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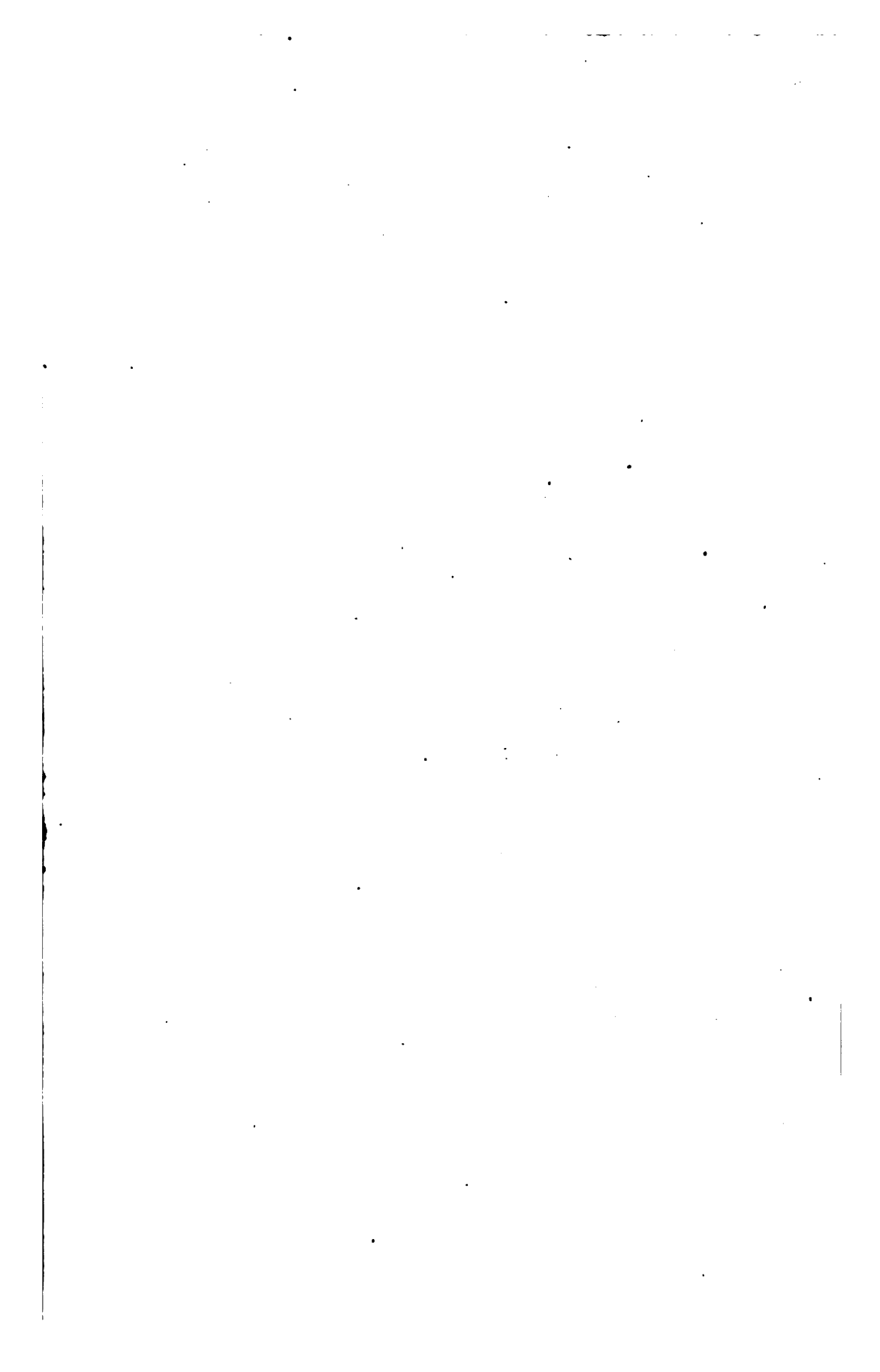
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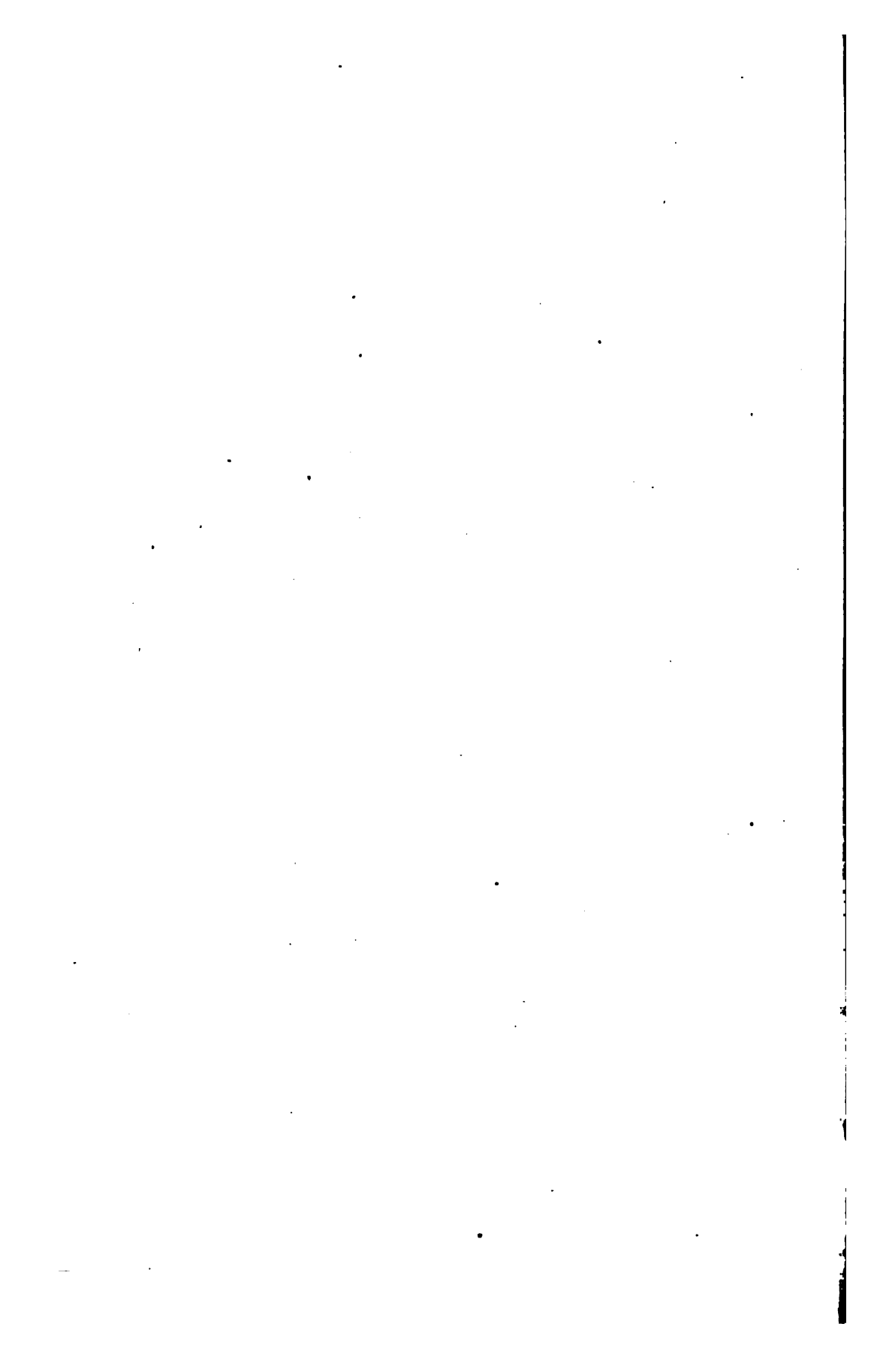
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THE  
AMERICAN EPHEMERIS  
AND  
NAUTICAL ALMANAC

FOR THE YEAR

1920

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July, 1917.



## PREFACE.

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This volume of the *American Ephemeris and Nautical Almanac*, the fifth to be issued under the international agreement resulting from the *Congrès International des Éphémérides Astronomiques* held at Paris in October, 1911, was prepared under the immediate supervision of Professor W. S. EICHELBERGER, U. S. N., the Director. The character of the matter herein contained and its arrangement are the same as in the immediately preceding volumes. However, new values for the semidiameters of the planets except Mercury have been introduced.

The Greenwich ephemerides of the Sun, Mercury, Venus, Mars, Jupiter, Saturn, Uranus, and Neptune were furnished by the office of the *British Nautical Almanac*.

The apparent places for Greenwich transit of 210 ten-day stars were furnished by the office of the *Berliner Jahrbuch*.

The conjunctions, phenomena, and configurations of Jupiter's satellites I-IV and the apparent places for Greenwich transit of 38 circumpolar stars were furnished by the office of the *Connaissance des Temps*.

The Greenwich ephemeris of the Moon, and the apparent places for Greenwich transit of 121 ten-day stars were furnished by the office of the *Almanaque Nautico*.

The apparent places for Greenwich transit of 137 ten-day stars were furnished by the office of the *Annuario Astronomico di Torino*.

In accordance with the recommendations of the *Congrès International des Éphémérides Astronomiques*, most of the material furnished from abroad is based upon tables prepared in the American Nautical Almanac Office. In the Introduction are mentioned the various tables upon which the different ephemerides are based.

The following computations were made by the American Nautical Almanac Office:

In Part I, all the hourly and daily variations for the quantities furnished from abroad except in the case of the right ascension and declination of the Moon.

In Part II, the quantities used in computing the apparent places of the stars from their mean places; the mean place list; the interpolation of the apparent places of 408 stars from transit at Greenwich to transit at Washington; the apparent places of 417 stars; the interpolation of the ephemerides of the Sun, Moon, and planets from Greenwich noon to transit at Washington; the stellar magnitudes of the planets.

In Part III, the data relating to the eclipses of the Sun and Moon; the data relating to the occultations of stars and planets by the Moon; the ephemerides for physical observations of the Sun, Moon, Mars, and Jupiter; the elements of the illuminated disks of Mercury and Venus; the stellar magnitudes of the planets; the data concerning the satellites of Saturn, Uranus, Neptune, and the fifth, sixth, and seventh satellites of Jupiter; the diagrams of all the satellite orbits; the list of phenomena; the list of observatories with their geographical coordinates; the tables for the determination of latitude and azimuth from observations of Polaris; and the tables for the determination of the time of the rising and setting of the Sun and Moon.

All computations made in the American Nautical Almanac Office and those received from the other offices were subjected to checks to insure absence of errors.

T. B. HOWARD,  
*Rear Admiral, U. S. Navy, Retired,*  
*Superintendent Naval Observatory.*

WASHINGTON, *July, 1917.*



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# ERRATA.

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*The American Ephemeris, 1918.*

Page.			<i>for</i>		<i>read</i>	
149	Dec. 32, Helioc. Latitude . . . .		<i>for</i>	37.0	<i>read</i>	36.7
231	Footnote, 32 H. Camelop. . . . .		<i>for</i>	5 <sup>m</sup> , 19 <sup>''</sup> .8 s. pr.	<i>read</i>	5 <sup>m</sup> .8, 21 <sup>''</sup> .6 n. pr.
711	Mar. 12, Mean Time . . . . .		<i>for</i>	2 <sup>h</sup> 2 <sup>m</sup> 25 <sup>s</sup>	<i>read</i>	2 <sup>h</sup> 12 <sup>m</sup> 25 <sup>s</sup>
730	Lines 2, 4, and 6, of computation of magnitude . . . . .		<i>for</i>	$\xi$	<i>read</i>	$\zeta$
734	Line 20 of computation . . . . .		<i>for</i>	$\sin d$	<i>read</i>	$\sin \delta$

## INTRODUCTION.

---

The ephemeris of the Sun is constructed from **NEWCOMB'S** *Tables of the Sun, Astronomical Papers of the American Ephemeris*, Vol. VI, part 1.

The adopted value of the mean equatorial horizontal parallax of the Sun is  $8''.80$ , *Paris Conference, May, 1896*.

The Sun's rectangular equatorial coordinates are computed from the longitudes and latitudes by the following formulæ:

$$\begin{aligned} X &= R \cos \lambda \\ Y &= R \sin \lambda \cos \omega - 19.3 R \beta \\ Z &= R \sin \lambda \sin \omega + 44.5 R \beta \end{aligned}$$

The reductions to mean equinox are computed by the formulæ—

$$\begin{aligned} \Delta X &= + Y \sec \omega \Delta \lambda \sin 1'' \\ \Delta Y &= -X \cos \omega \Delta \lambda \sin 1'' + Z \Delta \omega \sin 1'' + 9.1 \tau R \sin (\lambda + 6^\circ) \\ \Delta Z &= -X \sin \omega \Delta \lambda \sin 1'' - Y \Delta \omega \sin 1'' - 21.0 \tau R \sin (\lambda + 6^\circ) \end{aligned}$$

where the numerical coefficients are in units of the seventh place of decimals and

$R$ —the Sun's distance from the Earth,

$\lambda$ —the Sun's true longitude,

$\beta$ —the Sun's true latitude, expressed in seconds of arc,

$\omega$ —the obliquity of the ecliptic,

$\Delta \lambda$ —the reduction of longitude for precession and nutation from the beginning of the Besselian fictitious year,

$\Delta \omega$ —the reduction of the mean to the apparent obliquity,

$\tau$ —the fraction of the year since the beginning of the Besselian fictitious year.

The longitude, latitude, and parallax of the Moon are derived from **HANSEN'S** *Tables de la Lune* (London, 1857), the mean longitude being corrected as in previous years, beginning with the volume for the year 1883. The statement concerning these corrections which is contained in the volumes from 1883 to 1911, inclusive, is erroneous, in that they have not been computed strictly in accordance with the formula in **NEWCOMB'S** *Researches on the Motion of the Moon*, part 1, page 268, *Washington Observations*, 1875, Appendix II. That formula is,

$$-1''.14-29''.17 T-3''.86 T^2-V_2-0''.09 \sin A-15''.49 \cos A.$$

while the expression actually used is,

$$-1''.14-29''.17 T-3''.76 T^2-V_2-15''.49 \cos A.$$

In these formulæ  $T$  is the time in units of 100 years reckoned from 1800.

The ephemerides of Mercury, Venus, and Mars are derived from **NEWCOMB'S** tables of these planets, *Astronomical Papers of the American Ephemeris*, Vol. VI, parts 2, 3, and 4.

The ephemerides of Jupiter and Saturn are derived from the tables constructed in this office by GEORGE W. HILL, *Astronomical Papers of the American Ephemeris*, Vol. VII, parts 1 and 2.

The ephemerides of Uranus and Neptune are derived from NEWCOMB'S tables of these planets, *Astronomical Papers of the American Ephemeris*, Vol. VII, parts 3 and 4.

The nutation used in computing the ephemerides of the Sun, Moon, and planets has been taken from Tables XXXII and XXXIII of NEWCOMB'S *Tables of the Sun, Astronomical Papers of the American Ephemeris*, Vol. VI, part 1. The formulæ from which this nutation is computed are as follows, the time interval T being expressed in units of 100 years, reckoned from 1900. See *Tables of the Sun*, page 26.

$$\begin{array}{ll} \delta\psi = -(17''.234 + 0''.017 T) \sin \Omega & \delta\epsilon = +9''.214 \cos \Omega \\ + 0''.209 \sin 2 \Omega & -0''.090 \cos 2 \Omega \\ - 1''.257 \sin 2 L & +0''.546 \cos 2 L \\ - 0''.049 \sin (3 L + 78^\circ.7) & +0''.021 \cos (3 L + 78^\circ.7) \\ + 0''.110 \sin (L + 75^\circ.3) & -0''.009 \cos (L - 78^\circ.7) \end{array}$$

The formulæ for the nutation used in computing the Besselian and Independent Star Numbers are as follows:

Terms of Long Period.	Terms of Short Period.
$\delta\psi = -(17''.234 + 0''.017 T) \sin \Omega$	$-0''.204 \sin 2 \zeta$
$+ 0''.209 \sin 2 \Omega$	$+0''.011 \sin (\zeta + \Gamma)$
$- 1''.272 \sin 2 L$	$+0''.068 \sin (\zeta - \Gamma)$
$+ 0''.126 \sin (L - \Gamma)$	$-0''.034 \sin (2 \zeta - \Omega)$
$- 0''.050 \sin (3 L - \Gamma)$	$-0''.026 \sin (3 \zeta - \Gamma)$
$+ 0''.021 \sin (L + \Gamma)$	$+0''.015 \sin (\zeta - 2 L + \Gamma)$
$+ 0''.012 \sin (2 L - \Omega)$	$+0''.006 \sin 2 (\zeta - L)$
$\delta\epsilon = + (9''.210 + 0''.0009 T) \cos \Omega$	$+0''.068 \cos 2 \zeta$
$- 0''.090 \cos 2 \Omega$	$+0''.018 \cos (2 \zeta - \Omega)$
$+ 0''.551 \cos 2 L$	$+0''.011 \cos (3 \zeta - \Gamma)$
$+ 0''.022 \cos (3 L - \Gamma)$	$-0''.005 \cos (\zeta + \Gamma)$
$- 0''.009 \cos (L + \Gamma)$	
$- 0''.007 \cos (2 L - \Omega)$	

The meaning of the symbols used and the manner in which these latter formulæ have been employed in computing the ephemerides of the stars are explained on pages 200 and 201. The slight discrepancy between the terms in 2 L in these two sets of formulæ is due to the correction of an error in the first set. See *Bulletin Astronomique*, 1898, Vol. XV, page 244.

The list of 825 stars contained in Part II has been selected from NEWCOMB'S *Catalogue of Fundamental Stars, Astronomical Papers of the American Ephemeris*, Vol. VIII, part 2.

In general, the names of the stars are the same as in NEWCOMB'S Suggested List of Fundamental Stars, except that the FLAMSTEED number has been omitted in all cases where Greek or italic letters are available. In some cases the constellation and number of the uranometries of HEIS or GOULD have been used. In all such cases, H<sup>1</sup> or the letter G precedes the constellation name, as, for example, 5 H<sup>1</sup>. Cassiopeiæ and 38 G. Horologii.

The magnitudes of the stars have, with a few exceptions, been taken from *Annals of the Harvard College Observatory*, Vol. L, 1908.

The spectral classification has been furnished by the Harvard College Observatory. The notation is that of *Annals of Harvard College Observatory*, Vol. LVI.

The mean places, annual variations, and annual proper motions of the stars have been taken from NEWCOMB'S Catalogue, except that those of  $\epsilon$  Hydri, 38 G. Horologii, and  $\tau$  Centauri have been taken from *Veroeffentlichungen des Koeniglichen Astronomischen Rechen-Instituts zu Berlin*, 1907, No. 33.

The values of  $\Delta\alpha$  and  $\Delta\delta$  which are given for the companions to the stars  $\gamma$  Andromedæ,  $\alpha^1$  Crucis,  $\zeta^1$  Ursæ Majoris and 61 Cygni, have been taken from BOSS'S *Preliminary General Catalogue*, and those for  $\alpha^2$  Geminorum from DORNER'S elements given in the *Astronomische Nachrichten*, 1904, vol. 166, page 145.

The formulæ for the computation of the Besselian and Independent Star Numbers are given on page 200, the coefficients being those given by NEWCOMB in *Bulletin Astronomique*, 1898, Vol. XV, page 241.

The terms of short period of the nutation, depending on the Moon's mean longitude, have been computed from the formulæ for these terms given above.

The method by which the right ascensions and declinations of the stars interpolated from the 10-day ephemerides are corrected for the effect of these short-period terms is given on page 201.

According to the formulæ on pages 200 and 201 the star constants  $a, b, c, d, a', b', c', d'$  are computed for each star from its mean place at the beginning of the year, but if strict accuracy is required they should be computed from the star's mean place at date, and the following second-order terms should be added to the usual expressions for the reduction from mean to apparent place, namely—

To $\alpha - \alpha_0$	To $\delta - \delta_0$
$\begin{aligned} &+0.000\ 003\ r^2\ \sin\ \alpha \\ &-0.000\ 149\ r^2\ \cos\ \alpha \end{aligned} \left. \begin{array}{l} \\ \\ \\ \\ \\ \\ \\ \\ \\ \\ \end{array} \right\} \tan\ \delta$	$\begin{aligned} &+0.000\ 975\ r^2\ \sin^2\ \alpha \\ &-0.000\ 023\ \cos\ 2\ \Omega \end{aligned} \left. \begin{array}{l} \\ \\ \\ \\ \\ \\ \\ \\ \\ \\ \end{array} \right\} \tan\ \delta$
$\begin{aligned} &-0.000\ 0650\ r^2\ \sin\ 2\alpha \\ &+0.000\ 0108\ \sin\ 2\ \Omega\ \cos\ 2\alpha \\ &-0.000\ 0107\ \cos\ 2\ \Omega\ \sin\ 2\alpha \\ &+0.000\ 0620\ \sin\ 2\ \odot\ \cos\ 2\alpha \\ &-0.000\ 0622\ \cos\ 2\ \odot\ \sin\ 2\alpha \end{aligned} \left. \begin{array}{l} \\ \\ \\ \\ \\ \end{array} \right\} \sec^2\ \delta$	$\begin{aligned} &-0.000\ 467\ \cos\ 2\ \odot\ \cos\ 2\alpha \\ &-0.000\ 465\ \sin\ 2\ \odot\ \sin\ 2\alpha \\ &-0.000\ 039\ \cos\ (\odot + \Omega) \\ &-0.000\ 380\ \cos\ (\odot + \Omega)\ \cos\ 2\alpha \\ &-0.000\ 385\ \sin\ (\odot + \Omega)\ \sin\ 2\alpha \\ &-0.000\ 380\ \cos\ (\odot - \Omega) \\ &-0.000\ 040\ \cos\ (\odot - \Omega)\ \cos\ 2\alpha \\ &-0.000\ 072\ \sin\ (\odot - \Omega)\ \sin\ 2\alpha \end{aligned} \left. \begin{array}{l} \\ \\ \\ \\ \\ \\ \\ \\ \end{array} \right\} \sin\ \delta\ \tan\ \delta$
$\begin{aligned} &+0.000\ 0513\ \sin\ (\odot + \Omega)\ \cos\ 2\alpha \\ &-0.000\ 0507\ \cos\ (\odot + \Omega)\ \sin\ 2\alpha \\ &+0.000\ 0097\ \sin\ (\odot - \Omega)\ \cos\ 2\alpha \\ &-0.000\ 0053\ \cos\ (\odot - \Omega)\ \sin\ 2\alpha \end{aligned} \left. \begin{array}{l} \\ \\ \\ \end{array} \right\} \tan\ \delta\ \sec\ \delta$	

These terms are negligible for stars whose declination is numerically less than  $80^\circ$ , but in computing the apparent places given in the American Ephemeris they have been applied whenever sensible.

The *apparent* places of seven stars have been corrected for the effect of annual parallax. These stars, with the adopted values of the annual parallax, are—

$\tau$ Ceti . . . . .	0.31	"	$\alpha$ Centauri . . . . .	0.75
$\epsilon$ Eridani . . . . .	0.32		$\alpha$ Aquilæ (Altair) . . . . .	0.23
$\alpha$ Canis Majoris (Sirius). . . . .	0.38		61 Cygni . . . . .	0.30
$\alpha$ Canis Minoris (Procyon). . . . .	0.33			

The *apparent* places of  $\alpha$  Canis Majoris (Sirius),  $\alpha$  Canis Minoris (Procyon), and  $\alpha^2$  Centauri have been corrected for the effect of orbital motion. AUWERS'S elements were used for Sirius and Procyon, and SEE'S elements for  $\alpha^2$  Centauri. The values of these corrections are given on pages 98 and 99 of *Veroeffentlichungen des Koeniglichen Astronomischen Rechen-Instituts zu Berlin*, 1907, No. 33, but those for Sirius and Procyon need an additional correction to refer them to the center of the orbit before they are applicable to the mean places taken from NEWCOMB'S Fundamental Catalogue. These additional corrections for Sirius and Procyon were omitted in the *Star List of the American Ephemeris* [*Supplement to the American Ephemeris and Nautical Almanac*] for 1910 and 1911, and in the *American Ephemeris and Nautical Almanac* for 1912 and 1913. The values of the corrections for the three stars are—

	Sirius.		Procyon.		$\alpha^2$ Centauri.	
	1920. 0	1921. 0	1920. 0	1921. 0	1920. 0	1921. 0
$\Delta\alpha$	-0°. 141	-0°. 139	-0°. 051	-0°. 043	+0°. 605	+0°. 589
$\Delta\delta$	-0''. 96	-1''. 08	+0''. 43	+0''. 54	+5''. 10	+4''. 79

These corrections have not been applied to the mean places as published in this volume.

The stars occulted by the Moon have been selected from the *Catalogue of Zodiacal Stars* contained in Vol. VIII, part 3, *Astronomical Papers of the American Ephemeris*, and the mean places have been derived from the same catalogue.

In Part III the elements of eclipses of the Sun and occultations of stars by the Moon are given in accordance with BESSEL'S method, the special forms employed being a modification of those developed in CHAUVENET'S *Spherical and Practical Astronomy*.

In the computation of the elements of eclipses, the following corrections to the longitude, latitude, and parallax of the Moon, deduced by NEWCOMB from recent observations of occultations of stars by the Moon, *Astronomical Papers of the American Ephemeris*, Vol. IX, part 1, have been applied. These corrections have been assumed in each case to be constant during the eclipse.

G. M. T.	$\delta v$	$\delta b$	$\delta \pi$
1920	"	"	"
May 2 <sup>d</sup> 14 <sup>h</sup>	+6.2	+0.5	+0.41
May 17 18	+7.7	+1.4	+0.50
Oct. 27 2	+5.5	+2.0	+0.47
Nov. 10 4	+5.2	+0.5	+0.43

The elongations of the satellites of Mars are derived from elements given by H. STRUVE in *Sitzungsberichte der Königlich Preussischen Akademie der Wissenschaften*, 1911, page 1073.;

The conjunctions and phenomena of Jupiter's four brighter satellites are derived from SAMPSON'S tables. The configurations are derived from a continuation of DAMOISEAU'S tables by M. POTTIER.

The elongations of the Vth satellite of Jupiter are derived from unpublished elements deduced from the observations of BARNARD.

The differential coordinates of Jupiter's VIth and VIIth satellites are derived from elements and tables given in *Lick Observatory Bulletin*, 1906, Vol. IV, No. 112, and in *Astronomische Nachrichten*, 1907, Vol. 174, page 359, respectively.

The positions of the rings and the elongations and conjunctions of the satellites of Saturn are derived from elements given by H. STREUVE in *Observations de Poulkova*, Supplement 1, St. Petersburg, 1888; *Publications de Poulkovo*, Second Series, Vol. XI, St. Petersburg, 1898; with corrections communicated by H. STREUVE to the *Berliner Jahrbuch*. The differential coordinates of Phœbe are derived from elements and tables given in *Annals of Harvard College Observatory*, 1905, Vol. LIII, No. VI.

The apparent outer dimensions (*a* and *b*) of the rings of Saturn are also according to STREUVE; the relative dimensions of the rings are computed from BESSEL's data, except those for the dusky ring, which are based on the observations of various astronomers.

The elongations of Ariel and Umbriel, the inner satellites of Uranus, are derived from the data of NEWCOMB's *Uranian and Neptunian Systems*, *Washington Observations*, 1873, Appendix I. The elongations of Titania and Oberon, the outer satellites of Uranus, are derived from elements given by H. STREUVE in *Abhandlungen der K. Preussischen Akademie der Wissenschaften*, 1912.

The elongations of the satellite of Neptune are derived from elements given by A. HALL in the *Astronomical Journal*, 1898, Vol. XIX, page 65.

The adopted apparent semidiameter of the Sun at the Earth's mean distance is 16' 1''.50, while in the computation of eclipses the value given by AUWERS in the *Astronomische Nachrichten*, 1891, Vol. 128, page 367, is employed, viz., 15' 59''.63.

In the computation of the ephemeris for physical observations of the Sun the following elements by CARRINGTON have been used:

Inclination of the Sun's equator to the ecliptic . . . . .	7° 15'
Longitude of the ascending node of the Sun's equator on the ecliptic . . . . .	73° 40' + 50''.25 ( <i>t</i> -1850)
Sidereal period of rotation (mean solar days) . . . . .	25 <sup>d</sup> .38

The apparent semidiameter of the Moon is computed from the Moon's equatorial horizontal parallax,  $\pi$ , by the formula,

$$S=0.272\ 506\ \pi+1''.50$$

where the constant 0.272 506 is based on data from occultations given by J. PETERS in the *Astronomische Nachrichten*, 1895, Vol. 138, page 147; and the constant 1''.50 is added to cover the average effect of irradiation.

The value of the Moon's semidiameter employed in the computation of eclipses is computed from the formula,

$$\sin S=0.272\ 274\ \sin \pi$$

In the computation of the ephemeris for physical observations of the Moon, the following notation and formulæ have been used, the value of *I* and the formulæ for physical libration being those given by F. HAYN in *Abhandlungen der K. Sächsischen Gesell. der Wissenschaften*, Vols. 29 and 30, 1904, 1907:

*I*—the inclination of the Moon's mean equator to the ecliptic ( $-1^{\circ}\ 32'.1$ ),

$\Omega$ —the longitude of the ascending node of the Moon's orbit, or the longitude of the descending node of the Moon's mean equator,

*C*—the angle at the center of the Moon's disk made by a lunar meridian with the circle of declination, counted from north to east,

$\lambda, \beta, \alpha, \delta$ —the geocentric longitude, latitude, right ascension, and declination of the Moon,

- $i$ —the inclination of the Moon's mean equator to the Earth's true equator,
- $\Delta$ —the distance on the Moon's mean equator from its ascending node on the Earth's true equator to its ascending node on the ecliptic,
- $\Omega'$ —the distance along the Earth's true equator from the true equinox to the ascending node of the Moon's mean equator,
- $C$ —the Moon's mean longitude, referred to the mean equinox,
- $g'$ —the Earth's mean anomaly,
- $g$ —the Moon's mean anomaly,
- $\omega$ —the angular distance of the perigee of the Moon's orbit from its ascending node on the ecliptic,
- $b, l$ —the optical librations in latitude and longitude, respectively,
- $\delta b, \delta l$ —the physical librations in latitude and longitude, respectively,
- $b+\delta b$ —the Moon's geocentric libration in latitude—the Earth's selenographic latitude,
- $l+\delta l$ —the Moon's geocentric libration in longitude—the Earth's selenographic longitude,
- $\delta C$ —the physical libration of  $C$ ,
- $\mu = -0'.617 \sin 2(\Omega - \lambda)$ ,
- $A = \sin I \cos(\Omega - \lambda)$ ,
- $\tan B = \tan I \sin(\Omega - \lambda)$ ,
- $\lambda' = \lambda + \mu + Ab$ ,
- $b = B - \beta$ ,
- $l = \lambda' - C$ ,
- $\sin C' = \sin i \frac{\cos(\lambda' + \Delta - \Omega)}{\cos \delta} = -\sin i \frac{\cos(\alpha - \Omega')}{\cos b}$ ,
- $\delta b = +108'' \sin(\omega + l) + 37'' \sin(\omega - l) - 11'' \sin(g + \omega - l)$ ,
- $\delta l = +12'' \sin g - 59'' \sin g' - 18'' \sin 2\omega$ ,
- $\quad - [108'' \cos(\omega + l) - 37'' \cos(\omega - l) + 11'' \cos(g + \omega - l)] \tan b$ ,
- $\delta C = - [108'' \cos(\omega + l) - 37'' \cos(\omega - l) + 11'' \cos(g + \omega - l)] \sec b$ ,
- $C = C' + \delta C$ .

The Sun's selenographic latitude and longitude have been computed from formulæ the same as those given above except that the heliocentric coordinates of the Moon have been substituted for the geocentric coordinates.

The following elements have been used in computing the ephemerides for physical observations of the planets Mars and Jupiter:

Position of north pole of Mars . . . . .	$\left\{ \begin{array}{l} \alpha = 21^{\text{h}} 10^{\text{m}} 0^{\text{s}} + 1^{\text{s}}.565(t-1905) \\ \delta = 54^{\circ} 30' 0'' + 12''.60(t-1905) \end{array} \right.$
Position of north pole of Jupiter . . . . .	$\left\{ \begin{array}{l} \alpha = 17^{\text{h}} 52^{\text{m}} 0^{\text{s}}.84 + 0^{\text{s}}.247(t-1910) \\ \delta = 64^{\circ} 33' 34''.8 - 0''.60(t-1910) \end{array} \right.$
Rotation period of Mars . . . . .	24 <sup>h</sup> 37 <sup>m</sup> 22 <sup>s</sup> .65
Rotation period of Jupiter	$\left\{ \begin{array}{l} \text{System I.} \quad 9^{\text{h}} 50^{\text{m}} 30^{\text{s}}.004 \\ \text{System II.} \quad 9^{\text{h}} 55^{\text{m}} 40^{\text{s}}.632 \end{array} \right.$
Longitude of Central Meridian of Mars, May 15, 1897, Greenwich Mean Noon . . . . .	52°.01
Longitude of Central Meridian of Jupiter (System I.), July 14, 1897, Greenwich Mean Noon . . . . .	47°.31
Longitude of Central Meridian of Jupiter (System II.), July 14, 1897, Greenwich Mean Noon . . . . .	96°.58

The position of the north pole of Mars is as given by LOWELL and CROMMELIN (see *Monthly Notices R. A. S.*, 1905, Vol. 66, page 56), while that of the north pole of Jupiter has been deduced from the position given by DAMOISEAU for 1750 (see *Tables Écliptiques des Satellites de Jupiter*, page (1)). The rotation periods of Mars and of Jupiter and the longitudes of the central meridians are according to MARTH (see *Monthly Notices R. A. S.*, 1896, Vol. 56, pages 395-403 and 517-524). The longitude of the Great Red Spot and the time of



its transit across the Central Meridian given in the volumes for 1913 and 1914 have been replaced by those of System II. of MARTH. This change has been made in view of the following facts: The Paris Conference of October, 1911, assigned to the office of the American Ephemeris and Nautical Almanac the preparation of the ephemerides for the physical observations of the planets; a general desire exists that the use of System II. of MARTH should not be discontinued; and the position of the Great Red Spot during the opposition of 1912 was about  $70^\circ$  from the place predicted from the elements adopted in the *American Ephemeris and Nautical Almanac* for 1913.

The adopted semidiameters of the planets, with the authority for each, are given on page xvii. Their stellar magnitudes have been computed from formulæ given by G. MUELLER in *Publicationen des Astrophysikalischen Observatoriums zu Potsdam*, 1893, Vol. 8, page 366.

In the list of observatories the authority for the various positions is given in each case. The latitudes given are in most cases astronomical. In some instances they have been determined by geodetic triangulation from other points. The reductions from geographic to geocentric latitude,  $\varphi' - \varphi$ , and the distance from the center of the earth,  $\rho$ , are computed from the formulæ on page xvi, using the flattening  $\frac{1}{297}$  obtained by JOHN F. HAYFORD in *Supplementary Investigation in 1909 of the Figure of the Earth and Isostasy*, U. S. Coast and Geodetic Survey, 1910, and adopted by the *Paris Conference*, October, 1911.

## ANNIVERSARIES AND FESTIVALS, 1920.

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New Year's Day . . . . .	Thursday, Jan. 1.
Epiphany . . . . .	Tuesday, Jan. 6.
Septuagesima Sunday . . . . .	Sunday, Feb. 1.
Lincoln's Birthday . . . . .	Thursday, Feb. 12.
Quinquagesima (Shrove Sunday) . . . . .	Sunday, Feb. 15.
Ash Wednesday . . . . .	Wednesday, Feb. 18.
Washington's Birthday . . . . .	Sunday, Feb. 22.
Palm Sunday . . . . .	Sunday, Mar. 28.
Good Friday . . . . .	Friday, Apr. 2.
First Day of Passover . . . . .	Saturday, Apr. 3.
Easter Sunday . . . . .	Sunday, Apr. 4.
Rogation Sunday . . . . .	Sunday, May 9.
Ascension Day . . . . .	Thursday, May 13.
Hebrew Pentecost (Shebuoth) . . . . .	Sunday, May 23.
Pentecost (Whit Sunday) . . . . .	Sunday, May 23.
Trinity Sunday . . . . .	Sunday, May 30.
Memorial Day . . . . .	Sunday, May 30.
Corpus Christi . . . . .	Thursday, June 3.
Independence Day . . . . .	Sunday, July 4.
Labor Day . . . . .	Monday, Sept. 6.
Hebrew New Year (Rosh Hashanah) . . . . .	Monday, Sept. 13.
Day of Atonement (Yom Kippur) . . . . .	Wednesday, Sept. 22.
First Day of Tabernacle (Sucoth) . . . . .	Monday, Sept. 27.
Columbus Day . . . . .	Tuesday, Oct. 12.
General Election Day . . . . .	Tuesday, Nov. 2.
Thanksgiving Day . . . . .	Thursday, Nov. 25.
First Sunday in Advent . . . . .	Sunday, Nov. 28.
Christmas Day . . . . .	Saturday, Dec. 25.

# CHRONOLOGICAL ERAS AND CYCLES.

## CHRONOLOGICAL ERAS.

The year 1920 of the Christian era comprises the latter part of the 144th and the beginning of the 145th year of the independence of the United States of America, and corresponds to the year 6633 of the Julian period.

Of the peoples using the Christian era some employ the Gregorian calendar and some the Julian. January 1, 1920, Julian calendar, corresponds to January 14, 1920, Gregorian calendar.

The year 7429 of the Byzantine era begins on September 1, 1920, Julian calendar.

The year 5681 of the Jewish era begins at sunset on September 12, 1920, Gregorian calendar.

The year 2673 since the foundation of Rome, according to VARRO, begins on January 1, 1920, Julian calendar.

The year 2669 of the era of NABONASSAR begins on April 30, 1920, Julian calendar.

The year 2580 of the Japanese era, being the 9th year of the period Taisho, begins on January 1, 1920, Gregorian calendar.

The year 2232 of the Grecian era, or the era of the SELEUCIDÆ, begins in the present-day usage of the Syrians on September 1, 1920, or on October 1, 1920, Julian calendar, according to different sects; but in the ancient usage of Damascus and Arabia Petræa the year began with the vernal equinox.

The year 1637 of the era of DIOCLETIAN begins on August 29, 1920, Julian calendar.

The year 1339 of the Mohammedan era, or the era of the Hegira, begins at sunset on September 14, 1920, Gregorian calendar.

2 422 325 is the Julian day number of January 1, 1920, Gregorian calendar.

## CHRONOLOGICAL CYCLES.

Dominical Letters . . . . .	DC	Solar Cycle . . . . .	25
Epact . . . . .	10	Roman Indiction . . . . .	3
Lunar Cycle or Golden Number	2	Julian Period . . . . .	6633

# ASTRONOMICAL CONSTANTS.

Solar Parallax . . . . .	8.80	} Paris Conference.
Constant of Nutation . . . . .	9.21	
Constant of Aberration . . . . .	20.47	
General Precession . . . . .	50'' .2564+0'' .000 222(t-1900)	} Newcomb.
Obliquity of the Ecliptic . . . . .	23° 27' 8''.26-0''.4684(t-1900)	
Equatorial Horizontal Parallax of the Moon . . . . .	57' 2''.63*	(Newcomb).
Mean distance Earth to Moon 384 411 kilometers=238 862 statute miles or 60.2878 radii.		
Mean distance Earth to Sun 149 504 201 kilometers=92 897 416 statute miles.		
Velocity of light 299 860 kilometers=186 324 statute miles per second (Newcomb and Michelson).		
Light travels unit distance in 498°.580.		
Gaussian Gravitation Constant, †k=0.017 202 099-3 548''.187 61.		
Acceleration in one second due to gravity, $g=9.8060-\frac{m}{R}0.0260 \cos 2\varphi-\frac{2h}{R}g.\ddagger$		} Helmert.
Length of seconds pendulum, $l=0.993 549-\frac{m}{R}0.002 631 \cos 2\varphi-\frac{2h}{R}l.\ddagger$		
Length of the year:		
Tropical (ordinary) . . . . .	365.242 198 79-0.000 000 0614 (t-1900)	} Newcomb.
Sidereal . . . . .	365.256 360 42+0.000 000 0011 (t-1900)	
Anomalistic . . . . .	365.259 641 34+0.000 000 0304 (t-1900)	
Eclipse . . . . .	346.620 000 +0.000 000 36 (t-1900)	
Length of the month:		
Synodical (ordinary) . . . . .	29.530 588-29 <sup>d</sup> 12 <sup>h</sup> 44 <sup>m</sup> 2.8 <sup>s</sup>	} Hansen.
Tropical . . . . .	27.321 582-27 7 43 4.7	
Sidereal . . . . .	27.321 661-27 7 43 11.5	
Anomalistic . . . . .	27.554 550-27 13 18 33.1	
Nodical . . . . .	27.212 219-27 5 5 35.7	
Length of the day:		
Sidereal . . . . .	23 <sup>h</sup> 56 <sup>m</sup> 4.091 <sup>s</sup> of mean solar time.	
Mean Solar . . . . .	24 3 56.555 of sidereal time.	
Dimensions of the Earth (Hayford's Spheroid of 1909):		
Equatorial Radius, a=6378.388 kilometers or 3963.34 statute miles.		
Polar Radius, b=6356.909 " or 3949.90 " "		
Flattening, $\frac{a-b}{a}=\frac{1}{297.0}$		
Logarithm of the eccentricity $\frac{\sqrt{a^2-b^2}}{a}=\log e=8.913 804$		
Logarithm radius= $\log \rho=9.999 2695+0.000 7324 \cos 2\varphi-0.000 0019 \cos 4\varphi$ .		
Reduction from geographic latitude $\varphi$ to geocentric latitude $\varphi'$ , $\varphi'-\varphi=-11' 35''.66 \sin 2\varphi+1''.17 \sin 4\varphi$ .		
1 degree of latitude (in statute miles)=69.0569-0.3494 cos 2 $\varphi$ +0.0007 cos 4 $\varphi$ .		
1 degree of longitude (in statute miles)=69.2316 cos $\varphi$ -0.0584 cos 3 $\varphi$ +0.0001 cos 5 $\varphi$ .		
1 meter=3.280 8333 feet. 1 foot=0.304 8006 meters.		
1 statute mile=0.868 362 nautical or geographical miles.		
1 nautical mile=1.151 594 statute miles.		

\* Used in the computation of eclipses. The parallax used in the computation of the ephemeris of the Moon contained in this volume is 57' 2''.23 (Hansen).  
 † k<sup>2</sup> is the acceleration due to the Sun's attraction at the mean distance of the Earth from the Sun, which is also the astronomical unit of distance, the unit of time being one mean solar day.  
 ‡  $\varphi$ =latitude, h=elevation above sea level in meters, and log R=6.80416.

NOTE.—The above values of log  $\rho$  and  $\varphi'-\varphi$  were computed with the eccentricity that results from assuming that the flattening of the earth is exactly  $\frac{1}{297}$ .

# ASTRONOMICAL CONSTANTS.

## SEMIDIAMETERS OF THE SUN, MOON, AND PLANETS.

Name.	At Unit Distance.	At Mean Least Distance. †	In Kilometers.	In Statute Miles.	Authority.
Sun . . . . .	15 59.63	....	695 553.46	432 196.01	Auwers.
Moon . . . . .	15 32.58*	....	1 738.02	1 079.96	Newcomb.
Mercury . . . . .	3.34	5.45	2 420.89	1 504.27	Le Verrier.
Venus . . . . .	8.41	30.40	6 095.71	3 787.69	Auwers.
Mars . . . . .	4.68	8.94	3 392.14	2 107.78	Hartwig.
Jupiter (Equatorial) . . . . .	1 38.47	23.43	71 372.71	44 348.86	Sampson.
Jupiter (Polar) . . . . .	1 31.91	21.87	66 617.91	41 394.37	Sampson.
Saturn (Equatorial) . . . . .	1 23.33	9.76	60 396.99	37 530.11	Struve.
Saturn (Polar) . . . . .	1 14.57	8.73	54 049.59	33 584.79	Struve.
Uranus . . . . .	34.28	1.88	24 846.72	15 439.00	Barnard, See, Wirtz.
Neptune . . . . .	36.56	1.26	26 499.30	16 465.87	Barnard.

## ELEMENTS OF THE PLANETARY ORBITS FOR THE EPOCH JANUARY 1, 1920, G. M. T.

Name.	Mean Distance.	Sidereal Period in Tropical Years.	Sidereal Mean Daily Motion.	Synodic Period in Tropical Years.	Eccentricity.
☿ Mercury . . . . .	0.387 099	0.240 85	14 732.420	0.317 26	0.205 6183
♀ Venus . . . . .	0.723 331	0.615 21	5 767.670	1.598 72	0.006 8111
⊕ Earth . . . . .	1.000 000	1.000 04	3 548.193	....	0.016 7427
♂ Mars . . . . .	1.523 688	1.880 89	1 886.519	2.135 39	0.093 3271
♃ Jupiter . . . . .	5.202 803	11.862 23	299.128	1.092 11	0.048 3768
♄ Saturn . . . . .	9.538 843	29.457 72	120.465	1.035 18	0.055 8207
♅ Uranus . . . . .	19.190 978	84.015 29	42.23	1.012 09	0.047 1006
♆ Neptune . . . . .	30.070 672	164.788 29	21.53	1.006 14	0.008 5460

Name.	Inclination to the Ecliptic.	Mean Longitude of the Node.	Mean Longitude of the Perihelion.	Mean Longitude at the Epoch.	Logarithm of Mass in Unit of Sun's Mass.
☿ Mercury . . . . .	7 0 11.7	47 22 58.8	76 12 38.9	162 59 35.68	3.221 8487-10
♀ Venus . . . . .	3 23 37.8	75 57 34.7	130 26 43.4	166 36 34.01	4.389 3398-10
⊕ Earth . . . . .	....	....	101 33 52.9	99 51 1.71	4.482 2896-10
♂ Mars . . . . .	1 51 0.9	48 56 24.7	334 35 11.8	162 5 14.93	3.509 5499-10
♃ Jupiter . . . . .	1 18 27.5	99 38 24.4	13 2 1.6	125 18 37.06	6.979 9082-10
♄ Saturn . . . . .	2 29 29.4	112 57 28.8	91 28 49.8	151 16 1.45	6.455 7335-10
♅ Uranus . . . . .	0 46 22.0	73 35 27.1	169 22 7.5	329 20 34.67	5.640 7528-10
♆ Neptune . . . . .	1 46 38.4	130 53 55.5	43 55 49.6	128 59 52.84	5.705 5338-10

The elements of the four inner planets are derived from those given by NEWCOMB in Vol. VI of the *Astronomical Papers of the American Ephemeris*, and are the same as those used in computing the ephemerides of these planets. Those of Jupiter, Saturn, Uranus, and Neptune are taken from Vol. VII of the *Astronomical Papers* for the epoch of the tables. They are reduced to 1920 by applying LE VERRIER'S variations, and can not be regarded as being strictly identical with the elements used in computing the ephemerides of those planets in this volume.

\* At mean distance. See *Ast. Papers Am. Eph.*, Vol. IX, p. 39. For the values of the semidiameter used in this volume see page xi.  
 † By mean least distance is meant the difference between the mean distance and unity.

# SYMBOLS AND ABBREVIATIONS.

## SIGNS OF THE PLANETS, ETC.

<p>☉ The Sun.</p> <p>☾ The Moon.</p> <p>☿ Mercury.</p> <p>♀ Venus.</p> <p>♁ The Earth.</p>		<p>♂ Mars.</p> <p>♃ Jupiter.</p> <p>♄ Saturn.</p> <p>♅ Uranus.</p> <p>♆ Neptune.</p>
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## SIGNS OF THE ZODIAC.

<p>Spring Signs. { 1. ♈ Aries.</p> <p>                  { 2. ♉ Taurus.</p> <p>                  { 3. ♊ Gemini.</p> <p>Summer Signs. { 4. ♋ Cancer.</p> <p>                  { 5. ♌ Leo.</p> <p>                  { 6. ♍ Virgo.</p>		<p>Autumn Signs. { 7. ♎ Libra.</p> <p>                  { 8. ♏ Scorpius.</p> <p>                  { 9. ♐ Sagittarius.</p> <p>Winter Signs. { 10. ♑ Capricornus.</p> <p>                  { 11. ♒ Aquarius.</p> <p>                  { 12. ♓ Pisces.</p>
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## ASPECTS.

- ♌ Conjunction, or having the same Longitude or Right Ascension.
- ☐ Quadrature, or differing  $\pm 90^\circ$  in Longitude or Right Ascension.
- ♆ Opposition, or differing  $180^\circ$  in Longitude or Right Ascension.

## ABBREVIATIONS.

<p>♊ Ascending Node.</p> <p>♋ Descending Node.</p> <p>N. North.</p> <p>S. South.</p> <p>E. East.</p> <p>W. West.</p>		<p>° Degrees.</p> <p>' Minutes of Arc.</p> <p>" Seconds of Arc.</p> <p>h Hours.</p> <p>m Minutes of Time.</p> <p>s Seconds of Time.</p>
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**PART I.**

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**ASTRONOMICAL EPHEMERIS FOR THE  
MERIDIAN OF GREENWICH.**

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## FOR GREENWICH MEAN NOON.

Date.	Day of the Week.	Apparent Right Ascension.			Var. per Hour.	Apparent Declination.			Var. per Hour.	Semi-diameter.	Hor. Par.	Equation of Time. App.—Mean.	Var. per Hour.	Sidereal Time, or Right Ascension of Mean Sun.				
		h	m	s	s	°	'	"	"	'	"	m	s	s	h	m	s	
Jan. 1	Th	18	42	36.66	11.049	-23	5	11.3	+11.24	16	17.89	8.95	-3	13.03	-1.192	18	39	23.62
2	Fr	18	47	1.66	11.035	23	0	27.7	12.39	16	17.90	8.95	3	41.48	1.179	18	43	20.18
3	Sa	18	51	26.33	11.020	22	55	16.7	13.53	16	17.90	8.95	4	9.60	1.164	18	47	16.74
4	Su	18	55	50.64	11.005	22	49	38.3	14.67	16	17.90	8.95	4	37.34	1.148	18	51	13.29
5	Mo	19	0	14.55	10.988	22	43	32.7	15.80	16	17.90	8.95	5	4.70	1.131	18	55	9.85
6	Tu	19	4	38.05	10.970	-22	37	0.0	+16.92	16	17.88	8.95	-5	31.64	-1.113	18	59	6.41
7	We	19	9	1.11	10.951	22	30	0.5	18.04	16	17.86	8.95	5	58.14	1.095	19	3	2.97
8	Th	19	13	23.71	10.932	22	22	34.3	19.14	16	17.83	8.95	6	24.18	1.075	19	6	59.52
9	Fr	19	17	45.83	10.911	22	14	41.6	20.24	16	17.80	8.95	6	49.75	1.055	19	10	56.08
10	Sa	19	22	7.44	10.889	22	6	22.8	21.33	16	17.76	8.95	7	14.80	1.033	19	14	52.64
11	Su	19	26	28.52	10.867	-21	57	37.9	+22.41	16	17.72	8.95	-7	39.33	-1.011	19	18	49.20
12	Mo	19	30	49.06	10.844	21	48	27.2	23.48	16	17.67	8.95	8	3.31	0.987	19	22	45.75
13	Tu	19	35	9.02	10.819	21	38	51.1	24.53	16	17.61	8.95	8	26.71	0.963	19	26	42.31
14	We	19	39	28.38	10.794	21	28	49.8	25.57	16	17.55	8.95	8	49.52	0.937	19	30	38.87
15	Th	19	43	47.13	10.768	21	18	23.5	26.61	16	17.49	8.95	9	11.70	0.911	19	34	35.42
16	Fr	19	48	5.23	10.740	-21	7	32.6	+27.63	16	17.42	8.95	-9	33.25	-0.884	19	38	31.98
17	Sa	19	52	22.67	10.713	20	56	17.4	28.63	16	17.35	8.94	9	54.14	0.856	19	42	28.54
18	Su	19	56	39.44	10.684	20	44	38.3	29.62	16	17.27	8.94	10	14.34	0.827	19	46	25.09
19	Mo	20	0	55.50	10.654	20	32	35.4	30.61	16	17.18	8.94	10	33.85	0.798	19	50	21.65
20	Tu	20	5	10.84	10.624	20	20	9.2	31.57	16	17.10	8.94	10	52.64	0.768	19	54	18.20
21	We	20	9	25.45	10.593	-20	7	20.1	+32.52	16	17.01	8.94	-11	10.69	-0.736	19	58	14.76
22	Th	20	13	39.30	10.561	19	54	8.4	33.45	16	16.92	8.94	11	27.98	0.705	20	2	11.32
23	Fr	20	17	52.39	10.529	19	40	34.5	34.37	16	16.82	8.94	11	44.51	0.673	20	6	7.87
24	Sa	20	22	4.69	10.496	19	26	38.7	35.27	16	16.72	8.94	12	0.26	0.640	20	10	4.43
25	Su	20	26	16.19	10.463	19	12	21.4	36.16	16	16.62	8.94	12	15.21	0.606	20	14	0.99
26	Mo	20	30	26.89	10.429	-18	57	43.1	+37.03	16	16.51	8.94	-12	29.35	-0.572	20	17	57.54
27	Tu	20	34	36.77	10.395	18	42	44.0	37.89	16	16.40	8.94	12	42.67	0.538	20	21	54.10
28	We	20	38	45.83	10.360	18	27	24.6	38.72	16	16.29	8.94	12	55.17	0.504	20	25	50.65
29	Th	20	42	54.05	10.325	18	11	45.3	39.54	16	16.17	8.93	13	6.84	0.469	20	29	47.21
30	Fr	20	47	1.43	10.290	17	55	46.5	40.35	16	16.04	8.93	13	17.67	0.434	20	33	43.76
31	Sa	20	51	7.98	10.255	-17	39	28.5	+41.14	16	15.91	8.93	-13	27.66	-0.399	20	37	40.32
Feb. 1	Su	20	55	13.69	10.221	17	22	51.7	41.91	16	15.78	8.93	13	36.82	0.364	20	41	36.88
2	Mo	20	59	18.57	10.186	17	5	56.6	42.67	16	15.64	8.93	13	45.14	0.329	20	45	33.43
3	Tu	21	3	22.62	10.151	16	48	43.4	43.42	16	15.49	8.93	13	52.63	0.295	20	49	29.99
4	We	21	7	25.84	10.117	16	31	12.6	44.14	16	15.34	8.93	13	59.30	0.261	20	53	26.54
5	Th	21	11	28.24	10.083	-16	13	24.6	+44.85	16	15.17	8.93	-14	5.15	-0.227	20	57	23.10
6	Fr	21	15	29.84	10.050	15	55	19.8	45.54	16	15.01	8.92	14	10.18	0.193	21	1	19.65
7	Sa	21	19	30.64	10.017	15	36	58.5	46.22	16	14.84	8.92	14	14.43	0.160	21	5	16.21
8	Su	21	23	30.64	9.984	15	18	21.2	46.88	16	14.67	8.92	14	17.88	0.127	21	9	12.76
9	Mo	21	27	29.86	9.951	14	59	28.2	47.52	16	14.49	8.92	14	20.55	0.095	21	13	9.32
10	Tu	21	31	28.30	9.919	-14	40	20.0	+48.15	16	14.31	8.92	-14	22.43	-0.063	21	17	5.87
11	We	21	35	25.98	9.887	14	20	57.0	48.76	16	14.12	8.92	14	23.55	-0.031	21	21	2.42
12	Th	21	39	22.89	9.856	14	1	19.6	49.35	16	13.93	8.91	14	23.91	+0.001	21	24	58.98
13	Fr	21	43	19.05	9.825	13	41	28.3	49.92	16	13.74	8.91	14	23.52	0.032	21	28	55.53
14	Sa	21	47	14.47	9.794	13	21	23.3	50.48	16	13.54	8.91	14	22.38	0.063	21	32	52.08
15	Su	21	51	9.15	9.763	-13	1	5.3	+51.02	16	13.34	8.91	-14	20.51	+0.092	21	36	48.64
16	Mo	21	55	3.11	9.733	-12	40	34.5	+51.54	16	13.14	8.91	-14	17.91	+0.123	21	40	45.19



FOR GREENWICH MEAN NOON.

Date.	Day of the Year.	True Longitude.	Var. per Hour.	Latitude.	Logarithm of the Radius of the Earth.	Var. per Hour.	Prec. in Long.	Nut. in Long.	Aberation.	True Obliquity.	Mean Time of Sidereal Noon.		
											23° 26'	h	m
Jan. 1	1	279 47 47.8	182.87	+0.23	9.992 6630	- 2.9	-0.02	+14.28	20.81	52.75	5 19	43.86	
2	2	280 48 56.6	182.86	+0.09	9.992 6577	1.7	+0.12	14.31	20.81	52.75	5 15	47.94	
3	3	281 50 5.2	182.85	-0.05	9.992 6551	- 0.5	0.25	14.35	20.81	52.75	5 11	52.03	
4	4	282 51 13.6	182.85	0.18	9.992 6554	+ 0.7	0.39	14.38	20.81	52.75	5 7	56.12	
5	5	283 52 21.9	182.84	0.30	9.992 6586	2.0	0.53	14.42	20.81	52.75	5 4	0.21	
6	6	284 53 30.0	182.84	-0.40	9.992 6648	+ 3.2	0.67	+14.45	20.81	52.75	5 0	4.30	
7	7	285 54 38.1	182.84	0.46	9.992 6739	4.4	0.80	14.48	20.81	52.75	4 56	8.38	
8	8	286 55 46.1	182.84	0.48	9.992 6859	5.6	0.94	14.51	20.81	52.76	4 52	12.47	
9	9	287 56 54.1	182.84	0.48	9.992 7006	6.7	1.08	14.54	20.81	52.76	4 48	16.56	
10	10	288 58 2.1	182.84	0.45	9.992 7180	7.8	1.22	14.57	20.81	52.76	4 44	20.65	
11	11	289 59 10.1	182.83	-0.39	9.992 7390	+ 8.8	1.35	+14.60	20.81	52.77	4 40	24.74	
12	12	291 0 18.0	182.83	0.31	9.992 7604	9.8	1.49	14.63	20.81	52.77	4 36	28.83	
13	13	292 1 25.9	182.83	0.21	9.992 7851	10.7	1.63	14.65	20.81	52.78	4 32	32.92	
14	14	293 2 33.7	182.82	-0.10	9.992 8119	11.6	1.77	14.68	20.81	52.78	4 28	37.01	
15	15	294 3 41.3	182.81	+0.02	9.992 8408	12.5	1.90	14.70	20.80	52.79	4 24	41.10	
16	16	295 4 48.7	182.80	+0.14	9.992 8717	+13.3	2.04	+14.73	20.80	52.80	4 20	45.18	
17	17	296 5 55.7	182.79	0.25	9.992 9044	14.0	2.18	14.75	20.80	52.80	4 16	49.27	
18	18	297 7 2.4	182.77	0.35	9.992 9389	14.7	2.32	14.77	20.80	52.81	4 12	53.36	
19	19	298 8 8.7	182.75	0.44	9.992 9752	15.4	2.46	14.79	20.80	52.82	4 8	57.45	
20	20	299 9 14.4	182.73	0.52	9.993 0130	16.1	2.59	14.81	20.80	52.83	4 5	1.54	
21	21	300 10 19.6	182.70	+0.57	9.993 0525	+16.8	2.73	+14.82	20.79	52.84	4 1	5.63	
22	22	301 11 24.0	182.66	0.59	9.993 0936	17.4	2.87	14.84	20.79	52.85	3 57	9.72	
23	23	302 12 27.6	182.64	0.59	9.993 1362	18.1	3.01	14.85	20.79	52.86	3 53	13.81	
24	24	303 13 30.4	182.60	0.56	9.993 1804	18.7	3.14	14.86	20.79	52.87	3 49	17.90	
25	25	304 14 32.2	182.55	0.49	9.993 2262	19.4	3.28	14.87	20.79	52.88	3 45	21.99	
26	26	305 15 32.9	182.50	+0.40	9.993 2737	+20.2	3.42	+14.88	20.78	52.89	3 41	26.08	
27	27	306 16 32.5	182.46	0.28	9.993 3230	20.9	3.56	14.89	20.78	52.90	3 37	30.17	
28	28	307 17 30.9	182.41	0.15	9.993 3741	21.7	3.69	14.89	20.78	52.91	3 33	34.26	
29	29	308 18 28.0	182.35	+0.01	9.993 4272	22.6	3.83	14.90	20.78	52.92	3 29	38.35	
30	30	309 19 23.9	182.30	-0.12	9.993 4825	23.5	3.97	14.90	20.77	52.93	3 25	42.44	
31	31	310 20 18.5	182.25	-0.25	9.993 5401	+24.5	4.11	+14.90	20.77	52.94	3 21	46.53	
Feb. 1	32	311 21 11.8	182.20	0.36	9.993 6001	25.5	4.24	14.90	20.77	52.96	3 17	50.62	
2	33	312 22 3.8	182.14	0.45	9.993 6625	26.5	4.38	14.90	20.77	52.97	3 13	54.71	
3	34	313 22 54.6	182.09	0.52	9.993 7275	27.6	4.52	14.89	20.76	52.98	3 9	58.80	
4	35	314 23 44.2	182.04	0.57	9.993 7950	28.7	4.66	14.88	20.76	52.99	3 6	2.90	
5	36	315 24 32.7	182.00	-0.58	9.993 8651	+29.7	4.79	+14.88	20.76	53.00	3 2	6.99	
6	37	316 25 20.0	181.96	0.55	9.993 9376	30.7	4.93	14.87	20.75	53.02	2 58	11.08	
7	38	317 26 6.3	181.90	0.49	9.994 0126	31.7	5.07	14.86	20.75	53.03	2 54	15.17	
8	39	318 26 51.5	181.86	0.41	9.994 0898	32.6	5.21	14.85	20.74	53.04	2 50	19.26	
9	40	319 27 35.7	181.82	0.31	9.994 1691	33.5	5.35	14.83	20.74	53.05	2 46	23.35	
10	41	320 28 18.8	181.78	-0.20	9.994 2505	+34.3	5.48	+14.81	20.74	53.06	2 42	27.44	
11	42	321 29 0.9	181.73	-0.08	9.994 3337	35.0	5.62	14.80	20.73	53.07	2 38	31.54	
12	43	322 29 41.8	181.68	+0.03	9.994 4187	35.7	5.76	14.78	20.73	53.08	2 34	35.63	
13	44	323 30 21.6	181.64	0.15	9.994 5052	36.4	5.90	14.76	20.72	53.10	2 30	39.72	
14	45	324 31 0.2	181.59	0.26	9.994 5932	37.0	6.03	14.74	20.72	53.11	2 26	43.81	
15	46	325 31 37.7	181.54	+0.35	9.994 6826	+37.5	6.17	+14.71	20.72	53.12	2 22	47.90	
16	47	326 32 13.8	181.48	+0.42	9.994 7733	+38.0	6.31	+14.69	20.71	53.13	2 18	52.00	

## FOR GREENWICH MEAN NOON.

Date.	Day of the Week.	Apparent Right Ascension.			Var. per Hour.	Apparent Declination.			Var. per Hour.	Semi-diameter.	Hor. Par.	Equation of Time. App.—Mean.			Var. per Hour.	Sidereal Time, or Right Ascension of Mean Sun.		
		h	m	s		°	'	"				'	"	''		m	s	s
Feb. 16	Mo	21	55	3.11	9.733	-12	40	34.5	+51.54	16	13.14	8.91	-14	17.91	+0.123	21	40	45.19
17	Tu	21	58	56.35	9.704	12	19	51.5	52.04	16	12.93	8.90	14	14.00	0.153	21	44	41.75
18	We	22	2	48.89	9.675	11	58	56.6	52.52	16	12.72	8.90	14	10.59	0.183	21	48	38.30
19	Th	22	6	40.73	9.646	11	37	50.4	53.99	16	12.51	8.90	14	5.88	0.211	21	52	34.85
20	Fr	22	10	31.89	9.618	11	16	33.1	53.44	16	12.30	8.90	14	0.48	0.239	21	56	31.41
21	Sa	22	14	22.37	9.590	-10	55	5.3	+53.87	16	12.09	8.90	-13	54.41	+0.267	22	0	27.96
22	Su	22	18	12.19	9.562	10	33	27.4	54.28	16	11.87	8.89	13	47.67	0.294	22	4	24.51
23	Mo	22	22	1.95	9.535	10	11	39.9	54.67	16	11.66	8.89	13	40.28	0.321	22	8	21.07
24	Tu	22	25	49.87	9.509	9	49	43.0	55.05	16	11.44	8.89	13	32.25	0.348	22	12	17.62
25	We	22	29	37.76	9.483	9	27	37.4	55.41	16	11.21	8.89	13	23.59	0.374	22	16	14.17
26	Th	22	33	25.04	9.457	-9	5	23.3	+55.75	16	10.99	8.89	-13	14.31	+0.399	22	20	10.73
27	Fr	22	37	11.71	9.433	8	43	1.2	56.08	16	10.76	8.88	13	4.43	0.424	22	24	7.28
28	Sa	22	40	57.81	9.409	8	20	31.5	56.39	16	10.53	8.88	12	53.97	0.448	22	28	3.83
29	Su	22	44	43.34	9.386	7	57	54.5	56.68	16	10.30	8.88	12	42.95	0.471	22	32	0.38
Mar. 1	Mo	22	48	28.32	9.363	7	35	10.7	56.96	16	10.07	8.88	12	31.98	0.493	22	35	56.94
2	Tu	22	52	12.78	9.342	-7	12	20.4	+57.22	16	9.83	8.88	-12	19.29	+0.514	22	39	53.49
3	We	22	55	56.75	9.322	6	49	24.0	57.47	16	9.59	8.87	12	6.70	0.535	22	43	50.04
4	Th	22	59	40.23	9.302	6	26	21.9	57.70	16	9.34	8.87	11	53.63	0.554	22	47	46.60
5	Fr	23	3	23.25	9.284	6	3	14.5	57.91	16	9.09	8.87	11	40.11	0.573	22	51	43.15
6	Sa	23	7	5.85	9.266	5	40	2.0	58.12	16	8.84	8.87	11	26.15	0.590	22	55	39.70
7	Su	23	10	48.04	9.250	-5	16	44.9	+58.30	16	8.58	8.86	-11	11.78	+0.607	22	59	36.25
8	Mo	23	14	29.83	9.234	4	53	23.5	58.47	16	8.32	8.86	10	57.03	0.622	23	3	32.81
9	Tu	23	18	11.27	9.219	4	29	58.3	58.62	16	8.06	8.86	10	41.91	0.637	23	7	29.36
10	We	23	21	52.36	9.205	4	6	29.6	58.76	16	7.79	8.86	10	26.45	0.651	23	11	25.51
11	Th	23	25	33.13	9.193	3	42	57.7	58.89	16	7.53	8.86	10	10.67	0.664	23	15	22.46
12	Fr	23	29	13.60	9.181	-3	19	23.0	+58.99	16	7.26	8.85	-9	54.59	+0.676	23	19	19.02
13	Sa	23	32	53.80	9.169	2	55	46.0	59.08	16	6.98	8.85	9	38.23	0.687	23	23	15.57
14	Su	23	36	33.73	9.159	2	32	7.0	59.16	16	6.71	8.85	9	21.61	0.697	23	27	12.12
15	Mo	23	40	13.42	9.149	2	8	26.3	59.22	16	6.44	8.85	9	4.75	0.707	23	31	8.67
16	Tu	23	43	52.89	9.141	1	44	44.4	59.28	16	6.17	8.84	8	47.67	0.716	23	35	5.22
17	We	23	47	32.17	9.133	-1	21	1.6	+59.29	16	5.89	8.84	-8	30.39	+0.724	23	39	1.78
18	Th	23	51	11.26	9.125	0	57	18.4	59.30	16	5.62	8.84	8	12.93	0.731	23	42	58.33
19	Fr	23	54	50.18	9.119	0	33	35.1	59.30	16	5.35	8.84	7	55.30	0.737	23	46	54.88
20	Sa	23	58	28.96	9.113	-0	9	52.0	59.28	16	5.07	8.83	7	37.53	0.743	23	50	51.43
21	Su	0	2	7.60	9.108	+0	13	50.3	59.24	16	4.80	8.83	7	19.62	0.749	23	54	47.98
22	Mo	0	5	46.13	9.103	+0	37	31.6	+59.19	16	4.53	8.83	-7	1.59	+0.753	23	58	44.54
23	Tu	0	9	24.56	9.099	1	1	11.5	59.12	16	4.26	8.83	6	43.47	0.757	0	2	41.09
24	We	0	13	2.90	9.096	1	24	49.6	59.04	16	3.99	8.82	6	25.26	0.760	0	6	37.64
25	Th	0	16	41.18	9.094	1	48	25.4	58.94	16	3.72	8.82	6	6.99	0.762	0	10	34.19
26	Fr	0	20	19.41	9.092	2	11	58.7	58.83	16	3.45	8.82	5	48.67	0.764	0	14	30.74
27	Sa	0	23	57.61	9.091	+2	35	29.1	+58.70	16	3.17	8.82	-5	30.31	+0.765	0	18	27.29
28	Su	0	27	35.79	9.091	2	58	56.2	58.55	16	2.90	8.81	5	11.95	0.765	0	22	23.85
29	Mo	0	31	13.99	9.092	3	22	19.7	58.40	16	2.63	8.81	4	53.59	0.764	0	26	20.40
30	Tu	0	34	52.22	9.094	3	45	39.3	58.28	16	2.36	8.81	4	35.27	0.762	0	30	16.95
31	We	0	38	30.50	9.097	4	8	54.7	58.04	16	2.09	8.81	4	17.00	0.760	0	34	13.50
Apr. 1	Th	0	42	8.86	9.100	+4	32	5.4	+57.84	16	1.81	8.80	-3	58.81	+0.756	0	38	10.05
2	Fr	0	45	47.32	9.105	+4	55	11.2	+57.63	16	1.54	8.80	-3	40.71	+0.751	0	42	6.61

FOR GREENWICH MEAN NOON.

Data.	Day of the Year.	True Longitude.	Var. per Hour.	Latitude.	Logarithm of the Radius Vector of the Earth.	Var. per Hour.	Pres. in Long.	Nut. in Long.	Aber-ration.	True Obliquity.	Mean Time of Sidereal Noon.
										23° 26'	h m s
Feb. 16	47	326 32 13.8	161.43	+0.42	9.994 7733	+28.0	6.31	+14.69	20.71	53.13	2 18 52.00
17	48	327 32 48.6	161.43	0.47	9.994 8652	28.5	6.45	14.66	20.71	53.14	2 14 56.09
18	49	328 33 22.0	161.36	0.49	9.994 9582	28.9	6.58	14.63	20.70	53.15	2 11 0.18
19	50	329 33 54.0	161.30	0.48	9.995 0520	29.3	6.72	14.60	20.70	53.16	2 7 4.27
20	51	330 34 24.4	161.23	0.44	9.995 1466	29.6	6.86	14.57	20.69	53.17	2 3 8.36
21	52	331 34 53.2	161.16	+0.38	9.995 2421	+40.0	7.00	+14.54	20.69	53.18	1 59 12.46
22	53	332 35 20.2	161.09	0.30	9.995 3385	40.3	7.13	14.50	20.69	53.18	1 55 16.55
23	54	333 35 45.4	161.01	0.19	9.995 4357	40.7	7.27	14.47	20.68	53.19	1 51 20.64
24	55	334 36 8.8	160.93	+0.06	9.995 5338	41.1	7.41	14.48	20.68	53.20	1 47 24.74
25	56	335 36 30.2	160.85	-0.07	9.995 6328	41.5	7.55	14.39	20.67	53.21	1 43 28.83
26	57	336 36 49.6	160.76	-0.21	9.995 7330	+43.0	7.68	+14.35	20.67	53.22	1 39 32.92
27	58	337 37 6.9	160.68	0.34	9.995 8343	43.5	7.82	14.31	20.66	53.22	1 35 37.01
28	59	338 37 22.2	160.59	0.45	9.995 9369	43.0	7.96	14.27	20.66	53.23	1 31 41.11
29	60	339 37 35.4	160.51	0.55	9.996 0409	43.6	8.10	14.23	20.65	53.23	1 27 45.20
Mar. 1	61	340 37 46.6	160.42	0.62	9.996 1464	44.3	8.24	14.19	20.65	53.24	1 23 49.29
2	62	341 37 55.7	160.34	-0.65	9.996 2535	+44.9	8.37	+14.14	20.64	53.24	1 19 53.39
3	63	342 38 2.9	160.26	0.66	9.996 3622	45.6	8.51	14.10	20.64	53.25	1 15 57.48
4	64	343 38 8.2	160.18	0.63	9.996 4726	46.3	8.65	14.05	20.63	53.25	1 12 1.57
5	65	344 38 11.5	160.10	0.58	9.996 5846	47.0	8.79	14.00	20.63	53.25	1 8 5.67
6	66	345 38 13.0	160.03	0.50	9.996 6982	47.6	8.92	13.95	20.62	53.25	1 4 9.76
7	67	346 38 12.8	160.96	-0.39	9.996 8133	+48.2	9.06	+13.90	20.62	53.25	1 0 13.85
8	68	347 38 10.8	160.88	0.28	9.996 9298	48.8	9.20	13.85	20.61	53.26	0 56 17.95
9	69	348 38 7.1	160.81	0.16	9.997 0475	49.3	9.34	13.80	20.60	53.26	0 52 22.04
10	70	349 38 1.6	160.74	-0.04	9.997 1664	49.7	9.47	13.75	20.60	53.26	0 48 26.13
11	71	350 37 54.5	160.67	+0.08	9.997 2863	50.1	9.61	13.70	20.59	53.26	0 44 30.23
12	72	351 37 45.7	160.60	+0.19	9.997 4071	+50.5	9.75	+13.65	20.59	53.25	0 40 34.32
13	73	352 37 35.2	160.53	0.28	9.997 5286	50.8	9.89	13.60	20.58	53.25	0 36 38.41
14	74	353 37 23.0	160.45	0.36	9.997 6507	51.0	10.02	13.54	20.58	53.25	0 32 42.51
15	75	354 37 9.0	160.38	0.42	9.997 7733	51.1	10.16	13.49	20.57	53.24	0 28 46.60
16	76	355 36 53.3	160.31	0.45	9.997 8962	51.2	10.30	13.44	20.56	53.24	0 24 50.70
17	77	356 36 35.8	160.23	+0.45	9.998 0193	+51.3	10.44	+13.38	20.56	53.23	0 20 54.79
18	78	357 36 16.5	160.16	0.41	9.998 1425	51.3	10.57	13.33	20.55	53.23	0 16 58.88
19	79	358 35 55.3	160.08	0.35	9.998 2656	51.2	10.71	13.27	20.55	53.22	0 13 2.98
20	80	359 35 32.1	160.99	0.26	9.998 3885	51.2	10.85	13.22	20.54	53.22	0 9 7.07
21	81	0 35 6.9	160.91	0.16	9.998 5113	51.1	10.99	13.16	20.53	53.21	0 5 11.16
22	82	1 34 39.6	160.82	+0.04	9.998 6338	+51.0	11.12	+13.11	20.53	53.20	0 0 15.25
23	83	2 34 10.1	160.73	-0.09	9.998 7560	50.9	11.26	13.05	20.52	53.19	23 53 23.44
24	84	3 33 38.4	160.63	0.23	9.998 8780	50.8	11.40	13.00	20.52	53.18	23 49 27.54
25	85	4 33 4.4	160.53	0.37	9.998 9999	50.8	11.54	12.94	20.51	53.17	23 45 31.63
26	86	5 32 28.0	160.43	0.49	9.999 1218	50.8	11.68	12.89	20.51	53.16	23 41 35.72
27	87	6 31 49.3	160.34	-0.59	9.999 2437	+50.9	11.81	+12.84	20.50	53.15	23 37 39.82
28	88	7 31 8.2	160.24	0.67	9.999 3659	51.0	11.95	12.78	20.49	53.14	23 33 43.91
29	89	8 30 24.8	160.14	0.71	9.999 4883	51.1	12.09	12.73	20.49	53.12	23 29 48.01
30	90	9 29 39.1	160.05	0.72	9.999 6111	51.3	12.23	12.68	20.48	53.11	23 25 52.10
31	91	10 28 51.0	160.95	0.69	9.999 7344	51.5	12.36	12.63	20.48	53.10	23 21 56.20
Apr. 1	92	11 28 0.8	160.86	-0.64	9.999 8582	+51.7	12.50	+12.57	20.47	53.08	23 18 0.29
2	93	12 27 8.4	160.77	-0.56	9.999 9825	+51.9	12.64	+12.52	20.47	53.07	23 14 4.38

## FOR GREENWICH MEAN NOON.

Date.	Day of the Week.	Apparent Right Ascension.			Var. per Hour.	Apparent Declination.			Var. per Hour.	Semi-diameter.	Hor. Par.	Equation of Time. App.—Mean.			Var. per Hour.	Sidereal Time, or Right Ascension of Mean Sun.			
		h	m	s		s	°	'				"	"	"		m	s	s	h
Apr. 1	Th	0	42	8.86	9.100	+	4	32	5.4	+57.84	16	1.81	8.80	-3	58.81	+0.756	0	38	10.06
2	Fr	0	45	47.32	9.105		4	55	11.2	57.63	16	1.54	8.80	3	40.71	0.751	0	42	6.61
3	Sa	0	49	25.90	9.111		5	18	11.7	57.41	16	1.26	8.80	3	22.74	0.746	0	46	3.16
4	Su	0	53	4.63	9.117		5	41	6.7	57.17	16	0.98	8.79	3	4.91	0.739	0	49	59.71
5	Mo	0	56	43.52	9.124		6	3	55.8	56.91	16	0.71	8.79	2	47.25	0.732	0	53	56.26
6	Tu	1	0	22.60	9.133	+	6	26	38.6	+56.65	16	0.43	8.79	-2	29.78	+0.724	0	57	52.82
7	We	1	4	1.89	9.142		6	49	14.9	56.37	16	0.15	8.79	2	12.52	0.714	1	1	49.37
8	Th	1	7	41.41	9.152		7	11	44.2	56.07	15	59.87	8.78	1	55.49	0.704	1	5	45.92
9	Fr	1	11	21.19	9.163		7	34	6.4	55.76	15	59.59	8.78	1	38.71	0.694	1	9	42.47
10	Sa	1	15	1.23	9.174		7	56	20.9	55.44	15	59.31	8.78	1	22.20	0.682	1	13	39.03
11	Su	1	18	41.56	9.187	+	8	18	27.5	+55.10	15	59.04	8.78	-1	5.98	+0.670	1	17	35.58
12	Mo	1	22	22.19	9.200		8	40	25.9	54.76	15	58.76	8.77	0	50.06	0.657	1	21	32.13
13	Tu	1	26	3.15	9.214		9	2	15.7	54.39	15	58.48	8.77	0	34.46	0.643	1	25	28.68
14	We	1	29	44.44	9.228		9	23	56.5	54.01	15	58.21	8.77	0	19.20	0.628	1	29	25.24
15	Th	1	33	26.09	9.243		9	45	28.1	53.61	15	57.93	8.77	-0	4.30	0.613	1	33	21.79
16	Fr	1	37	8.10	9.258	+10	6	50	0.0	+53.20	15	57.66	8.76	+0	10.24	+0.598	1	37	18.34
17	Sa	1	40	50.49	9.274		10	28	1.9	52.78	15	57.40	8.76	0	24.40	0.583	1	41	14.90
18	Su	1	44	33.27	9.291		10	49	3.5	52.34	15	57.13	8.76	0	38.18	0.566	1	45	11.45
19	Mo	1	48	16.45	9.308		11	9	54.4	51.89	15	56.87	8.76	0	51.55	0.549	1	49	8.00
20	Tu	1	52	0.04	9.325		11	30	34.3	51.42	15	56.61	8.75	1	4.52	0.532	1	53	4.56
21	We	1	55	44.04	9.342	+11	51	2.7		+50.94	15	56.35	8.75	+1	17.07	+0.514	1	57	1.11
22	Th	1	59	28.46	9.360		12	11	19.4	50.45	15	56.10	8.75	1	29.20	0.496	2	0	57.66
23	Fr	2	3	13.32	9.378		12	31	24.1	49.94	15	55.85	8.75	1	40.89	0.478	2	4	54.22
24	Sa	2	6	58.62	9.397		12	51	16.3	49.41	15	55.60	8.75	1	52.15	0.460	2	8	50.77
25	Su	2	10	44.38	9.416		13	10	55.8	48.87	15	55.36	8.74	2	2.95	0.440	2	12	47.32
26	Mo	2	14	30.59	9.435	+13	30	22.3		+48.32	15	55.11	8.74	+2	13.29	+0.421	2	16	43.88
27	Tu	2	18	17.28	9.456		13	49	35.3	47.76	15	54.87	8.74	2	23.15	0.401	2	20	40.43
28	We	2	22	4.46	9.476		14	8	34.7	47.18	15	54.63	8.74	2	32.53	0.380	2	24	36.98
29	Th	2	25	52.13	9.497		14	27	20.1	46.59	15	54.39	8.73	2	41.41	0.360	2	28	33.54
30	Fr	2	29	40.31	9.518		14	45	51.2	45.99	15	54.15	8.73	2	49.79	0.338	2	32	30.09
May 1	Sa	2	33	29.01	9.540	+15	4	7.6		+45.38	15	53.92	8.73	+2	57.64	+0.316	2	36	26.65
2	Su	2	37	18.24	9.562		15	22	9.2	44.75	15	53.68	8.73	3	4.96	0.294	2	40	23.20
3	Mo	2	41	8.01	9.585		15	39	55.5	44.11	15	53.45	8.73	3	11.74	0.271	2	44	19.76
4	Tu	2	44	58.33	9.609		15	57	26.3	43.45	15	53.22	8.72	3	17.97	0.248	2	48	16.31
5	We	2	48	49.22	9.632		16	14	41.3	42.79	15	52.99	8.72	3	23.65	0.225	2	52	12.86
6	Th	2	52	40.67	9.656	+16	31	40.2		+42.11	15	52.76	8.72	+3	28.75	+0.201	2	56	9.42
7	Fr	2	56	32.70	9.680		16	48	22.6	41.42	15	52.53	8.72	3	33.28	0.176	3	0	5.97
8	Sa	3	0	25.31	9.704		17	4	48.3	40.72	15	52.30	8.72	3	37.22	0.152	3	4	2.53
9	Su	3	4	18.50	9.729		17	20	57.0	40.00	15	52.08	8.71	3	40.58	0.128	3	7	59.08
10	Mo	3	8	12.29	9.754		17	36	48.4	39.27	15	51.86	8.71	3	43.35	0.103	3	11	55.64
11	Tu	3	12	6.67	9.778	+17	52	22.2		+38.53	15	51.64	8.71	+3	45.53	+0.078	3	15	52.19
12	We	3	16	1.64	9.803		18	7	38.0	37.78	15	51.42	8.71	3	47.11	0.054	3	19	48.75
13	Th	3	19	57.20	9.828		18	22	35.6	37.02	15	51.21	8.71	3	48.10	0.029	3	23	45.30
14	Fr	3	23	53.36	9.852		18	37	14.8	36.24	15	51.00	8.70	3	48.50	+0.004	3	27	41.86
15	Sa	3	27	50.10	9.876		18	51	35.1	35.45	15	50.80	8.70	3	48.31	-0.020	3	31	38.42
16	Su	3	31	47.43	9.901	+19	5	36.4		+34.65	15	50.60	8.70	+3	47.54	-0.044	3	35	34.97
17	Mo	3	35	45.33	9.924	+19	19	18.3		+33.84	15	50.40	8.70	+3	46.19	-0.068	3	39	31.52

FOR GREENWICH MEAN NOON.

Date.	Day of the Year.	True Longitude.	Var. per Hour.	Latitude.	Logarithm of the Radius Vector of the Earth.	Var. per Hour.	Prec. in Long.	Nut. in Long.	Aber-ration.	True Obliquity.	Mean Time of Sidereal Noon.		
											23° 26'	h	m
Apr. 1	92	11 28 0.8	147.86	-0.64	9.999 8582	+51.7	12.50	+12.57	20.47	53.08	23	18	0.29
2	93	12 27 8.4	147.77	0.56	9.999 9825	51.9	12.64	12.52	20.47	53.07	23	14	4.38
3	94	13 26 13.8	147.68	0.46	0.000 1073	52.1	12.78	12.47	20.46	53.05	23	10	8.48
4	95	14 25 17.3	147.60	0.34	0.000 2326	52.3	12.91	12.42	20.45	53.03	23	6	12.57
5	96	15 24 18.8	147.52	0.22	0.000 3583	52.4	13.05	12.37	20.45	53.02	23	2	16.66
6	97	16 23 18.3	147.44	-0.09	0.000 4843	+52.5	13.19	+12.32	20.44	53.00	22	58	20.76
7	98	17 22 16.0	147.36	+0.04	0.000 6105	52.6	13.33	12.28	20.44	52.98	22	54	24.85
8	99	18 21 11.8	147.29	0.15	0.000 7369	52.6	13.46	12.23	20.43	52.96	22	50	28.94
9	100	19 20 5.8	147.21	0.25	0.000 8632	52.6	13.60	12.18	20.42	52.94	22	46	33.04
10	101	20 18 58.0	147.14	0.34	0.000 9895	52.6	13.74	12.14	20.42	52.92	22	42	37.13
11	102	21 17 48.5	147.07	+0.41	0.001 1155	+52.4	13.88	+12.10	20.41	52.90	22	38	41.22
12	103	22 16 37.3	147.00	0.45	0.001 2411	52.2	14.01	12.05	20.41	52.88	22	34	45.32
13	104	23 15 24.3	146.92	0.46	0.001 3662	52.0	14.15	12.01	20.40	52.86	22	30	49.41
14	105	24 14 9.6	146.85	0.44	0.001 4906	51.6	14.29	11.97	20.39	52.84	22	26	53.50
15	106	25 12 53.2	146.78	0.39	0.001 6141	51.3	14.43	11.93	20.39	52.82	22	22	57.60
16	107	26 11 35.0	146.71	+0.31	0.001 7367	+50.9	14.57	+11.89	20.38	52.79	22	19	1.69
17	108	27 10 15.1	146.63	0.21	0.001 8582	50.4	14.70	11.85	20.38	52.77	22	15	5.78
18	109	28 8 53.3	146.55	+0.08	0.001 9785	49.8	14.84	11.82	20.37	52.75	22	11	9.87
19	110	29 7 29.5	146.47	-0.06	0.002 0974	49.3	14.98	11.78	20.37	52.73	22	7	13.97
20	111	30 6 3.9	146.39	0.20	0.002 2150	48.7	15.12	11.75	20.36	52.70	22	3	18.06
21	112	31 4 36.1	146.30	-0.34	0.002 3313	+48.3	15.25	+11.71	20.36	52.68	21	59	22.15
22	113	32 3 6.3	146.21	0.47	0.002 4463	47.7	15.39	11.68	20.35	52.65	21	55	26.24
23	114	33 1 34.4	146.12	0.58	0.002 5601	47.2	15.53	11.65	20.34	52.63	21	51	30.34
24	115	34 0 0.3	146.03	0.66	0.002 6727	46.7	15.67	11.62	20.34	52.60	21	47	34.43
25	116	34 58 24.0	145.94	0.71	0.002 7844	46.4	15.80	11.59	20.33	52.58	21	43	38.52
26	117	35 56 45.6	145.86	-0.72	0.002 8952	+46.0	15.94	+11.57	20.33	52.55	21	39	42.61
27	118	36 55 5.1	145.77	0.71	0.003 0052	45.7	16.08	11.54	20.32	52.53	21	35	46.71
28	119	37 53 22.5	145.68	0.67	0.003 1146	45.4	16.22	11.52	20.32	52.50	21	31	50.80
29	120	38 51 37.9	145.60	0.60	0.003 2233	45.2	16.35	11.50	20.31	52.48	21	27	54.89
30	121	39 49 51.3	145.52	0.50	0.003 3315	45.0	16.49	11.48	20.31	52.45	21	23	58.98
May 1	122	40 48 2.8	145.44	-0.38	0.003 4392	+44.8	16.63	+11.46	20.30	52.43	21	20	3.07
2	123	41 46 12.5	145.37	0.25	0.003 5463	44.5	16.77	11.44	20.30	52.40	21	16	7.17
3	124	42 44 20.4	145.30	-0.12	0.003 6529	44.3	16.90	11.42	20.29	52.37	21	12	11.26
4	125	43 42 26.7	145.23	+0.01	0.003 7589	44.0	17.04	11.41	20.29	52.35	21	8	15.35
5	126	44 40 31.3	145.16	0.14	0.003 8643	43.8	17.18	11.40	20.28	52.32	21	4	19.44
6	127	45 38 34.4	145.10	+0.25	0.003 9690	+43.5	17.32	+11.38	20.28	52.29	21	0	23.53
7	128	46 36 36.1	145.04	0.34	0.004 0729	43.1	17.45	11.37	20.27	52.27	20	56	27.62
8	129	47 34 36.3	144.98	0.41	0.004 1760	42.7	17.59	11.36	20.27	52.24	20	52	31.71
9	130	48 32 35.1	144.92	0.46	0.004 2780	42.3	17.73	11.35	20.26	52.22	20	48	35.80
10	131	49 30 32.5	144.86	0.48	0.004 3790	41.8	17.87	11.35	20.26	52.19	20	44	39.90
11	132	50 28 28.7	144.81	+0.47	0.004 4787	+41.3	18.01	+11.34	20.25	52.16	20	40	43.99
12	133	51 26 23.6	144.76	0.42	0.004 5771	40.7	18.14	11.34	20.25	52.14	20	36	48.08
13	134	52 24 17.3	144.71	0.35	0.004 6740	40.0	18.28	11.34	20.25	52.11	20	32	52.17
14	135	53 22 9.7	144.66	0.26	0.004 7693	39.3	18.42	11.34	20.24	52.09	20	28	56.26
15	136	54 20 0.9	144.61	0.15	0.004 8627	38.5	18.56	11.34	20.24	52.06	20	25	0.35
16	137	55 17 50.9	144.55	+0.01	0.004 9541	+37.7	18.69	+11.34	20.23	52.04	20	21	4.44
17	138	56 15 39.5	144.50	-0.13	0.005 0435	+36.8	18.83	+11.34	20.23	52.01	20	17	8.53

## FOR GREENWICH MEAN NOON.

Date.	Day of the Week.	Apparent Right Ascension.			Var. per Hour.	Apparent Declination.			Var. per Hour.	Semi-diameter.	Hor. Par.	Equation of Time. App.—Mean.		Var. per Hour.	Sidereal Time, or Right Ascension of Mean Sun.			
		h	m	s		s	°	'				"	"		"	m	s	h
May 17	Mo	3	35	45.33	0.924	+19	19	18.3	+33.84	15	50.40	8.70	+3	46.19	-0.068	3	39	31.52
18	Tu	3	39	43.80	0.948	19	32	40.6	33.01	15	50.21	8.70	3	44.28	0.091	3	43	28.08
19	We	3	43	42.82	0.971	19	45	43.0	32.18	15	50.03	8.69	3	41.82	0.114	3	47	24.64
20	Th	3	47	42.39	0.993	19	58	25.2	31.33	15	49.84	8.69	3	38.81	0.136	3	51	21.19
21	Fr	3	51	42.48	10.015	20	10	46.9	30.47	15	49.67	8.69	3	35.27	0.158	3	55	17.75
22	Sa	3	55	43.10	10.066	+20	22	48.0	+29.61	15	49.50	8.69	+3	31.21	-0.180	3	59	14.30
23	Su	3	59	44.22	10.097	20	34	28.1	28.73	15	49.33	8.69	3	28.64	0.201	4	3	10.86
24	Mo	4	3	45.84	10.078	20	45	47.0	27.94	15	49.16	8.69	3	21.57	0.221	4	7	7.42
25	Tu	4	7	47.95	10.098	20	56	44.5	26.95	15	49.00	8.69	3	16.02	0.241	4	11	3.97
26	We	4	11	50.54	10.118	21	7	20.4	26.04	15	48.85	8.68	3	9.99	0.261	4	15	0.53
27	Th	4	15	53.59	10.137	+21	17	34.4	+25.13	15	48.69	8.68	+3	3.50	-0.280	4	18	57.08
28	Fr	4	19	57.10	10.155	21	27	26.3	24.20	15	48.54	8.68	2	56.54	0.299	4	22	53.64
29	Sa	4	24	1.05	10.174	21	36	56.0	23.27	15	48.40	8.68	2	49.14	0.317	4	26	50.20
30	Su	4	28	5.44	10.192	21	46	3.2	22.33	15	48.25	8.68	2	41.31	0.335	4	30	46.75
31	Mo	4	32	10.26	10.209	21	54	47.7	21.38	15	48.11	8.68	2	33.05	0.353	4	34	43.31
June 1	Tu	4	36	15.49	10.226	+22	3	9.4	+20.42	15	47.97	8.68	+2	24.37	-0.370	4	38	39.87
2	We	4	40	21.12	10.243	22	11	8.1	19.46	15	47.83	8.67	2	15.90	0.386	4	42	36.42
3	Th	4	44	27.14	10.259	22	18	43.6	18.49	15	47.70	8.67	2	5.84	0.403	4	46	32.98
4	Fr	4	48	33.53	10.274	22	25	55.8	17.52	15	47.57	8.67	1	56.01	0.417	4	50	29.54
5	Sa	4	52	40.28	10.288	22	32	44.4	16.53	15	47.44	8.67	1	45.82	0.432	4	54	26.09
6	Su	4	56	47.37	10.302	+22	39	9.3	+15.54	15	47.32	8.67	+1	35.28	-0.446	4	58	22.65
7	Mo	5	0	54.79	10.316	22	45	10.5	14.55	15	47.20	8.67	1	24.42	0.459	5	2	19.21
8	Tu	5	5	2.52	10.328	22	50	47.7	13.55	15	47.08	8.67	1	13.25	0.471	5	6	15.76
9	We	5	9	10.54	10.340	22	56	0.9	12.55	15	46.97	8.67	1	1.79	0.483	5	10	12.32
10	Th	5	13	18.83	10.351	23	0	49.9	11.54	15	46.86	8.67	0	50.05	0.494	5	14	8.88
11	Fr	5	17	27.37	10.361	+23	5	14.6	+10.52	15	46.75	8.66	+0	38.07	-0.504	5	18	5.44
12	Sa	5	21	36.14	10.370	23	9	15.0	9.51	15	46.65	8.66	0	25.85	0.513	5	22	1.99
13	Su	5	25	45.12	10.378	23	12	50.9	8.48	15	46.55	8.66	0	13.43	0.521	5	25	58.55
14	Mo	5	29	54.28	10.385	23	16	2.2	7.46	15	46.47	8.66	+0	0.83	0.528	5	29	55.11
15	Tu	5	34	3.59	10.390	23	18	48.9	6.43	15	46.38	8.66	-0	11.92	0.534	5	33	51.66
16	We	5	38	13.02	10.395	+23	21	11.0	+5.40	15	46.30	8.66	-0	24.80	-0.539	5	37	48.22
17	Th	5	42	22.55	10.399	23	23	8.3	4.37	15	46.23	8.66	0	37.77	0.542	5	41	44.78
18	Fr	5	46	32.15	10.401	23	24	40.9	3.34	15	46.16	8.66	0	50.81	0.544	5	45	41.33
19	Sa	5	50	41.78	10.401	23	25	48.8	2.31	15	46.10	8.66	1	3.89	0.545	5	49	37.89
20	Su	5	54	51.42	10.401	23	26	31.9	1.28	15	46.04	8.66	1	16.98	0.545	5	53	34.45
21	Mo	5	59	1.05	10.400	+23	26	50.2	+0.25	15	45.99	8.66	-1	30.05	-0.544	5	57	31.00
22	Tu	6	3	10.63	10.398	23	26	43.7	-0.79	15	45.94	8.66	1	43.07	0.541	6	1	27.56
23	We	6	7	20.15	10.395	23	26	12.4	1.82	15	45.90	8.66	1	56.03	0.538	6	5	24.12
24	Th	6	11	29.57	10.390	23	25	16.4	2.85	15	45.86	8.66	2	8.90	0.534	6	9	20.68
25	Fr	6	15	38.88	10.385	23	23	55.7	3.88	15	45.83	8.66	2	21.65	0.529	6	13	17.23
26	Sa	6	19	48.06	10.379	+23	22	10.3	-4.90	15	45.80	8.66	-2	34.27	-0.523	6	17	13.79
27	Su	6	23	57.08	10.372	23	20	0.3	5.93	15	45.78	8.66	2	46.74	0.516	6	21	10.35
28	Mo	6	28	5.93	10.365	23	17	25.7	6.95	15	45.75	8.66	2	59.03	0.508	6	25	6.90
29	Tu	6	32	14.58	10.356	23	14	26.6	7.97	15	45.74	8.66	3	11.12	0.499	6	29	3.46
30	We	6	36	23.02	10.347	23	11	3.0	8.99	15	45.72	8.66	3	23.00	0.490	6	33	0.02
July 1	Th	6	40	31.23	10.337	+23	7	15.1	-10.00	15	45.71	8.66	-3	34.65	-0.480	6	36	56.58
2	Fr	6	44	39.18	10.326	+23	3	3.0	-11.01	15	45.70	8.66	-3	46.05	-0.469	6	40	53.13

FOR GREENWICH MEAN NOON.

Date.	Day of the Year.	True Longitude.	Var. per Hour.	Latitude.	Logarithm of the Radius Vector of the Earth.	Var. per Hour.	Prec. in Long.	Nut. in Long.	Aber-ration.	True Obliquity.	Mean Time of Sidereal Noon.
		" " "	" "	" "			" "	" "	" "	23° 26'	h m s
May 17	138	56 15 39.5	144.80	-0.13	0.005 0435	+36.8	18.83	+11.34	20.23	52.01	20 17 8.53
18	139	57 13 26.9	144.44	0.27	0.005 1307	36.9	18.97	11.34	20.22	51.99	20 13 12.62
19	140	58 11 12.8	144.28	0.40	0.005 2158	35.0	19.11	11.35	20.22	51.96	20 9 16.71
20	141	59 8 57.2	144.23	0.51	0.005 2987	34.1	19.24	11.35	20.22	51.94	20 5 20.80
21	142	60 6 40.2	144.26	0.60	0.005 3794	33.2	19.38	11.36	20.21	51.92	20 1 24.89
22	143	61 4 21.6	144.19	-0.66	0.005 4581	+32.4	19.52	+11.37	20.21	51.89	19 57 28.98
23	144	62 2 1.5	144.13	0.69	0.005 5348	31.6	19.66	11.38	20.21	51.87	19 53 33.07
24	145	62 59 39.8	144.06	0.68	0.005 6098	30.9	19.79	11.39	20.20	51.85	19 49 37.16
25	146	63 57 16.6	144.00	0.64	0.005 6830	30.2	19.93	11.40	20.20	51.83	19 45 41.25
26	147	64 54 51.9	143.94	0.57	0.005 7547	29.6	20.07	11.42	20.19	51.81	19 41 45.34
27	148	65 52 25.8	143.88	-0.48	0.005 8250	+29.0	20.21	+11.43	20.19	51.78	19 37 49.43
28	149	66 49 56.3	143.83	0.36	0.005 8938	28.4	20.34	11.45	20.19	51.76	19 33 53.52
29	150	67 47 29.5	143.77	0.24	0.005 9613	27.9	20.48	11.46	20.18	51.74	19 29 57.61
30	151	68 44 59.4	143.72	-0.11	0.006 0275	27.3	20.62	11.48	20.18	51.72	19 26 1.70
31	152	69 42 28.2	143.68	+0.02	0.006 0925	26.8	20.76	11.50	20.18	51.70	19 22 5.79
June 1	153	70 39 55.9	143.63	+0.15	0.006 1562	+26.3	20.90	+11.52	20.18	51.68	19 18 9.88
2	154	71 37 22.6	143.59	0.27	0.006 2186	25.8	21.03	11.54	20.17	51.66	19 14 13.97
3	155	72 34 48.3	143.55	0.37	0.006 2798	25.2	21.17	11.56	20.17	51.65	19 10 18.06
4	156	73 32 13.2	143.52	0.45	0.006 3397	24.7	21.31	11.58	20.17	51.63	19 6 22.14
5	157	74 29 37.3	143.49	0.50	0.006 3982	24.1	21.45	11.60	20.16	51.61	19 2 26.23
6	158	75 27 0.7	143.46	+0.53	0.006 4552	+23.5	21.58	+11.63	20.16	51.59	18 58 30.32
7	159	76 24 23.4	143.43	0.53	0.006 5108	22.8	21.72	11.65	20.16	51.58	18 54 34.41
8	160	77 21 45.5	143.41	0.50	0.006 5647	22.1	21.86	11.67	20.16	51.56	18 50 38.50
9	161	78 19 7.1	143.39	0.44	0.006 6169	21.4	22.00	11.70	20.15	51.55	18 46 42.59
10	162	79 16 28.2	143.37	0.36	0.006 6673	20.6	22.13	11.72	20.15	51.53	18 42 46.68
11	163	80 13 48.9	143.35	+0.25	0.006 7156	+19.7	22.27	+11.75	20.15	51.52	18 38 50.77
12	164	81 11 9.1	143.34	+0.12	0.006 7618	18.8	22.41	11.78	20.15	51.51	18 34 54.86
13	165	82 8 29.0	143.32	-0.01	0.006 8058	17.8	22.55	11.80	20.15	51.49	18 30 58.94
14	166	83 5 48.4	143.30	0.14	0.006 8473	16.8	22.68	11.83	20.14	51.48	18 27 3.03
15	167	84 3 7.3	143.28	0.27	0.006 8862	15.7	22.82	11.86	20.14	51.47	18 23 7.12
16	168	85 0 25.8	143.26	-0.39	0.006 9225	+14.6	22.96	+11.88	20.14	51.46	18 19 11.21
17	169	85 57 43.7	143.23	0.48	0.006 9562	13.5	23.10	11.91	20.14	51.45	18 15 15.30
18	170	86 55 1.0	143.21	0.55	0.006 9872	12.4	23.23	11.94	20.14	51.44	18 11 19.39
19	171	87 52 17.7	143.18	0.59	0.007 0156	11.3	23.37	11.97	20.14	51.43	18 7 23.48
20	172	88 49 33.6	143.15	0.59	0.007 0415	10.3	23.51	12.00	20.14	51.42	18 3 27.57
21	173	89 46 48.9	143.12	-0.56	0.007 0650	+ 9.3	23.65	+12.02	20.13	51.41	17 59 31.66
22	174	90 44 3.6	143.10	0.51	0.007 0863	8.4	23.78	12.05	20.13	51.41	17 55 35.74
23	175	91 41 17.5	143.07	0.43	0.007 1055	7.6	23.92	12.08	20.13	51.40	17 51 39.83
24	176	92 38 30.9	143.05	0.32	0.007 1227	6.8	24.06	12.11	20.13	51.39	17 47 43.92
25	177	93 35 43.7	143.02	0.20	0.007 1380	6.0	24.20	12.14	20.13	51.39	17 43 48.01
26	178	94 32 56.0	143.00	-0.07	0.007 1515	+ 5.3	24.34	+12.16	20.13	51.38	17 39 52.10
27	179	95 30 7.8	142.98	+0.06	0.007 1633	4.6	24.47	12.19	20.13	51.38	17 35 56.19
28	180	96 27 19.3	142.97	0.18	0.007 1735	3.9	24.61	12.22	20.13	51.37	17 32 0.28
29	181	97 24 30.4	142.96	0.30	0.007 1821	3.3	24.75	12.25	20.13	51.37	17 28 4.37
30	182	98 21 41.3	142.95	0.41	0.007 1892	2.6	24.89	12.27	20.13	51.37	17 24 8.46
July 1	183	99 18 52.1	142.95	+0.49	0.007 1947	+ 2.0	25.02	+12.30	20.13	51.37	17 20 12.54
2	184	100 16 2.9	142.95	+0.55	0.007 1987	+ 1.4	25.16	+12.32	20.13	51.37	17 16 16.63

## FOR GREENWICH MEAN NOON.

Date.	Day of the Week.	Apparent Right Ascension.			Var. per Hour.	Apparent Declination.			Var. per Hour.	Semi-diameter.	Hor. Par.	Equation of Time. App.—Mean.		Var. per Hour.	Sidereal Time, or Right Ascension of Mean Sun.			
		h	m.	s	s	°	'	"	"	'	"	m	s	s	h	m	s	
July 1	Th	6	40	31.23	10.327	+23	7	15.1	-10.00	15	45.71	8.66	-3	34.65	-0.480	6	36	56.58
2	Fr	6	44	39.18	10.326	23	3	3.0	11.01	15	45.70	8.66	3	46.05	0.400	6	40	53.13
3	Sa	6	48	46.86	10.314	22	58	26.7	12.01	15	45.69	8.65	3	57.17	0.457	6	44	49.69
4	Su	6	52	54.26	10.302	22	53	26.3	13.01	15	45.69	8.65	4	8.01	0.445	6	48	46.25
5	Mo	6	57	1.95	10.289	22	48	2.0	14.01	15	45.69	8.65	4	18.55	0.432	6	52	42.80
6	Tu	7	1	8.12	10.275	+22	42	13.9	-15.00	15	45.70	8.66	-4	28.76	-0.419	6	56	39.36
7	We	7	5	14.56	10.261	22	36	2.1	15.96	15	45.71	8.66	4	38.64	0.404	7	0	35.92
8	Th	7	9	20.64	10.246	22	29	26.8	16.96	15	45.72	8.66	4	48.16	0.389	7	4	32.48
9	Fr	7	13	26.35	10.230	22	22	28.1	17.93	15	45.74	8.66	4	57.32	0.374	7	8	29.03
10	Sa	7	17	31.67	10.213	22	15	6.2	18.89	15	45.76	8.66	5	6.09	0.357	7	12	25.59
11	Su	7	21	36.59	10.196	+22	7	21.2	-19.85	15	45.79	8.66	-5	14.45	-0.340	7	16	22.14
12	Mo	7	25	41.09	10.178	21	59	13.4	20.80	15	45.82	8.66	5	22.39	0.322	7	20	18.70
13	Tu	7	29	45.14	10.159	21	50	42.9	21.74	15	45.85	8.66	5	29.89	0.303	7	24	15.26
14	We	7	33	48.74	10.140	21	41	49.9	22.67	15	45.90	8.66	5	36.93	0.283	7	28	11.81
15	Th	7	37	51.86	10.120	21	32	34.7	23.59	15	45.94	8.66	5	43.49	0.263	7	32	8.37
16	Fr	7	41	54.48	10.099	+21	22	57.6	-24.50	15	46.00	8.66	-5	49.56	-0.242	7	36	4.93
17	Sa	7	45	56.59	10.077	21	12	58.6	25.41	15	46.06	8.66	5	55.11	0.220	7	40	1.48
18	Su	7	49	58.16	10.054	21	2	38.1	26.30	15	46.13	8.66	6	0.12	0.198	7	43	58.04
19	Mo	7	53	59.19	10.031	20	51	56.2	27.18	15	46.20	8.66	6	4.59	0.175	7	47	54.59
20	Tu	7	57	59.65	10.007	20	40	53.3	28.06	15	46.27	8.66	6	8.50	0.151	7	51	51.15
21	We	8	1	59.54	9.983	+20	29	29.6	-28.92	15	46.35	8.66	-6	11.84	-0.127	7	55	47.71
22	Th	8	5	58.85	9.959	20	17	45.3	29.77	15	46.44	8.66	6	14.59	0.102	7	59	44.26
23	Fr	8	9	57.57	9.934	20	5	40.7	30.61	15	46.53	8.66	6	16.75	0.078	8	3	40.82
24	Sa	8	13	55.70	9.909	19	53	16.0	31.44	15	46.62	8.66	6	18.32	0.053	8	7	37.37
25	Su	8	17	53.22	9.884	19	40	31.5	32.26	15	46.72	8.66	6	19.29	0.028	8	11	33.93
26	Mo	8	21	50.13	9.859	+19	27	27.4	-33.07	15	46.82	8.67	-6	19.65	-0.002	8	15	30.48
27	Tu	8	25	46.44	9.834	19	14	3.9	33.87	15	46.93	8.67	6	19.40	+0.023	8	19	27.04
28	We	8	29	42.14	9.808	19	0	21.4	34.66	15	47.04	8.67	6	18.55	0.048	8	23	23.60
29	Th	8	33	37.23	9.783	18	46	20.1	35.44	15	47.15	8.67	6	17.08	0.074	8	27	20.15
30	Fr	8	37	31.72	9.758	18	32	0.3	36.20	15	47.27	8.67	6	15.01	0.099	8	31	16.71
31	Sa	8	41	25.60	9.732	+18	17	22.3	-36.96	15	47.38	8.67	-6	12.33	+0.124	8	35	13.26
Aug. 1	Su	8	45	18.87	9.707	18	2	26.2	37.71	15	47.50	8.67	6	9.05	0.149	8	39	9.82
2	Mo	8	49	11.54	9.682	17	47	12.4	38.44	15	47.63	8.67	6	5.17	0.174	8	43	6.37
3	Tu	8	53	3.62	9.658	17	31	41.2	39.16	15	47.75	8.67	6	0.69	0.199	8	47	2.93
4	We	8	56	55.11	9.633	17	15	52.9	39.87	15	47.88	8.68	5	55.62	0.223	8	50	59.48
5	Th	9	0	46.01	9.609	+16	59	47.6	-40.56	15	48.01	8.68	-5	49.97	+0.248	8	54	56.04
6	Fr	9	4	36.33	9.585	16	43	25.8	41.25	15	48.15	8.68	5	43.74	0.272	8	58	52.59
7	Sa	9	8	26.07	9.561	16	26	47.6	41.92	15	48.29	8.68	5	36.93	0.296	9	2	49.14
8	Su	9	12	15.25	9.537	16	9	53.5	42.58	15	48.43	8.68	5	29.55	0.319	9	6	45.70
9	Mo	9	16	3.86	9.514	15	52	43.7	43.23	15	48.58	8.68	5	21.61	0.342	9	10	42.25
10	Tu	9	19	51.91	9.491	+15	35	18.5	-43.86	15	48.73	8.68	-5	13.11	+0.366	9	14	38.81
11	We	9	23	39.41	9.468	15	17	38.3	44.48	15	48.89	8.68	5	4.05	0.389	9	18	35.36
12	Th	9	27	26.36	9.445	14	59	43.3	45.09	15	49.05	8.69	4	54.44	0.412	9	22	31.92
13	Fr	9	31	12.75	9.422	14	41	33.9	45.68	15	49.21	8.69	4	44.26	0.435	9	26	28.47
14	Sa	9	34	58.60	9.399	14	23	10.5	46.26	15	49.38	8.69	4	33.58	0.457	9	30	25.02
15	Su	9	38	43.91	9.377	+14	4	33.4	-46.83	15	49.56	8.69	-4	22.33	+0.480	9	34	21.58
16	Mo	9	42	28.69	9.355	+13	45	42.8	-47.38	15	49.74	8.69	-4	10.55	+0.502	9	38	18.13



FOR GREENWICH MEAN NOON.

Date.	Day of the Year.	True Longitude.	Var. per Hour.	Latitude.	Logarithm of the Radius Vector of the Earth.	Var. per Hour.	Prec. in Long.	Nut. in Long.	Aber-ration.	True Obliquity.	Mean Time of Sidereal Noon.
		" " "	" "	" "		" "	" "	" "	" "	23° 26'	h m s
July	1	183 99 18 52.1	142.95	+0.49	0.007 1947	+ 2.0	25.02	+12.30	20.13	51.37	17 20 12.54
	2	184 100 16 2.9	142.95	0.55	0.007 1987	1.4	25.16	12.32	20.13	51.37	17 16 16.63
	3	185 101 13 13.6	142.95	0.58	0.007 2012	+ 0.7	25.30	12.35	20.13	51.37	17 12 20.72
	4	186 102 10 24.4	142.95	0.59	0.007 2021	0.0	25.44	12.37	20.13	51.36	17 8 24.81
	5	187 103 7 35.4	142.96	0.57	0.007 2014	- 0.6	25.57	12.40	20.13	51.36	17 4 28.90
	6	188 104 4 46.6	142.98	+0.52	0.007 1991	- 1.3	25.71	+12.42	20.13	51.36	17 0 32.99
	7	189 105 1 58.2	142.99	0.45	0.007 1951	2.1	25.85	12.44	20.13	51.37	16 56 37.08
	8	190 105 59 10.2	143.01	0.35	0.007 1892	2.9	25.99	12.46	20.13	51.37	16 52 41.17
	9	191 106 56 22.5	143.03	0.24	0.007 1813	3.7	26.12	12.49	20.13	51.37	16 48 45.26
	10	192 107 53 35.4	143.05	+0.11	0.007 1714	4.6	26.26	12.51	20.13	51.38	16 44 49.34
	11	193 108 50 48.8	143.07	-0.03	0.007 1593	- 5.5	26.40	+12.53	20.13	51.38	16 40 53.43
	12	194 109 48 2.7	143.09	0.15	0.007 1448	6.5	26.54	12.55	20.13	51.38	16 36 57.52
	13	195 110 45 17.1	143.11	0.27	0.007 1279	7.6	26.67	12.56	20.13	51.39	16 33 1.61
	14	196 111 42 32.0	143.13	0.37	0.007 1083	8.7	26.81	12.58	20.13	51.39	16 29 5.70
	15	197 112 39 47.4	143.15	0.44	0.007 0861	9.8	26.95	12.60	20.13	51.40	16 25 9.79
	16	198 113 37 3.2	143.17	-0.48	0.007 0612	-10.9	27.09	+12.61	20.13	51.40	16 21 13.88
	17	199 114 34 19.3	143.18	0.49	0.007 0336	12.0	27.23	12.63	20.14	51.41	16 17 17.97
	18	200 115 31 35.8	143.19	0.46	0.007 0034	13.1	27.36	12.64	20.14	51.42	16 13 22.06
	19	201 116 28 52.5	143.20	0.40	0.006 9707	14.1	27.50	12.65	20.14	51.42	16 9 26.15
	20	202 117 26 9.5	143.21	0.32	0.006 9355	15.1	27.64	12.66	20.14	51.43	16 5 30.24
	21	203 118 23 26.8	143.23	-0.22	0.006 8961	-16.0	27.78	+12.67	20.14	51.44	16 1 34.33
	22	204 119 20 44.3	143.24	-0.10	0.006 8586	16.9	27.91	12.68	20.14	51.45	15 57 38.42
	23	205 120 18 2.2	143.25	+0.02	0.006 8172	17.7	28.05	12.69	20.15	51.46	15 53 42.51
	24	206 121 15 20.4	143.27	0.15	0.006 7738	18.4	28.19	12.70	20.15	51.47	15 49 46.60
	25	207 122 12 39.1	143.29	0.27	0.006 7288	19.1	28.33	12.70	20.15	51.47	15 45 50.69
	26	208 123 9 58.2	143.31	+0.39	0.006 6820	-19.8	28.46	+12.71	20.15	51.48	15 41 54.78
	27	209 124 7 17.8	143.33	0.49	0.006 6337	20.4	28.60	12.71	20.15	51.49	15 37 58.87
	28	210 125 4 38.1	143.36	0.57	0.006 5839	21.0	28.74	12.71	20.16	51.50	15 34 2.96
	29	211 126 1 59.0	143.39	0.62	0.006 5327	21.6	28.88	12.71	20.16	51.51	15 30 7.05
	30	212 126 59 20.6	143.42	0.66	0.006 4802	22.2	29.01	12.71	20.16	51.52	15 26 11.14
	31	213 127 56 43.0	143.45	+0.67	0.006 4263	-22.7	29.15	+12.70	20.16	51.53	15 22 15.24
Aug.	1	214 128 54 6.4	143.49	0.65	0.006 3711	23.3	29.29	12.70	20.17	51.54	15 18 19.33
	2	215 129 51 30.7	143.54	0.60	0.006 3146	23.8	29.43	12.69	20.17	51.56	15 14 23.42
	3	216 130 48 56.1	143.66	0.53	0.006 2568	24.4	29.56	12.69	20.17	51.57	15 10 27.51
	4	217 131 46 22.6	143.63	0.44	0.006 1976	25.0	29.70	12.68	20.17	51.58	15 6 31.60
	5	218 132 43 50.3	143.68	+0.33	0.006 1369	-25.6	29.84	+12.67	20.18	51.59	15 2 35.69
	6	219 133 41 19.3	143.74	0.20	0.006 0748	26.2	29.98	12.66	20.18	51.60	14 58 39.78
	7	220 134 38 49.7	143.79	+0.07	0.006 0111	26.9	30.12	12.65	20.18	51.61	14 54 43.87
	8	221 135 36 21.4	143.85	-0.06	0.005 9456	27.7	30.25	12.63	20.19	51.62	14 50 47.96
	9	222 136 33 54.5	143.91	0.17	0.005 8783	28.5	30.39	12.62	20.19	51.64	14 46 52.06
	10	223 137 31 29.0	143.97	-0.27	0.005 8090	-29.3	30.53	+12.60	20.19	51.65	14 42 56.15
	11	224 138 29 4.9	144.03	0.35	0.005 7376	30.2	30.67	12.58	20.20	51.66	14 39 0.24
	12	225 139 26 42.2	144.06	0.39	0.005 6640	31.1	30.80	12.56	20.20	51.67	14 35 4.33
	13	226 140 24 20.9	144.14	0.40	0.005 5881	32.1	30.94	12.54	20.20	51.68	14 31 8.42
	14	227 141 22 0.8	144.19	0.38	0.005 5099	33.0	31.08	12.52	20.21	51.69	14 27 12.52
	15	228 142 19 42.0	144.24	-0.33	0.005 4295	-34.0	31.22	+12.50	20.21	51.70	14 23 16.61
	16	229 143 17 24.3	144.29	-0.25	0.005 3468	-34.9	31.35	+12.48	20.21	51.71	14 19 20.70

FOR GREENWICH MEAN NOON.

Date.	Day of the Week.	Apparent Right Ascension.	Var. per Hour.	Apparent Declination.	Var. per Hour.	Semi-diameter.	Hor. Par.	Equation of Time. App.—Mean.	Var. per Hour.	Sidereal Time, or Right Ascension of Mean Sun.
		h m s	s	° ' "	"	' "	"	m s	s	h m s
Aug. 16	Mo	9 42 28.69	9.355	+13 45 42.8	-47.38	15 49.74	8.69	- 4 10.55	+0.862	9 38 18.13
17	Tu	9 46 12.93	9.332	13 26 39.2	47.92	15 49.92	8.69	3 56.24	0.864	9 42 14.69
18	We	9 49 56.64	9.311	13 7 22.8	48.44	15 50.11	8.70	3 45.40	0.866	9 46 11.24
19	Th	9 53 39.85	9.290	12 47 54.1	48.95	15 50.31	8.70	3 32.05	0.867	9 50 7.80
20	Fr	9 57 22.54	9.269	12 28 13.3	49.45	15 50.51	8.70	3 18.20	0.868	9 54 4.35
21	Sa	10 1 4.75	9.249	+12 8 20.6	-49.93	15 50.71	8.70	- 3 3.85	+0.868	9 58 0.90
22	Su	10 4 46.47	9.229	11 48 16.5	50.40	15 50.91	8.70	2 49.02	0.868	10 1 57.46
23	Mo	10 8 27.73	9.210	11 28 1.3	50.86	15 51.12	8.70	2 33.72	0.867	10 5 54.01
24	Tu	10 12 8.54	9.191	11 7 35.2	51.31	15 51.33	8.71	2 17.98	0.865	10 9 50.56
25	We	10 15 48.91	9.173	10 46 58.6	51.74	15 51.54	8.71	2 1.79	0.863	10 13 47.11
26	Th	10 19 28.86	9.156	+10 26 11.8	-52.16	15 51.75	8.71	- 1 45.19	+0.700	10 17 43.67
27	Fr	10 23 8.40	9.140	10 5 15.1	52.56	15 51.97	8.71	1 28.18	0.717	10 21 40.22
28	Sa	10 26 47.56	9.124	9 44 8.8	52.96	15 52.19	8.71	1 10.79	0.732	10 25 36.77
29	Su	10 30 26.36	9.109	9 22 53.1	53.34	15 52.41	8.72	0 53.03	0.747	10 29 33.33
30	Mo	10 34 4.80	9.095	9 1 28.5	53.71	15 52.63	8.72	0 34.92	0.761	10 33 29.88
31	Tu	10 37 42.92	9.082	+ 8 39 55.2	-54.06	15 52.85	8.72	- 0 16.48	+0.775	10 37 26.43
Sept. 1	We	10 41 20.72	9.069	8 18 13.4	54.41	15 53.07	8.72	+ 0 2.26	0.787	10 41 22.98
2	Th	10 44 58.24	9.058	7 56 23.6	54.74	15 53.30	8.72	0 21.29	0.799	10 45 19.54
3	Fr	10 48 35.50	9.047	7 34 26.0	55.05	15 53.53	8.73	0 40.59	0.809	10 49 16.09
4	Sa	10 52 12.51	9.037	7 12 21.0	55.36	15 53.76	8.73	1 0.14	0.819	10 53 12.64
5	Su	10 55 49.28	9.028	+ 6 50 8.8	-55.65	15 53.99	8.73	+ 1 19.91	+0.828	10 57 9.19
6	Mo	10 59 25.85	9.020	6 27 49.7	55.93	15 54.22	8.73	1 39.89	0.836	11 1 5.75
7	Tu	11 3 2.24	9.012	6 5 24.2	56.19	15 54.46	8.74	2 0.06	0.844	11 5 2.30
8	We	11 6 38.45	9.005	5 42 52.5	56.44	15 54.70	8.74	2 20.41	0.851	11 8 58.85
9	Th	11 10 14.50	8.999	5 20 15.0	56.68	15 54.94	8.74	2 40.91	0.857	11 12 55.40
10	Fr	11 13 50.41	8.994	+ 4 57 32.1	-56.90	15 55.18	8.74	+ 3 1.55	+0.862	11 16 51.96
11	Sa	11 17 26.19	8.989	4 34 44.0	57.10	15 55.43	8.74	3 22.31	0.867	11 20 48.51
12	Su	11 21 1.87	8.985	4 11 51.1	57.29	15 55.68	8.75	3 43.19	0.872	11 24 45.06
13	Mo	11 24 37.45	8.981	3 48 53.9	57.47	15 55.94	8.75	4 4.16	0.876	11 28 41.61
14	Tu	11 28 12.95	8.978	3 25 52.6	57.63	15 56.19	8.75	4 25.22	0.879	11 32 38.16
15	We	11 31 48.38	8.975	+ 3 2 47.6	-57.78	15 56.45	8.75	+ 4 46.34	+0.881	11 36 34.72
16	Th	11 35 23.77	8.974	2 39 39.2	57.91	15 56.72	8.76	5 7.50	0.883	11 40 31.27
17	Fr	11 38 59.12	8.973	2 16 27.8	58.03	15 56.98	8.76	5 28.70	0.884	11 44 27.82
18	Sa	11 42 34.46	8.973	1 53 13.7	58.14	15 57.25	8.76	5 49.91	0.884	11 48 24.37
19	Su	11 46 9.81	8.974	1 29 57.2	58.23	15 57.52	8.76	6 11.11	0.883	11 52 20.92
20	Mo	11 49 45.19	8.975	+ 1 6 38.8	-58.30	15 57.79	8.77	+ 6 32.29	+0.881	11 56 17.48
21	Tu	11 53 20.61	8.977	0 43 18.7	58.37	15 58.06	8.77	6 53.42	0.879	12 0 14.03
22	We	11 56 56.10	8.981	+ 0 19 57.2	58.41	15 58.34	8.77	7 14.48	0.876	12 4 10.58
23	Th	12 0 31.68	8.985	- 0 3 25.2	58.45	15 58.61	8.77	7 35.45	0.872	12 8 7.13
24	Fr	12 4 7.37	8.990	0 26 48.4	58.47	15 58.89	8.78	7 56.32	0.867	12 12 3.68
25	Sa	12 7 43.19	8.996	- 0 50 11.9	-58.48	15 59.16	8.78	+ 8 17.05	+0.861	12 16 0.24
26	Su	12 11 19.16	9.003	1 13 35.4	58.47	15 59.44	8.78	8 37.63	0.854	12 19 56.79
27	Mo	12 14 55.32	9.011	1 36 58.6	58.45	15 59.71	8.78	8 58.02	0.845	12 23 53.34
28	Tu	12 18 31.68	9.020	2 0 21.2	58.42	15 59.99	8.79	9 18.21	0.837	12 27 49.89
29	We	12 22 8.26	9.030	2 23 42.8	58.37	16 0 26	8.79	9 38.18	0.827	12 31 46.44
30	Th	12 25 45.10	9.041	- 2 47 3.1	-58.31	16 0 53	8.79	+ 9 57.89	+0.816	12 35 42.99
Oct. 1	Fr	12 29 22.22	9.053	- 3 10 21.8	-58.24	16 0 80	8.79	+10 17.33	+0.804	12 39 39.55

FOR GREENWICH MEAN NOON.

Date.	Day of the Year.	True Longitude.	Var. per Hour.	Latitude.	Logarithm of the Radius Vector of the Earth.	Var. per Hour.	Pres. in Long.	Nut. in Long.	Aber-ration.	True Obliquity.	Mean Time of Sidereal Noon.
		" "	" "	" "		" "	" "	" "	" "	23° 26'	h m s
Aug. 16	229	143 17 24.3	144.39	-0.25	0.005 3468	-34.9	31.35	+12.48	20.21	51.71	14 19 20.70
17	230	144 15 7.8	144.34	0.15	0.005 2621	35.7	31.49	12.45	20.22	51.72	14 15 24.79
18	231	145 12 52.5	144.38	-0.08	0.005 1758	36.5	31.63	12.42	20.22	51.73	14 11 28.88
19	232	146 10 38.2	144.43	+0.10	0.005 0868	37.2	31.77	12.39	20.23	51.74	14 7 32.98
20	233	147 8 25.1	144.48	0.23	0.004 9985	37.9	31.90	12.36	20.23	51.76	14 3 37.07
21	234	148 6 13.1	144.53	+0.35	0.004 9047	-38.6	32.04	+12.33	20.23	51.77	13 59 41.16
22	235	149 4 2.3	144.58	0.46	0.004 8114	39.1	32.18	12.30	20.24	51.77	13 55 45.25
23	236	150 1 52.7	144.63	0.55	0.004 7168	39.6	32.32	12.26	20.24	51.78	13 51 49.34
24	237	150 59 44.4	144.68	0.63	0.004 6211	40.1	32.45	12.22	20.25	51.79	13 47 53.44
25	238	151 57 37.3	144.73	0.70	0.004 5242	40.6	32.59	12.19	20.25	51.80	13 43 57.53
26	239	152 55 31.6	144.79	+0.74	0.004 4264	-40.9	32.73	+12.15	20.26	51.81	13 40 1.62
27	240	153 53 27.2	144.85	0.75	0.004 3277	41.3	32.87	12.11	20.26	51.82	13 36 5.72
28	241	154 51 24.3	144.91	0.73	0.004 2282	41.6	33.00	12.07	20.27	51.83	13 32 9.81
29	242	155 49 23.0	144.98	0.68	0.004 1280	41.9	33.14	12.03	20.27	51.83	13 28 13.90
30	243	156 47 23.3	145.05	0.61	0.004 0271	42.2	33.28	11.99	20.28	51.84	13 24 18.00
31	244	157 45 25.2	145.12	+0.51	0.003 9256	-42.4	33.42	+11.94	20.28	51.85	13 20 22.09
Sept. 1	245	158 43 28.9	145.19	0.40	0.003 8235	42.7	33.56	11.90	20.28	51.85	13 16 26.18
2	246	159 41 34.4	145.27	0.27	0.003 7206	43.0	33.69	11.85	20.29	51.86	13 12 30.27
3	247	160 39 41.9	145.35	+0.13	0.003 6170	43.3	33.83	11.81	20.29	51.86	13 8 34.37
4	248	161 37 51.3	145.44	0.00	0.003 5127	43.6	33.97	11.76	20.30	51.87	13 4 38.46
5	249	162 36 2.8	145.52	-0.12	0.003 4075	-44.0	34.11	+11.71	20.30	51.87	13 0 42.56
6	250	163 34 16.3	145.61	0.23	0.003 3013	44.5	34.24	11.66	20.31	51.88	12 56 46.65
7	251	164 32 31.9	145.69	0.31	0.003 1939	45.0	34.38	11.61	20.31	51.88	12 52 50.74
8	252	165 30 49.6	145.78	0.36	0.003 0854	45.5	34.52	11.56	20.32	51.88	12 48 54.84
9	253	166 29 9.3	145.86	0.38	0.002 9755	46.1	34.66	11.51	20.32	51.88	12 44 58.93
10	254	167 27 31.9	145.95	-0.37	0.002 8642	-46.7	34.79	+11.46	20.33	51.89	12 41 3.02
11	255	168 25 54.8	146.03	0.32	0.002 7514	47.3	34.93	11.41	20.34	51.89	12 37 7.12
12	256	169 24 30.4	146.11	0.25	0.002 6371	47.9	35.07	11.36	20.34	51.89	12 33 11.21
13	257	170 22 47.9	146.18	0.15	0.002 5214	48.5	35.21	11.30	20.35	51.89	12 29 15.30
14	258	171 21 17.2	146.26	-0.03	0.002 4042	49.1	35.34	11.25	20.35	51.89	12 25 19.40
15	259	172 19 48.3	146.33	+0.09	0.002 2858	-49.6	35.48	+11.19	20.36	51.89	12 21 23.49
16	260	173 18 21.1	146.40	0.21	0.002 1661	50.1	35.62	11.14	20.36	51.88	12 17 27.59
17	261	174 16 55.6	146.47	0.34	0.002 0453	50.5	35.76	11.08	20.37	51.88	12 13 31.68
18	262	175 15 31.7	146.54	0.43	0.001 9237	50.9	35.89	11.02	20.37	51.88	12 9 35.78
19	263	176 14 9.6	146.61	0.57	0.001 8012	51.2	36.03	10.97	20.38	51.87	12 5 39.87
20	264	177 12 49.1	146.68	+0.66	0.001 6781	-51.4	36.17	+10.92	20.39	51.87	12 1 43.96
21	265	178 11 30.4	146.75	0.72	0.001 5545	51.6	36.31	10.86	20.39	51.86	11 57 48.06
22	266	179 10 13.3	146.82	0.76	0.001 4305	51.7	36.45	10.80	20.40	51.86	11 53 52.15
23	267	180 8 58.0	146.90	0.77	0.001 3062	51.8	36.58	10.74	20.40	51.85	11 49 56.24
24	268	181 7 44.5	146.98	0.75	0.001 1817	51.9	36.72	10.68	20.41	51.85	11 46 0.34
25	269	182 6 32.3	147.05	+0.71	0.001 0573	-51.8	36.86	+10.63	20.41	51.84	11 42 4.43
26	270	183 5 22.9	147.13	0.64	0.000 9330	51.8	37.00	10.57	20.42	51.83	11 38 8.53
27	271	184 4 14.9	147.21	0.54	0.000 8088	51.7	37.13	10.52	20.43	51.82	11 34 12.62
28	272	185 3 8.9	147.30	0.42	0.000 6850	51.5	37.27	10.46	20.43	51.81	11 30 16.72
29	273	186 2 4.9	147.38	0.29	0.000 5615	51.4	37.41	10.40	20.44	51.80	11 26 20.81
30	274	187 1 3.1	147.47	+0.15	0.000 4388	-51.3	37.55	+10.35	20.44	51.79	11 22 24.90
Oct. 1	275	188 0 3.4	147.56	+0.02	0.000 3155	-51.1	37.68	+10.29	20.45	51.78	11 18 29.00

FOR GREENWICH MEAN NOON.

Date.	Day of the Week.	Apparent Right Ascension.	Var. per Hour.	Apparent Declination.	Var. per Hour.	Semi-diameter.	Hor. Par.	Equation of Time. App.—Mean.	Var. per Hour.	Sidereal Time, or Right Ascension of Mean Sun.
		h m s	s	° ' "	"	' "	"	m s	s	h m s
Oct. 1	Fr	12 29 22.22	9.053	- 3 10 21.8	-58.24	16 0.80	8.79	+10 17.33	+0.804	12 39 39.55
2	Sa	12 32 59.64	9.066	3 33 38.5	58.15	16 1.07	8.80	10 36.46	0.799	12 43 36.10
3	Su	12 36 37.38	9.080	3 56 52.9	58.04	16 1.34	8.80	10 55.27	0.776	12 47 32.65
4	Mo	12 40 15.47	9.095	4 20 4.6	57.93	16 1.61	8.80	11 13.73	0.763	12 51 29.20
5	Tu	12 43 53.93	9.110	4 43 13.4	57.79	16 1.88	8.80	11 31.83	0.746	12 55 25.75
6	We	12 47 32.77	9.127	- 5 6 18.7	-57.64	16 2.16	8.81	+11 49.53	+0.729	12 59 22.31
7	Th	12 51 12.03	9.145	5 29 20.3	57.48	16 2.43	8.81	12 6.83	0.712	13 3 18.86
8	Fr	12 54 51.71	9.163	5 52 17.7	57.30	16 2.70	8.81	12 23.70	0.694	13 7 15.41
9	Sa	12 58 31.84	9.181	6 15 10.7	57.10	16 2.97	8.81	12 40.13	0.675	13 11 11.96
10	Su	13 2 12.42	9.201	6 37 58.7	56.89	16 3.24	8.82	12 56.10	0.655	13 15 8.51
11	Mo	13 5 53.47	9.221	- 7 0 41.4	-56.66	16 3.52	8.82	+13 11.59	+0.635	13 19 5.07
12	Tu	13 9 35.02	9.241	7 23 18.4	56.41	16 3.79	8.82	13 26.60	0.615	13 23 1.62
13	We	13 13 17.06	9.263	7 45 49.3	56.15	16 4.07	8.82	13 41.11	0.594	13 26 58.17
14	Th	13 16 59.63	9.285	8 8 13.8	55.88	16 4.35	8.83	13 55.09	0.572	13 30 54.72
15	Fr	13 20 42.73	9.307	8 30 31.4	55.58	16 4.63	8.83	14 8.55	0.549	13 34 51.28
16	Sa	13 24 26.37	9.330	- 8 52 41.7	-55.27	16 4.90	8.83	+14 21.46	+0.526	13 38 47.83
17	Su	13 28 10.58	9.354	9 14 44.4	54.94	16 5.18	8.83	14 33.80	0.502	13 42 44.38
18	Mo	13 31 55.37	9.379	9 36 39.0	54.60	16 5.46	8.84	14 45.56	0.478	13 46 40.94
19	Tu	13 35 40.75	9.404	9 58 25.2	54.24	16 5.74	8.84	14 56.74	0.453	13 50 37.49
20	We	13 39 26.74	9.429	10 20 2.6	53.87	16 6.01	8.84	15 7.30	0.427	13 54 34.04
21	Th	13 43 13.36	9.456	-10 41 30.8	-53.48	16 6.29	8.84	+15 17.24	+0.401	13 58 30.59
22	Fr	13 47 0.62	9.483	11 2 49.4	53.07	16 6.56	8.85	15 26.53	0.373	14 2 27.15
23	Sa	13 50 48.54	9.511	11 23 58.0	52.64	16 6.83	8.85	15 35.16	0.346	14 6 23.70
24	Su	13 54 37.13	9.539	11 44 56.3	52.20	16 7.10	8.85	15 43.12	0.317	14 10 20.25
25	Mo	13 58 26.42	9.568	12 5 43.7	51.75	16 7.37	8.85	15 50.39	0.288	14 14 16.81
26	Tu	14 2 16.41	9.598	-12 26 20.1	-51.28	16 7.63	8.86	+15 56.95	+0.258	14 18 13.36
27	We	14 6 7.13	9.629	12 46 44.9	50.79	16 7.89	8.86	16 2.79	0.228	14 22 9.91
28	Th	14 9 58.59	9.660	13 6 57.8	50.28	16 8.15	8.86	16 7.88	0.196	14 26 6.47
29	Fr	14 13 50.81	9.692	13 26 58.4	49.76	16 8.41	8.86	16 12.21	0.164	14 30 3.02
30	Sa	14 17 43.81	9.725	13 46 46.3	49.23	16 8.66	8.87	16 15.76	0.132	14 33 59.58
31	Su	14 21 37.60	9.758	-14 6 21.1	-48.67	16 8.91	8.87	+16 18.53	+0.099	14 37 56.13
Nov. 1	Mo	14 25 32.20	9.792	14 25 42.4	48.10	16 9.15	8.87	16 20.49	0.065	14 41 52.68
2	Tu	14 29 27.61	9.826	14 44 49.9	47.51	16 9.39	8.87	16 21.63	+0.030	14 45 49.24
3	We	14 33 23.85	9.861	15 3 43.1	46.91	16 9.63	8.87	16 21.94	-0.005	14 49 45.79
4	Th	14 37 20.93	9.896	15 22 21.6	46.29	16 9.87	8.88	16 21.41	0.040	14 53 42.34
5	Fr	14 41 18.85	9.931	-15 40 45.0	-45.65	16 10.11	8.88	+16 20.04	-0.075	14 57 38.90
6	Sa	14 45 17.62	9.966	15 58 52.9	45.00	16 10.34	8.88	16 17.83	0.110	15 1 35.45
7	Su	14 49 17.24	10.002	16 16 44.8	44.32	16 10.57	8.88	16 14.77	0.145	15 5 32.01
8	Mo	14 53 17.72	10.037	16 34 20.3	43.63	16 10.80	8.89	16 10.85	0.181	15 9 28.56
9	Tu	14 57 19.04	10.073	16 51 39.1	42.92	16 11.03	8.89	16 6.08	0.216	15 13 25.12
10	We	15 1 21.22	10.109	-17 8 40.7	-42.20	16 11.26	8.89	+16 0.46	-0.252	15 17 21.67
11	Th	15 5 24.24	10.144	17 25 24.7	41.46	16 11.49	8.89	15 53.99	0.287	15 21 18.23
12	Fr	15 9 28.11	10.179	17 41 50.7	40.70	16 11.71	8.89	15 46.67	0.323	15 25 14.78
13	Sa	15 13 32.82	10.214	17 57 58.3	39.92	16 11.94	8.90	15 38.51	0.357	15 29 11.34
14	Su	15 17 38.38	10.249	18 13 47.0	39.13	16 12.16	8.90	15 29.52	0.392	15 33 7.89
15	Mo	15 21 44.76	10.283	-18 29 16.5	-38.32	16 12.37	8.90	+15 19.69	-0.427	15 37 4.45
16	Tu	15 25 51.98	10.318	-18 44 26.5	-37.50	16 12.59	8.90	+15 9.03	-0.461	15 41 1.00

FOR GREENWICH MEAN NOON.

Date.	Day of the Year.	True Longitude.	Var. per Hour.	Latitude.	Logarithm of the Radius Vector of the Earth.	Var. per Hour.	Prec. in Long.	Nut. in Long.	Aber-ration.	True Obliquity.	Mean Time of Sidereal Noon.
		" " "	"	"			"	"	"	23° 26'	h m s
Oct. 1	275	188 0 3.4	147.56	+0.02	0.000 3155	-51.1	37.68	+10.29	20.45	51.78	11 18 29.00
2	276	188 59 6.0	147.66	-0.11	0.000 1931	51.0	37.82	10.24	20.46	51.77	11 14 33.09
3	277	189 58 10.9	147.75	0.23	0.000 0708	50.9	37.96	10.19	20.46	51.75	11 10 37.18
4	278	190 57 18.2	147.85	0.32	9.999 9486	50.9	38.10	10.13	20.47	51.74	11 6 41.28
5	279	191 56 27.8	147.95	0.39	9.999 8265	50.9	38.23	10.07	20.47	51.73	11 2 45.37
6	280	192 55 39.7	148.05	-0.42	9.999 7043	-51.0	38.37	+10.02	20.48	51.71	10 58 49.47
7	281	193 54 54.0	148.14	0.41	9.999 5819	51.1	38.51	9.97	20.48	51.70	10 54 53.56
8	282	194 54 10.6	148.24	0.37	9.999 4592	51.2	38.65	9.92	20.49	51.68	10 50 57.66
9	283	195 53 29.5	148.33	0.30	9.999 3362	51.3	38.78	9.87	20.50	51.66	10 47 1.75
10	284	196 52 50.6	148.42	0.21	9.999 2128	51.5	38.92	9.82	20.50	51.65	10 43 5.84
11	285	197 52 13.8	148.51	-0.09	9.999 0889	-51.7	39.06	+ 9.77	20.51	51.63	10 39 9.94
12	286	198 51 39.1	148.60	+0.04	9.998 9646	51.9	39.20	9.72	20.51	51.61	10 35 14.03
13	287	199 51 6.4	148.68	0.17	9.998 8400	52.0	39.33	9.67	20.52	51.59	10 31 18.12
14	288	200 50 35.7	148.76	0.29	9.998 7151	52.1	39.47	9.63	20.52	51.57	10 27 22.22
15	289	201 50 6.9	148.84	0.42	9.998 5900	52.1	39.61	9.58	20.53	51.55	10 23 26.31
16	290	202 49 39.9	148.92	+0.53	9.998 4648	-52.1	39.75	+ 9.54	20.54	51.53	10 19 30.40
17	291	203 49 14.8	148.99	0.62	9.998 3397	52.1	39.89	9.49	20.54	51.51	10 15 34.50
18	292	204 48 51.4	149.06	0.69	9.998 2147	52.0	40.02	9.45	20.55	51.49	10 11 38.59
19	293	205 48 29.8	149.13	0.74	9.998 0901	51.8	40.16	9.41	20.55	51.47	10 7 42.68
20	294	206 48 9.9	149.21	0.77	9.997 9660	51.6	40.30	9.37	20.56	51.45	10 3 46.77
21	295	207 47 51.8	149.28	+0.76	9.997 8424	-51.3	40.44	+ 9.33	20.57	51.43	9 59 50.87
22	296	208 47 35.4	149.35	0.72	9.997 7196	51.0	40.57	9.29	20.57	51.40	9 55 54.96
23	297	209 47 20.7	149.42	0.65	9.997 5976	50.6	40.71	9.26	20.58	51.38	9 51 59.05
24	298	210 47 7.8	149.50	0.55	9.997 4766	50.3	40.85	9.22	20.58	51.36	9 48 3.14
25	299	211 46 56.7	149.58	0.44	9.997 3568	49.6	40.99	9.19	20.59	51.33	9 44 7.24
26	300	212 46 47.4	149.66	+0.32	9.997 2388	-49.1	41.12	+ 9.16	20.59	51.31	9 40 11.33
27	301	213 46 39.9	149.73	0.18	9.997 1211	48.5	41.26	9.13	20.60	51.29	9 36 15.42
28	302	214 46 34.4	149.81	+0.03	9.997 0054	47.9	41.40	9.10	20.61	51.26	9 32 19.51
29	303	215 46 30.9	149.90	-0.11	9.996 8912	47.3	41.54	9.07	20.61	51.24	9 28 23.61
30	304	216 46 29.4	149.98	0.23	9.996 7785	46.7	41.67	9.05	20.62	51.21	9 24 27.70
31	305	217 46 29.9	150.07	-0.33	9.996 6672	-46.1	41.81	+ 9.02	20.62	51.19	9 20 31.79
Nov. 1	306	218 46 32.7	150.16	0.41	9.996 5572	45.6	41.95	9.00	20.63	51.16	9 16 35.88
2	307	219 46 37.5	150.25	0.45	9.996 4485	45.1	42.09	8.98	20.63	51.13	9 12 39.97
3	308	220 46 44.6	150.35	0.46	9.996 3409	44.6	42.22	8.96	20.64	51.11	9 8 44.07
4	309	221 46 53.7	150.43	0.43	9.996 2343	44.2	42.36	8.94	20.64	51.08	9 4 48.16
5	310	222 47 5.0	150.51	-0.38	9.996 1287	-43.8	42.50	+ 8.93	20.65	51.06	9 0 52.25
6	311	223 47 18.4	150.60	0.30	9.996 0239	43.5	42.64	8.91	20.65	51.03	8 56 56.34
7	312	224 47 33.7	150.68	0.19	9.995 9198	43.2	42.78	8.90	20.66	51.00	8 53 0.43
8	313	225 47 51.0	150.76	-0.07	9.995 8165	42.9	42.91	8.89	20.66	50.98	8 49 4.52
9	314	226 48 10.2	150.84	+0.06	9.995 7138	42.6	43.05	8.88	20.67	50.95	8 45 8.62
10	315	227 48 31.1	150.91	+0.19	9.995 6118	-42.4	43.19	+ 8.87	20.67	50.93	8 41 12.71
11	316	228 48 53.8	150.98	0.32	9.995 5105	42.0	43.33	8.86	20.68	50.90	8 37 16.80
12	317	229 49 18.1	151.04	0.43	9.995 4100	41.7	43.46	8.86	20.68	50.87	8 33 20.89
13	318	230 49 43.9	151.11	0.53	9.995 3101	41.3	43.60	8.85	20.69	50.85	8 29 24.98
14	319	231 50 11.3	151.17	0.61	9.995 2116	40.9	43.74	8.85	20.69	50.82	8 25 29.07
15	320	232 50 40.0	151.23	+0.66	9.995 1139	-40.5	43.88	+ 8.85	20.70	50.80	8 21 33.16
16	321	233 51 10.2	151.28	+0.69	9.995 0173	-40.0	44.01	+ 8.85	20.70	50.77	8 17 37.25

## FOR GREENWICH MEAN NOON.

Date.	Day of the Week.	Apparent Right Ascension.	Var. per Hour.	Apparent Declination.	Var. per Hour.	Semi-diameter.	Hor. Par.	Equation of Time. App.—Mean.	Var. per Hour.	Sidereal Time, or Right Ascension of Mean Sun.
		h m s	s	° ' "	"	" "	"	m s	s	h m s
Nov. 16	Tu	15 25 51.98	10.318	-18 44 26.5	-37.50	16 12.59	8.90	+15 9.03	-0.461	15 41 1.00
17	We	15 30 0.02	10.322	18 59 16.4	36.65	16 12.80	8.90	14 57.54	0.466	15 44 57.56
18	Th	15 34 8.87	10.326	19 13 45.9	35.80	16 13.01	8.91	14 45.24	0.520	15 48 54.12
19	Fr	15 38 18.54	10.420	19 27 54.7	34.96	16 13.22	8.91	14 32.13	0.563	15 52 50.67
20	Sa	15 42 29.01	10.433	19 41 42.4	34.04	16 13.43	8.91	14 18.22	0.596	15 56 47.23
21	Su	15 46 40.27	10.435	-19 55 8.6	-33.14	16 13.63	8.91	+14 3.52	-0.620	16 0 43.78
22	Mo	15 50 52.31	10.518	20 8 12.9	32.22	16 13.82	8.91	13 48.06	0.602	16 4 40.34
23	Tu	15 55 5.13	10.550	20 20 55.0	31.20	16 14.01	8.91	13 31.76	0.604	16 8 36.90
24	We	15 59 18.72	10.532	20 33 14.6	30.34	16 14.20	8.92	13 14.73	0.725	16 12 33.45
25	Th	16 3 33.07	10.614	20 45 11.3	29.38	16 14.38	8.92	12 56.94	0.757	16 16 30.01
26	Fr	16 7 48.17	10.645	-20 56 44.8	-28.41	16 14.55	8.92	+12 36.40	-0.733	16 20 26.56
27	Sa	16 12 4.01	10.675	21 7 54.8	27.42	16 14.72	8.92	12 19.11	0.819	16 24 23.12
28	Su	16 16 20.57	10.705	21 18 40.9	26.42	16 14.89	8.92	11 59.10	0.846	16 28 19.68
29	Mo	16 20 37.86	10.735	21 29 2.8	25.40	16 15.05	8.92	11 38.98	0.878	16 32 16.23
30	Tu	16 24 55.84	10.764	21 39 0.3	24.38	16 15.20	8.93	11 16.95	0.907	16 36 12.79
Dec. 1	We	16 29 14.51	10.792	-21 48 33.0	-23.34	16 15.36	8.93	+10 54.83	-0.935	16 40 9.35
2	Th	16 33 33.85	10.819	21 57 40.6	22.20	16 15.50	8.93	10 32.05	0.962	16 44 5.90
3	Fr	16 37 53.83	10.846	22 6 22.9	21.23	16 15.64	8.93	10 8.66	0.989	16 48 2.46
4	Sa	16 42 14.44	10.871	22 14 39.7	20.16	16 15.78	8.93	9 44.58	1.014	16 51 59.02
5	Su	16 46 35.64	10.895	22 22 30.5	19.06	16 15.91	8.93	9 19.94	1.039	16 55 55.57
6	Mo	16 50 57.41	10.918	-22 29 55.3	-17.96	16 16.04	8.93	+ 8 54.73	-1.063	16 59 52.13
7	Tu	16 55 19.71	10.940	22 36 53.7	16.88	16 16.17	8.93	8 28.98	1.084	17 3 48.69
8	We	16 59 42.53	10.961	22 43 25.6	15.77	16 16.29	8.94	8 2.72	1.104	17 7 45.24
9	Th	17 4 5.82	10.980	22 49 30.7	14.65	16 16.41	8.94	7 35.98	1.123	17 11 41.80
10	Fr	17 8 29.56	10.998	22 55 8.8	13.52	16 16.51	8.94	7 8.80	1.141	17 15 38.36
11	Sa	17 12 53.71	11.014	-23 0 19.7	-12.30	16 16.63	8.94	+ 6 41.21	-1.158	17 19 34.92
12	Su	17 17 18.23	11.029	23 5 3.3	11.24	16 16.74	8.94	6 13.24	1.173	17 23 31.47
13	Mo	17 21 43.10	11.043	23 9 19.4	10.10	16 16.84	8.94	5 44.98	1.186	17 27 28.03
14	Tu	17 26 8.28	11.055	23 13 7.9	8.94	16 16.94	8.94	5 16.30	1.198	17 31 24.59
15	We	17 30 33.74	11.066	23 16 28.6	7.78	16 17.04	8.94	4 47.41	1.209	17 35 21.15
16	Th	17 34 59.44	11.075	-23 19 21.4	-6.62	16 17.14	8.94	+ 4 18.27	-1.219	17 39 17.70
17	Fr	17 39 25.34	11.083	23 21 46.3	5.45	16 17.22	8.94	3 48.92	1.226	17 43 14.26
18	Sa	17 43 51.41	11.089	23 23 43.1	4.28	16 17.31	8.94	3 19.41	1.232	17 47 10.82
19	Su	17 48 17.62	11.094	23 25 11.8	3.11	16 17.39	8.95	2 49.76	1.237	17 51 7.38
20	Mo	17 52 43.92	11.098	23 26 12.2	1.93	16 17.46	8.95	2 20.01	1.241	17 55 3.93
21	Tu	17 57 10.30	11.100	-23 26 44.5	-0.76	16 17.53	8.95	+ 1 50.19	-1.243	17 59 0.49
22	We	18 1 36.71	11.100	23 26 48.5	+0.42	16 17.59	8.95	1 20.94	1.244	18 2 57.05
23	Th	18 6 3.12	11.100	23 26 24.2	1.60	16 17.65	8.95	0 50.49	1.243	18 6 53.61
24	Fr	18 10 29.50	11.098	23 25 31.7	2.78	16 17.70	8.95	+ 0 20.66	1.243	18 10 50.16
25	Sa	18 14 55.83	11.095	23 24 10.9	3.95	16 17.74	8.95	- 0 9.11	1.239	18 14 46.72
26	Su	18 19 22.08	11.091	-23 22 21.9	+ 5.13	16 17.78	8.95	- 0 38.80	-1.235	18 18 43.28
27	Mo	18 23 48.21	11.086	23 20 4.7	6.30	16 17.81	8.95	1 8.37	1.230	18 22 39.84
28	Tu	18 28 14.20	11.079	23 17 19.3	7.47	16 17.83	8.95	1 37.81	1.228	18 26 36.39
29	We	18 32 40.02	11.072	23 14 5.9	8.64	16 17.85	8.95	2 7.07	1.215	18 30 32.95
30	Th	18 37 5.65	11.063	23 10 24.5	9.80	16 17.87	8.95	2 36.14	1.206	18 34 29.51
31	Fr	18 41 31.04	11.053	-23 6 15.3	+10.96	16 17.87	8.95	- 3 4.97	-1.196	18 38 26.07
32	Sa	18 45 56.17	11.041	-23 1 38.2	+12.12	16 17.87	8.95	- 3 33.55	-1.186	18 42 22.62

FOR GREENWICH MEAN NOON.

Date.	Day of the Year.	True Longitude.	Var. per Hour.	Latitude.	Logarithm of the Radius Vector of the Earth.	Var. per Hour.	Prec. in Long.	Nut. in Long.	Aber-ration.	True Obliquity.	Mean Time of Sidereal Noon.
		" " "	"	"			"	"	"	23° 26'	h m s
Nov. 16	321	233 51 10.2	151.28	+0.69	9.995 0173	-40.0	44.01	+ 8.85	20.70	50.77	8 17 37.25
17	322	234 51 41.6	151.34	0.69	9.994 9220	39.4	44.15	8.86	20.70	50.74	8 13 41.34
18	323	235 52 14.4	151.39	0.66	9.994 8280	38.9	44.29	8.86	20.71	50.72	8 9 45.43
19	324	236 52 48.4	151.44	0.60	9.994 7355	38.2	44.43	8.87	20.71	50.70	8 5 49.52
20	325	237 53 23.6	151.49	0.52	9.994 6446	37.5	44.56	8.88	20.72	50.67	8 1 53.61
21	326	238 54 0.1	151.54	+0.41	9.994 5555	-36.7	44.70	+ 8.88	20.72	50.65	7 57 57.70
22	327	239 54 37.7	151.59	0.28	9.994 4683	35.9	44.84	8.89	20.73	50.62	7 54 1.79
23	328	240 55 16.5	151.64	0.15	9.994 3832	35.0	44.98	8.91	20.73	50.60	7 50 5.88
24	329	241 55 56.4	151.69	+0.01	9.994 3004	34.0	45.11	8.92	20.73	50.58	7 46 9.97
25	330	242 56 37.7	151.75	-0.13	9.994 2198	33.1	45.25	8.93	20.74	50.55	7 42 14.06
26	331	243 57 20.2	151.80	-0.26	9.994 1417	-32.0	45.39	+ 8.95	20.74	50.53	7 38 18.15
27	332	244 58 4.0	151.86	0.37	9.994 0660	31.0	45.53	8.97	20.75	50.51	7 34 22.24
28	333	245 58 49.3	151.93	0.46	9.993 9927	30.0	45.66	8.99	20.75	50.49	7 30 26.33
29	334	246 59 35.9	151.97	0.52	9.993 9218	29.1	45.80	9.01	20.75	50.47	7 26 30.42
30	335	248 0 24.0	152.04	0.54	9.993 8532	28.1	45.94	9.03	20.76	50.45	7 22 34.51
Dec. 1	336	249 1 13.6	152.10	-0.52	9.993 7868	-27.2	46.08	+ 9.05	20.76	50.43	7 18 38.60
2	337	250 2 4.6	152.16	0.48	9.993 7225	26.4	46.22	9.07	20.76	50.41	7 14 42.68
3	338	251 2 57.1	152.23	0.41	9.993 6601	25.6	46.35	9.10	20.77	50.39	7 10 46.77
4	339	252 3 50.9	152.27	0.32	9.993 5995	24.9	46.49	9.12	20.77	50.37	7 6 50.86
5	340	253 4 46.1	152.32	0.20	9.993 5406	24.2	46.63	9.15	20.77	50.35	7 2 54.95
6	341	254 5 42.5	152.38	-0.07	9.993 4834	-23.5	46.77	+ 9.18	20.77	50.34	6 58 59.04
7	342	255 6 40.1	152.42	+0.05	9.993 4277	22.9	46.90	9.20	20.78	50.32	6 55 3.13
8	343	256 7 38.8	152.48	0.17	9.993 3736	22.2	47.04	9.23	20.78	50.30	6 51 7.22
9	344	257 8 38.5	152.51	0.28	9.993 3209	21.6	47.18	9.26	20.78	50.29	6 47 11.31
10	345	258 9 39.2	152.54	0.38	9.993 2697	21.0	47.32	9.29	20.78	50.27	6 43 15.40
11	346	259 10 40.7	152.58	+0.46	9.993 2201	-20.4	47.45	+ 9.32	20.79	50.26	6 39 19.48
12	347	260 11 43.0	152.61	0.52	9.993 1720	19.7	47.59	9.36	20.79	50.25	6 35 23.57
13	348	261 12 45.9	152.64	0.55	9.993 1255	19.0	47.73	9.39	20.79	50.23	6 31 27.66
14	349	262 13 49.4	152.66	0.55	9.993 0806	18.3	47.87	9.42	20.79	50.22	6 27 31.75
15	350	263 14 53.5	152.69	0.52	9.993 0375	17.6	48.00	9.46	20.79	50.21	6 23 35.84
16	351	264 15 58.0	152.70	+0.47	9.992 9962	-16.8	48.14	+ 9.49	20.80	50.20	6 19 39.93
17	352	265 17 2.9	152.71	0.39	9.992 9569	16.0	48.28	9.52	20.80	50.19	6 15 44.02
18	353	266 18 8.2	152.73	0.29	9.992 9195	15.1	48.42	9.56	20.80	50.18	6 11 48.10
19	354	267 19 13.7	152.74	0.17	9.992 8844	14.2	48.55	9.59	20.80	50.17	6 7 52.19
20	355	268 20 19.5	152.75	+0.05	9.992 8515	13.2	48.69	9.63	20.80	50.16	6 3 56.28
21	356	269 21 25.5	152.75	-0.08	9.992 8210	-12.2	48.83	+ 9.66	20.81	50.15	6 0 0.37
22	357	270 22 31.6	152.76	0.23	9.992 7931	11.0	48.97	9.70	20.81	50.15	5 56 4.46
23	358	271 23 38.0	152.77	0.37	9.992 7680	9.9	49.11	9.73	20.81	50.14	5 52 8.54
24	359	272 24 44.6	152.78	0.48	9.992 7457	8.7	49.24	9.77	20.81	50.14	5 48 12.63
25	360	273 25 51.5	152.79	0.56	9.992 7263	7.5	49.38	9.80	20.81	50.13	5 44 16.72
26	361	274 26 58.6	152.80	-0.62	9.992 7098	- 6.3	49.52	+ 9.84	20.81	50.13	5 40 20.81
27	362	275 28 6.1	152.83	0.65	9.992 6962	5.0	49.66	9.87	20.81	50.13	5 36 24.90
28	363	276 29 14.0	152.84	0.65	9.992 6856	3.9	49.79	9.90	20.81	50.13	5 32 28.99
29	364	277 30 22.3	152.86	0.61	9.992 6777	2.8	49.93	9.94	20.81	50.12	5 28 33.08
30	365	278 31 31.1	152.87	0.54	9.992 6724	1.7	50.07	9.97	20.81	50.12	5 24 37.16
31	366	279 32 40.2	152.89	-0.45	9.992 6696	- 0.7	50.21	+10.00	20.81	50.12	5 20 41.25
32	367	280 33 49.7	152.90	-0.34	9.992 6692	+ 0.3	50.34	+10.04	20.81	50.12	5 16 45.34

GREENWICH MEAN TIME.

Date.	X True Equinox.		Reduc. to Mean Eq'x of 1920.0.	Y True Equinox.			Reduc. to Mean Eq'x of 1920.0.	Z True Equinox.		Reduc. to Mean Eq'x of 1920.0.
	Noon.	Midnight.		Noon.	Noon.	Midnight.		Noon.	Noon.	
			Noon.			Noon.			Noon.	
Jan. 1	+0.167 3007	+0.175 9099	-670	-0.888 8996	-0.887 4932	+ 9	-0.385 5442	-0.384 9346	-311	
2	0.184 5050	0.193 0855	676	0.886 0180	0.884 4742	- 4	0.384 2951	0.383 6259	315	
3	0.201 6508	0.210 2002	681	0.882 8620	0.881 1814	17	0.382 9269	0.382 1983	320	
4	0.218 7331	0.227 2489	686	0.879 4327	0.877 6159	30	0.381 4402	0.380 6525	324	
5	0.235 7471	0.244 2270	691	0.875 7313	0.873 7790	44	0.379 8353	0.378 9888	328	
6	+0.252 6880	+0.261 1296	-696	-0.871 7590	-0.869 6716	- 57	-0.378 1129	-0.377 2078	-333	
7	0.269 5511	0.277 9518	700	0.867 5169	0.865 2950	71	0.376 2734	0.375 3098	337	
8	0.286 3312	0.294 6887	704	0.863 0061	0.860 6502	85	0.374 3171	0.373 2953	342	
9	0.303 0236	0.311 3353	708	0.858 2275	0.855 7382	100	0.372 2445	0.371 1648	346	
10	0.319 6232	0.327 8867	712	0.853 1824	0.850 5604	115	0.370 0562	0.368 9188	350	
11	+0.336 1250	+0.344 3376	-715	-0.847 8725	-0.845 1187	-130	-0.367 7527	-0.366 5581	-355	
12	0.352 5238	0.360 6830	717	0.842 2990	0.839 4136	145	0.365 3349	0.364 0832	359	
13	0.368 8145	0.376 9177	720	0.836 4628	0.833 4467	160	0.362 8031	0.361 4947	363	
14	0.384 9919	0.393 0364	722	0.830 3656	0.827 2198	175	0.360 1580	0.358 7932	367	
15	0.401 0506	0.409 0339	723	0.824 0094	0.820 7348	191	0.357 4005	0.355 9798	372	
16	+0.416 9855	+0.424 9049	-724	-0.817 3961	-0.813 9936	-207	-0.354 5314	-0.353 0553	-376	
17	0.432 7914	0.440 6444	725	0.810 5275	0.806 9980	223	0.351 5517	0.350 0206	380	
18	0.448 4633	0.456 2473	725	0.803 4054	0.799 7501	239	0.348 4622	0.346 8766	384	
19	0.463 9959	0.471 7083	725	0.796 0324	0.792 2525	255	0.345 2639	0.343 6243	388	
20	0.479 3840	0.487 0223	725	0.788 4108	0.784 5076	271	0.341 9578	0.340 2647	392	
21	+0.494 6227	+0.502 1846	-724	-0.780 5431	-0.776 5177	-287	-0.338 5451	-0.336 7991	-396	
22	0.509 7072	0.517 1899	723	0.772 4318	0.768 2857	304	0.335 0268	0.333 2285	400	
23	0.524 6322	0.532 0334	721	0.764 0797	0.759 8142	320	0.331 4042	0.329 5542	403	
24	0.539 3930	0.546 7104	719	0.755 4896	0.751 1062	337	0.327 6786	0.325 7776	407	
25	0.553 9850	0.561 2163	717	0.746 6646	0.742 1651	354	0.323 8513	0.321 8999	411	
26	+0.568 4036	+0.575 5464	-714	-0.737 6080	-0.732 9938	-370	-0.319 9236	-0.317 9226	-414	
27	0.582 6441	0.589 6963	710	0.728 3228	0.723 5955	387	0.315 8970	0.313 8470	418	
28	0.596 7025	0.603 6621	706	0.718 8124	0.713 9739	404	0.311 7727	0.309 6745	421	
29	0.610 5746	0.617 4397	702	0.709 0803	0.704 1321	420	0.307 5524	0.305 4066	425	
30	0.624 2567	0.631 0251	697	0.699 1299	0.694 0739	437	0.303 2373	0.301 0447	428	
31	+0.637 7447	+0.644 4148	-692	-0.688 9645	-0.683 8023	-453	-0.298 8289	-0.296 5902	-431	
Feb. 1	0.651 0351	0.657 6050	687	0.678 5877	0.673 3210	470	0.294 3288	0.292 0448	436	
2	0.664 1241	0.670 5920	681	0.668 0026	0.662 6331	487	0.289 7383	0.287 4095	438	
3	0.677 0083	0.683 3724	674	0.657 2127	0.651 7420	503	0.285 0587	0.282 6860	441	
4	0.689 6841	0.695 9428	667	0.646 2212	0.640 6508	520	0.280 2915	0.277 8755	444	
5	+0.702 1482	+0.708 2998	-660	-0.635 0313	-0.629 3629	-536	-0.275 4381	-0.272 9795	-447	
6	0.714 3972	0.720 4398	653	0.623 6461	0.617 8813	553	0.270 4999	0.267 9994	449	
7	0.726 4272	0.732 3590	645	0.612 0690	0.606 2095	569	0.265 4783	0.262 9367	452	
8	0.738 2348	0.744 0542	636	0.600 3031	0.594 3504	585	0.260 3747	0.257 7926	455	
9	0.749 8165	0.755 5215	627	0.588 3520	0.582 3081	601	0.255 1906	0.252 5689	457	
10	+0.761 1686	+0.766 7574	-618	-0.576 2192	-0.570 0857	-617	-0.249 9276	-0.247 2670	-460	
11	0.772 2876	0.777 7586	609	0.563 9081	0.557 6869	633	0.244 5873	0.241 8886	462	
12	0.783 1699	0.788 5211	599	0.551 4225	0.545 1154	649	0.239 1712	0.236 4353	464	
13	0.793 8119	0.799 0418	588	0.538 7661	0.532 3751	664	0.233 6811	0.230 9088	466	
14	0.804 2104	0.809 3173	577	0.525 9428	0.519 4698	680	0.228 1187	0.225 3109	468	
15	+0.814 3622	+0.819 3445	-566	-0.512 9566	-0.506 4036	-695	-0.222 4857	-0.219 6433	-470	
16	+0.824 2639	+0.829 1199	-555	-0.499 8116	-0.493 1809	-710	-0.216 7839	-0.213 9078	-472	



GREENWICH MEAN TIME.

Date.	X True Equinox.		Reduc. to Mean Eq <sup>r</sup> of 1920.0.	Y True Equinox.		Reduc. to Mean Eq <sup>r</sup> of 1920.0.	Z True Equinox.		Reduc. to Mean Eq <sup>r</sup> of 1920.0.
	Noon.	Midnight.	Noon.	Noon.	Midnight.	Noon.	Noon.	Midnight.	Noon.
Feb. 16	+0.824 2639	+0.829 1199	-555	-0.499 8116	-0.493 1809	710	-0.216 7839	-0.213 9078	-472
17	0.833 9122	0.838 6404	543	0.486 5119	0.479 8053	725	0.211 0151	0.208 1062	474
18	0.843 9042	0.847 9031	530	0.473 0617	0.466 2816	739	0.205 1812	0.202 2404	476
19	0.852 4968	0.856 9048	518	0.459 4655	0.452 6139	754	0.199 2841	0.196 3124	477
20	0.861 3069	0.865 6427	505	0.445 7275	0.438 8069	768	0.193 3257	0.190 3241	479
21	+0.869 9118	+0.874 1140	-492	-0.431 8526	-0.424 8653	782	-0.187 9080	-0.184 2775	-480
22	0.878 2490	0.882 3165	478	0.417 8456	0.410 7939	796	0.181 2330	0.178 1747	481
23	0.886 3163	0.890 2479	464	0.403 7108	0.396 5970	809	0.175 1029	0.172 0177	482
24	0.894 1112	0.897 9059	450	0.389 4531	0.382 2798	822	0.168 9195	0.165 8085	483
25	0.901 6318	0.905 2387	435	0.375 0776	0.367 8471	835	0.162 6850	0.159 5492	484
26	+0.908 8763	+0.912 3944	-420	-0.360 5888	-0.353 3634	848	-0.156 4014	-0.153 2418	-485
27	0.915 8428	0.919 2213	405	0.345 9915	0.338 6535	861	0.150 0707	0.146 8883	485
28	0.922 5298	0.925 7680	389	0.331 2902	0.323 9621	873	0.143 6949	0.140 4907	486
29	0.928 9360	0.932 0334	373	0.316 4899	0.309 0540	885	0.137 2760	0.134 0510	486
Mar. 1	0.935 0602	0.938 0161	357	0.301 5951	0.294 1136	897	0.130 8159	0.127 5710	486
2	+0.940 9009	+0.943 7146	-341	-0.286 6101	-0.279 0851	908	-0.124 3166	-0.121 0528	-486
3	0.946 4571	0.949 1281	324	0.271 5392	0.263 9729	920	0.117 7798	0.114 4980	486
4	0.951 7275	0.954 2552	307	0.256 3869	0.248 7816	931	0.111 2076	0.107 9088	486
5	0.956 7110	0.959 0947	290	0.241 1576	0.233 5153	941	0.104 6018	0.101 2809	486
6	0.961 4062	0.963 6453	273	0.225 8564	0.218 1784	952	0.097 9843	0.094 6342	486
7	+0.965 8120	+0.967 9060	-255	-0.210 4843	-0.202 7752	962	-0.091 2969	-0.087 9527	-485
8	0.969 9271	0.971 8752	237	0.195 0501	0.187 3101	971	0.084 6017	0.081 2443	484
9	0.973 7503	0.975 5521	219	0.179 5557	0.171 7875	981	0.077 8807	0.074 5111	483
10	0.977 2806	0.978 9355	201	0.164 0061	0.156 2121	990	0.071 1357	0.067 7548	482
11	0.980 5168	0.982 0243	183	0.148 4060	0.140 5884	999	0.064 3686	0.060 9775	481
12	+0.983 4580	+0.984 8176	-164	-0.132 7599	-0.124 9210	1008	-0.057 5818	-0.054 1816	-480
13	0.986 1030	0.987 3142	145	0.117 0724	0.109 2146	1016	0.050 7771	0.047 3686	479
14	0.988 4511	0.989 5136	126	0.101 3482	0.093 4739	1024	0.043 9565	0.040 5410	477
15	0.990 5017	0.991 4152	107	0.085 5922	0.077 7037	1032	0.037 1223	0.033 7007	475
16	0.992 2541	0.993 0182	88	0.069 8091	0.061 9090	1039	0.030 2764	0.026 8497	474
17	+0.993 7077	+0.994 3224	-68	-0.054 0089	-0.046 0945	1046	-0.023 4210	-0.019 9905	-472
18	0.994 8620	0.995 3267	48	0.038 1815	0.030 2654	1053	0.016 5584	0.013 1250	469
19	0.995 7164	0.996 0311	28	0.022 3469	-0.014 4266	1059	0.009 6907	-0.006 2556	467
20	0.996 2710	0.996 4359	-8	-0.006 5051	+0.001 4169	1065	-0.002 8201	+0.000 6156	465
21	0.996 5259	0.996 5409	+12	+0.009 3386	0.017 2596	1071	+0.004 0513	0.007 4866	462
22	+0.996 4811	+0.996 3464	+32	+0.025 1791	+0.033 0966	1077	+0.010 9213	+0.014 3551	-460
23	0.996 1370	0.995 8530	53	0.041 0114	0.048 9228	1082	0.017 7876	0.021 2187	457
24	0.995 4943	0.995 0612	73	0.056 8308	0.064 7832	1087	0.024 6481	0.028 0755	454
25	0.994 5539	0.993 9723	94	0.072 6309	0.080 5228	1091	0.031 5007	0.034 9233	451
26	0.993 3166	0.992 5868	115	0.088 4082	0.096 2887	1096	0.038 3432	0.041 7601	447
27	+0.991 7832	+0.990 9059	+136	+0.104 1576	+0.112 0204	1100	+0.045 1738	+0.048 5839	-444
28	0.989 9551	0.988 9309	157	0.119 8745	0.127 7193	1103	0.051 9903	0.055 3927	440
29	0.987 8335	0.986 6630	178	0.135 5542	0.143 3787	1106	0.058 7908	0.062 1845	436
30	0.985 4195	0.984 1033	199	0.151 1922	0.158 9943	1109	0.065 5736	0.068 9577	432
31	0.982 7145	0.981 2533	220	0.166 7843	0.174 5618	1112	0.072 3366	0.075 7101	428
Apr. 1	+0.979 7198	+0.978 1142	+242	+0.182 3263	+0.190 0772	1114	+0.079 0780	+0.082 4400	-424
2	+0.976 4865	+0.974 6370	+263	+0.197 8140	+0.205 5361	1116	+0.085 7959	+0.089 1455	-420

## GREENWICH MEAN TIME.

Date.	X True Equinox.		Reduc. to Mean Eq'x of 1920.0.	Y True Equinox.		Reduc. to Mean Eq'x of 1920.0.	Z True Equinox.		Reduc. to Mean Eq'x of 1920.0.
	Noon.	Midnight.		Noon.	Noon.		Midnight.	Noon.	
Apr. 1	+0.979 7198	+0.978 1142	+ 242	+0.182 3263	+0.190 0772	-1114	+0.079 0780	+0.082 4400	-424
2	0.976 4365	0.974 6870	263	0.197 8140	0.205 5361	1116	0.085 7959	0.089 1455	420
3	0.972 8658	0.970 9730	284	0.213 2430	0.220 9343	1118	0.092 4886	0.095 8249	415
4	0.969 0088	0.966 9734	306	0.228 6094	0.236 2677	1119	0.099 1541	0.102 4761	411
5	0.964 8669	0.962 6895	328	0.243 9088	0.251 5321	1120	0.105 7906	0.109 0974	406
6	+0.960 4414	+0.958 1227	+ 349	+0.259 1371	+0.266 7232	-1121	+0.112 3963	+0.115 6870	-401
7	0.955 7336	0.953 2743	371	0.274 2900	0.281 8369	1121	0.118 9693	0.122 2429	396
8	0.950 7450	0.948 1457	393	0.289 3634	0.296 8689	1121	0.125 5077	0.128 7633	390
9	0.945 4767	0.942 7382	415	0.304 3528	0.311 8147	1121	0.132 0096	0.135 2464	385
10	0.939 9304	0.937 0535	437	0.319 2541	0.326 6704	1121	0.138 4733	0.141 6901	379
11	+0.934 1076	+0.931 0930	+ 458	+0.334 0631	+0.341 4315	-1120	+0.144 8967	+0.148 0928	-374
12	0.928 0100	0.924 8587	480	0.348 7752	0.356 0937	1119	0.151 2781	0.154 4524	368
13	0.921 6394	0.918 3522	502	0.363 3863	0.370 6526	1117	0.157 6154	0.160 7670	362
14	0.914 9974	0.911 5752	524	0.377 8920	0.385 1039	1116	0.163 9069	0.167 0348	356
15	0.908 0859	0.904 5298	546	0.392 2878	0.399 4431	1113	0.170 1506	0.173 2538	350
16	+0.900 9072	+0.897 2183	+ 569	+0.406 5694	+0.413 6660	-1111	+0.176 3444	+0.179 4222	-343
17	0.893 4635	0.889 6429	591	0.420 7323	0.427 7679	1108	0.182 4868	0.185 5380	336
18	0.885 7569	0.881 8059	613	0.434 7721	0.441 7444	1105	0.188 5758	0.191 5993	330
19	0.877 7901	0.873 7100	635	0.448 6843	0.455 5912	1102	0.194 6090	0.197 6044	323
20	0.869 5658	0.865 3580	657	0.462 4647	0.469 3042	1098	0.200 5852	0.203 5513	316
21	+0.861 0869	+0.856 7530	+ 679	+0.476 1091	+0.482 8789	-1094	+0.206 5024	+0.209 4383	-309
22	0.852 3567	0.847 8983	701	0.489 8132	0.496 3114	1089	0.212 3588	0.215 2637	301
23	0.843 3782	0.838 7968	722	0.502 9731	0.509 5978	1084	0.218 1528	0.221 0259	294
24	0.834 1546	0.829 4519	744	0.516 1851	0.522 7345	1079	0.223 8828	0.226 7239	286
25	0.824 6892	0.819 8609	766	0.529 2456	0.535 7179	1073	0.229 5472	0.232 3548	278
26	+0.814 9855	+0.810 0453	+ 788	+0.542 1510	+0.548 5446	-1067	+0.235 1445	+0.237 9176	-271
27	0.805 0467	0.799 9900	810	0.554 8982	0.561 2114	1061	0.240 6733	0.243 4115	263
28	0.794 8758	0.789 7045	832	0.567 4837	0.573 7148	1055	0.246 1322	0.248 8350	254
29	0.784 4764	0.779 1920	854	0.579 9044	0.586 0520	1048	0.251 5198	0.254 1864	246
30	0.773 8516	0.768 4557	875	0.592 1572	0.598 2196	1041	0.256 8347	0.259 4644	238
May 1	+0.763 0046	+0.757 4987	+ 897	+0.604 2388	+0.610 2145	-1033	+0.262 0754	+0.264 6676	-229
2	0.751 9384	0.746 3242	919	0.616 1464	0.622 0340	1025	0.267 2407	0.269 7946	221
3	0.740 6564	0.734 9354	940	0.627 8770	0.633 6749	1017	0.272 3292	0.274 8442	212
4	0.729 1616	0.723 3355	961	0.639 4274	0.645 1341	1008	0.277 3395	0.279 8149	203
5	0.717 4574	0.711 5277	983	0.650 7945	0.656 4084	999	0.282 2703	0.284 7055	194
6	+0.705 5468	+0.699 5152	+1004	+0.661 9754	+0.667 4951	-990	+0.287 1204	+0.289 5147	-185
7	0.693 4833	0.687 3015	1025	0.672 9672	0.678 3913	980	0.291 8893	0.294 2410	175
8	0.681 1201	0.674 8896	1046	0.683 7670	0.689 0938	970	0.296 5727	0.298 8832	166
9	0.668 6106	0.662 2834	1067	0.694 3714	0.699 5993	960	0.301 1723	0.303 4399	157
10	0.655 9084	0.649 4800	1088	0.704 7773	0.709 9050	949	0.305 6858	0.307 9098	147
11	+0.643 0168	+0.636 5012	+1109	+0.714 9820	+0.720 0061	-938	+0.310 1117	+0.312 2914	-137
12	0.629 9395	0.623 3323	1130	0.724 9828	0.729 9057	926	0.314 4489	0.316 5839	128
13	0.616 6801	0.609 9833	1150	0.734 7764	0.739 5945	914	0.318 6962	0.320 7857	118
14	0.603 2424	0.596 4578	1170	0.744 3597	0.749 0716	902	0.322 8522	0.324 8956	108
15	0.589 6301	0.582 7598	1191	0.753 7299	0.758 3341	889	0.326 9156	0.328 9121	97
16	+0.575 8474	+0.568 8935	+1211	+0.762 8938	+0.767 3788	-876	+0.330 8850	+0.332 8341	-87
17	+0.561 8935	+0.554 8631	+1231	+0.771 8187	+0.776 2061	-863	+0.334 7594	+0.336 6607	-77

GREENWICH MEAN TIME.

Date.	X True Equinox.		Reduc. to Mean Eq'x of 1920.0.	Y True Equinox.		Reduc. to Mean Eq'x of 1920.0.	Z True Equinox.		Reduc. to Mean Eq'x of 1920.0.
	Noon.	Midnight.	Noon.	Noon.	Midnight.	Noon.	Noon.	Midnight.	Noon.
May 17	+0.561 8085	+0.554 8631	+1231	+0.771 8187	+0.776 2061	-863	+0.334 7504	+0.336 6607	- 77
18	0.547 7877	0.540 6790	1250	0.780 5318	0.784 8044	849	0.338 5878	0.340 3906	66
19	0.533 5196	0.526 3279	1270	0.789 0206	0.793 1801	835	0.342 2189	0.344 0226	56
20	0.519 0987	0.511 8825	1289	0.797 2825	0.801 3276	820	0.345 8616	0.347 5557	45
21	0.504 5297	0.497 1911	1308	0.805 3151	0.809 2448	805	0.349 2849	0.350 9891	34
22	+0.489 8173	+0.482 4068	+1327	+0.813 1164	+0.816 9297	-789	+0.352 6681	+0.354 3219	- 24
23	0.474 9662	0.467 4900	1346	0.820 6844	0.824 3804	773	0.355 9508	0.357 5533	13
24	0.459 9810	0.452 4396	1365	0.828 0174	0.831 5953	757	0.359 1308	0.360 6827	- 2
25	0.444 8663	0.437 2618	1383	0.835 1139	0.838 5730	741	0.362 2089	0.363 7022	+ 9
26	0.429 6267	0.421 9614	1401	0.841 9723	0.845 3117	724	0.365 1837	0.366 6823	20
27	+0.414 2665	+0.406 5426	+1419	+0.848 5911	+0.851 8101	-706	+0.368 6549	+0.369 4514	+ 31
28	0.398 7901	0.391 0097	1436	0.854 9687	0.858 0666	688	0.370 8216	0.372 1655	43
29	0.383 2019	0.375 3672	1454	0.861 1037	0.864 6900	670	0.373 4831	0.374 7743	54
30	0.367 5060	0.359 6190	1471	0.866 9952	0.869 8491	652	0.376 6890	0.377 2771	65
31	0.351 7068	0.343 7699	1488	0.872 6416	0.875 3723	633	0.378 4885	0.379 6732	77
June 1	+0.335 8067	+0.327 8239	+1504	+0.878 0412	+0.880 6481	-614	+0.380 8611	+0.381 9621	+ 88
2	0.319 8159	0.311 7853	1520	0.883 1930	0.885 6756	594	0.383 0661	0.384 1432	100
3	0.303 7327	0.295 6585	1536	0.888 6959	0.890 4536	574	0.385 1932	0.386 2160	111
4	0.287 5634	0.279 4478	1552	0.892 7486	0.894 9608	553	0.387 2118	0.388 1798	123
5	0.271 3123	0.263 1574	1567	0.897 1499	0.899 2559	532	0.389 1207	0.390 0341	135
6	+0.254 9837	+0.246 7917	+1582	+0.901 2965	+0.903 2776	-511	+0.390 9200	+0.391 7784	+146
7	0.238 5820	0.230 3552	1596	0.905 1930	0.907 0446	489	0.392 6091	0.393 4121	158
8	0.222 1117	0.213 8522	1610	0.908 9322	0.910 5558	467	0.394 1873	0.394 9347	170
9	0.205 5772	0.197 2873	1624	0.912 2152	0.913 8163	445	0.395 6542	0.396 3458	182
10	0.188 9630	0.180 6650	1638	0.915 3410	0.916 8070	422	0.397 0094	0.397 6449	194
11	+0.172 3337	+0.163 9693	+1651	+0.918 2061	+0.919 5443	-399	+0.398 2522	+0.398 8314	+206
12	0.155 6339	0.147 2667	1663	0.920 8154	0.922 0214	376	0.399 8823	0.399 9050	218
13	0.138 8837	0.130 5005	1676	0.923 1621	0.924 2373	352	0.400 3994	0.400 8654	230
14	0.122 1028	0.113 6962	1688	0.925 2471	0.926 1912	328	0.401 8030	0.401 7121	242
15	0.105 2814	0.096 8590	1699	0.927 0696	0.927 8821	303	0.402 0927	0.402 4447	254
16	+0.088 4296	+0.079 9940	+1710	+0.928 6287	+0.929 3093	-278	+0.402 7682	+0.403 0631	+266
17	0.071 5527	0.063 1065	1721	0.929 9239	0.930 4726	253	0.403 3295	0.403 5673	277
18	0.054 6559	0.046 2016	1731	0.930 9554	0.931 3721	227	0.403 7765	0.403 9570	289
19	0.037 7444	0.029 2848	1740	0.931 7227	0.932 0072	201	0.404 1089	0.404 2322	301
20	0.020 8234	+0.012 3610	1749	0.932 2257	0.932 3782	175	0.404 3270	0.404 3933	313
21	+0.003 8981	-0.004 5648	+1758	+0.932 4649	+0.932 4857	-148	+0.404 4310	+0.404 4402	+325
22	-0.013 0299	0.021 4877	1766	0.932 4408	0.932 8301	121	0.404 4208	0.404 3730	337
23	0.029 9465	0.063 4028	1773	0.932 1536	0.931 9115	94	0.404 2967	0.404 1919	349
24	0.046 8590	0.055 3055	1780	0.931 6039	0.931 2307	67	0.404 0587	0.403 8971	361
25	0.063 7508	0.072 1912	1787	0.930 7921	0.930 2881	40	0.403 7072	0.403 4890	373
26	-0.080 6268	-0.089 0554	+1793	+0.929 7188	+0.929 0843	- 12	+0.403 2424	+0.402 9675	+385
27	0.097 4779	0.105 8934	1799	0.928 8846	0.927 6198	+ 17	0.402 6644	0.402 3330	397
28	0.114 8013	0.122 7010	1804	0.928 7900	0.925 8952	45	0.401 9733	0.401 6855	409
29	0.131 0919	0.139 4735	1808	0.924 9356	0.923 9113	74	0.401 1697	0.400 7257	420
30	0.147 8452	0.156 2065	1812	0.922 8222	0.921 6684	103	0.400 2536	0.399 7584	432
July 1	-0.164 5599	-0.172 8957	+1815	+0.920 4501	+0.919 1674	+132	+0.399 2251	+0.398 6689	+444
2	-0.181 2225	-0.189 6366	+1818	+0.917 8203	+0.916 4089	+161	+0.398 0847	+0.397 4727	+456

## GREENWICH MEAN TIME.

Date.	X		Reduc.	Y		Reduc.	Z		Reduc.
	True Equinox.		to Mean	True Equinox.		to Mean	True Equinox.		to Mean
	Noon.	Midnight.	Eq'rs of 1920.0.	Noon.	Midnight.	Eq'rs of 1920.0.	Noon.	Midnight.	Eq'rs of 1920.0.
July 1	-0.164 5569	-0.172 8957	+1815	+0.920 4501	+0.919 1674	+ 132	+0.399 2251	+0.398 6689	+444
2	0.181 2225	0.189 5366	1818	0.917 8203	0.916 4089	161	0.398 0847	0.397 4727	456
3	0.197 8376	0.206 1249	1820	0.914 9833	0.913 3936	191	0.396 8928	0.396 1651	467
4	0.214 3979	0.222 6561	1822	0.911 7898	0.910 1221	221	0.395 4695	0.394 7462	479
5	0.230 8989	0.239 1258	1823	0.908 3906	0.906 5954	251	0.393 9951	0.393 2164	490
6	-0.247 3363	-0.255 5297	+1823	+0.904 7365	+0.902 8141	+ 281	+0.392 4100	+0.391 5760	+502
7	0.263 7055	0.271 8631	1823	0.900 8283	0.898 7790	311	0.390 7144	0.389 8253	513
8	0.280 0020	0.288 1216	1822	0.896 6664	0.894 4906	342	0.388 9088	0.387 9648	524
9	0.296 2213	0.304 3006	1820	0.892 2517	0.889 9500	372	0.386 9935	0.385 9949	536
10	0.312 3588	0.320 3954	1818	0.887 5855	0.885 1582	403	0.384 9690	0.383 9159	547
11	-0.328 4097	-0.336 4012	+1816	+0.882 6683	+0.880 1160	+ 434	+0.382 8356	+0.381 7282	+558
12	0.344 3693	0.352 3133	1812	0.877 5013	0.874 8244	464	0.380 5938	0.379 4325	569
13	0.360 2327	0.368 1268	1808	0.872 0855	0.869 2848	495	0.378 2443	0.377 0293	580
14	0.375 9650	0.383 8368	1804	0.866 4225	0.863 4937	527	0.375 7876	0.374 5193	591
15	0.391 6514	0.399 4883	1798	0.860 5136	0.857 4675	558	0.373 2245	0.371 9032	601
16	-0.407 1968	-0.414 9264	+1792	+0.854 3605	+0.851 1930	+ 589	+0.370 5555	+0.369 1816	+612
17	0.422 6265	0.430 2965	1786	0.847 9651	0.844 6772	620	0.367 7816	0.366 3556	623
18	0.437 9358	0.445 5437	1779	0.841 3294	0.837 9221	651	0.364 9037	0.363 4261	633
19	0.453 1198	0.460 6635	1771	0.834 4556	0.830 9302	683	0.361 9228	0.360 3940	643
20	0.468 1742	0.475 6516	1762	0.827 3461	0.823 7036	714	0.358 8397	0.357 2601	654
21	-0.483 0951	-0.490 5041	+1753	+0.820 0031	+0.816 2448	+ 745	+0.355 6554	+0.354 0257	+664
22	0.497 8782	0.505 2167	1743	0.812 4291	0.808 5563	776	0.352 3710	0.350 6916	674
23	0.512 5192	0.519 7852	1732	0.804 6266	0.800 6403	807	0.348 9875	0.347 2589	683
24	0.527 0143	0.534 2059	1721	0.796 5978	0.792 4993	838	0.345 5059	0.343 7296	693
25	0.541 3596	0.548 4749	1709	0.788 3451	0.784 1354	869	0.341 9272	0.340 1017	703
26	-0.555 5513	-0.562 5884	+1697	+0.779 8707	+0.775 5512	+ 900	+0.338 2523	+0.336 3791	+712
27	0.569 5856	0.576 5425	1684	0.771 1773	0.766 7493	931	0.334 4823	0.332 5620	721
28	0.583 4587	0.590 8337	1670	0.762 2875	0.757 7321	961	0.330 6183	0.328 6514	730
29	0.597 1671	0.603 9584	1655	0.753 1435	0.748 5020	992	0.326 6614	0.324 6494	739
30	0.610 7072	0.617 4130	1640	0.743 8078	0.739 0613	1022	0.322 6126	0.320 5540	748
31	-0.624 0753	-0.630 6936	+1624	+0.734 2628	+0.729 4126	+1052	+0.318 4727	+0.316 3690	+757
Aug. 1	0.637 2676	0.643 7968	1608	0.724 5109	0.719 5582	1082	0.314 2429	0.312 0947	766
2	0.650 2807	0.656 7190	1591	0.714 5547	0.709 5008	1112	0.309 9245	0.307 7324	774
3	0.663 1111	0.669 4567	1573	0.704 3968	0.699 2429	1142	0.305 5185	0.303 2829	782
4	0.675 7552	0.682 0062	1555	0.694 0394	0.688 7866	1171	0.301 0257	0.298 7472	790
5	-0.688 2092	-0.694 3638	+1536	+0.683 4850	+0.678 1349	+1200	+0.296 4474	+0.294 1266	+798
6	0.700 4696	0.706 5260	1516	0.672 7365	0.667 2902	1229	0.291 7849	0.289 4224	806
7	0.712 5327	0.718 4891	1496	0.661 7963	0.656 2551	1257	0.287 0392	0.284 6355	813
8	0.724 3948	0.730 2493	1475	0.650 6671	0.645 0325	1286	0.282 2115	0.279 7673	821
9	0.736 0520	0.741 8026	1453	0.639 8518	0.633 6253	1314	0.277 3031	0.274 8191	828
10	-0.747 5005	-0.753 1454	+1431	+0.627 8533	+0.622 0362	+1342	+0.272 3154	+0.269 7922	+835
11	0.758 7367	0.764 2740	1408	0.616 1745	0.610 2685	1369	0.267 2496	0.264 6879	842
12	0.769 7568	0.775 1846	1385	0.604 3187	0.598 3255	1396	0.262 1073	0.259 5079	848
13	0.780 5570	0.785 8734	1361	0.592 2893	0.586 2107	1423	0.256 8899	0.254 2535	855
14	0.791 1335	0.796 3370	1337	0.580 0900	0.573 9278	1450	0.251 5989	0.248 9263	861
15	-0.801 4834	-0.806 5722	+1312	+0.567 7246	+0.561 4807	+1476	+0.246 2359	+0.243 5279	+867
16	-0.811 6031	-0.816 5757	+1286	+0.555 1967	+0.548 8731	+1501	+0.240 8026	+0.238 0601	+873

GREENWICH MEAN TIME.

Date.	X True Equinox.		Reduc. to Mean Eq'x of 1920.0.	Y True Equinox.		Reduc. to Mean Eq'x of 1920.0.	Z True Equinox.		Reduc. to Mean Eq'x of 1920.0.
	Noon.	Midnight.		Noon.	Midnight.		Noon.	Midnight.	
Aug. 16	-0.811 6031	-0.816 5757	+1286	+0.555 1967	+0.548 8731	+1501	+0.240 8026	+0.238 0601	+873
17	0.821 4896	0.826 3445	1260	0.542 5102	0.536 1086	1527	0.235 3007	0.232 5246	878
18	0.831 1400	0.835 8758	1233	0.529 6689	0.523 1916	1552	0.229 7319	0.226 9229	884
19	0.840 5516	0.845 1670	1206	0.516 6771	0.510 1259	1576	0.224 0977	0.221 2566	889
20	0.849 7217	0.854 2154	1178	0.503 5384	0.496 9152	1600	0.218 3998	0.215 5275	894
21	-0.858 6478	-0.863 0186	+1150	+0.490 2569	+0.483 5638	+1624	+0.212 6399	+0.209 7872	+899
22	0.867 3275	0.871 5748	1121	0.476 8365	0.470 0754	1647	0.206 8197	0.203 8875	903
23	0.875 7586	0.879 8801	1091	0.463 2809	0.456 4536	1670	0.200 9407	0.197 9797	907
24	0.883 9386	0.887 9337	1062	0.449 5939	0.442 7023	1692	0.195 0047	0.192 0158	911
25	0.891 8652	0.895 7829	1031	0.435 7793	0.428 8255	1714	0.189 0133	0.185 9974	915
26	-0.899 5365	-0.903 2758	+1000	+0.421 8412	+0.414 8270	+1735	+0.182 9682	+0.179 9260	+919
27	0.906 9504	0.910 5601	969	0.407 7834	0.400 7107	1756	0.176 8711	0.173 8035	922
28	0.914 1047	0.917 5840	938	0.393 6995	0.386 4802	1776	0.170 7234	0.167 6811	925
29	0.920 9977	0.924 3454	906	0.379 3234	0.372 1394	1796	0.164 5269	0.161 4108	928
30	0.927 6270	0.930 8423	873	0.364 9288	0.357 6920	1815	0.158 2831	0.155 1441	931
31	-0.933 9911	-0.937 0730	+ 840	+0.350 4296	+0.343 1420	+1834	+0.151 9939	+0.148 8328	+933
Sept. 1	0.940 0878	0.943 0352	807	0.335 8297	0.328 4930	1853	0.145 6609	0.142 4785	935
2	0.945 9150	0.948 7269	773	0.321 1825	0.313 7485	1870	0.139 2857	0.136 0827	937
3	0.951 4708	0.954 1464	739	0.306 3417	0.298 9126	1888	0.132 8698	0.129 6472	939
4	0.956 7534	0.959 2917	704	0.291 4617	0.283 9895	1904	0.126 4152	0.123 1740	940
5	-0.961 7609	-0.964 1607	+ 669	+0.276 4963	+0.268 9827	+1920	+0.119 9237	+0.116 6646	+941
6	0.966 4909	0.968 7512	634	0.261 4493	0.253 8965	1938	0.113 3968	0.110 1207	942
7	0.970 9415	0.973 0614	599	0.246 3250	0.238 7353	1951	0.106 8365	0.103 5445	943
8	0.975 1108	0.977 0894	563	0.231 1279	0.223 5033	1965	0.100 2448	0.096 9377	943
9	0.978 9969	0.980 8832	527	0.215 8621	0.208 2050	1979	0.093 6235	0.090 3024	943
10	-0.982 5982	-0.984 2916	+ 490	+0.200 5824	+0.192 8450	+1992	+0.086 9746	+0.083 6405	+943
11	0.985 9132	0.987 4629	453	0.185 1434	0.177 4282	2005	0.080 3003	0.076 9642	943
12	0.988 9404	0.990 3456	416	0.169 7000	0.161 9593	2017	0.073 6024	0.070 2453	942
13	0.991 6784	0.992 9387	379	0.154 2068	0.146 4431	2029	0.066 8831	0.063 5160	941
14	0.994 1264	0.995 2413	341	0.138 6688	0.130 8845	2040	0.060 1444	0.056 7684	940
15	-0.996 2834	-0.997 2525	+ 304	+0.123 0908	+0.115 2883	+2050	+0.053 3884	+0.050 0046	+938
16	0.998 1486	0.998 9717	266	0.107 4777	0.099 6595	2060	0.046 6172	0.043 2265	937
17	0.999 7217	1.000 3936	227	0.091 8343	0.084 0027	2069	0.039 8329	0.036 4365	935
18	1.001 0023	1.001 5828	189	0.076 1653	0.068 3226	2077	0.033 0875	0.029 6362	932
19	1.001 9901	1.002 3741	150	0.060 4753	0.052 6239	2085	0.026 2329	0.022 8278	930
20	-1.002 6847	-1.002 9220	+ 111	+0.044 7690	+0.036 9112	+2093	+0.019 4211	+0.016 0131	+927
21	1.003 0861	1.003 1768	72	0.029 0511	0.021 1892	2099	0.012 6041	0.009 1943	924
22	1.003 1942	1.003 1382	33	+0.013 3260	+0.005 4622	2105	+0.005 7839	+0.002 3732	920
23	1.003 0088	1.002 8061	6	-0.002 4017	-0.010 2652	2111	-0.001 0376	-0.004 4483	916
24	1.002 5301	1.002 1809	45	0.018 1276	0.025 9884	2116	0.007 8585	0.011 2680	912
25	-1.001 7584	-1.001 2627	- 85	-0.033 8471	-0.041 7031	+2120	-0.014 6766	-0.018 0841	+908
26	1.000 6938	1.000 0517	125	0.049 5558	0.057 4048	2123	0.021 4903	0.024 8949	904
27	0.999 3364	0.998 5481	164	0.065 2495	0.073 0894	2126	0.028 2977	0.031 6984	899
28	0.997 6867	0.996 7523	204	0.080 9239	0.088 7526	2129	0.035 0967	0.038 4925	894
29	0.995 7449	0.994 6645	244	0.096 5748	0.104 3901	2130	0.041 8856	0.045 2757	888
30	-0.993 5111	-0.992 2848	- 284	-0.112 1978	-0.119 9975	+2131	-0.048 6625	-0.052 0458	+883
Oct. 1	-0.990 9855	-0.989 6134	- 324	-0.127 7886	-0.135 5707	+2132	-0.055 4254	-0.058 8010	+877

GREENWICH MEAN TIME.

Date.	X		Reduc. to Mean Eq'x of 1920.0.	Y		Reduc. to Mean Eq'x of 1920.0.	Z		Reduc. to Mean Eq'x of 1920.0.	
	True Equinox.			True Equinox.			True Equinox.			
	Noon.	Midnight.	Noon.	Noon.	Midnight.	Noon.	Noon.	Midnight.	Noon.	
Oct.	1	-0.990 9855	-0.989 6134	324	-0.127 7886	-0.185 5707	+2192	-0.065 4254	-0.068 8010	+877
	2	0.988 1684	0.986 6506	364	0.143 3431	0.151 1658	2132	0.062 1725	0.065 5395	871
	3	0.985 0600	0.983 3966	404	0.158 8567	0.166 5968	2131	0.068 9017	0.072 2590	864
	4	0.981 6604	0.979 8516	444	0.174 3249	0.182 0405	2129	0.075 6112	0.078 9579	857
	5	0.977 9702	0.976 0163	484	0.189 7430	0.197 4319	2127	0.082 2988	0.085 6338	850
	6	-0.973 9898	-0.971 8909	524	-0.205 1067	-0.212 7666	+2125	-0.088 9026	-0.092 2349	+843
	7	0.969 7196	0.967 4760	565	0.220 4110	0.228 0393	2122	0.095 6004	0.098 9069	836
	8	0.965 1603	0.962 7728	605	0.235 6510	0.243 2454	2118	0.102 2101	0.105 5038	828
	9	0.960 3129	0.957 7815	645	0.250 8219	0.258 3799	2113	0.108 7898	0.112 0677	820
	10	0.955 1784	0.952 5038	685	0.265 9188	0.273 4579	2108	0.115 3373	0.118 5982	811
	11	-0.949 7579	-0.946 9409	725	-0.280 9366	-0.288 4143	+2102	-0.121 8563	-0.125 0932	+802
	12	0.944 0530	0.941 0944	765	0.295 8705	0.303 3045	2096	0.128 3287	0.131 5506	793
	13	0.938 0652	0.934 9657	805	0.310 7157	0.318 1035	2089	0.134 7647	0.137 9686	784
	14	0.931 7963	0.928 5571	844	0.325 4673	0.332 8065	2081	0.141 1622	0.144 3451	775
	15	0.925 2483	0.921 8702	884	0.340 1205	0.347 4088	2073	0.147 5171	0.150 6780	765
	16	-0.918 4231	-0.914 9072	924	-0.354 6708	-0.361 9080	+2065	-0.153 8274	-0.156 9652	+755
	17	0.911 3227	0.907 6700	963	0.369 1138	0.376 2936	2055	0.160 0911	0.163 2049	745
	18	0.903 9494	0.900 1612	1002	0.383 4448	0.390 5670	2045	0.166 3064	0.169 3953	734
	19	0.896 3056	0.892 3829	1042	0.397 6596	0.404 7220	2034	0.172 4714	0.175 5345	723
	20	0.888 3935	0.884 3377	1081	0.411 7538	0.418 7544	2023	0.178 5843	0.181 6206	712
21	-0.880 2157	-0.876 0279	1120	-0.425 7233	-0.432 6599	+2011	-0.184 6432	-0.187 6518	+701	
22	0.871 7746	0.867 4560	1158	0.439 5638	0.446 4345	1999	0.190 6463	0.193 6264	689	
23	0.863 0725	0.858 6245	1197	0.453 2714	0.460 0741	1986	0.196 5919	0.199 5426	677	
24	0.854 1122	0.849 5361	1235	0.466 8420	0.473 5747	1972	0.202 4783	0.205 3987	665	
25	0.844 8965	0.840 1936	1274	0.480 2717	0.486 9326	1957	0.208 3037	0.211 1930	652	
26	-0.835 4277	-0.830 5993	1312	-0.493 5569	-0.500 1441	+1942	-0.214 0663	-0.216 9236	+640	
27	0.825 7086	0.820 7560	1349	0.506 6937	0.513 2053	1927	0.219 7647	0.222 5894	627	
28	0.815 7417	0.810 6661	1387	0.519 6784	0.526 1126	1911	0.225 3973	0.228 1883	614	
29	0.805 5296	0.800 3324	1424	0.532 5073	0.538 8622	1894	0.230 9621	0.233 7186	601	
30	0.795 0748	0.789 7572	1461	0.545 1767	0.551 4504	1877	0.236 4576	0.239 1789	587	
31	-0.784 3799	-0.778 9432	1498	-0.557 6827	-0.563 8733	+1859	-0.241 8823	-0.244 5675	+573	
Nov.	1	0.773 4475	0.767 8930	1535	0.570 0216	0.576 1272	1840	0.247 2343	0.249 8825	559
	2	0.762 2802	0.756 6094	1571	0.582 1894	0.588 2078	1821	0.252 5119	0.255 1222	545
	3	0.750 8809	0.745 0951	1607	0.594 1820	0.600 1114	1801	0.257 7133	0.260 2849	530
	4	0.739 2524	0.733 3531	1643	0.605 9956	0.611 8840	1781	0.262 8369	0.265 3690	515
	5	-0.727 3978	-0.721 3869	1679	-0.617 6261	-0.623 3714	+1760	-0.267 8810	-0.270 3726	+500
	6	0.715 3207	0.709 1997	1714	0.629 0694	0.634 7197	1738	0.272 8437	0.275 2940	485
	7	0.703 0244	0.696 7951	1749	0.640 3217	0.645 8749	1716	0.277 7234	0.280 1316	470
	8	0.690 5124	0.684 1767	1783	0.651 3789	0.656 8831	1693	0.282 5185	0.284 8838	454
	9	0.677 7886	0.671 3485	1817	0.662 2371	0.667 5905	1670	0.287 2272	0.289 5487	438
	10	-0.664 8569	-0.658 3143	1851	-0.672 8927	-0.678 1434	+1646	-0.291 8480	-0.294 1249	+422
	11	0.651 7212	0.645 0782	1885	0.683 3420	0.688 4881	1621	0.296 3793	0.298 6110	406
	12	0.638 3857	0.631 6444	1918	0.693 5814	0.698 6214	1596	0.300 8197	0.303 0054	390
	13	0.624 8548	0.618 0174	1950	0.703 6078	0.708 5401	1570	0.305 1678	0.307 3067	373
	14	0.611 1327	0.604 2013	1983	0.713 4178	0.718 2406	1544	0.309 4219	0.311 5134	356
	15	-0.597 2238	-0.590 2007	2015	-0.723 0080	-0.727 7198	+1517	-0.313 5810	-0.315 6245	+339
	16	-0.583 1326	-0.576 0200	2046	-0.732 3755	-0.736 9748	+1489	-0.317 6437	-0.319 6385	+322

GREENWICH MEAN TIME.

Date.	X		Reduc. to Mean Eq'x of 1920.0.	Y		Reduc. to Mean Eq'x of 1920.0.	Z		Reduc. to Mean Eq'x of 1920.0.
	True Equinox.			True Equinox.			True Equinox.		
	Noon.	Midnight.	Noon.	Noon.	Midnight.	Noon.	Noon.	Midnight.	Noon.
Nov. 16	-0.583 1326	-0.576 0200	-2046	-0.732 3755	-0.736 9748	+1489	-0.317 6437	-0.319 6385	+322
17	0.568 8634	0.561 8635	2077	0.741 5174	0.746 0031	1461	0.321 6088	0.323 5543	305
18	0.554 4209	0.547 1360	2108	0.750 4313	0.754 8016	1432	0.325 4749	0.327 3705	287
19	0.539 8094	0.532 4418	2138	0.759 1139	0.763 3678	1403	0.329 2410	0.331 0861	270
20	0.525 0336	0.517 5855	2168	0.767 5629	0.771 6989	1373	0.332 9058	0.334 6999	252
21	-0.510 0980	-0.502 5718	-2197	-0.775 7756	-0.779 7927	+1343	-0.336 4683	-0.338 2109	+234
22	0.495 0074	0.487 4054	2225	0.783 7500	0.787 6472	1312	0.339 9275	0.341 8181	216
23	0.479 7663	0.472 0907	2254	0.791 4840	0.795 2601	1280	0.343 2824	0.344 9204	198
24	0.464 3792	0.456 6323	2281	0.798 9751	0.802 6238	1248	0.346 6320	0.348 1170	179
25	0.448 8505	0.441 0344	2309	0.806 2211	0.809 7517	1215	0.349 6754	0.351 2071	161
26	-0.433 1845	-0.425 3014	-2335	-0.813 2203	-0.816 6267	+1182	-0.352 7118	-0.354 1895	+142
27	0.417 3856	0.409 4377	2362	0.819 9707	0.823 2519	1148	0.355 6400	0.357 0633	123
28	0.401 4582	0.393 4477	2387	0.826 4700	0.829 6248	1114	0.358 4593	0.359 8278	105
29	0.385 4067	0.377 3357	2412	0.832 7161	0.835 7435	1079	0.361 1686	0.362 4816	86
30	0.369 2354	0.361 1063	2436	0.838 7067	0.841 6055	1044	0.363 7668	0.365 0240	67
Dec. 1	-0.352 9490	-0.344 7641	-2460	-0.844 4396	-0.847 2088	+1008	-0.366 2531	-0.367 4540	+ 47
2	0.336 5522	0.328 3139	2483	0.849 9128	0.852 5514	971	0.368 6266	0.369 7708	28
3	0.320 0499	0.311 7607	2506	0.855 1242	0.857 6310	934	0.370 8864	0.371 9733	+ 9
4	0.303 4469	0.295 1092	2528	0.860 0714	0.862 4452	896	0.373 0315	0.374 0608	- 11
5	0.286 7483	0.278 3649	2549	0.864 7523	0.866 9924	858	0.375 0611	0.376 0323	31
6	-0.269 9595	-0.261 5329	-2569	-0.869 1653	-0.871 2707	+ 820	-0.376 9743	-0.377 8871	- 50
7	0.253 0857	0.244 8186	2589	0.873 3085	0.875 2784	781	0.378 7705	0.379 6245	70
8	0.236 1324	0.227 6277	2608	0.877 1802	0.879 0138	741	0.380 4490	0.381 2440	90
9	0.219 1051	0.210 5654	2627	0.880 7799	0.882 4756	701	0.382 0093	0.382 7449	110
10	0.202 0093	0.193 4374	2645	0.884 1035	0.885 6626	660	0.383 4506	0.384 1265	130
11	-0.184 8505	-0.176 2493	-2662	-0.887 1527	-0.888 5737	+ 619	-0.384 7726	-0.385 3888	-149
12	0.167 6345	0.159 0068	2678	0.889 9255	0.891 2078	578	0.385 9749	0.386 5309	169
13	0.150 3668	0.141 7153	2694	0.892 4206	0.893 5638	536	0.387 0568	0.387 5525	189
14	0.133 0531	0.124 3807	2708	0.894 6374	0.895 6413	494	0.388 0181	0.388 4536	209
15	0.115 6989	0.107 0084	2722	0.896 5754	0.897 4396	451	0.388 8588	0.389 2338	229
16	-0.098 3099	-0.089 6041	-2736	-0.898 2340	-0.898 9585	+ 408	-0.389 5785	-0.389 8929	-249
17	0.080 8916	0.072 1732	2748	0.899 6130	0.900 1975	364	0.390 1770	0.390 4307	269
18	0.063 4497	0.054 7216	2760	0.900 7121	0.901 1567	320	0.390 6541	0.390 8472	289
19	0.045 9897	0.037 2546	2770	0.901 5313	0.901 8358	276	0.391 0099	0.391 1422	310
20	0.028 5170	0.019 7776	2780	0.902 0708	0.902 2347	231	0.391 2442	0.391 3159	330
21	-0.011 0370	-0.002 2959	-2789	-0.902 3292	-0.902 3537	+ 186	-0.391 3572	-0.391 3682	-350
22	+0.006 4450	+0.015 1852	2797	0.902 3084	0.902 1933	140	0.391 3489	0.391 2993	370
23	0.023 9239	0.032 6605	2805	0.902 0083	0.901 7536	95	0.391 2194	0.391 1092	390
24	0.041 3945	0.050 1252	2811	0.901 4291	0.901 0350	49	0.390 9688	0.390 7981	410
25	0.058 8519	0.067 5740	2817	0.900 5712	0.900 0377	+ 2	0.390 5971	0.390 3659	429
26	+0.076 2910	+0.085 0022	-2821	-0.899 4347	-0.898 7622	- 44	-0.390 1044	-0.389 8128	-449
27	0.093 7070	0.102 4047	2825	0.898 0201	0.897 2085	91	0.389 4910	0.389 1390	469
28	0.111 0948	0.119 7766	2828	0.896 3275	0.895 3770	138	0.388 7569	0.388 3446	489
29	0.128 4495	0.137 1128	2830	0.894 3570	0.893 2676	186	0.387 9021	0.387 4295	508
30	0.145 7658	0.154 4079	2831	0.892 1089	0.890 8808	233	0.386 9267	0.386 3938	528
31	+0.163 0383	+0.171 6564	-2831	-0.889 5835	-0.888 2169	- 281	-0.385 8309	-0.385 2379	-548
32	+0.180 2617	+0.188 8534	-2830	-0.886 7812	-0.885 2763	- 329	-0.384 6149	-0.383 9619	-567

## GREENWICH MEAN TIME.

Hour.	Right Ascension.	Var. per Min.	Declination.	Var. per Min.	Hour.	Right Ascension.	Var. per Min.	Declination.	Var. per Min.
JANUARY 1.					JANUARY 3.				
	h m s	s	° ' "	"		h m s	s	° ' "	"
0	2 25 31.43	2.4241	+15 48 47.8	+ 8.524	0	4 28 3.08	2.6564	+20 26 46.1	+2.586
1	2 27 57.05	2.4300	15 57 16.5	8.432	1	4 30 42.55	2.6592	20 29 16.8	2.437
2	2 30 23.03	2.4359	16 5 39.6	8.338	2	4 33 22.18	2.6618	20 31 38.5	2.288
3	2 32 49.36	2.4418	16 13 57.0	8.243	3	4 36 1.96	2.6643	20 33 51.1	2.134
4	2 35 16.05	2.4477	16 22 8.7	8.145	4	4 38 41.89	2.6666	20 35 54.6	1.963
5	2 37 43.09	2.4535	16 30 14.4	8.046	5	4 41 21.95	2.6688	20 37 48.9	1.800
6	2 40 10.47	2.4593	16 38 14.2	7.947	6	4 44 2.15	2.6710	20 39 34.2	1.678
7	2 42 38.21	2.4652	16 46 8.0	7.846	7	4 46 42.47	2.6730	20 41 10.2	1.523
8	2 45 6.30	2.4710	16 53 55.7	7.743	8	4 49 22.91	2.6749	20 42 37.0	1.370
9	2 47 34.73	2.4768	17 1 37.2	7.639	9	4 52 3.46	2.6766	20 43 54.6	1.216
10	2 50 3.51	2.4825	17 9 12.4	7.533	10	4 54 44.10	2.6782	20 45 2.9	1.061
11	2 52 32.63	2.4883	17 16 41.2	7.426	11	4 57 24.84	2.6797	20 46 1.9	0.906
12	2 55 2.10	2.4939	17 24 3.5	7.318	12	5 0 5.66	2.6810	20 46 51.6	0.751
13	2 57 31.90	2.4996	17 31 19.3	7.208	13	5 2 46.56	2.6822	20 47 32.0	0.595
14	3 0 2.05	2.5052	17 38 28.5	7.097	14	5 5 27.52	2.6832	20 48 3.0	0.439
15	3 2 32.53	2.5108	17 45 31.0	6.984	15	5 8 8.54	2.6841	20 48 24.7	0.283
16	3 5 3.34	2.5163	17 52 26.6	6.870	16	5 10 49.61	2.6848	20 48 37.0	+0.127
17	3 7 34.49	2.5218	17 59 15.4	6.755	17	5 13 30.72	2.6855	20 48 39.9	-0.030
18	3 10 5.96	2.5273	18 5 57.2	6.638	18	5 16 11.87	2.6860	20 48 33.4	0.118
19	3 12 37.76	2.5327	18 12 32.0	6.521	19	5 18 53.04	2.6863	20 48 17.6	0.243
20	3 15 9.88	2.5380	18 18 59.7	6.402	20	5 21 34.23	2.6866	20 47 52.3	0.409
21	3 17 42.32	2.5433	18 25 20.2	6.281	21	5 24 15.43	2.6866	20 47 17.7	0.656
22	3 20 15.08	2.5486	18 31 33.4	6.158	22	5 26 56.62	2.6865	20 46 33.6	0.912
23	3 22 48.15	2.5538	+18 37 39.2	+6.035	23	5 29 37.81	2.6863	+20 45 40.2	-0.968
JANUARY 2.					JANUARY 4.				
	h m s	s	° ' "	"		h m s	s	° ' "	"
0	3 25 21.53	2.5589	+18 43 37.6	+5.911	0	5 32 18.98	2.6859	+20 44 37.5	-1.124
1	3 27 55.22	2.5639	18 49 28.5	5.785	1	5 35 0.12	2.6854	20 43 25.3	1.261
2	3 30 29.20	2.5689	18 55 11.8	5.658	2	5 37 41.23	2.6848	20 42 3.8	1.437
3	3 33 3.49	2.5738	19 0 47.5	5.530	3	5 40 22.30	2.6841	20 40 32.9	1.592
4	3 35 38.06	2.5787	19 6 15.4	5.400	4	5 43 3.32	2.6831	20 38 52.8	1.747
5	3 38 12.93	2.5834	19 11 35.5	5.269	5	5 45 44.27	2.6820	20 37 3.3	1.908
6	3 40 48.07	2.5881	19 16 47.7	5.137	6	5 48 25.16	2.6809	20 35 4.5	2.057
7	3 43 23.50	2.5928	19 21 51.9	5.004	7	5 51 5.98	2.6795	20 32 56.5	2.211
8	3 45 59.20	2.5973	19 26 48.2	4.870	8	5 53 46.70	2.6780	20 30 39.2	2.365
9	3 48 35.17	2.6017	19 31 36.3	4.734	9	5 56 27.34	2.6765	20 28 12.7	2.518
10	3 51 11.40	2.6060	19 36 16.3	4.598	10	5 59 7.88	2.6748	20 25 37.0	2.671
11	3 53 47.89	2.6103	19 40 48.1	4.461	11	6 1 48.31	2.6728	20 22 52.2	2.823
12	3 56 24.63	2.6145	19 45 11.6	4.323	12	6 4 28.62	2.6708	20 19 58.3	2.975
13	3 59 1.63	2.6186	19 49 26.8	4.183	13	6 7 8.81	2.6687	20 16 55.2	3.127
14	4 1 38.86	2.6225	19 53 33.5	4.042	14	6 9 48.87	2.6664	20 13 43.1	3.277
15	4 4 16.33	2.6263	19 57 31.8	3.900	15	6 12 28.78	2.6640	20 10 22.0	3.426
16	4 6 54.02	2.6301	20 1 21.5	3.758	16	6 15 8.55	2.6615	20 6 52.0	3.575
17	4 9 31.94	2.6338	20 5 2.7	3.614	17	6 17 48.16	2.6593	20 3 13.0	3.724
18	4 12 10.08	2.6373	20 8 35.2	3.469	18	6 20 27.61	2.6561	19 59 25.1	3.871
19	4 14 48.42	2.6408	20 11 59.0	3.324	19	6 23 6.89	2.6533	19 55 28.5	4.018
20	4 17 26.97	2.6442	20 15 14.1	3.178	20	6 25 46.00	2.6503	19 51 23.0	4.163
21	4 20 5.72	2.6474	20 18 20.4	3.032	21	6 28 24.92	2.6471	19 47 8.9	4.308
22	4 22 44.66	2.6505	20 21 17.9	2.884	22	6 31 3.65	2.6438	19 42 46.1	4.453
23	4 25 23.78	2.6535	20 24 6.5	2.735	23	6 33 42.18	2.6404	19 38 14.6	4.596
24	4 28 3.08	2.6564	+20 26 46.1	+2.586	24	6 36 20.50	2.6369	+19 33 34.7	-4.737



GREENWICH MEAN TIME.

Hour.	Right Ascension.	Var. per Min.	Declination.	Var. per Min.	Hour.	Right Ascension.	Var. per Min.	Declination.	Var. per Min.
JANUARY 5.					JANUARY 7.				
0	6 36 20.50	2.6880	+19 33 34.7	-4.737	0	8 37 21.41	2.3657	+13 26 45.8	-9.985
1	6 38 58.61	2.6933	19 28 46.2	4.878	1	8 39 44.37	2.3706	13 16 44.5	10.057
2	6 41 36.50	2.6987	19 23 49.3	5.015	2	8 42 6.96	2.3756	13 6 39.0	10.137
3	6 44 14.17	2.7040	19 18 44.1	5.157	3	8 44 29.20	2.3807	12 56 29.3	10.196
4	6 46 51.61	2.7092	19 13 30.5	5.305	4	8 46 51.08	2.3857	12 46 15.5	10.263
5	6 49 28.82	2.7151	19 8 8.7	5.451	5	8 49 12.60	2.3908	12 35 57.7	10.320
6	6 52 5.78	2.7210	19 2 38.8	5.596	6	8 51 33.77	2.3958	12 25 36.0	10.383
7	6 54 42.49	2.6997	18 57 0.8	5.701	7	8 53 54.58	2.3439	12 15 10.6	10.455
8	6 57 18.94	2.6984	18 51 14.7	5.834	8	8 56 15.04	2.3380	12 4 41.4	10.516
9	6 59 55.14	2.6911	18 45 20.7	5.998	9	8 58 35.14	2.3330	11 54 8.7	10.575
10	7 2 31.07	2.6946	18 39 18.8	6.097	10	9 0 54.88	2.3283	11 43 32.4	10.633
11	7 5 6.73	2.6931	18 33 9.1	6.226	11	9 3 14.28	2.3204	11 32 52.7	10.690
12	7 7 42.12	2.6974	18 26 51.7	6.353	12	9 5 33.33	2.3146	11 22 9.7	10.743
13	7 10 17.22	2.6937	18 20 26.7	6.481	13	9 7 52.03	2.3088	11 11 23.5	10.797
14	7 12 52.04	2.6778	18 13 54.0	6.607	14	9 10 10.88	2.3030	11 0 34.1	10.840
15	7 15 26.56	2.6720	18 7 13.9	6.730	15	9 12 28.39	2.2973	10 49 41.6	10.890
16	7 18 0.79	2.6660	18 0 26.4	6.853	16	9 14 46.05	2.2915	10 38 46.2	10.948
17	7 20 34.72	2.6590	17 53 31.5	6.976	17	9 17 3.37	2.2858	10 27 47.9	10.995
18	7 23 8.35	2.6570	17 46 29.4	7.094	18	9 19 20.35	2.2802	10 16 46.8	11.041
19	7 25 41.67	2.6528	17 39 20.2	7.213	19	9 21 36.99	2.2746	10 5 43.0	11.085
20	7 28 14.68	2.6475	17 32 8.9	7.330	20	9 23 53.30	2.2689	9 54 36.6	11.128
21	7 30 47.37	2.6423	17 24 40.6	7.446	21	9 26 9.27	2.2634	9 43 27.7	11.169
22	7 33 19.75	2.6366	17 17 10.4	7.560	22	9 28 24.91	2.2580	9 32 16.3	11.209
23	7 35 51.80	2.6315	+17 9 33.4	-7.673	23	9 30 40.23	2.2536	+ 9 21 2.6	-11.248
JANUARY 6.					JANUARY 8.				
0	7 38 23.53	2.6260	+17 1 40.6	-7.784	0	9 32 55.21	2.2470	+ 9 9 46.6	-11.284
1	7 40 54.92	2.6206	16 53 50.3	7.893	1	9 35 9.87	2.2417	8 58 28.5	11.320
2	7 43 25.99	2.6150	16 46 2.4	8.002	2	9 37 24.21	2.2363	8 47 8.2	11.355
3	7 45 56.72	2.6093	16 37 50.0	8.109	3	9 39 38.23	2.2310	8 35 45.9	11.388
4	7 48 27.11	2.6038	16 29 49.3	8.213	4	9 41 51.93	2.2258	8 24 21.7	11.419
5	7 50 57.17	2.6081	16 21 33.4	8.318	5	9 44 5.32	2.2206	8 12 55.6	11.449
6	7 53 26.88	2.6023	16 13 11.2	8.420	6	9 46 18.39	2.2153	8 1 27.8	11.478
7	7 55 56.25	2.4966	16 4 43.0	8.520	7	9 48 31.16	2.2103	7 49 58.3	11.506
8	7 58 25.27	2.4908	15 56 8.8	8.619	8	9 50 43.62	2.2051	7 38 27.1	11.533
9	8 0 53.94	2.4780	15 47 28.7	8.716	9	9 52 55.77	2.2001	7 26 54.4	11.557
10	8 3 22.27	2.4692	15 38 42.9	8.813	10	9 55 7.63	2.1951	7 15 20.3	11.580
11	8 5 50.24	2.4633	15 29 51.3	8.907	11	9 57 19.18	2.1902	7 3 44.8	11.603
12	8 8 17.86	2.4574	15 20 54.1	8.999	12	9 59 30.45	2.1853	6 52 8.0	11.623
13	8 10 45.13	2.4515	15 11 51.4	9.090	13	10 1 41.42	2.1804	6 40 30.0	11.643
14	8 13 12.04	2.4455	15 2 43.3	9.179	14	10 3 52.10	2.1757	6 28 50.8	11.663
15	8 15 38.59	2.4395	14 53 29.9	9.267	15	10 6 2.50	2.1709	6 17 10.5	11.679
16	8 18 4.78	2.4336	14 44 11.3	9.353	16	10 8 12.61	2.1663	6 5 29.3	11.695
17	8 20 30.62	2.4277	14 34 47.5	9.438	17	10 10 22.45	2.1617	5 53 47.1	11.711
18	8 22 56.10	2.4217	14 25 18.7	9.521	18	10 12 32.01	2.1570	5 42 4.0	11.724
19	8 25 21.22	2.4156	14 15 45.0	9.602	19	10 14 41.29	2.1528	5 30 20.2	11.736
20	8 27 45.97	2.4096	14 6 6.5	9.682	20	10 16 50.31	2.1481	5 18 35.7	11.748
21	8 30 10.37	2.4037	13 56 23.2	9.761	21	10 18 59.06	2.1437	5 6 50.5	11.758
22	8 32 34.41	2.3977	13 46 35.2	9.838	22	10 21 7.55	2.1393	4 55 4.8	11.767
23	8 34 58.09	2.3917	13 36 42.7	9.913	23	10 23 15.78	2.1350	4 43 18.5	11.775
24	8 37 21.41	2.3857	+13 26 45.8	-9.985	24	10 25 23.75	2.1308	+ 4 31 31.8	-11.781

GREENWICH MEAN TIME.

Hour.	Right Ascension.	Var. per Min.	Declination.	Var. per Min.	Hour.	Right Ascension.	Var. per Min.	Declination.	Var. per Min.
JANUARY 9.					JANUARY 11.				
	h m s		° ' "	"		h m s		° ' "	"
0	10 25 23.75	2.1208	+4 31 31.8	-11.781	0	12 3 52.73	1.9663	-4 42 59.2	-10.994
1	10 27 31.47	2.1265	4 19 44.8	11.787	1	12 5 52.40	1.9688	4 53 57.8	10.958
2	10 29 38.93	2.1223	4 7 57.4	11.792	2	12 7 51.98	1.9623	5 4 54.2	10.922
3	10 31 46.15	2.1183	3 56 9.8	11.795	3	12 9 51.47	1.9600	5 15 48.4	10.885
4	10 33 53.13	2.1143	3 44 22.0	11.798	4	12 11 50.89	1.9577	5 26 40.4	10.848
5	10 35 59.87	2.1103	3 32 34.1	11.798	5	12 13 50.24	1.9556	5 37 30.2	10.810
6	10 38 6.37	2.1064	3 20 46.2	11.798	6	12 15 49.52	1.9574	5 48 17.6	10.770
7	10 40 12.64	2.1026	3 8 58.3	11.798	7	12 17 48.78	1.9663	5 59 2.6	10.731
8	10 42 18.68	2.0988	2 57 10.5	11.796	8	12 19 47.87	1.9653	6 9 45.3	10.692
9	10 44 24.50	2.0951	2 45 22.8	11.798	9	12 21 46.96	1.9643	6 20 25.6	10.651
10	10 46 30.09	2.0913	2 33 35.4	11.788	10	12 23 45.98	1.9632	6 31 3.4	10.609
11	10 48 35.46	2.0876	2 21 48.2	11.784	11	12 25 44.95	1.9632	6 41 38.7	10.568
12	10 50 40.62	2.0843	2 10 1.3	11.778	12	12 27 43.86	1.9615	6 52 11.5	10.526
13	10 52 45.57	2.0808	1 58 14.8	11.772	13	12 29 42.78	1.9608	7 2 41.8	10.483
14	10 54 50.31	2.0773	1 46 28.7	11.763	14	12 31 41.56	1.9601	7 13 9.4	10.438
15	10 56 54.84	2.0739	1 34 43.2	11.754	15	12 33 40.24	1.9708	7 23 34.4	10.394
16	10 58 59.18	2.0706	1 22 58.2	11.745	16	12 35 38.06	1.9787	7 33 56.7	10.349
17	11 1 3.31	2.0673	1 11 13.8	11.735	17	12 37 37.78	1.9781	7 44 16.3	10.304
18	11 3 7.25	2.0641	0 59 30.0	11.723	18	12 39 36.45	1.9775	7 54 33.2	10.259
19	11 5 11.00	2.0610	0 47 47.0	11.710	19	12 41 35.08	1.9770	8 4 47.4	10.213
20	11 7 14.57	2.0579	0 36 4.8	11.697	20	12 43 33.69	1.9766	8 14 58.7	10.168
21	11 9 17.95	2.0548	0 24 23.4	11.683	21	12 45 32.27	1.9632	8 25 7.2	10.118
22	11 11 21.15	2.0518	0 12 42.9	11.667	22	12 47 30.83	1.9758	8 35 12.8	10.069
23	11 13 24.17	2.0490	+0 1 3.4	-11.651	23	12 49 29.37	1.9756	-8 45 15.5	-10.021
JANUARY 10.					JANUARY 12.				
0	11 15 27.03	2.0463	-0 10 35.2	-11.635	0	12 51 27.90	1.9753	-8 55 15.3	-9.973
1	11 17 29.71	2.0433	0 22 12.8	11.617	1	12 53 26.41	1.9750	9 5 12.1	9.922
2	11 19 32.22	2.0406	0 33 49.2	11.598	2	12 55 24.90	1.9748	9 15 5.9	9.872
3	11 21 34.58	2.0379	0 45 24.5	11.578	3	12 57 23.39	1.9748	9 24 56.7	9.821
4	11 23 36.77	2.0353	0 56 58.6	11.558	4	12 59 21.87	1.9747	9 34 44.4	9.769
5	11 25 38.81	2.0328	1 8 31.5	11.538	5	13 1 20.35	1.9747	9 44 29.0	9.718
6	11 27 40.70	2.0303	1 20 3.1	11.516	6	13 3 18.83	1.9746	9 54 10.5	9.665
7	11 29 42.44	2.0278	1 31 33.4	11.493	7	13 5 17.30	1.9746	10 3 48.8	9.613
8	11 31 44.04	2.0255	1 43 2.2	11.469	8	13 7 15.78	1.9748	10 13 24.0	9.560
9	11 33 45.50	2.0232	1 54 29.7	11.445	9	13 9 14.27	1.9749	10 22 55.9	9.506
10	11 35 46.82	2.0208	2 5 55.6	11.419	10	13 11 12.77	1.9751	10 32 24.6	9.451
11	11 37 48.00	2.0186	2 17 20.0	11.394	11	13 13 11.28	1.9753	10 41 50.0	9.396
12	11 39 49.05	2.0165	2 28 42.9	11.368	12	13 15 9.80	1.9755	10 51 12.1	9.340
13	11 41 49.98	2.0144	2 40 4.2	11.341	13	13 17 8.34	1.9758	11 0 30.8	9.284
14	11 43 50.78	2.0123	2 51 23.8	11.313	14	13 19 6.90	1.9762	11 9 46.2	9.228
15	11 45 51.46	2.0104	3 2 41.8	11.285	15	13 21 5.48	1.9766	11 18 58.2	9.172
16	11 47 52.03	2.0085	3 13 58.0	11.254	16	13 23 4.09	1.9770	11 28 6.8	9.114
17	11 49 52.48	2.0066	3 25 12.3	11.223	17	13 25 2.72	1.9774	11 37 11.9	9.056
18	11 51 52.82	2.0048	3 36 24.8	11.193	18	13 27 1.38	1.9779	11 46 13.5	8.998
19	11 53 53.05	2.0030	3 47 35.5	11.163	19	13 29 0.07	1.9784	11 55 11.6	8.938
20	11 55 53.18	2.0013	3 58 44.3	11.130	20	13 30 58.79	1.9790	12 4 6.1	8.879
21	11 57 53.21	1.9997	4 9 51.1	11.096	21	13 32 57.55	1.9796	12 12 57.1	8.820
22	11 59 53.14	1.9981	4 20 55.8	11.062	22	13 34 56.34	1.9802	12 21 44.5	8.759
23	12 1 52.98	1.9966	4 31 58.5	11.028	23	13 36 55.17	1.9809	12 30 28.2	8.698
24	12 3 52.73	1.9952	-4 42 59.2	-10.994	24	13 38 54.05	1.9817	-12 39 8.3	-8.638

GREENWICH MEAN TIME.

Hour.	Right Ascension.	Var. per Min.	Declination.	Var. per Min.	Hour.	Right Ascension.	Var. per Min.	Declination.	Var. per Min.
JANUARY 13.					JANUARY 15.				
	h m s	s	° ' "	"		h m s	s	° ' "	"
0	13 38 54.05	1.9817	-12 39 8.3	-8.638	0	15 15 20.21	2.0438	-18 14 35.0	-5.174
1	13 40 52.97	1.9823	12 47 44.7	8.576	1	15 17 22.88	2.0454	18 19 43.0	5.092
2	13 42 51.93	1.9831	12 56 17.4	8.513	2	15 19 25.66	2.0471	18 24 46.0	5.009
3	13 44 50.94	1.9839	13 4 46.3	8.450	3	15 21 28.53	2.0486	18 29 44.1	4.927
4	13 46 50.00	1.9848	13 13 11.4	8.388	4	15 23 31.49	2.0502	18 34 37.2	4.843
5	13 48 49.11	1.9856	13 21 32.8	8.324	5	15 25 34.55	2.0518	18 39 25.2	4.758
6	13 50 48.27	1.9865	13 29 50.3	8.260	6	15 27 37.71	2.0535	18 44 8.2	4.674
7	13 52 47.49	1.9875	13 38 4.0	8.196	7	15 29 40.97	2.0552	18 48 46.1	4.590
8	13 54 46.77	1.9884	13 46 13.8	8.131	8	15 31 44.33	2.0568	18 53 19.0	4.506
9	13 56 46.10	1.9893	13 54 19.7	8.065	9	15 33 47.78	2.0583	18 57 46.8	4.420
10	13 58 45.49	1.9904	14 2 21.6	7.998	10	15 35 51.32	2.0598	19 2 9.4	4.334
11	14 0 44.95	1.9915	14 10 19.5	7.933	11	15 37 54.96	2.0615	19 6 26.9	4.248
12	14 2 44.47	1.9925	14 18 13.5	7.867	12	15 39 58.70	2.0632	19 10 39.2	4.162
13	14 4 44.05	1.9936	14 26 3.5	7.799	13	15 42 2.54	2.0647	19 14 46.3	4.075
14	14 6 43.70	1.9948	14 33 49.4	7.731	14	15 44 6.46	2.0662	19 18 48.2	3.988
15	14 8 43.42	1.9958	14 41 31.2	7.663	15	15 46 10.48	2.0678	19 22 44.9	3.901
16	14 10 43.20	1.9970	14 49 8.9	7.594	16	15 48 14.60	2.0694	19 26 36.3	3.813
17	14 12 43.06	1.9983	14 56 42.5	7.525	17	15 50 18.81	2.0709	19 30 22.5	3.726
18	14 14 42.99	1.9995	15 4 11.9	7.456	18	15 52 23.11	2.0725	19 34 3.4	3.638
19	14 16 43.00	2.0008	15 11 37.2	7.386	19	15 54 27.51	2.0740	19 37 39.0	3.548
20	14 18 43.08	2.0020	15 18 58.2	7.315	20	15 56 31.99	2.0755	19 41 9.2	3.459
21	14 20 43.24	2.0033	15 26 15.0	7.245	21	15 58 36.57	2.0770	19 44 34.1	3.370
22	14 22 43.47	2.0046	15 33 27.6	7.173	22	16 0 41.23	2.0785	19 47 53.6	3.280
23	14 24 43.79	2.0059	-15 40 35.8	-7.102	23	16 2 45.99	2.0800	-19 51 7.7	-3.191
JANUARY 14.					JANUARY 16.				
0	14 26 44.18	2.0073	-15 47 39.8	-7.030	0	16 4 50.83	2.0814	-19 54 16.5	-3.101
1	14 28 44.66	2.0087	15 54 39.4	6.957	1	16 6 55.76	2.0829	19 57 19.8	3.010
2	14 30 45.22	2.0100	16 1 34.6	6.884	2	16 9 0.78	2.0843	20 0 17.7	2.919
3	14 32 45.86	2.0114	16 8 25.5	6.812	3	16 11 5.88	2.0858	20 3 10.1	2.828
4	14 34 46.59	2.0129	16 15 12.0	6.738	4	16 13 11.07	2.0872	20 5 57.0	2.737
5	14 36 47.41	2.0143	16 21 54.0	6.663	5	16 15 16.34	2.0885	20 8 38.5	2.645
6	14 38 48.31	2.0158	16 28 31.5	6.588	6	16 17 21.69	2.0899	20 11 14.4	2.553
7	14 40 49.30	2.0173	16 35 4.6	6.513	7	16 19 27.13	2.0913	20 13 44.8	2.461
8	14 42 50.38	2.0187	16 41 33.1	6.438	8	16 21 32.64	2.0926	20 16 9.7	2.368
9	14 44 51.54	2.0202	16 47 57.1	6.362	9	16 23 38.24	2.0939	20 18 29.0	2.276
10	14 46 52.80	2.0218	16 54 16.5	6.285	10	16 25 43.91	2.0952	20 20 42.8	2.183
11	14 48 54.15	2.0233	17 0 31.3	6.208	11	16 27 49.66	2.0964	20 22 51.0	2.089
12	14 50 55.59	2.0248	17 6 41.5	6.132	12	16 29 55.48	2.0977	20 24 53.5	1.996
13	14 52 57.12	2.0263	17 12 47.1	6.054	13	16 32 1.38	2.0989	20 26 50.5	1.903
14	14 54 58.74	2.0278	17 18 48.0	5.976	14	16 34 7.35	2.1002	20 28 41.8	1.808
15	14 57 0.46	2.0295	17 24 44.2	5.898	15	16 36 13.40	2.1013	20 30 27.5	1.714
16	14 59 2.28	2.0310	17 30 35.7	5.819	16	16 38 19.51	2.1025	20 32 7.5	1.620
17	15 1 4.18	2.0325	17 36 22.5	5.740	17	16 40 25.70	2.1037	20 33 41.9	1.525
18	15 3 6.18	2.0342	17 42 4.5	5.660	18	16 42 31.95	2.1047	20 35 10.5	1.430
19	15 5 8.28	2.0358	17 47 41.7	5.579	19	16 44 38.26	2.1058	20 36 33.5	1.336
20	15 7 10.47	2.0373	17 53 14.0	5.499	20	16 46 44.64	2.1069	20 37 50.8	1.241
21	15 9 12.76	2.0390	17 58 41.6	5.419	21	16 48 51.08	2.1079	20 39 2.4	1.146
22	15 11 15.15	2.0406	18 4 4.3	5.338	22	16 50 57.59	2.1088	20 40 8.9	1.050
23	15 13 17.63	2.0422	18 9 22.1	5.256	23	16 53 4.15	2.1099	20 41 8.4	0.954
24	15 15 20.21	2.0438	-18 14 35.0	-5.174	24	16 55 10.78	2.1109	-20 42 2.8	-0.859

GREENWICH MEAN TIME.

Hour.	Right Ascension.	Var. per Min.	Declination.	Var. per Min.	Hour.	Right Ascension.	Var. per Min.	Declination.	Var. per Min.
JANUARY 17.					JANUARY 19.				
	h m s	s	° ' "	"		h m s	s	° ' "	"
0	16 55 10.78	2.1109	-20 42 2.8	-0.359	0	18 37 1.28	2.1205	-19 31 37.7	+3.781
1	16 57 17.46	2.1118	20 42 51.5	0.743	1	18 39 8.49	2.1199	19 27 48.0	3.573
2	16 59 24.19	2.1126	20 43 34.4	0.667	2	18 41 15.67	2.1194	19 23 52.7	3.909
3	17 1 30.97	2.1135	20 44 11.5	0.571	3	18 43 22.82	2.1188	19 19 51.7	4.093
4	17 3 37.81	2.1143	20 44 42.9	0.474	4	18 45 29.93	2.1182	19 15 45.2	4.158
5	17 5 44.69	2.1152	20 45 8.4	0.378	5	18 47 37.00	2.1175	19 11 33.0	4.240
6	17 7 51.63	2.1160	20 45 28.2	0.282	6	18 49 44.03	2.1168	19 7 15.3	4.342
7	17 9 58.61	2.1167	20 45 42.2	0.185	7	18 51 51.02	2.1162	19 2 52.0	4.435
8	17 12 5.63	2.1174	20 45 50.4	-0.088	8	18 53 57.97	2.1154	18 58 23.1	4.538
9	17 14 12.70	2.1181	20 45 52.7	+0.010	9	18 56 4.87	2.1146	18 53 48.7	4.618
10	17 16 19.80	2.1188	20 45 49.2	0.106	10	18 58 11.72	2.1138	18 49 8.9	4.710
11	17 18 26.95	2.1194	20 45 40.0	0.203	11	19 0 18.53	2.1131	18 44 23.5	4.808
12	17 20 34.13	2.1200	20 45 24.9	0.301	12	19 2 25.29	2.1123	18 39 32.6	4.908
13	17 22 41.35	2.1206	20 45 3.9	0.398	13	19 4 32.00	2.1114	18 34 36.3	4.963
14	17 24 48.60	2.1212	20 44 37.1	0.495	14	19 6 38.66	2.1105	18 29 34.6	5.073
15	17 26 55.89	2.1217	20 44 4.5	0.593	15	19 8 45.26	2.1096	18 24 27.5	5.164
16	17 29 3.20	2.1221	20 43 26.0	0.690	16	19 10 51.81	2.1088	18 19 14.9	5.254
17	17 31 10.54	2.1225	20 42 41.7	0.788	17	19 12 58.31	2.1078	18 13 57.0	5.343
18	17 33 17.90	2.1229	20 41 51.5	0.885	18	19 15 4.75	2.1068	18 8 33.8	5.431
19	17 35 25.29	2.1234	20 40 55.5	0.983	19	19 17 11.13	2.1058	18 3 5.3	5.520
20	17 37 32.71	2.1238	20 39 53.6	1.080	20	19 19 17.45	2.1048	17 57 31.4	5.608
21	17 39 40.14	2.1240	20 38 45.9	1.178	21	19 21 23.71	2.1039	17 51 52.3	5.696
22	17 41 47.59	2.1243	20 37 32.3	1.275	22	19 23 29.92	2.1029	17 46 7.9	5.783
23	17 43 55.05	2.1246	-20 36 12.9	+1.373	23	19 25 36.06	2.1018	-17 40 18.3	+5.870
JANUARY 18.					JANUARY 20.				
	h m s	s	° ' "	"		h m s	s	° ' "	"
0	17 46 2.54	2.1248	-20 34 47.6	+1.470	0	19 27 42.14	2.1008	-17 34 23.5	+5.957
1	17 48 10.03	2.1249	20 33 16.5	1.568	1	19 29 48.16	2.0998	17 28 23.5	6.043
2	17 50 17.53	2.1251	20 31 39.5	1.665	2	19 31 54.11	2.0986	17 22 18.4	6.128
3	17 52 25.04	2.1252	20 29 56.7	1.763	3	19 33 59.99	2.0975	17 16 8.2	6.214
4	17 54 32.55	2.1253	20 28 8.0	1.860	4	19 36 5.81	2.0965	17 9 52.9	6.306
5	17 56 40.07	2.1254	20 26 13.5	1.957	5	19 38 11.57	2.0954	17 3 32.5	6.383
6	17 58 47.60	2.1254	20 24 13.2	2.054	6	19 40 17.25	2.0942	16 57 7.1	6.466
7	18 0 55.12	2.1253	20 22 7.0	2.151	7	19 42 22.87	2.0931	16 50 36.6	6.549
8	18 3 2.64	2.1253	20 19 55.1	2.248	8	19 44 28.42	2.0919	16 44 1.2	6.632
9	18 5 10.16	2.1253	20 17 37.3	2.345	9	19 46 33.90	2.0908	16 37 20.8	6.714
10	18 7 17.67	2.1252	20 15 13.7	2.442	10	19 48 39.31	2.0896	16 30 35.5	6.796
11	18 9 25.18	2.1251	20 12 44.3	2.538	11	19 50 44.65	2.0884	16 23 45.3	6.877
12	18 11 32.68	2.1248	20 10 9.1	2.635	12	19 52 49.92	2.0873	16 16 50.3	6.958
13	18 13 40.16	2.1247	20 7 28.1	2.732	13	19 54 55.12	2.0860	16 9 50.4	7.038
14	18 15 47.64	2.1245	20 4 41.3	2.828	14	19 57 0.24	2.0848	16 2 45.7	7.118
15	18 17 55.10	2.1242	20 1 48.7	2.924	15	19 59 5.30	2.0837	15 55 36.2	7.198
16	18 20 2.54	2.1239	19 58 50.4	3.020	16	20 1 10.28	2.0824	15 48 22.0	7.276
17	18 22 9.97	2.1236	19 55 46.3	3.116	17	20 3 15.19	2.0813	15 41 3.1	7.354
18	18 24 17.37	2.1232	19 52 36.5	3.211	18	20 5 20.03	2.0800	15 33 39.5	7.432
19	18 26 24.75	2.1228	19 49 21.0	3.307	19	20 7 24.79	2.0788	15 26 11.3	7.508
20	18 28 32.11	2.1225	19 45 59.7	3.403	20	20 9 29.49	2.0777	15 18 38.5	7.585
21	18 30 39.45	2.1220	19 42 32.7	3.497	21	20 11 34.11	2.0763	15 11 1.1	7.661
22	18 32 46.75	2.1215	19 39 0.1	3.592	22	20 13 38.65	2.0752	15 3 19.2	7.737
23	18 34 54.03	2.1211	19 35 21.7	3.687	23	20 15 43.13	2.0740	14 55 32.7	7.812
24	18 37 1.28	2.1205	-19 31 37.7	+3.781	24	20 17 47.53	2.0728	-14 47 41.8	+7.885

GREENWICH MEAN TIME.

Hour.	Right Ascension.	Var. per Min.	Declination.	Var. per Min.	Hour.	Right Ascension.	Var. per Min.	Declination.	Var. per Min.
JANUARY 21.					JANUARY 23.				
	h m s	s	° ' "	"		h m s	s	° ' "	"
0	20 17 47.53	2.0728	-14 47 41.8	+ 7.885	0	21 56 5.22	2.0803	-7 16 2.4	+10.663
1	20 19 51.86	2.0715	14 39 46.5	7.959	1	21 58 7.03	2.0800	7 5 21.4	10.703
2	20 21 56.11	2.0708	14 31 46.7	8.033	2	22 0 8.82	2.0807	6 54 38.0	10.743
3	20 24 0.29	2.0693	14 23 42.6	8.104	3	22 2 10.59	2.0804	6 43 52.3	10.780
4	20 26 4.41	2.0680	14 15 34.2	8.176	4	22 4 12.35	2.0808	6 33 4.4	10.818
5	20 28 8.45	2.0667	14 7 21.5	8.248	5	22 6 14.10	2.0802	6 22 14.2	10.855
6	20 30 12.41	2.0655	13 59 4.5	8.318	6	22 8 15.85	2.0801	6 11 21.8	10.891
7	20 32 16.31	2.0644	13 50 43.3	8.388	7	22 10 17.59	2.0800	6 0 27.3	10.928
8	20 34 20.14	2.0633	13 42 17.9	8.458	8	22 12 19.33	2.0809	5 49 30.7	10.960
9	20 36 23.89	2.0620	13 33 48.4	8.526	9	22 14 21.06	2.0800	5 38 32.1	10.993
10	20 38 27.58	2.0609	13 25 14.8	8.593	10	22 16 22.80	2.0800	5 27 31.5	11.028
11	20 40 31.20	2.0608	13 16 37.2	8.661	11	22 18 24.54	2.0801	5 16 29.0	11.068
12	20 42 34.75	2.0606	13 7 55.5	8.728	12	22 20 26.29	2.0803	5 5 24.6	11.099
13	20 44 38.23	2.0674	12 59 9.8	8.795	13	22 22 28.04	2.0803	4 54 18.3	11.119
14	20 46 41.64	2.0668	12 50 20.1	8.860	14	22 24 29.81	2.0806	4 43 10.3	11.148
15	20 48 44.98	2.0652	12 41 26.6	8.924	15	22 26 31.59	2.0806	4 32 0.6	11.177
16	20 50 48.26	2.0643	12 32 29.2	8.988	16	22 28 33.38	2.0801	4 20 49.1	11.205
17	20 52 51.48	2.0631	12 23 28.0	9.052	17	22 30 35.20	2.0804	4 9 36.0	11.231
18	20 54 54.63	2.0620	12 14 23.0	9.115	18	22 32 37.03	2.0808	3 58 21.4	11.257
19	20 56 57.72	2.0609	12 5 14.2	9.178	19	22 34 38.89	2.0813	3 47 5.2	11.283
20	20 59 0.74	2.0499	11 56 1.7	9.238	20	22 36 40.78	2.0817	3 35 47.5	11.307
21	21 1 3.71	2.0489	11 46 45.6	9.299	21	22 38 42.69	2.0821	3 24 28.4	11.329
22	21 3 6.61	2.0478	11 37 25.8	9.359	22	22 40 44.63	2.0827	3 13 8.0	11.352
23	21 5 9.45	2.0469	-11 28 2.5	+ 9.418	23	22 42 46.61	2.0833	-3 1 46.2	+11.374
JANUARY 22.					JANUARY 24.				
0	21 7 12.24	2.0460	-11 18 35.6	+ 9.478	0	22 44 48.63	2.0836	-2 50 23.1	+11.395
1	21 9 14.97	2.0450	11 9 5.2	9.535	1	22 46 50.68	2.0846	2 38 58.8	11.415
2	21 11 17.64	2.0441	10 59 31.4	9.592	2	22 48 52.78	2.0858	2 27 33.8	11.434
3	21 13 20.26	2.0433	10 49 54.2	9.648	3	22 50 54.92	2.0860	2 16 6.7	11.453
4	21 15 22.83	2.0428	10 40 13.6	9.705	4	22 52 57.10	2.0868	2 4 39.0	11.470
5	21 17 25.34	2.0415	10 30 29.6	9.760	5	22 54 59.34	2.0878	1 53 10.3	11.486
6	21 19 27.81	2.0407	10 20 42.4	9.813	6	22 57 1.63	2.0887	1 41 40.7	11.502
7	21 21 30.22	2.0398	10 10 52.0	9.868	7	22 59 3.98	2.0896	1 30 10.1	11.517
8	21 23 32.59	2.0391	10 0 58.3	9.921	8	23 1 6.38	2.0406	1 18 38.7	11.530
9	21 25 34.91	2.0383	9 51 1.5	9.973	9	23 3 8.85	2.0417	1 7 6.5	11.543
10	21 27 37.18	2.0375	9 41 1.6	10.023	10	23 5 11.38	2.0428	0 55 33.5	11.556
11	21 29 39.41	2.0368	9 30 58.7	10.074	11	23 7 13.98	2.0438	0 43 59.8	11.567
12	21 31 41.60	2.0362	9 20 52.7	10.124	12	23 9 16.64	2.0450	0 32 25.5	11.577
13	21 33 43.75	2.0355	9 10 43.8	10.173	13	23 11 19.38	2.0463	0 20 50.6	11.586
14	21 35 45.86	2.0349	9 0 81.9	10.222	14	23 13 22.20	2.0476	-0 9 15.2	11.594
15	21 37 47.94	2.0343	8 50 17.1	10.269	15	23 15 25.09	2.0489	+0 2 20.7	11.602
16	21 39 49.98	2.0337	8 39 59.6	10.316	16	23 17 28.07	2.0508	0 13 57.1	11.608
17	21 41 51.98	2.0331	8 29 39.2	10.363	17	23 19 31.13	2.0518	0 25 33.8	11.615
18	21 43 53.95	2.0326	8 19 16.1	10.408	18	23 21 34.28	2.0533	0 37 10.9	11.620
19	21 45 55.89	2.0322	8 8 50.3	10.453	19	23 23 37.52	2.0548	0 48 48.2	11.623
20	21 47 57.81	2.0318	7 58 21.8	10.496	20	23 25 40.85	2.0568	1 0 25.7	11.627
21	21 49 59.70	2.0313	7 47 50.8	10.539	21	23 27 44.28	2.0580	1 12 3.4	11.628
22	21 52 1.56	2.0308	7 37 17.1	10.582	22	23 29 47.81	2.0597	1 23 41.1	11.629
23	21 54 3.40	2.0305	7 26 41.0	10.623	23	23 31 51.44	2.0614	1 35 18.9	11.630
24	21 56 5.22	2.0303	-7 16 2.4	+10.663	24	23 33 55.18	2.0632	+1 46 56.7	+11.629

GREENWICH MEAN TIME.

Hour.	Right Ascension.	Var. per Min.	Declination.	Var. per Min.	Hour.	Right Ascension.	Var. per Min.	Declination.	Var. per Min.
JANUARY 25.					JANUARY 27.				
	h m s	s	° ' "	"		h m s	s	° ' "	"
0	23 33 55.18	2.0632	+ 1 46 56.7	+11.629	0	1 15 58.68	2.2081	+10 45 31.3	+10.413
1	23 35 59.02	2.0650	1 58 34.4	11.628	1	1 18 11.29	2.2123	10 55 54.5	10.260
2	23 38 2.98	2.0670	2 10 12.0	11.625	2	1 20 24.15	2.2168	11 6 14.5	10.208
3	23 40 7.06	2.0689	2 21 49.4	11.622	3	1 22 37.25	2.2206	11 16 31.3	10.252
4	23 42 11.25	2.0708	2 33 26.6	11.617	4	1 24 50.62	2.2240	11 26 44.9	10.198
5	23 44 15.56	2.0729	2 45 3.4	11.611	5	1 27 4.24	2.2272	11 36 55.1	10.141
6	23 46 20.00	2.0750	2 56 39.9	11.605	6	1 29 18.12	2.2305	11 47 1.8	10.083
7	23 48 24.56	2.0772	3 8 16.0	11.598	7	1 31 32.26	2.2378	11 57 5.1	10.026
8	23 50 29.26	2.0793	3 19 51.6	11.589	8	1 33 46.66	2.2423	12 7 4.9	9.966
9	23 52 34.08	2.0816	3 31 26.7	11.580	9	1 36 1.33	2.2467	12 17 1.0	9.904
10	23 54 39.05	2.0839	3 43 1.2	11.569	10	1 38 16.26	2.2511	12 26 53.4	9.843
11	23 56 44.15	2.0863	3 54 35.0	11.558	11	1 40 31.46	2.2557	12 36 42.1	9.779
12	23 58 49.40	2.0887	4 6 8.1	11.546	12	1 42 46.93	2.2602	12 46 26.9	9.715
13	0 0 54.79	2.0911	4 17 40.5	11.533	13	1 45 2.68	2.2647	12 56 7.9	9.649
14	0 3 0.33	2.0937	4 29 12.0	11.518	14	1 47 18.70	2.2693	13 5 44.8	9.582
15	0 5 6.03	2.0962	4 40 42.7	11.503	15	1 49 34.99	2.2728	13 15 17.7	9.514
16	0 7 11.87	2.0988	4 52 12.4	11.487	16	1 51 51.56	2.2783	13 24 46.5	9.445
17	0 9 17.88	2.1015	5 3 41.1	11.469	17	1 54 8.41	2.2832	13 34 11.1	9.374
18	0 11 24.05	2.1042	5 15 8.7	11.451	18	1 56 25.54	2.2878	13 43 31.4	9.303
19	0 13 30.38	2.1068	5 26 35.2	11.432	19	1 58 42.95	2.2923	13 52 47.4	9.230
20	0 15 36.87	2.1097	5 38 0.5	11.412	20	2 1 0.64	2.2973	14 1 59.0	9.156
21	0 17 43.54	2.1127	5 49 24.6	11.390	21	2 3 18.62	2.3020	14 11 6.1	9.080
22	0 19 50.39	2.1155	6 0 47.3	11.368	22	2 5 36.88	2.3067	14 20 8.6	9.003
23	0 21 57.40	2.1184	+ 6 12 8.7	+11.345	23	2 7 55.42	2.3115	+14 29 6.5	+ 8.927
JANUARY 26.					JANUARY 28.				
0	0 24 4.60	2.1215	+ 6 23 28.7	+11.320	0	2 10 14.26	2.3163	+14 37 59.8	+ 8.848
1	0 26 11.98	2.1245	6 34 47.1	11.294	1	2 12 33.38	2.3210	14 46 48.2	8.768
2	0 28 19.54	2.1277	6 46 4.0	11.268	2	2 14 52.78	2.3258	14 55 31.9	8.687
3	0 30 27.30	2.1308	6 57 19.3	11.241	3	2 17 12.48	2.3308	15 4 10.6	8.603
4	0 32 35.24	2.1340	7 8 32.9	11.212	4	2 19 32.47	2.3358	15 12 44.3	8.520
5	0 34 43.38	2.1373	7 19 44.7	11.182	5	2 21 52.75	2.3408	15 21 13.0	8.435
6	0 36 51.72	2.1406	7 30 54.7	11.152	6	2 24 13.31	2.3453	15 29 36.5	8.349
7	0 39 0.25	2.1439	7 42 2.9	11.120	7	2 26 34.17	2.3501	15 37 54.9	8.262
8	0 41 8.99	2.1474	7 53 9.1	11.087	8	2 28 55.32	2.3549	15 46 7.9	8.173
9	0 43 17.94	2.1508	8 4 13.3	11.053	9	2 31 16.76	2.3598	15 54 15.7	8.084
10	0 45 27.09	2.1543	8 15 15.4	11.018	10	2 33 38.49	2.3646	16 2 18.0	7.993
11	0 47 36.45	2.1578	8 26 15.4	10.983	11	2 36 0.51	2.3694	16 10 14.8	7.901
12	0 49 46.03	2.1615	8 37 13.3	10.945	12	2 38 22.82	2.3743	16 18 6.1	7.808
13	0 51 55.83	2.1652	8 48 8.8	10.906	13	2 40 45.42	2.3792	16 25 51.7	7.713
14	0 54 5.85	2.1688	8 59 2.0	10.867	14	2 43 8.32	2.3840	16 33 31.7	7.618
15	0 56 16.09	2.1725	9 9 52.8	10.827	15	2 45 31.50	2.3888	16 41 5.9	7.521
16	0 58 26.55	2.1763	9 20 41.2	10.785	16	2 47 54.97	2.3936	16 48 34.2	7.423
17	1 0 37.24	2.1801	9 31 27.0	10.742	17	2 50 18.73	2.3984	16 55 56.6	7.324
18	1 2 48.16	2.1840	9 42 10.2	10.698	18	2 52 42.78	2.4033	17 3 13.1	7.224
19	1 4 59.32	2.1879	9 52 50.8	10.653	19	2 55 7.12	2.4080	17 10 23.5	7.123
20	1 7 10.71	2.1918	10 3 28.6	10.607	20	2 57 31.74	2.4127	17 17 27.7	7.019
21	1 9 22.34	2.1958	10 14 3.6	10.560	21	2 59 56.64	2.4174	17 24 25.8	6.916
22	1 11 34.21	2.1998	10 24 35.8	10.512	22	3 2 21.83	2.4222	17 31 17.6	6.811
23	1 13 46.32	2.2039	10 35 5.0	10.463	23	3 4 47.30	2.4268	17 38 3.1	6.706
24	1 15 58.68	2.2081	+10 45 31.3	+10.413	24	3 7 13.05	2.4315	+17 44 42.3	+ 6.608

GREENWICH MEAN TIME.

Hour.	Right Ascension.	Var. per Min.	Declination.	Var. per Min.	Hour.	Right Ascension.	Var. per Min.	Declination.	Var. per Min.
JANUARY 29.					JANUARY 31.				
	h m s	s	° ' "	"		h m s	s	° ' "	"
0	3 7 13.05	2.4315	+17 44 42.3	+6.506	0	5 8 22.08	2.5888	+20 39 17.4	+0.376
1	3 9 39.08	2.4361	17 51 14.9	6.489	1	5 10 57.45	2.5901	20 39 35.6	0.232
2	3 12 5.38	2.4408	17 57 41.0	6.390	2	5 13 32.89	2.5913	20 39 45.2	+0.088
3	3 14 31.97	2.4453	18 4 0.5	6.370	3	5 16 8.40	2.5923	20 39 46.2	-0.057
4	3 16 58.82	2.4498	18 10 13.4	6.158	4	5 18 43.96	2.5931	20 39 38.4	0.203
5	3 19 25.95	2.4544	18 16 19.5	6.045	5	5 21 19.57	2.5938	20 39 21.9	0.348
6	3 21 53.35	2.4588	18 22 18.8	5.932	6	5 23 55.22	2.5945	20 38 56.7	0.493
7	3 24 21.01	2.4633	18 28 11.3	5.817	7	5 26 30.91	2.5951	20 38 22.7	0.638
8	3 26 48.94	2.4678	18 33 56.8	5.701	8	5 29 6.63	2.5955	20 37 40.1	0.783
9	3 29 17.14	2.4721	18 39 35.4	5.584	9	5 31 42.37	2.5959	20 36 48.8	0.928
10	3 31 45.59	2.4763	18 45 6.9	5.466	10	5 34 18.14	2.5962	20 35 48.7	1.074
11	3 34 14.30	2.4806	18 50 31.3	5.347	11	5 36 53.91	2.5963	20 34 39.9	1.219
12	3 36 43.26	2.4848	18 55 48.5	5.227	12	5 39 29.69	2.5963	20 33 22.4	1.364
13	3 39 12.47	2.4890	19 0 58.5	5.106	13	5 42 5.47	2.5963	20 31 56.2	1.509
14	3 41 41.94	2.4932	19 6 1.2	4.984	14	5 44 41.24	2.5960	20 30 21.3	1.654
15	3 44 11.65	2.4972	19 10 56.6	4.862	15	5 47 16.99	2.5957	20 28 37.7	1.798
16	3 46 41.60	2.5012	19 15 44.6	4.737	16	5 49 52.72	2.5953	20 26 45.5	1.943
17	3 49 11.79	2.5051	19 20 25.0	4.612	17	5 52 28.42	2.5948	20 24 44.5	2.088
18	3 51 42.21	2.5090	19 24 58.0	4.487	18	5 55 4.09	2.5941	20 22 34.9	2.232
19	3 54 12.87	2.5128	19 29 23.4	4.360	19	5 57 39.71	2.5933	20 20 16.7	2.375
20	3 56 43.75	2.5165	19 33 41.2	4.233	20	6 0 15.29	2.5926	20 17 49.9	2.518
21	3 59 14.85	2.5203	19 37 51.3	4.108	21	6 2 50.82	2.5916	20 15 14.5	2.662
22	4 1 46.18	2.5239	19 41 53.6	3.974	22	6 5 26.28	2.5906	20 12 30.5	2.806
23	4 4 17.72	2.5274	+19 45 48.2	+3.844	23	6 8 1.68	2.5894	+20 9 37.9	-2.947
JANUARY 30.					FEBRUARY 1.				
	h m s	s	° ' "	"		h m s	s	° ' "	"
0	4 6 49.47	2.5309	+19 49 34.9	+3.718	0	6 10 37.01	2.5882	+20 6 36.9	-3.088
1	4 9 21.43	2.5343	19 53 13.8	3.582	1	6 13 12.26	2.5868	20 3 27.3	3.231
2	4 11 53.59	2.5377	19 56 44.7	3.449	2	6 15 47.42	2.5853	20 0 9.2	3.372
3	4 14 25.95	2.5409	20 0 7.7	3.316	3	6 18 22.49	2.5837	19 56 42.7	3.511
4	4 16 58.50	2.5441	20 3 22.6	3.181	4	6 20 57.46	2.5820	19 53 7.9	3.651
5	4 19 31.24	2.5472	20 6 29.4	3.047	5	6 23 32.33	2.5802	19 49 24.6	3.791
6	4 22 4.16	2.5502	20 9 28.2	2.912	6	6 26 7.08	2.5783	19 45 33.0	3.929
7	4 24 37.26	2.5532	20 12 18.8	2.775	7	6 28 41.72	2.5763	19 41 33.1	4.068
8	4 27 10.54	2.5560	20 15 1.2	2.638	8	6 31 16.24	2.5743	19 37 24.9	4.205
9	4 29 43.98	2.5588	20 17 35.3	2.500	9	6 33 50.64	2.5721	19 33 8.5	4.341
10	4 32 17.59	2.5614	20 20 1.2	2.363	10	6 36 24.90	2.5698	19 28 44.0	4.477
11	4 34 51.35	2.5640	20 22 18.8	2.224	11	6 38 59.02	2.5675	19 24 11.3	4.618
12	4 37 25.27	2.5665	20 24 28.1	2.084	12	6 41 33.00	2.5651	19 19 30.5	4.748
13	4 39 59.33	2.5689	20 26 28.9	1.944	13	6 44 6.83	2.5625	19 14 41.6	4.881
14	4 42 33.54	2.5713	20 28 21.4	1.804	14	6 46 40.50	2.5598	19 9 44.8	5.013
15	4 45 7.88	2.5734	20 30 5.4	1.663	15	6 49 14.01	2.5571	19 4 40.0	5.146
16	4 47 42.35	2.5756	20 31 40.9	1.522	16	6 51 47.36	2.5543	18 59 27.3	5.277
17	4 50 16.95	2.5776	20 33 8.0	1.380	17	6 54 20.53	2.5514	18 54 6.8	5.407
18	4 52 51.66	2.5794	20 34 26.5	1.238	18	6 56 53.53	2.5485	18 48 38.5	5.536
19	4 55 26.48	2.5813	20 35 36.5	1.095	19	6 59 26.35	2.5455	18 43 2.5	5.664
20	4 58 1.42	2.5831	20 36 37.9	0.952	20	7 1 58.99	2.5424	18 37 18.8	5.792
21	5 0 36.45	2.5846	20 37 30.7	0.808	21	7 4 31.44	2.5392	18 31 27.5	5.918
22	5 3 11.57	2.5862	20 38 14.9	0.665	22	7 7 3.69	2.5358	18 25 28.6	6.043
23	5 5 46.79	2.5876	20 38 50.5	0.521	23	7 9 35.74	2.5325	18 19 22.2	6.168
24	5 8 22.08	2.5888	+20 39 17.4	+0.376	24	7 12 7.59	2.5291	+18 13 8.4	-6.292

GREENWICH MEAN TIME.

Hour.	Right Ascension.	Var. per Min.	Declination.	Var. per Min.	Hour.	Right Ascension.	Var. per Min.	Declination.	Var. per Min.
FEBRUARY 2.					FEBRUARY 4.				
	h m s	s	° ' "	"		h m s	s	° ' "	"
0	7 12 7.59	2.5291	+18 13 8.4	-6.292	0	9 8 38.54	2.3157	+11 12 39.0	-10.700
1	7 14 39.23	2.5256	18 6 47.2	6.414	1	9 10 57.34	2.3110	11 1 55.3	10.757
2	7 17 10.66	2.5220	18 0 18.7	6.536	2	9 13 15.86	2.3063	10 51 8.2	10.813
3	7 19 41.87	2.5183	17 53 42.9	6.656	3	9 15 34.09	2.3016	10 40 17.8	10.867
4	7 22 12.86	2.5147	17 47 0.0	6.774	4	9 17 52.05	2.2969	10 29 24.2	10.920
5	7 24 43.63	2.5110	17 40 10.0	6.892	5	9 20 9.72	2.2923	10 18 27.4	10.971
6	7 27 14.18	2.5072	17 33 13.0	7.008	6	9 22 27.11	2.2876	10 7 27.7	11.020
7	7 29 44.49	2.5032	17 26 9.0	7.124	7	9 24 44.23	2.2830	9 56 25.0	11.068
8	7 32 14.56	2.4993	17 18 58.1	7.239	8	9 27 1.06	2.2783	9 45 19.5	11.116
9	7 34 44.40	2.4953	17 11 40.3	7.352	9	9 29 17.62	2.2738	9 34 11.1	11.163
10	7 37 13.99	2.4912	17 4 15.8	7.463	10	9 31 33.91	2.2692	9 23 0.1	11.205
11	7 39 43.34	2.4872	16 56 44.7	7.574	11	9 33 49.92	2.2647	9 11 46.5	11.248
12	7 42 12.45	2.4830	16 49 6.9	7.684	12	9 36 5.67	2.2602	9 0 30.4	11.288
13	7 44 41.30	2.4788	16 41 22.6	7.792	13	9 38 21.14	2.2556	8 49 11.9	11.328
14	7 47 9.90	2.4745	16 33 31.9	7.898	14	9 40 36.34	2.2512	8 37 51.0	11.368
15	7 49 38.24	2.4702	16 25 34.8	8.004	15	9 42 51.28	2.2468	8 26 27.8	11.405
16	7 52 6.32	2.4658	16 17 31.4	8.108	16	9 45 5.96	2.2424	8 15 2.4	11.440
17	7 54 34.14	2.4615	16 9 21.8	8.211	17	9 47 20.37	2.2380	8 3 35.0	11.473
18	7 57 1.70	2.4571	16 1 6.1	8.312	18	9 49 34.52	2.2337	7 52 5.6	11.507
19	7 59 28.99	2.4526	15 52 44.3	8.413	19	9 51 48.41	2.2293	7 40 34.2	11.538
20	8 1 56.01	2.4482	15 44 16.5	8.512	20	9 54 2.04	2.2251	7 29 0.9	11.568
21	8 4 22.77	2.4437	15 35 42.9	8.609	21	9 56 15.42	2.2209	7 17 25.9	11.598
22	8 6 49.25	2.4390	15 27 3.4	8.706	22	9 58 28.55	2.2167	7 5 49.2	11.625
23	8 9 15.45	2.4344	+15 18 18.2	-8.800	23	10 0 41.42	2.2124	+ 6 54 10.9	-11.651
FEBRUARY 3.					FEBRUARY 5.				
0	8 11 41.38	2.4299	+15 9 27.4	-8.893	0	10 2 54.04	2.2083	+ 6 42 31.1	-11.675
1	8 14 7.04	2.4253	15 0 31.0	8.985	1	10 5 6.42	2.2043	6 30 49.9	11.699
2	8 16 32.41	2.4205	14 51 29.2	9.075	2	10 7 18.55	2.2003	6 19 7.2	11.722
3	8 18 57.50	2.4159	14 42 22.0	9.165	3	10 9 30.44	2.1962	6 7 23.3	11.742
4	8 21 22.32	2.4113	14 33 9.4	9.253	4	10 11 42.10	2.1923	5 55 38.2	11.762
5	8 23 46.85	2.4065	14 23 51.7	9.338	5	10 13 53.51	2.1883	5 43 51.9	11.780
6	8 26 11.10	2.4018	14 14 28.8	9.423	6	10 16 4.69	2.1843	5 32 4.6	11.797
7	8 28 35.06	2.3970	14 5 0.9	9.507	7	10 18 15.63	2.1805	5 20 16.3	11.813
8	8 30 58.74	2.3923	13 55 28.0	9.589	8	10 20 26.35	2.1767	5 8 27.1	11.828
9	8 33 22.13	2.3875	13 45 50.2	9.669	9	10 22 36.83	2.1729	4 56 37.0	11.841
10	8 35 45.24	2.3827	13 36 7.7	9.748	10	10 24 47.09	2.1692	4 44 46.2	11.853
11	8 38 8.06	2.3779	13 26 20.4	9.826	11	10 26 57.13	2.1655	4 32 54.7	11.863
12	8 40 30.59	2.3731	13 16 28.6	9.902	12	10 29 6.95	2.1618	4 21 2.6	11.873
13	8 42 52.83	2.3683	13 6 32.2	9.977	13	10 31 16.55	2.1583	4 9 10.0	11.882
14	8 45 14.79	2.3636	12 56 31.4	10.049	14	10 33 25.94	2.1548	3 57 16.8	11.889
15	8 47 36.46	2.3588	12 46 26.3	10.121	15	10 35 35.11	2.1512	3 45 23.3	11.894
16	8 49 57.84	2.3539	12 36 16.9	10.192	16	10 37 44.07	2.1477	3 33 29.5	11.899
17	8 52 18.93	2.3492	12 26 3.3	10.260	17	10 39 52.83	2.1443	3 21 35.4	11.902
18	8 54 39.74	2.3444	12 15 45.7	10.328	18	10 42 1.38	2.1408	3 9 41.2	11.905
19	8 57 0.26	2.3396	12 5 24.0	10.393	19	10 44 9.73	2.1375	2 57 46.8	11.907
20	8 59 20.49	2.3348	11 54 58.5	10.458	20	10 46 17.88	2.1342	2 45 52.4	11.907
21	9 1 40.43	2.3300	11 44 29.1	10.521	21	10 48 25.83	2.1309	2 33 58.0	11.905
22	9 4 0.09	2.3252	11 33 56.0	10.582	22	10 50 33.58	2.1277	2 22 3.7	11.904
23	9 6 19.46	2.3204	11 23 19.3	10.642	23	10 52 41.15	2.1246	2 10 9.5	11.901
24	9 8 38.54	2.3157	+11 12 39.0	-10.700	24	10 54 48.53	2.1214	+ 1 58 15.6	-11.896



GREENWICH MEAN TIME.

Hour.	Right Ascension.	Var. per Min.	Declination.	Var. per Min.	Hour.	Right Ascension.	Var. per Min.	Declination.	Var. per Min.
FEBRUARY 6.					FEBRUARY 8.				
	h m s	s	° ' "	"		h m s	s	° ' "	"
0	10 54 48.53	2.1214	+1 58 15.6	-11.806	0	12 33 56.51	2.0269	- 7 9 15.7	-10.587
1	10 56 55.72	2.1183	1 46 22.0	11.391	1	12 35 58.10	2.0261	7 19 49.5	10.540
2	10 59 2.73	2.1153	1 34 28.7	11.394	2	12 37 59.65	2.0253	7 30 20.4	10.492
3	11 1 9.56	2.1124	1 22 35.9	11.877	3	12 40 1.14	2.0245	7 40 48.5	10.444
4	11 3 16.22	2.1095	1 10 43.5	11.868	4	12 42 2.59	2.0238	7 51 13.7	10.396
5	11 5 22.70	2.1065	0 58 51.7	11.858	5	12 44 3.99	2.0231	8 1 36.0	10.347
6	11 7 29.00	2.1037	0 47 0.5	11.848	6	12 46 5.36	2.0225	8 11 55.3	10.297
7	11 9 35.14	2.1009	0 35 10.0	11.836	7	12 48 6.69	2.0218	8 22 11.6	10.246
8	11 11 41.11	2.0982	0 23 20.2	11.823	8	12 50 7.98	2.0212	8 32 24.8	10.194
9	11 13 46.92	2.0955	+0 11 31.2	11.810	9	12 52 9.23	2.0206	8 42 34.9	10.143
10	11 15 52.57	2.0928	-0 0 17.0	11.795	10	12 54 10.46	2.0203	8 52 41.9	10.091
11	11 17 58.06	2.0903	0 12 4.2	11.779	11	12 56 11.66	2.0196	9 2 45.8	10.038
12	11 20 3.40	2.0877	0 23 50.5	11.763	12	12 58 12.83	2.0193	9 12 46.5	9.984
13.	11 22 8.58	2.0852	0 35 35.7	11.745	13	13 0 13.98	2.0190	9 22 43.9	9.930
14	11 24 13.62	2.0828	0 47 19.9	11.727	14	13 2 15.11	2.0186	9 32 38.1	9.876
15	11 26 18.51	2.0803	0 59 2.9	11.707	15	13 4 16.21	2.0183	9 42 29.0	9.820
16	11 28 23.26	2.0779	1 10 44.7	11.686	16	13 6 17.30	2.0181	9 52 16.5	9.764
17	11 30 27.86	2.0756	1 22 25.2	11.664	17	13 8 18.38	2.0178	10 2 0.7	9.708
18	11 32 32.33	2.0734	1 34 4.4	11.642	18	13 10 19.44	2.0176	10 11 41.5	9.651
19	11 34 36.67	2.0712	1 45 42.3	11.619	19	13 12 20.49	2.0174	10 21 18.8	9.593
20	11 36 40.87	2.0690	1 57 18.7	11.595	20	13 14 21.53	2.0173	10 30 52.6	9.535
21	11 38 44.95	2.0669	2 8 53.7	11.570	21	13 16 22.56	2.0172	10 40 23.0	9.477
22	11 40 48.90	2.0648	2 20 27.1	11.543	22	13 18 23.59	2.0172	10 49 49.8	9.418
23	11 42 52.72	2.0628	-2 31 58.9	-11.517	23	13 20 24.62	2.0171	-10 59 13.1	-9.358
FEBRUARY 7.					FEBRUARY 9.				
0	11 44 56.43	2.0606	-2 43 29.1	-11.489	0	13 22 25.64	2.0171	-11 8 32.7	-9.297
1	11 47 0.02	2.0588	2 54 57.6	11.461	1	13 24 26.67	2.0173	11 17 48.7	9.237
2	11 49 3.49	2.0569	3 6 24.4	11.432	2	13 26 27.71	2.0173	11 27 1.1	9.176
3	11 51 6.85	2.0552	3 17 49.4	11.401	3	13 28 28.74	2.0173	11 36 9.8	9.113
4	11 53 10.11	2.0534	3 29 12.5	11.369	4	13 30 29.79	2.0175	11 45 14.8	9.052
5	11 55 13.26	2.0516	3 40 33.7	11.338	5	13 32 30.84	2.0177	11 54 16.0	8.988
6	11 57 16.30	2.0498	3 51 53.0	11.305	6	13 34 31.91	2.0179	12 3 13.4	8.925
7	11 59 19.24	2.0483	4 3 10.3	11.272	7	13 36 32.99	2.0181	12 12 7.0	8.861
8	12 1 22.09	2.0467	4 14 25.6	11.238	8	13 38 34.08	2.0183	12 20 56.7	8.797
9	12 3 24.84	2.0451	4 25 38.8	11.208	9	13 40 35.19	2.0187	12 29 42.6	8.733
10	12 5 27.50	2.0436	4 36 49.9	11.167	10	13 42 36.32	2.0190	12 38 24.6	8.667
11	12 7 30.07	2.0421	4 47 58.8	11.129	11	13 44 37.47	2.0193	12 47 2.6	8.601
12	12 9 32.55	2.0407	4 59 5.4	11.092	12	13 46 38.64	2.0197	12 55 36.7	8.535
13	12 11 34.95	2.0393	5 10 9.8	11.054	13	13 48 39.83	2.0200	13 4 6.8	8.468
14	12 13 37.26	2.0379	5 21 11.9	11.015	14	13 50 41.04	2.0205	13 12 32.9	8.402
15	12 15 39.50	2.0367	5 32 11.6	10.975	15	13 52 42.29	2.0210	13 20 55.0	8.333
16	12 17 41.66	2.0354	5 43 8.9	10.934	16	13 54 43.56	2.0214	13 29 12.9	8.265
17	12 19 43.75	2.0342	5 54 3.7	10.893	17	13 56 44.86	2.0220	13 37 26.8	8.198
18	12 21 45.76	2.0330	6 4 56.1	10.852	18	13 58 46.20	2.0226	13 45 36.6	8.128
19	12 23 47.71	2.0319	6 15 46.0	10.809	19	14 0 47.57	2.0231	13 53 42.2	8.058
20	12 25 49.59	2.0308	6 26 33.2	10.766	20	14 2 48.97	2.0236	14 1 43.6	7.988
21	12 27 51.41	2.0298	6 37 17.9	10.722	21	14 4 50.40	2.0243	14 9 40.8	7.918
22	12 29 53.17	2.0288	6 47 59.9	10.677	22	14 6 51.88	2.0249	14 17 33.8	7.848
23	12 31 54.87	2.0278	6 58 39.1	10.632	23	14 8 53.39	2.0256	14 25 22.5	7.776
24	12 33 56.51	2.0269	-7 9 15.7	-10.587	24	14 10 54.95	2.0263	-14 33 6.9	-7.704

## GREENWICH MEAN TIME.

Hour.	Right Ascension.	Var. per Min.	Declination.	Var. per Min.	Hour.	Right Ascension.	Var. per Min.	Declination.	Var. per Min.
FEBRUARY 10.					FEBRUARY 12.				
	h m s	s	° ' "	"		h m s	s	° ' "	"
0	14 10 54.95	2.0263	-14 33 6.9	-7.704	0	15 49 14.82	2.0742	-19 13 6.2	-3.828
1	14 12 56.54	2.0269	14 40 47.0	7.633	1	15 51 19.30	2.0753	19 16 53.2	3.740
2	14 14 58.18	2.0277	14 48 22.8	7.561	2	15 53 23.85	2.0764	19 20 35.0	3.652
3	14 16 59.86	2.0284	14 55 54.3	7.488	3	15 55 28.47	2.0775	19 24 11.4	3.562
4	14 19 1.59	2.0292	15 3 21.3	7.413	4	15 57 33.15	2.0785	19 27 42.4	3.473
5	14 21 3.36	2.0299	15 10 43.9	7.340	5	15 59 37.89	2.0796	19 31 8.1	3.383
6	14 23 5.18	2.0306	15 18 2.1	7.267	6	16 1 42.70	2.0806	19 34 28.4	3.294
7	14 25 7.05	2.0316	15 25 15.9	7.193	7	16 3 47.58	2.0818	19 37 43.4	3.204
8	14 27 8.97	2.0323	15 32 25.1	7.117	8	16 5 52.51	2.0828	19 40 52.9	3.113
9	14 29 10.93	2.0332	15 39 29.9	7.042	9	16 7 57.51	2.0838	19 43 56.9	3.022
10	14 31 12.95	2.0342	15 46 30.1	6.966	10	16 10 2.57	2.0848	19 46 55.6	2.933
11	14 33 15.03	2.0350	15 53 25.8	6.890	11	16 12 7.69	2.0858	19 49 48.8	2.841
12	14 35 17.15	2.0358	16 0 16.9	6.813	12	16 14 12.88	2.0868	19 52 36.5	2.749
13	14 37 19.33	2.0368	16 7 3.3	6.736	13	16 16 18.12	2.0878	19 55 18.7	2.655
14	14 39 21.57	2.0378	16 13 45.2	6.659	14	16 18 23.42	2.0888	19 57 55.5	2.567
15	14 41 23.86	2.0387	16 20 22.4	6.582	15	16 20 28.78	2.0898	20 0 26.8	2.475
16	14 43 26.21	2.0397	16 26 55.0	6.503	16	16 22 34.20	2.0908	20 2 52.5	2.383
17	14 45 28.62	2.0406	16 33 22.8	6.425	17	16 24 39.68	2.0918	20 5 12.7	2.291
18	14 47 31.08	2.0416	16 39 46.0	6.347	18	16 26 45.21	2.0927	20 7 27.4	2.198
19	14 49 33.61	2.0427	16 46 4.4	6.267	19	16 28 50.80	2.0936	20 9 36.5	2.106
20	14 51 36.20	2.0436	16 52 18.0	6.188	20	16 30 56.44	2.0945	20 11 40.1	2.013
21	14 53 38.84	2.0446	16 58 26.9	6.108	21	16 33 2.14	2.0954	20 13 38.0	1.919
22	14 55 41.55	2.0457	17 4 31.0	6.028	22	16 35 7.89	2.0963	20 15 30.4	1.825
23	14 57 44.32	2.0467	-17 10 30.2	-5.947	23	16 37 13.70	2.0972	-20 17 17.2	-1.733
FEBRUARY 11.					FEBRUARY 13.				
	h m s	s	° ' "	"		h m s	s	° ' "	"
0	14 59 47.15	2.0478	-17 16 24.6	-5.867	0	16 39 19.55	2.0980	-20 18 58.4	-1.640
1	15 1 50.05	2.0488	17 22 14.2	5.785	1	16 41 25.46	2.0989	20 20 34.0	1.547
2	15 3 53.01	2.0498	17 27 58.8	5.703	2	16 43 31.42	2.0998	20 22 4.0	1.453
3	15 5 56.03	2.0509	17 33 38.6	5.622	3	16 45 37.43	2.1005	20 23 28.3	1.358
4	15 7 59.12	2.0521	17 39 13.4	5.538	4	16 47 43.48	2.1013	20 24 47.0	1.264
5	15 10 2.28	2.0532	17 44 43.2	5.456	5	16 49 49.58	2.1021	20 26 0.0	1.170
6	15 12 5.50	2.0542	17 50 8.1	5.374	6	16 51 55.73	2.1028	20 27 7.4	1.076
7	15 14 8.78	2.0553	17 55 28.1	5.291	7	16 54 1.92	2.1036	20 28 9.1	0.981
8	15 16 12.13	2.0564	18 0 43.0	5.207	8	16 56 8.16	2.1043	20 29 5.1	0.887
9	15 18 15.55	2.0575	18 5 52.9	5.123	9	16 58 14.44	2.1050	20 29 55.5	0.792
10	15 20 19.03	2.0586	18 10 57.8	5.039	10	17 0 20.76	2.1058	20 30 40.1	0.697
11	15 22 22.58	2.0597	18 15 57.6	4.954	11	17 2 27.13	2.1064	20 31 19.1	0.602
12	15 24 26.20	2.0608	18 20 52.3	4.869	12	17 4 33.53	2.1070	20 31 52.3	0.507
13	15 26 29.88	2.0619	18 25 41.9	4.784	13	17 6 39.97	2.1077	20 32 19.9	0.412
14	15 28 33.63	2.0631	18 30 26.4	4.699	14	17 8 46.45	2.1083	20 32 41.7	0.317
15	15 30 37.45	2.0642	18 35 5.8	4.613	15	17 10 52.96	2.1088	20 32 57.9	0.222
16	15 32 41.33	2.0653	18 39 40.0	4.527	16	17 12 59.51	2.1094	20 33 8.3	0.126
17	15 34 45.29	2.0665	18 44 9.0	4.441	17	17 15 6.09	2.1099	20 33 12.9	-0.030
18	15 36 49.31	2.0675	18 48 32.9	4.353	18	17 17 12.70	2.1104	20 33 11.9	+0.065
19	15 38 53.39	2.0686	18 52 51.5	4.267	19	17 19 19.34	2.1110	20 33 5.1	0.162
20	15 40 57.54	2.0698	18 57 5.0	4.181	20	17 21 26.02	2.1115	20 32 52.5	0.258
21	15 43 1.76	2.0708	19 1 13.2	4.093	21	17 23 32.72	2.1119	20 32 34.2	0.353
22	15 45 6.04	2.0720	19 5 16.1	4.005	22	17 25 39.45	2.1124	20 32 10.2	0.445
23	15 47 10.40	2.0732	19 9 13.8	3.917	23	17 27 46.21	2.1128	20 31 40.4	0.534
24	15 49 14.82	2.0742	-19 13 6.2	-3.828	24	17 29 52.99	2.1132	-20 31 4.9	+0.610

GREENWICH MEAN TIME.

Hour.	Right Ascension.	Var. per Min.	Declination.	Var. per Min.	Hour.	Right Ascension.	Var. per Min.	Declination.	Var. per Min.
FEBRUARY 14.					FEBRUARY 16.				
0	h m s	s	° ' "	"	0	h m s	s	° ' "	"
0	17 29 52.99	2.1132	-20 31 4.9	+0.640	0	19 11 22.32	2.1079	-18 10 45.2	+5.157
1	17 31 59.79	2.1136	20 30 23.6	0.736	1	19 13 28.78	2.1073	18 5 33.1	5.246
2	17 34 6.62	2.1139	20 29 36.5	0.833	2	19 15 35.20	2.1067	18 0 15.7	5.334
3	17 36 13.46	2.1143	20 28 43.7	0.928	3	19 17 41.58	2.1061	17 54 53.0	5.423
4	17 38 20.33	2.1147	20 27 45.1	1.024	4	19 19 47.93	2.1056	17 49 24.9	5.512
5	17 40 27.22	2.1149	20 26 40.8	1.120	5	19 21 54.25	2.1050	17 43 51.5	5.600
6	17 42 34.12	2.1151	20 25 30.7	1.217	6	19 24 0.53	2.1043	17 38 12.9	5.688
7	17 44 41.03	2.1153	20 24 14.8	1.313	7	19 26 6.77	2.1038	17 32 29.0	5.775
8	17 46 47.96	2.1156	20 22 53.2	1.408	8	19 28 12.98	2.1031	17 26 39.9	5.863
9	17 48 54.91	2.1158	20 21 25.8	1.504	9	19 30 19.14	2.1024	17 20 45.5	5.949
10	17 51 1.86	2.1160	20 19 52.7	1.599	10	19 32 25.27	2.1018	17 14 46.0	6.035
11	17 53 8.83	2.1162	20 18 13.9	1.696	11	19 34 31.36	2.1012	17 8 41.3	6.122
12	17 55 15.80	2.1163	20 16 29.2	1.792	12	19 36 37.41	2.1005	17 2 31.4	6.207
13	17 57 22.78	2.1164	20 14 38.9	1.887	13	19 38 43.42	2.0998	16 56 16.5	6.292
14	17 59 29.77	2.1166	20 12 42.8	1.983	14	19 40 49.39	2.0992	16 49 56.4	6.378
15	18 1 36.77	2.1167	20 10 40.9	2.079	15	19 42 55.32	2.0984	16 43 31.2	6.462
16	18 3 43.77	2.1167	20 8 33.3	2.174	16	19 45 1.20	2.0977	16 37 1.0	6.545
17	18 5 50.77	2.1167	20 6 20.0	2.270	17	19 47 7.04	2.0971	16 30 25.8	6.628
18	18 7 57.77	2.1167	20 4 0.9	2.366	18	19 49 12.85	2.0964	16 23 45.6	6.712
19	18 10 4.77	2.1167	20 1 36.1	2.461	19	19 51 18.61	2.0956	16 17 0.4	6.795
20	18 12 11.77	2.1167	19 59 5.6	2.556	20	19 53 24.32	2.0949	16 10 10.2	6.877
21	18 14 18.77	2.1166	19 56 29.4	2.651	21	19 55 30.00	2.0942	16 3 15.1	6.958
22	18 16 25.76	2.1165	19 53 47.5	2.747	22	19 57 35.63	2.0934	15 56 15.2	7.040
23	18 18 32.75	2.1164	-19 50 59.8	+2.842	23	19 59 41.21	2.0928	-15 49 10.3	+7.121
FEBRUARY 15.					FEBRUARY 17.				
0	h m s	s	° ' "	"	0	h m s	s	° ' "	"
0	18 20 39.73	2.1163	-19 48 6.5	+2.936	0	20 1 46.76	2.0921	-15 42 0.7	+7.201
1	18 22 46.70	2.1162	19 45 7.5	3.031	1	20 3 52.26	2.0913	15 34 46.2	7.282
2	18 24 53.67	2.1159	19 42 2.8	3.125	2	20 5 57.71	2.0906	15 27 26.9	7.361
3	18 27 0.62	2.1158	19 38 52.5	3.219	3	20 8 3.13	2.0899	15 20 2.9	7.440
4	18 29 7.56	2.1156	19 35 36.5	3.314	4	20 10 8.50	2.0891	15 12 34.1	7.518
5	18 31 14.49	2.1154	19 32 14.8	3.408	5	20 12 13.82	2.0883	15 5 0.7	7.596
6	18 33 21.41	2.1152	19 28 47.5	3.503	6	20 14 19.10	2.0877	14 57 22.6	7.673
7	18 35 28.31	2.1149	19 25 14.5	3.596	7	20 16 24.34	2.0870	14 49 39.9	7.751
8	18 37 35.20	2.1147	19 21 36.0	3.689	8	20 18 29.54	2.0863	14 41 52.5	7.828
9	18 39 42.07	2.1143	19 17 51.8	3.783	9	20 20 34.70	2.0856	14 34 0.6	7.903
10	18 41 48.92	2.1140	19 14 2.1	3.876	10	20 22 39.81	2.0848	14 26 4.2	7.978
11	18 43 55.75	2.1137	19 10 6.7	3.969	11	20 24 44.88	2.0840	14 18 3.3	8.053
12	18 46 2.56	2.1133	19 6 5.8	4.062	12	20 26 49.90	2.0833	14 9 57.9	8.128
13	18 48 9.35	2.1130	19 1 59.3	4.154	13	20 28 54.89	2.0827	14 1 48.0	8.201
14	18 50 16.12	2.1126	18 57 47.3	4.247	14	20 30 59.83	2.0820	13 53 33.8	8.273
15	18 52 22.86	2.1122	18 53 29.7	4.338	15	20 33 4.73	2.0813	13 45 15.2	8.347
16	18 54 29.58	2.1118	18 49 6.7	4.430	16	20 35 9.59	2.0807	13 36 52.2	8.418
17	18 56 36.27	2.1113	18 44 38.1	4.523	17	20 37 14.41	2.0801	13 28 25.0	8.489
18	18 58 42.93	2.1108	18 40 4.0	4.613	18	20 39 19.20	2.0794	13 19 53.5	8.560
19	19 0 49.57	2.1104	18 35 24.5	4.704	19	20 41 23.94	2.0787	13 11 17.7	8.630
20	19 2 56.18	2.1099	18 30 39.5	4.796	20	20 43 28.64	2.0781	13 2 37.8	8.699
21	19 5 2.76	2.1094	18 25 49.0	4.887	21	20 45 33.31	2.0775	12 53 53.8	8.768
22	19 7 9.31	2.1089	18 20 53.1	4.976	22	20 47 37.94	2.0768	12 45 5.6	8.838
23	19 9 15.83	2.1084	18 15 51.9	5.066	23	20 49 42.53	2.0762	12 36 13.2	8.906
24	19 11 22.32	2.1079	-18 10 45.2	+5.157	24	20 51 47.08	2.0756	-12 27 16.9	+8.972

GREENWICH MEAN TIME.

Hour.	Right Ascension.	Var. per Min.	Declination.	Var. per Min.	Hour.	Right Ascension.	Var. per Min.	Declination.	Var. per Min.
FEBRUARY 18.					FEBRUARY 20.				
0	h m s	s	° ' "	"	0	h m s	s	° ' "	"
0	20 51 47.08	2.0756	-12 27 16.9	+ 8.973	0	22 31 5.06	2.0714	-4 13 1.1	+11.329
1	20 53 51.60	2.0751	12 18 16.6	9.088	1	22 33 9.36	2.0720	4 1 41.1	11.367
2	20 55 56.09	2.0745	12 9 12.3	9.104	2	22 35 13.70	2.0727	3 50 19.5	11.371
3	20 58 0.54	2.0739	12 0 4.1	9.169	3	22 37 18.08	2.0733	3 38 56.2	11.401
4	21 0 4.96	2.0733	11 50 52.0	9.233	4	22 39 22.50	2.0741	3 27 31.4	11.426
5	21 2 9.34	2.0728	11 41 36.1	9.307	5	22 41 26.97	2.0748	3 16 5.1	11.451
6	21 4 13.70	2.0723	11 32 16.4	9.360	6	22 43 31.48	2.0755	3 4 37.3	11.475
7	21 6 18.02	2.0718	11 22 52.9	9.423	7	22 45 36.03	2.0763	2 53 8.1	11.499
8	21 8 22.32	2.0714	11 13 25.6	9.485	8	22 47 40.63	2.0772	2 41 37.8	11.519
9	21 10 26.59	2.0709	11 3 54.7	9.545	9	22 49 45.29	2.0782	2 30 5.8	11.540
10	21 12 30.83	2.0704	10 54 20.2	9.606	10	22 51 50.01	2.0791	2 18 32.8	11.560
11	21 14 35.04	2.0700	10 44 42.0	9.666	11	22 53 54.78	2.0801	2 6 58.6	11.579
12	21 16 39.23	2.0697	10 35 0.3	9.724	12	22 55 59.62	2.0811	1 55 23.3	11.597
13	21 18 43.40	2.0693	10 25 15.1	9.782	13	22 58 4.51	2.0821	1 43 47.0	11.613
14	21 20 47.54	2.0689	10 15 26.5	9.839	14	23 0 9.47	2.0832	1 32 9.7	11.629
15	21 22 51.67	2.0686	10 5 34.4	9.897	15	23 2 14.49	2.0843	1 20 31.5	11.644
16	21 24 55.77	2.0682	9 55 38.9	9.953	16	23 4 19.59	2.0855	1 8 52.4	11.658
17	21 26 59.85	2.0678	9 45 40.1	10.008	17	23 6 24.75	2.0867	0 57 12.5	11.671
18	21 29 3.91	2.0676	9 35 38.0	10.063	18	23 8 29.99	2.0879	0 45 31.9	11.683
19	21 31 7.96	2.0673	9 25 32.6	10.117	19	23 10 35.30	2.0892	0 33 50.6	11.694
20	21 33 11.99	2.0671	9 15 24.0	10.169	20	23 12 40.69	2.0905	0 22 8.6	11.704
21	21 35 16.01	2.0669	9 5 12.3	10.221	21	23 14 46.16	2.0919	-0 10 26.1	11.713
22	21 37 20.02	2.0667	8 54 57.5	10.273	22	23 16 51.72	2.0933	+0 1 16.9	11.720
23	21 39 24.01	2.0665	- 8 44 39.6	+10.323	23	23 18 57.36	2.0948	0 13 0.3	+11.727
FEBRUARY 19.					FEBRUARY 21.				
0	h m s	s	° ' "	"	0	h m s	s	° ' "	"
0	21 41 28.00	2.0663	- 8 34 18.7	+10.373	0	23 21 3.09	2.0963	+0 24 44.2	+11.733
1	21 43 31.97	2.0662	8 23 54.9	10.422	1	23 23 8.91	2.0978	0 36 28.3	11.738
2	21 45 35.94	2.0662	8 13 28.1	10.471	2	23 25 14.82	2.0993	0 48 12.7	11.743
3	21 47 39.91	2.0661	8 2 58.4	10.518	3	23 27 20.82	2.1008	0 59 57.3	11.748
4	21 49 43.87	2.0660	7 52 26.0	10.564	4	23 29 26.92	2.1025	1 11 42.0	11.754
5	21 51 47.83	2.0660	7 41 50.7	10.611	5	23 31 33.13	2.1043	1 23 26.8	11.757
6	21 53 51.79	2.0660	7 31 12.7	10.655	6	23 33 39.43	2.1060	1 35 11.6	11.764
7	21 55 55.75	2.0661	7 20 32.1	10.699	7	23 35 45.84	2.1078	1 46 56.3	11.769
8	21 57 59.72	2.0662	7 9 48.8	10.743	8	23 37 52.36	2.1095	1 58 41.0	11.773
9	22 0 3.69	2.0663	6 59 3.0	10.785	9	23 39 58.98	2.1113	2 10 25.4	11.778
10	22 2 7.67	2.0663	6 48 14.6	10.827	10	23 42 5.72	2.1133	2 22 9.5	11.783
11	22 4 11.65	2.0665	6 37 23.7	10.868	11	23 44 12.57	2.1152	2 33 53.4	11.788
12	22 6 15.65	2.0667	6 26 30.5	10.908	12	23 46 19.54	2.1172	2 45 36.9	11.791
13	22 8 19.65	2.0669	6 15 34.8	10.947	13	23 48 26.63	2.1192	2 57 19.9	11.793
14	22 10 23.67	2.0672	6 4 36.8	10.985	14	23 50 33.84	2.1212	3 9 2.4	11.796
15	22 12 27.71	2.0674	5 53 36.6	11.023	15	23 52 41.17	2.1233	3 20 44.3	11.801
16	22 14 31.76	2.0678	5 42 34.1	11.060	16	23 54 48.63	2.1253	3 32 25.6	11.803
17	22 16 35.84	2.0681	5 31 29.5	11.094	17	23 56 56.21	2.1275	3 44 6.2	11.809
18	22 18 39.93	2.0684	5 20 22.8	11.129	18	23 59 3.93	2.1298	3 55 46.0	11.817
19	22 20 44.05	2.0688	5 9 14.0	11.163	19	0 1 11.78	2.1320	4 7 25.0	11.823
20	22 22 48.19	2.0693	4 58 3.2	11.196	20	0 3 19.77	2.1343	4 19 3.1	11.827
21	22 24 52.36	2.0698	4 46 50.5	11.228	21	0 5 27.90	2.1367	4 30 40.2	11.830
22	22 26 56.56	2.0703	4 35 35.9	11.259	22	0 7 36.17	2.1390	4 42 16.3	11.833
23	22 29 0.79	2.0708	4 24 19.4	11.290	23	0 9 44.58	2.1413	4 53 51.2	11.837
24	22 31 5.06	2.0714	- 4 13 1.1	+11.319	24	0 11 53.13	2.1438	+5 5 25.0	+11.833

GREENWICH MEAN TIME.

Hour.	Right Ascension.	Var. per Min.	Declination.	Var. per Min.	Hour.	Right Ascension.	Var. per Min.	Declination.	Var. per Min.
<b>FEBRUARY 22.</b>					<b>FEBRUARY 24.</b>				
0	0 11 53.13	2.1438	+ 5 5 25.0	+11.553	0	1 58 16.10	2.2907	+13 35 4.3	+9.293
1	0 14 1.84	2.1463	5 16 57.6	11.532	1	2 0 34.19	2.2935	13 44 16.2	9.161
2	0 16 10.69	2.1488	5 28 28.8	11.500	2	2 2 52.52	2.2973	13 53 23.6	9.083
3	0 18 19.70	2.1514	5 39 58.7	11.496	3	2 5 11.07	2.3111	14 2 26.2	9.004
4	0 20 28.86	2.1540	5 51 27.1	11.461	4	2 7 29.85	2.3149	14 11 24.1	8.994
5	0 22 38.18	2.1567	6 2 54.0	11.436	5	2 9 48.86	2.3188	14 20 17.1	8.943
6	0 24 47.66	2.1593	6 14 19.4	11.409	6	2 12 8.10	2.3226	14 29 5.2	8.761
7	0 26 57.30	2.1620	6 25 43.1	11.381	7	2 14 27.57	2.3263	14 37 48.4	8.678
8	0 29 7.10	2.1648	6 37 5.1	11.352	8	2 16 47.26	2.3302	14 46 26.5	8.598
9	0 31 17.07	2.1676	6 48 25.3	11.321	9	2 19 7.19	2.3341	14 54 59.5	8.508
10	0 33 27.21	2.1704	6 59 43.6	11.290	10	2 21 27.35	2.3378	15 3 27.4	8.421
11	0 35 37.52	2.1733	7 11 0.1	11.267	11	2 23 47.73	2.3417	15 11 50.0	8.333
12	0 37 48.00	2.1761	7 22 14.5	11.223	12	2 26 8.35	2.3455	15 20 7.3	8.243
13	0 39 58.65	2.1791	7 33 28.9	11.189	13	2 28 29.19	2.3493	15 28 19.2	8.158
14	0 42 9.49	2.1821	7 44 37.2	11.153	14	2 30 50.26	2.3531	15 36 25.7	8.062
15	0 44 20.50	2.1850	7 55 45.3	11.116	15	2 33 11.56	2.3569	15 44 26.7	7.970
16	0 46 31.69	2.1881	8 6 51.1	11.078	16	2 35 33.09	2.3607	15 52 22.1	7.877
17	0 48 43.07	2.1913	8 17 54.6	11.038	17	2 37 54.84	2.3644	16 0 11.9	7.783
18	0 50 54.64	2.1943	8 28 55.7	10.998	18	2 40 16.82	2.3683	16 7 56.0	7.688
19	0 53 6.39	2.1973	8 39 54.3	10.956	19	2 42 39.03	2.3720	16 15 34.4	7.591
20	0 55 18.32	2.2005	8 50 50.4	10.913	20	2 45 1.46	2.3757	16 23 6.9	7.493
21	0 57 30.45	2.2038	9 1 43.9	10.869	21	2 47 24.11	2.3794	16 30 33.5	7.394
22	0 59 42.77	2.2070	9 12 34.7	10.823	22	2 49 46.99	2.3831	16 37 54.2	7.296
23	1 1 55.29	2.2103	+ 9 23 22.7	+10.777	23	2 52 10.08	2.3868	+16 45 9.0	+7.196
<b>FEBRUARY 23.</b>					<b>FEBRUARY 25.</b>				
0	1 4 8.00	2.2136	+ 9 34 7.9	+10.729	0	2 54 33.40	2.3905	+16 52 17.6	+7.093
1	1 6 20.92	2.2169	9 44 50.2	10.680	1	2 56 56.94	2.3941	16 59 20.1	6.991
2	1 8 34.03	2.2202	9 55 29.5	10.631	2	2 59 20.69	2.3977	17 6 16.5	6.888
3	1 10 47.34	2.2236	10 6 5.9	10.580	3	3 1 44.66	2.4013	17 13 6.6	6.783
4	1 13 0.86	2.2271	10 16 39.1	10.527	4	3 4 8.85	2.4049	17 19 50.4	6.677
5	1 15 14.59	2.2305	10 27 9.1	10.473	5	3 6 33.25	2.4084	17 26 27.8	6.570
6	1 17 28.52	2.2338	10 37 35.9	10.419	6	3 8 57.86	2.4119	17 32 58.8	6.463
7	1 19 42.65	2.2373	10 47 59.4	10.363	7	3 11 22.68	2.4154	17 39 23.4	6.355
8	1 21 57.00	2.2409	10 58 19.5	10.306	8	3 13 47.71	2.4188	17 45 41.4	6.245
9	1 24 11.56	2.2444	11 8 36.1	10.248	9	3 16 12.94	2.4223	17 51 52.8	6.135
10	1 26 26.33	2.2480	11 18 49.3	10.189	10	3 18 38.38	2.4257	17 57 57.6	6.024
11	1 28 41.32	2.2516	11 28 58.8	10.128	11	3 21 4.02	2.4290	18 3 55.7	5.912
12	1 30 56.52	2.2551	11 39 4.7	10.067	12	3 23 29.86	2.4323	18 9 47.0	5.799
13	1 33 11.93	2.2587	11 49 6.8	10.004	13	3 25 55.89	2.4356	18 15 31.6	5.686
14	1 35 27.56	2.2623	11 59 5.2	9.941	14	3 28 22.12	2.4388	18 21 9.2	5.570
15	1 37 43.41	2.2660	12 8 59.7	9.875	15	3 30 48.54	2.4419	18 26 40.0	5.455
16	1 39 59.48	2.2696	12 18 50.2	9.808	16	3 33 15.15	2.4451	18 32 3.8	5.338
17	1 42 15.78	2.2734	12 28 36.7	9.741	17	3 35 41.95	2.4482	18 37 20.6	5.222
18	1 44 32.29	2.2771	12 38 19.1	9.673	18	3 38 8.93	2.4513	18 42 30.4	5.103
19	1 46 49.03	2.2808	12 47 57.4	9.603	19	3 40 36.10	2.4543	18 47 33.0	4.984
20	1 49 5.99	2.2846	12 57 31.5	9.532	20	3 43 3.44	2.4572	18 52 28.5	4.865
21	1 51 23.18	2.2883	13 7 1.3	9.460	21	3 45 30.96	2.4600	18 57 16.8	4.744
22	1 53 40.59	2.2921	13 16 26.7	9.387	22	3 47 58.64	2.4628	19 1 57.8	4.623
23	1 55 58.23	2.2959	13 25 47.7	9.313	23	3 50 26.50	2.4657	19 6 31.6	4.502
24	1 58 16.10	2.2997	+13 35 4.3	+ 9.228	24	3 52 54.53	2.4684	+19 10 58.1	+4.379

## GREENWICH MEAN TIME.

Hour.	Right Ascension.	Var. per Min.	Declination.	Var. per Min.	Hour.	Right Ascension.	Var. per Min.	Declination.	Var. per Min.
FEBRUARY 26.					FEBRUARY 28.				
	<i>h m s</i>	<i>s</i>	<i>° ' "</i>	<i>"</i>		<i>h m s</i>	<i>s</i>	<i>° ' "</i>	<i>"</i>
0	3 52 54.53	2.4644	+19 10 58.1	+4.379	0	5 53 15.36	2.5163	+20 10 42.7	-1.982
1	3 55 22.71	2.4711	19 15 17.1	4.266	1	5 55 46.31	2.5154	20 8 39.3	2.118
2	3 57 51.06	2.4738	19 19 28.8	4.133	2	5 58 17.20	2.5143	20 6 28.8	2.230
3	4 0 19.56	2.4763	19 23 33.0	4.008	3	6 0 48.03	2.5132	20 4 9.8	2.383
4	4 2 48.22	2.4788	19 27 29.7	3.883	4	6 3 18.79	2.5120	20 1 42.9	2.516
5	4 5 17.02	2.4813	19 31 18.9	3.757	5	6 5 49.47	2.5107	19 59 7.9	2.640
6	4 7 45.97	2.4837	19 35 0.5	3.630	6	6 8 20.07	2.5093	19 56 25.0	2.731
7	4 10 15.06	2.4860	19 38 34.5	3.503	7	6 10 50.59	2.5080	19 53 34.2	2.813
8	4 12 44.29	2.4883	19 42 0.8	3.375	8	6 13 21.03	2.5065	19 50 35.5	2.894
9	4 15 13.65	2.4904	19 45 19.5	3.247	9	6 15 51.36	2.5048	19 47 28.9	2.973
10	4 17 43.14	2.4924	19 48 30.4	3.118	10	6 18 21.61	2.5032	19 44 14.5	3.050
11	4 20 12.76	2.4946	19 51 33.7	2.989	11	6 20 51.75	2.5014	19 40 52.2	3.126
12	4 22 42.40	2.4966	19 54 29.1	2.858	12	6 23 21.78	2.4996	19 37 22.2	3.200
13	4 25 12.35	2.4984	19 57 16.7	2.728	13	6 25 51.70	2.4978	19 33 44.4	3.272
14	4 27 42.32	2.5003	19 59 56.5	2.598	14	6 28 21.51	2.4958	19 29 59.0	3.342
15	4 30 12.39	2.5021	20 2 28.5	2.467	15	6 30 51.20	2.4938	19 26 5.8	3.410
16	4 32 42.57	2.5038	20 4 52.5	2.334	16	6 33 20.77	2.4918	19 22 5.0	3.476
17	4 35 12.85	2.5055	20 7 8.6	2.202	17	6 35 50.21	2.4896	19 17 56.5	3.540
18	4 37 43.23	2.5070	20 9 16.8	2.070	18	6 38 19.52	2.4873	19 13 40.5	3.602
19	4 40 13.69	2.5084	20 11 17.0	1.936	19	6 40 48.69	2.4850	19 9 17.0	3.663
20	4 42 44.24	2.5099	20 13 9.3	1.804	20	6 43 17.72	2.4827	19 4 46.0	3.722
21	4 45 14.88	2.5113	20 14 53.5	1.670	21	6 45 46.61	2.4803	19 0 7.5	3.780
22	4 47 45.59	2.5125	20 16 29.7	1.537	22	6 48 15.35	2.4778	18 55 21.6	3.837
23	4 50 16.38	2.5137	+20 17 57.9	+1.408	23	6 50 43.94	2.4753	+18 50 28.3	-3.893
FEBRUARY 27.					FEBRUARY 29.				
0	4 52 47.23	2.5147	+20 19 18.0	+1.268	0	6 53 12.38	2.4727	+18 45 27.7	-5.070
1	4 55 18.14	2.5158	20 20 30.1	1.138	1	6 55 40.66	2.4700	18 40 19.9	5.136
2	4 57 49.12	2.5167	20 21 34.0	0.998	2	6 58 8.78	2.4673	18 35 4.8	5.203
3	5 0 20.14	2.5175	20 22 29.9	0.868	3	7 0 36.74	2.4645	18 29 42.5	5.268
4	5 2 51.22	2.5183	20 23 17.6	0.728	4	7 3 4.52	2.4617	18 24 13.1	5.340
5	5 5 22.34	2.5190	20 23 57.2	0.588	5	7 5 32.14	2.4588	18 18 36.6	5.407
6	5 7 53.50	2.5196	20 24 28.7	0.457	6	7 7 59.58	2.4558	18 12 53.1	5.474
7	5 10 24.69	2.5201	20 24 52.0	0.321	7	7 10 26.84	2.4528	18 7 2.5	5.540
8	5 12 55.91	2.5206	20 25 7.2	0.186	8	7 12 53.92	2.4498	18 1 5.1	5.604
9	5 15 27.16	2.5209	20 25 14.3	+0.050	9	7 15 20.82	2.4468	17 55 0.8	5.670
10	5 17 58.42	2.5212	20 25 13.2	-0.087	10	7 17 47.53	2.4436	17 48 49.7	5.735
11	5 20 29.70	2.5214	20 25 3.9	0.223	11	7 20 14.05	2.4404	17 42 31.7	5.800
12	5 23 0.99	2.5215	20 24 46.5	0.358	12	7 22 40.38	2.4372	17 36 7.1	5.863
13	5 25 32.28	2.5216	20 24 20.9	0.494	13	7 25 6.52	2.4339	17 29 35.9	5.926
14	5 28 3.58	2.5215	20 23 47.2	0.630	14	7 27 32.45	2.4306	17 22 58.0	5.988
15	5 30 34.86	2.5213	20 23 5.3	0.766	15	7 29 58.19	2.4273	17 16 13.6	6.049
16	5 33 6.14	2.5211	20 22 15.3	0.902	16	7 32 23.73	2.4239	17 9 22.7	6.109
17	5 35 37.40	2.5208	20 21 17.1	1.038	17	7 34 49.06	2.4205	17 2 25.4	6.168
18	5 38 8.64	2.5204	20 20 10.8	1.173	18	7 37 14.19	2.4171	16 55 21.7	6.226
19	5 40 39.85	2.5199	20 18 56.4	1.308	19	7 39 39.11	2.4135	16 48 11.8	6.283
20	5 43 11.03	2.5194	20 17 33.9	1.443	20	7 42 3.81	2.4100	16 40 55.6	6.339
21	5 45 42.18	2.5188	20 16 3.2	1.578	21	7 44 28.31	2.4065	16 33 33.2	6.393
22	5 48 13.29	2.5181	20 14 24.5	1.713	22	7 46 52.59	2.4029	16 26 4.8	6.446
23	5 50 44.35	2.5173	20 12 37.6	1.848	23	7 49 16.66	2.3993	16 18 30.3	6.498
24	5 53 15.36	2.5163	+20 10 42.7	-1.982	24	7 51 40.50	2.3957	+16 10 49.8	-7.724

GREENWICH MEAN TIME.

Hour.	Right Ascension.	Var. per Min.	Declination.	Var. per Min.	Hour.	Right Ascension.	Var. per Min.	Declination.	Var. per Min.
MARCH 1.					MARCH 3.				
	h m s	s	° ' "	"		h m s	s	° ' "	"
0	7 51 40.50	2.3957	+16 10 49.8	- 7.724	0	9 42 17.13	2.2148	+8 28 25.6	-11.068
1	7 54 4.13	2.3920	16 3 3.4	7.822	1	9 44 29.91	2.2113	8 17 20.4	11.107
2	7 56 27.54	2.3883	15 55 11.2	7.918	2	9 46 42.49	2.2080	8 6 12.8	11.145
3	7 58 50.73	2.3846	15 47 13.2	8.014	3	9 48 54.87	2.2047	7 55 3.0	11.182
4	8 1 13.69	2.3808	15 39 9.5	8.100	4	9 51 7.05	2.2013	7 43 51.0	11.218
5	8 3 36.43	2.3772	15 31 0.1	8.202	5	9 53 19.02	2.1978	7 32 36.9	11.251
6	8 5 58.95	2.3733	15 22 45.2	8.294	6	9 55 30.79	2.1946	7 21 20.9	11.283
7	8 8 21.23	2.3695	15 14 24.8	8.386	7	9 57 42.37	2.1913	7 10 2.9	11.316
8	8 10 43.29	2.3658	15 5 58.9	8.476	8	9 59 53.75	2.1881	6 58 43.0	11.346
9	8 13 5.13	2.3620	14 57 27.7	8.565	9	10 2 4.94	2.1849	6 47 21.4	11.375
10	8 15 26.73	2.3581	14 48 51.1	8.653	10	10 4 15.94	2.1817	6 35 58.0	11.403
11	8 17 48.10	2.3543	14 40 9.4	8.738	11	10 6 26.74	2.1785	6 24 33.0	11.429
12	8 20 9.24	2.3504	14 31 22.5	8.824	12	10 8 37.36	2.1753	6 13 6.5	11.455
13	8 22 30.15	2.3466	14 22 30.5	8.908	13	10 10 47.80	2.1722	6 1 38.4	11.480
14	8 24 50.83	2.3428	14 13 33.5	8.992	14	10 12 58.04	2.1693	5 50 8.9	11.508
15	8 27 11.28	2.3388	14 4 31.5	9.073	15	10 15 8.11	2.1663	5 38 38.1	11.524
16	8 29 31.49	2.3349	13 55 24.8	9.153	16	10 17 17.99	2.1633	5 27 6.0	11.546
17	8 31 51.47	2.3310	13 46 13.2	9.233	17	10 19 27.70	2.1603	5 15 32.6	11.565
18	8 34 11.21	2.3272	13 36 56.9	9.311	18	10 21 37.23	2.1574	5 3 58.2	11.583
19	8 36 30.73	2.3233	13 27 35.9	9.388	19	10 23 46.59	2.1546	4 52 22.7	11.601
20	8 38 50.01	2.3194	13 18 10.4	9.463	20	10 25 55.78	2.1518	4 40 46.1	11.617
21	8 41 9.06	2.3155	13 8 40.4	9.537	21	10 28 4.80	2.1489	4 29 8.7	11.631
22	8 43 27.87	2.3117	12 59 6.0	9.610	22	10 30 13.65	2.1462	4 17 30.4	11.644
23	8 45 46.46	2.3078	+12 49 27.2	- 9.682	23	10 32 22.34	2.1435	+4 5 51.4	-11.657
MARCH 2.					MARCH 4.				
0	8 48 4.81	2.3038	+12 39 44.1	- 9.758	0	10 34 30.87	2.1408	+3 54 11.6	-11.669
1	8 50 22.92	2.3000	12 29 56.9	9.822	1	10 36 39.23	2.1380	3 42 31.1	11.678
2	8 52 40.81	2.2962	12 20 5.5	9.890	2	10 38 47.43	2.1354	3 30 50.2	11.687
3	8 54 58.46	2.2923	12 10 10.1	9.957	3	10 40 55.48	2.1329	3 19 8.7	11.696
4	8 57 15.88	2.2884	12 0 10.7	10.023	4	10 43 3.38	2.1303	3 7 26.7	11.703
5	8 59 33.07	2.2847	11 50 7.4	10.087	5	10 45 11.12	2.1278	2 55 44.4	11.708
6	9 1 50.04	2.2808	11 40 0.3	10.149	6	10 47 18.72	2.1253	2 44 1.8	11.713
7	9 4 6.77	2.2770	11 29 49.5	10.211	7	10 49 26.16	2.1229	2 32 18.9	11.716
8	9 6 23.28	2.2732	11 19 35.0	10.272	8	10 51 33.47	2.1206	2 20 35.9	11.718
9	9 8 39.55	2.2693	11 9 16.9	10.331	9	10 53 40.63	2.1182	2 8 52.8	11.719
10	9 10 55.60	2.2657	10 58 55.3	10.389	10	10 55 47.65	2.1158	1 57 9.6	11.719
11	9 13 11.43	2.2619	10 48 30.2	10.446	11	10 57 54.53	2.1136	1 45 26.5	11.718
12	9 15 27.03	2.2582	10 38 1.8	10.502	12	11 0 1.28	2.1113	1 33 43.4	11.717
13	9 17 42.41	2.2544	10 27 30.0	10.556	13	11 2 7.89	2.1091	1 22 0.5	11.713
14	9 19 57.56	2.2507	10 16 55.1	10.608	14	11 4 14.37	2.1070	1 10 17.9	11.708
15	9 22 12.49	2.2470	10 6 17.0	10.660	15	11 6 20.73	2.1049	0 58 35.5	11.703
16	9 24 27.20	2.2434	9 55 35.9	10.711	16	11 8 26.96	2.1028	0 46 53.5	11.698
17	9 26 41.70	2.2398	9 44 51.7	10.760	17	11 10 33.06	2.1007	0 35 11.8	11.690
18	9 28 55.97	2.2361	9 34 4.7	10.808	18	11 12 39.04	2.0988	0 23 30.7	11.681
19	9 31 10.03	2.2323	9 23 14.8	10.854	19	11 14 44.91	2.0968	0 11 50.1	11.672
20	9 33 23.87	2.2286	9 12 22.2	10.899	20	11 16 50.66	2.0948	+0 0 10.1	11.662
21	9 35 37.50	2.2250	9 1 26.9	10.943	21	11 18 56.29	2.0930	-0 11 29.3	11.650
22	9 37 50.92	2.2213	8 50 29.0	10.987	22	11 21 1.82	2.0912	0 23 7.9	11.637
23	9 40 4.13	2.2184	8 39 28.5	11.028	23	11 23 7.23	2.0893	0 34 45.7	11.623
24	9 42 17.13	2.2148	+ 8 28 25.6	-11.068	24	11 25 12.54	2.0876	-0 46 22.7	-11.610

GREENWICH MEAN TIME.

Hour.	Right Ascension.	Var. per Min.	Declination.	Var. per Min.	Hour.	Right Ascension.	Var. per Min.	Declination.	Var. per Min.
MARCH 5.					MARCH 7.				
	h m s	s	° ' "	"		h m s	s	° ' "	"
0	11 25 12.54	2.0676	-0 46 22.7	-11.610	0	13 4 4.87	2.0454	-9 29 25.8	-9.366
1	11 27 17.74	2.0658	0 57 58.9	11.594	1	13 6 7.59	2.0453	9 39 16.1	9.311
2	11 29 22.83	2.0641	1 9 34.0	11.577	2	13 8 10.31	2.0453	9 49 3.1	9.756
3	11 31 27.83	2.0625	1 21 8.1	11.560	3	13 10 13.03	2.0453	9 58 46.8	9.669
4	11 33 32.73	2.0606	1 32 41.2	11.541	4	13 12 15.74	2.0453	10 8 27.0	9.642
5	11 35 37.53	2.0793	1 44 13.0	11.521	5	13 14 18.46	2.0453	10 18 3.8	9.584
6	11 37 42.25	2.0778	1 55 43.7	11.502	6	13 16 21.17	2.0453	10 27 37.1	9.526
7	11 39 46.86	2.0762	2 7 13.2	11.480	7	13 18 23.89	2.0454	10 37 6.9	9.467
8	11 41 51.39	2.0748	2 18 41.3	11.467	8	13 20 26.62	2.0455	10 46 33.1	9.407
9	11 43 55.84	2.0734	2 30 8.0	11.433	9	13 22 29.35	2.0456	10 55 55.7	9.347
10	11 46 0.20	2.0721	2 41 33.3	11.409	10	13 24 32.09	2.0457	11 5 14.7	9.286
11	11 48 4.48	2.0706	2 52 57.1	11.384	11	13 26 34.84	2.0458	11 14 30.0	9.224
12	11 50 8.67	2.0693	3 4 19.4	11.358	12	13 28 37.59	2.0460	11 23 41.6	9.162
13	11 52 12.79	2.0681	3 15 40.1	11.332	13	13 30 40.36	2.0463	11 32 49.4	9.099
14	11 54 16.84	2.0668	3 26 59.2	11.303	14	13 32 43.14	2.0466	11 41 53.5	9.037
15	11 56 20.81	2.0656	3 38 16.5	11.274	15	13 34 45.94	2.0468	11 50 53.8	8.973
16	11 58 24.71	2.0645	3 49 32.1	11.245	16	13 36 48.75	2.0470	11 59 50.2	8.908
17	12 0 28.55	2.0633	4 0 45.9	11.214	17	13 38 51.58	2.0473	12 8 42.7	8.843
18	12 2 32.31	2.0623	4 11 57.8	11.183	18	13 40 54.43	2.0476	12 17 31.3	8.778
19	12 4 36.02	2.0613	4 23 7.8	11.151	19	13 42 57.29	2.0479	12 26 16.0	8.712
20	12 6 39.66	2.0602	4 34 15.9	11.118	20	13 45 0.18	2.0483	12 34 56.7	8.645
21	12 8 43.24	2.0593	4 45 21.9	11.083	21	13 47 3.09	2.0487	12 43 33.4	8.578
22	12 10 46.77	2.0583	4 56 25.9	11.048	22	13 49 6.02	2.0490	12 52 6.0	8.510
23	12 12 50.23	2.0573	-5 7 27.7	-11.013	23	13 51 8.97	2.0494	-13 0 34.6	-8.442
MARCH 6.					MARCH 8.				
0	12 14 53.65	2.0665	-5 18 27.4	-10.977	0	13 53 11.95	2.0498	-13 8 59.0	-8.373
1	12 16 57.01	2.0657	5 29 24.9	10.939	1	13 55 14.95	2.0503	13 17 19.3	8.303
2	12 19 0.33	2.0649	5 40 20.1	10.901	2	13 57 17.99	2.0508	13 25 35.4	8.234
3	12 21 3.60	2.0641	5 51 13.0	10.862	3	13 59 21.05	2.0513	13 33 47.4	8.164
4	12 23 6.82	2.0533	6 2 3.5	10.822	4	14 1 24.13	2.0517	13 41 55.1	8.093
5	12 25 10.00	2.0527	6 12 51.6	10.782	5	14 3 27.25	2.0523	13 49 58.5	8.021
6	12 27 13.14	2.0520	6 23 37.3	10.740	6	14 5 30.40	2.0528	13 57 57.6	7.950
7	12 29 16.24	2.0514	6 34 20.4	10.698	7	14 7 33.58	2.0533	14 5 52.5	7.878
8	12 31 19.31	2.0508	6 45 1.0	10.655	8	14 9 36.79	2.0538	14 13 42.9	7.804
9	12 33 22.33	2.0502	6 55 39.0	10.611	9	14 11 40.04	2.0544	14 21 29.0	7.732
10	12 35 25.33	2.0496	7 6 14.3	10.566	10	14 13 43.32	2.0549	14 29 10.7	7.658
11	12 37 28.30	2.0493	7 16 46.9	10.521	11	14 15 46.63	2.0555	14 36 48.0	7.584
12	12 39 31.24	2.0487	7 27 16.8	10.475	12	14 17 49.98	2.0561	14 44 20.8	7.509
13	12 41 34.14	2.0483	7 37 43.9	10.428	13	14 19 53.36	2.0567	14 51 49.1	7.434
14	12 43 37.03	2.0479	7 48 8.2	10.381	14	14 21 56.78	2.0573	14 59 12.9	7.358
15	12 45 39.89	2.0474	7 58 29.6	10.333	15	14 24 0.24	2.0580	15 6 32.1	7.283
16	12 47 42.72	2.0471	8 8 48.1	10.283	16	14 26 3.74	2.0586	15 13 46.8	7.207
17	12 49 45.54	2.0468	8 19 3.6	10.233	17	14 28 7.27	2.0593	15 20 56.9	7.130
18	12 51 48.34	2.0466	8 29 16.1	10.183	18	14 30 10.85	2.0599	15 28 2.4	7.053
19	12 53 51.13	2.0463	8 39 25.6	10.133	19	14 32 14.46	2.0605	15 35 3.2	6.975
20	12 55 53.90	2.0460	8 49 32.0	10.080	20	14 34 18.11	2.0612	15 41 59.4	6.897
21	12 57 56.65	2.0458	8 59 35.2	10.028	21	14 36 21.80	2.0619	15 48 50.9	6.813
22	12 59 59.40	2.0457	9 9 35.3	9.975	22	14 38 25.54	2.0626	15 55 37.6	6.739
23	13 2 2.14	2.0456	9 19 32.2	9.921	23	14 40 29.31	2.0633	16 2 19.6	6.661
24	13 4 4.87	2.0454	-9 29 25.8	-9.366	24	14 42 33.13	2.0640	-16 8 56.9	-6.581



GREENWICH MEAN TIME.

Hour.	Right Ascension.	Var. per Min.	Declination.	Var. per Min.	Hour.	Right Ascension.	Var. per Min.	Declination.	Var. per Min.
MARCH 9.					MARCH 11.				
0	h m s	s	° ' "	"	0	h m s	s	° ' "	"
1	14 42 33.13	2.0640	-16 8 56.9	-4.581	1	16 22 25.84	2.0056	-19 46 58.3	-2.404
2	14 44 36.99	2.0647	16 15 29.3	6.501	2	16 24 31.60	2.0063	19 49 19.8	2.311
3	14 46 40.89	2.0653	16 21 57.0	6.421	3	16 26 37.39	2.0068	19 51 35.6	2.218
4	14 48 44.83	2.0661	16 28 19.8	6.339	4	16 28 43.21	2.0073	19 53 46.0	2.127
5	14 50 48.82	2.0668	16 34 37.7	6.258	5	16 30 49.06	2.0077	19 55 50.8	2.033
6	14 52 52.85	2.0675	16 40 50.8	6.178	6	16 32 54.93	2.0080	19 57 50.0	1.940
7	14 54 56.92	2.0682	16 46 59.0	6.096	7	16 35 0.82	2.0084	19 59 43.6	1.847
8	14 57 1.03	2.0689	16 53 2.3	6.013	8	16 37 6.74	2.0088	20 1 31.6	1.754
9	14 59 5.19	2.0696	16 59 0.6	5.930	9	16 39 12.68	2.0093	20 3 14.1	1.661
10	15 1 9.40	2.0704	17 4 53.9	5.848	10	16 41 18.65	2.0096	20 4 50.9	1.568
11	15 3 13.64	2.0711	17 10 42.3	5.765	11	16 43 24.63	2.0098	20 6 22.2	1.475
12	15 5 17.93	2.0719	17 16 25.7	5.681	12	16 45 30.63	2.1002	20 7 47.9	1.381
13	15 7 22.27	2.0726	17 22 4.0	5.597	13	16 47 36.66	2.1006	20 9 7.9	1.287
14	15 9 26.64	2.0733	17 27 37.3	5.513	14	16 49 42.70	2.1009	20 10 22.3	1.193
15	15 11 31.07	2.0742	17 33 5.6	5.428	15	16 51 48.77	2.1012	20 11 31.1	1.100
16	15 13 35.54	2.0748	17 38 28.7	5.343	16	16 53 54.84	2.1014	20 12 34.3	1.006
17	15 15 40.05	2.0755	17 43 46.8	5.259	17	16 56 0.94	2.1017	20 13 31.8	0.912
18	15 17 44.60	2.0763	17 48 59.8	5.173	18	16 58 7.05	2.1019	20 14 23.7	0.818
19	15 19 49.20	2.0770	17 54 7.6	5.088	19	17 0 13.17	2.1021	20 15 10.0	0.724
20	15 21 53.84	2.0778	17 59 10.3	5.002	20	17 2 19.30	2.1023	20 15 50.6	0.630
21	15 23 58.53	2.0784	18 4 7.8	4.915	21	17 4 25.45	2.1026	20 16 25.6	0.536
22	15 26 3.25	2.0791	18 9 0.1	4.828	22	17 6 31.61	2.1028	20 16 54.9	0.442
23	15 28 8.02	2.0799	18 13 47.2	4.742	23	17 8 37.78	2.1028	20 17 18.6	0.348
24	15 30 12.84	2.0806	-18 18 29.1	-4.655	24	17 10 43.95	2.1030	-20 17 36.7	-0.254
MARCH 10.					MARCH 12.				
0	15 32 17.69	2.0813	-18 23 5.8	-4.568	0	17 12 50.14	2.1032	-20 17 49.1	-0.159
1	15 34 22.59	2.0820	18 27 37.2	4.479	1	17 14 56.33	2.1033	20 17 55.8	-0.065
2	15 36 27.58	2.0827	18 32 3.3	4.391	2	17 17 2.53	2.1034	20 17 56.9	+0.029
3	15 38 32.51	2.0833	18 36 24.1	4.303	3	17 19 8.74	2.1035	20 17 52.3	0.123
4	15 40 37.53	2.0840	18 40 39.7	4.215	4	17 21 14.95	2.1036	20 17 42.1	0.218
5	15 42 42.59	2.0847	18 44 49.9	4.127	5	17 23 21.17	2.1036	20 17 26.2	0.312
6	15 44 47.70	2.0854	18 48 54.9	4.038	6	17 25 27.38	2.1036	20 17 4.7	0.406
7	15 46 52.84	2.0860	18 52 54.4	3.948	7	17 27 33.60	2.1037	20 16 37.5	0.501
8	15 48 58.02	2.0867	18 56 48.7	3.859	8	17 29 39.82	2.1037	20 16 4.6	0.595
9	15 51 3.24	2.0873	19 0 37.5	3.769	9	17 31 46.04	2.1037	20 15 26.1	0.688
10	15 53 8.50	2.0879	19 4 21.0	3.680	10	17 33 52.26	2.1037	20 14 42.0	0.783
11	15 55 13.79	2.0886	19 7 59.1	3.590	11	17 35 58.48	2.1036	20 13 52.2	0.877
12	15 57 19.13	2.0892	19 11 31.8	3.499	12	17 38 4.69	2.1036	20 12 56.8	0.971
13	15 59 24.50	2.0898	19 14 59.0	3.409	13	17 40 10.90	2.1035	20 11 55.7	1.065
14	16 1 29.91	2.0904	19 18 20.9	3.319	14	17 42 17.10	2.1033	20 10 49.0	1.159
15	16 3 35.35	2.0910	19 21 37.3	3.228	15	17 44 23.30	2.1032	20 9 36.6	1.253
16	16 5 40.83	2.0916	19 24 48.2	3.137	16	17 46 29.49	2.1031	20 8 18.6	1.347
17	16 7 46.34	2.0922	19 27 53.7	3.046	17	17 48 35.67	2.1030	20 6 55.0	1.441
18	16 9 51.89	2.0928	19 30 53.7	2.955	18	17 50 41.85	2.1028	20 5 25.7	1.534
19	16 11 57.47	2.0933	19 33 48.3	2.868	19	17 52 48.01	2.1026	20 3 50.9	1.628
20	16 14 3.08	2.0938	19 36 37.3	2.771	20	17 54 54.16	2.1025	20 2 10.4	1.722
21	16 16 8.72	2.0943	19 39 20.8	2.679	21	17 57 0.31	2.1023	20 0 24.3	1.815
22	16 18 14.40	2.0948	19 41 58.8	2.588	22	17 59 6.44	2.1021	19 58 32.6	1.909
23	16 20 20.10	2.0953	19 44 31.3	2.496	23	18 1 12.56	2.1019	19 56 35.2	2.003
24	16 22 25.84	2.0958	-19 46 58.3	-2.404	24	18 3 18.67	2.1017	-19 54 32.3	+2.095

GREENWICH MEAN TIME.

Hour.	Right Ascension.	Var. per Min.	Declination.	Var. per Min.	Hour.	Right Ascension.	Var. per Min.	Declination.	Var. per Min.
MARCH 13.					MARCH 15.				
	h m s	s	° ' "	"		h m s	s	° ' "	"
0	18 3 18.67	2.1017	-19 54 32.3	+2.005	0	19 43 43.40	2.0799	-16 29 40.3	+6.354
1	18 5 24.76	2.1013	19 52 23.8	2.188	1	19 45 48.18	2.0794	16 23 16.6	6.436
2	18 7 30.83	2.1011	19 50 9.7	2.281	2	19 47 52.93	2.0789	16 16 48.0	6.518
3	18 9 36.89	2.1008	19 47 50.1	2.374	3	19 49 57.65	2.0784	16 10 14.5	6.599
4	18 11 42.93	2.1006	19 45 24.8	2.467	4	19 52 2.34	2.0779	16 3 36.1	6.680
5	18 13 48.96	2.1003	19 42 54.0	2.559	5	19 54 7.00	2.0774	15 56 52.9	6.760
6	18 15 54.96	2.0999	19 40 17.7	2.652	6	19 56 11.63	2.0769	15 50 4.9	6.841
7	18 18 0.95	2.0997	19 37 35.8	2.745	7	19 58 16.23	2.0764	15 43 12.0	6.922
8	18 20 6.92	2.0993	19 34 48.3	2.838	8	20 0 20.80	2.0759	15 36 14.4	7.000
9	18 22 12.86	2.0989	19 31 55.3	2.929	9	20 2 25.34	2.0755	15 29 12.0	7.079
10	18 24 18.79	2.0986	19 28 56.8	3.021	10	20 4 29.86	2.0751	15 22 4.9	7.158
11	18 26 24.69	2.0982	19 25 52.8	3.113	11	20 6 34.35	2.0746	15 14 53.1	7.236
12	18 28 30.57	2.0978	19 22 43.3	3.204	12	20 8 38.81	2.0742	15 7 36.6	7.313
13	18 30 36.43	2.0974	19 19 28.3	3.296	13	20 10 43.25	2.0738	15 0 15.5	7.391
14	18 32 42.26	2.0970	19 16 7.8	3.386	14	20 12 47.66	2.0733	14 52 49.7	7.468
15	18 34 48.07	2.0967	19 12 41.9	3.478	15	20 14 52.05	2.0729	14 45 19.3	7.545
16	18 36 53.86	2.0962	19 9 10.5	3.569	16	20 16 56.41	2.0725	14 37 44.3	7.621
17	18 38 59.61	2.0958	19 5 33.6	3.660	17	20 19 0.75	2.0721	14 30 4.8	7.696
18	18 41 5.35	2.0953	19 1 51.3	3.751	18	20 21 5.06	2.0718	14 22 20.8	7.771
19	18 43 11.05	2.0948	18 58 3.5	3.842	19	20 23 9.36	2.0714	14 14 32.3	7.846
20	18 45 16.73	2.0944	18 54 10.3	3.931	20	20 25 13.63	2.0710	14 6 39.3	7.921
21	18 47 22.38	2.0940	18 50 11.8	4.021	21	20 27 17.88	2.0707	13 58 41.8	7.994
22	18 49 28.01	2.0935	18 46 7.8	4.111	22	20 29 22.12	2.0704	13 50 40.0	8.068
23	18 51 33.60	2.0930	-18 41 58.5	+4.200	23	20 31 26.33	2.0701	-13 42 33.7	+8.140
MARCH 14.					MARCH 16.				
0	18 53 39.17	2.0925	-18 37 43.8	+4.290	0	20 33 30.53	2.0696	-13 34 23.2	+8.213
1	18 55 44.70	2.0920	18 33 23.7	4.379	1	20 35 34.71	2.0695	13 26 8.2	8.285
2	18 57 50.21	2.0915	18 28 58.3	4.468	2	20 37 38.87	2.0693	13 17 49.0	8.353
3	18 59 55.68	2.0910	18 24 27.6	4.557	3	20 39 43.02	2.0691	13 9 25.6	8.426
4	19 2 1.13	2.0906	18 19 51.5	4.645	4	20 41 47.16	2.0688	13 0 57.9	8.497
5	19 4 6.55	2.0900	18 15 10.2	4.733	5	20 43 51.28	2.0686	12 52 26.0	8.567
6	19 6 11.93	2.0894	18 10 23.6	4.821	6	20 45 55.39	2.0685	12 43 49.9	8.636
7	19 8 17.28	2.0889	18 5 31.7	4.909	7	20 47 59.50	2.0683	12 35 9.7	8.704
8	19 10 22.60	2.0884	18 0 34.5	4.996	8	20 50 3.59	2.0681	12 26 25.4	8.773
9	19 12 27.89	2.0879	17 55 32.2	5.083	9	20 52 7.67	2.0679	12 17 37.0	8.841
10	19 14 33.15	2.0874	17 50 24.6	5.170	10	20 54 11.74	2.0678	12 8 44.5	8.908
11	19 16 38.38	2.0868	17 45 11.8	5.257	11	20 56 15.81	2.0678	11 59 48.1	8.973
12	19 18 43.57	2.0863	17 39 53.8	5.343	12	20 58 19.88	2.0677	11 50 47.7	9.040
13	19 20 48.74	2.0858	17 34 30.7	5.428	13	21 0 23.93	2.0676	11 41 43.3	9.105
14	19 22 53.87	2.0852	17 29 2.4	5.515	14	21 2 27.99	2.0677	11 32 35.1	9.169
15	19 24 58.96	2.0847	17 23 28.9	5.600	15	21 4 32.05	2.0677	11 23 23.0	9.234
16	19 27 4.03	2.0842	17 17 50.4	5.684	16	21 6 36.11	2.0677	11 14 7.0	9.298
17	19 29 9.06	2.0836	17 12 6.8	5.769	17	21 8 40.17	2.0677	11 4 47.2	9.361
18	19 31 14.06	2.0831	17 6 18.1	5.854	18	21 10 44.23	2.0678	10 55 23.7	9.423
19	19 33 19.03	2.0826	17 0 24.3	5.938	19	21 12 48.30	2.0678	10 45 56.5	9.484
20	19 35 23.97	2.0821	16 54 25.5	6.022	20	21 14 52.37	2.0679	10 36 25.6	9.546
21	19 37 28.88	2.0815	16 48 21.7	6.105	21	21 16 56.45	2.0681	10 26 51.0	9.607
22	19 39 33.75	2.0809	16 42 12.9	6.188	22	21 19 0.54	2.0683	10 17 12.8	9.667
23	19 41 38.59	2.0804	16 35 59.1	6.272	23	21 21 4.64	2.0685	10 7 31.0	9.726
24	19 43 43.40	2.0799	-16 29 40.3	+6.354	24	21 23 8.76	2.0687	-9 57 45.7	+9.784

GREENWICH MEAN TIME.

Hour.	Right Ascension.	Var. per Min.	Declination.	Var. per Min.	Hour.	Right Ascension.	Var. per Min.	Declination.	Var. per Min.
MARCH 17.					MARCH 19.				
	h m s	s	° ' "	"		h m s	s	° ' "	"
0	21 23 8.76	2.0687	-9 57 45.7	+ 9.784	0	23 3 15.71	2.1158	-1 14 46.4	+11.684
1	21 25 12.88	2.0688	9 47 56.9	9.842	1	23 5 22.72	2.1178	1 3 4.8	11.702
2	21 27 17.02	2.0692	9 38 4.7	9.899	2	23 7 29.84	2.1196	0 51 22.2	11.718
3	21 29 21.18	2.0695	9 28 9.0	9.956	3	23 9 37.07	2.1215	0 39 38.7	11.733
4	21 31 25.36	2.0698	9 18 10.0	10.012	4	23 11 44.42	2.1235	0 27 54.3	11.747
5	21 33 29.56	2.0701	9 8 7.6	10.068	5	23 13 51.89	2.1256	0 16 9.1	11.760
6	21 35 33.77	2.0705	8 58 1.9	10.122	6	23 15 59.49	2.1276	-0 4 23.1	11.772
7	21 37 38.02	2.0709	8 47 53.0	10.175	7	23 18 7.20	2.1296	+0 7 23.6	11.783
8	21 39 42.28	2.0713	8 37 40.9	10.228	8	23 20 15.04	2.1318	0 19 10.9	11.798
9	21 41 46.58	2.0718	8 27 25.6	10.282	9	23 22 23.02	2.1340	0 30 58.8	11.802
10	21 43 50.90	2.0722	8 17 7.1	10.333	10	23 24 31.12	2.1361	0 42 47.2	11.810
11	21 45 55.25	2.0728	8 6 45.6	10.383	11	23 26 39.35	2.1383	0 54 36.0	11.816
12	21 47 59.64	2.0733	7 56 21.1	10.433	12	23 28 47.72	2.1407	1 6 25.1	11.822
13	21 50 4.05	2.0739	7 45 53.6	10.483	13	23 30 56.23	2.1430	1 18 14.6	11.827
14	21 52 8.51	2.0746	7 35 23.1	10.532	14	23 33 4.88	2.1454	1 30 4.3	11.830
15	21 54 13.00	2.0753	7 24 49.7	10.580	15	23 35 13.68	2.1478	1 41 54.2	11.832
16	21 56 17.54	2.0759	7 14 13.5	10.628	16	23 37 22.61	2.1502	1 53 44.1	11.833
17	21 58 22.11	2.0766	7 3 34.4	10.674	17	23 39 31.70	2.1527	2 5 34.1	11.833
18	22 0 26.73	2.0773	6 52 52.6	10.719	18	23 41 40.93	2.1552	2 17 24.0	11.831
19	22 2 31.39	2.0781	6 42 8.1	10.764	19	23 43 50.32	2.1578	2 29 13.8	11.829
20	22 4 36.10	2.0789	6 31 20.9	10.808	20	23 45 59.86	2.1603	2 41 3.5	11.825
21	22 6 40.86	2.0793	6 20 31.1	10.852	21	23 48 9.55	2.1628	2 52 52.8	11.820
22	22 8 45.68	2.0807	6 9 38.7	10.894	22	23 50 19.40	2.1656	3 4 41.9	11.814
23	22 10 50.54	2.0815	-5 58 43.8	+10.935	23	23 52 29.42	2.1683	+3 16 30.5	+11.807
MARCH 18.					MARCH 20.				
0	22 12 55.46	2.0825	-5 47 46.5	+10.976	0	23 54 39.59	2.1709	+3 28 18.7	+11.798
1	22 15 0.44	2.0835	5 36 46.7	11.017	1	23 56 49.93	2.1737	3 40 6.2	11.788
2	22 17 5.48	2.0844	5 25 44.5	11.055	2	23 59 0.44	2.1765	3 51 53.2	11.777
3	22 19 10.57	2.0855	5 14 40.1	11.093	3	0 1 11.11	2.1793	4 3 39.4	11.765
4	22 21 15.74	2.0867	5 3 33.4	11.131	4	0 3 21.96	2.1822	4 15 25.0	11.752
5	22 23 20.97	2.0877	4 52 24.4	11.168	5	0 5 32.97	2.1851	4 27 9.7	11.738
6	22 25 26.26	2.0888	4 41 13.3	11.203	6	0 7 44.17	2.1881	4 38 53.5	11.722
7	22 27 31.63	2.0901	4 30 0.1	11.238	7	0 9 55.54	2.1910	4 50 36.3	11.706
8	22 29 37.07	2.0913	4 18 44.8	11.272	8	0 12 7.09	2.1940	5 2 18.2	11.688
9	22 31 42.58	2.0926	4 7 27.5	11.304	9	0 14 18.82	2.1970	5 13 58.9	11.668
10	22 33 48.18	2.0938	3 56 8.3	11.336	10	0 16 30.73	2.2001	5 25 38.4	11.648
11	22 35 53.84	2.0951	3 44 47.2	11.367	11	0 18 42.83	2.2033	5 37 16.7	11.627
12	22 37 59.59	2.0966	3 33 24.3	11.398	12	0 20 55.12	2.2063	5 48 53.6	11.602
13	22 40 5.43	2.0979	3 21 59.5	11.427	13	0 23 7.59	2.2095	6 0 28.9	11.577
14	22 42 11.34	2.0993	3 10 33.1	11.455	14	0 25 20.26	2.2127	6 12 2.8	11.552
15	22 44 17.35	2.1009	2 59 4.9	11.483	15	0 27 33.11	2.2159	6 23 35.1	11.524
16	22 46 23.45	2.1023	2 47 35.2	11.508	16	0 29 46.17	2.2192	6 35 5.7	11.496
17	22 48 29.63	2.1039	2 36 3.9	11.534	17	0 31 59.42	2.2224	6 46 34.5	11.466
18	22 50 35.92	2.1055	2 24 31.1	11.558	18	0 34 12.86	2.2258	6 58 1.6	11.435
19	22 52 42.29	2.1071	2 12 56.9	11.582	19	0 36 26.51	2.2292	7 9 26.7	11.403
20	22 54 48.77	2.1088	2 1 21.3	11.604	20	0 38 40.36	2.2325	7 20 49.9	11.369
21	22 56 55.35	2.1105	1 49 44.4	11.626	21	0 40 54.41	2.2359	7 32 11.0	11.334
22	22 59 2.03	2.1123	1 38 6.2	11.646	22	0 43 8.67	2.2393	7 43 30.0	11.298
23	23 1 8.82	2.1140	1 26 26.9	11.665	23	0 45 23.13	2.2428	7 54 46.8	11.261
24	23 3 15.71	2.1158	-1 14 46.4	+11.684	24	0 47 37.80	2.2463	+8 6 1.3	+11.223

GREENWICH MEAN TIME.

Hour.	Right Ascension.	Var. per Min.	Declination.	Var. per Min.	Hour.	Right Ascension.	Var. per Min.	Declination.	Var. per Min.
MARCH 21.					MARCH 23.				
	h m s	s	° ' "	"		h m s	s	° ' "	"
0	0 47 37.80	2.2463	+ 8 6 1.3	+11.223	0	2 39 42.65	2.4239	+15 54 59.7	+7.824
1	0 49 52.68	2.2498	8 17 13.5	11.183	1	2 42 8.19	2.4274	16 2 46.1	7.723
2	0 52 7.77	2.2533	8 28 23.2	11.141	2	2 44 33.94	2.4308	16 10 26.4	7.621
3	0 54 23.07	2.2568	8 39 30.4	11.098	3	2 46 59.89	2.4343	16 18 0.6	7.518
4	0 56 38.58	2.2603	8 50 34.9	11.055	4	2 49 26.05	2.4376	16 25 28.5	7.413
5	0 58 54.31	2.2640	9 1 36.8	11.009	5	2 51 52.40	2.4409	16 32 50.1	7.307
6	1 1 10.26	2.2676	9 12 36.0	10.962	6	2 54 18.96	2.4442	16 40 5.3	7.201
7	1 3 26.42	2.2712	9 23 32.3	10.912	7	2 56 45.70	2.4473	16 47 14.2	7.093
8	1 5 42.80	2.2748	9 34 25.6	10.864	8	2 59 12.64	2.4507	16 54 16.5	6.984
9	1 7 59.40	2.2785	9 45 16.0	10.814	9	3 1 39.78	2.4538	17 1 12.3	6.874
10	1 10 16.22	2.2822	9 56 3.3	10.762	10	3 4 7.09	2.4568	17 8 1.4	6.763
11	1 12 33.26	2.2858	10 6 47.4	10.708	11	3 6 34.60	2.4599	17 14 43.9	6.653
12	1 14 50.52	2.2895	10 17 28.3	10.654	12	3 9 2.28	2.4629	17 21 19.7	6.540
13	1 17 8.00	2.2933	10 28 5.9	10.598	13	3 11 30.15	2.4660	17 27 48.7	6.426
14	1 19 25.71	2.2971	10 38 40.1	10.540	14	3 13 58.20	2.4688	17 34 10.8	6.312
15	1 21 43.65	2.3008	10 49 10.7	10.483	15	3 16 26.41	2.4717	17 40 26.1	6.196
16	1 24 1.81	2.3046	10 59 37.9	10.422	16	3 18 54.80	2.4745	17 46 34.3	6.079
17	1 26 20.20	2.3083	11 10 1.3	10.360	17	3 21 23.35	2.4773	17 52 35.6	5.962
18	1 28 38.81	2.3121	11 20 21.1	10.298	18	3 23 52.07	2.4800	17 58 29.8	5.845
19	1 30 57.65	2.3159	11 30 37.1	10.234	19	3 26 20.95	2.4827	18 4 17.0	5.728
20	1 33 16.72	2.3197	11 40 49.2	10.168	20	3 28 49.99	2.4853	18 9 56.9	5.608
21	1 35 36.01	2.3235	11 50 57.3	10.102	21	3 31 19.18	2.4878	18 15 29.6	5.485
22	1 37 55.54	2.3273	12 1 1.4	10.034	22	3 33 48.52	2.4902	18 20 55.1	5.364
23	1 40 15.29	2.3311	+12 11 1.4	+ 9.965	23	3 36 18.00	2.4926	+18 26 13.3	+5.243
MARCH 22.					MARCH 24.				
0	1 42 35.27	2.3349	+12 20 57.2	+ 9.894	0	3 38 47.63	2.4949	+18 31 24.1	+5.119
1	1 44 55.48	2.3388	12 30 48.7	9.823	1	3 41 17.39	2.4973	18 36 27.6	4.995
2	1 47 15.92	2.3426	12 40 35.9	9.749	2	3 43 47.30	2.4996	18 41 23.5	4.871
3	1 49 36.59	2.3464	12 50 18.6	9.675	3	3 46 17.33	2.5016	18 46 12.1	4.746
4	1 51 57.49	2.3503	12 59 56.9	9.600	4	3 48 47.49	2.5037	18 50 53.0	4.619
5	1 54 18.62	2.3540	13 9 30.6	9.522	5	3 51 17.77	2.5058	18 55 26.4	4.493
6	1 56 39.97	2.3578	13 18 59.6	9.444	6	3 53 48.18	2.5077	18 59 52.2	4.367
7	1 59 1.55	2.3616	13 28 23.9	9.364	7	3 56 18.69	2.5095	19 4 10.4	4.239
8	2 1 23.36	2.3654	13 37 43.3	9.283	8	3 58 49.32	2.5113	19 8 20.9	4.110
9	2 3 45.40	2.3692	13 46 57.9	9.202	9	4 1 20.05	2.5130	19 12 23.6	3.981
10	2 6 7.66	2.3729	13 56 7.5	9.118	10	4 3 50.88	2.5147	19 16 18.6	3.853
11	2 8 30.15	2.3768	14 5 12.1	9.034	11	4 6 21.81	2.5163	19 20 5.9	3.723
12	2 10 52.87	2.3805	14 14 11.6	8.948	12	4 8 52.83	2.5178	19 23 45.3	3.592
13	2 13 15.81	2.3842	14 23 5.8	8.861	13	4 11 23.94	2.5192	19 27 16.9	3.461
14	2 15 38.97	2.3879	14 31 54.9	8.773	14	4 13 55.13	2.5205	19 30 40.6	3.330
15	2 18 2.36	2.3917	14 40 38.5	8.683	15	4 16 26.40	2.5218	19 33 56.5	3.198
16	2 20 25.97	2.3953	14 49 16.8	8.593	16	4 18 57.75	2.5230	19 37 4.4	3.065
17	2 22 49.80	2.3989	14 57 49.6	8.500	17	4 21 29.16	2.5240	19 40 4.3	2.933
18	2 25 13.84	2.4026	15 6 16.8	8.407	18	4 24 0.63	2.5251	19 42 56.3	2.800
19	2 27 38.11	2.4063	15 14 38.4	8.313	19	4 26 32.17	2.5261	19 45 40.3	2.667
20	2 30 2.59	2.4098	15 22 54.3	8.218	20	4 29 3.76	2.5269	19 48 16.3	2.533
21	2 32 27.29	2.4134	15 31 4.5	8.121	21	4 31 35.40	2.5277	19 50 44.2	2.398
22	2 34 52.20	2.4169	15 39 8.8	8.023	22	4 34 7.08	2.5284	19 53 4.1	2.264
23	2 37 17.32	2.4204	15 47 7.2	7.924	23	4 36 38.81	2.5290	19 55 15.9	2.129
24	2 39 42.65	2.4239	+15 54 59.7	+ 7.824	24	4 39 10.56	2.5295	+19 57 19.6	+1.995

GREENWICH MEAN TIME.

Hour.	Right Ascension.	Var. per Min.	Declination.	Var. per Min.	Hour.	Right Ascension.	Var. per Min.	Declination.	Var. per Min.
MARCH 25.					MARCH 27.				
0	4 39 10.56	2.5295	+19 57 19.6	+1.995	0	6 39 38.29	2.4603	+18 58 42.3	-4.316
1	4 41 42.35	2.5301	19 59 15.3	1.860	1	6 42 5.81	2.4572	18 54 19.7	4.436
2	4 44 14.17	2.5304	20 1 2.8	1.724	2	6 44 33.15	2.4540	18 49 50.0	4.554
3	4 46 46.00	2.5306	20 2 42.2	1.589	3	6 47 0.29	2.4507	18 45 13.2	4.673
4	4 49 17.84	2.5308	20 4 13.5	1.453	4	6 49 27.23	2.4474	18 40 29.3	4.790
5	4 51 49.70	2.5310	20 5 36.6	1.318	5	6 51 53.98	2.4442	18 35 38.4	4.907
6	4 54 21.56	2.5310	20 6 51.6	1.183	6	6 54 20.53	2.4408	18 30 40.5	5.023
7	4 56 53.42	2.5309	20 7 58.5	1.047	7	6 56 46.87	2.4373	18 25 35.7	5.137
8	4 59 25.27	2.5308	20 8 57.2	0.911	8	6 59 13.00	2.4338	18 20 24.1	5.251
9	5 1 57.11	2.5305	20 9 47.8	0.775	9	7 1 38.93	2.4304	18 15 5.6	5.364
10	5 4 28.93	2.5302	20 10 30.2	0.638	10	7 4 4.65	2.4268	18 9 40.4	5.477
11	5 7 0.73	2.5298	20 11 4.4	0.503	11	7 6 30.15	2.4233	18 4 8.4	5.588
12	5 9 32.51	2.5294	20 11 30.5	0.367	12	7 8 55.44	2.4197	17 58 29.8	5.698
13	5 12 4.26	2.5288	20 11 48.4	0.231	13	7 11 20.51	2.4159	17 52 44.6	5.808
14	5 14 35.97	2.5281	20 11 58.2	+0.096	14	7 13 45.35	2.4123	17 46 52.9	5.916
15	5 17 7.63	2.5273	20 11 59.9	-0.040	15	7 16 9.98	2.4086	17 40 54.7	6.024
16	5 19 39.25	2.5266	20 11 53.4	0.176	16	7 18 34.38	2.4048	17 34 50.0	6.131
17	5 22 10.82	2.5257	20 11 38.8	0.311	17	7 20 58.56	2.4011	17 28 39.0	6.237
18	5 24 42.33	2.5248	20 11 16.1	0.446	18	7 23 22.51	2.3973	17 22 21.6	6.342
19	5 27 13.79	2.5237	20 10 45.3	0.581	19	7 25 46.23	2.3934	17 15 58.0	6.445
20	5 29 45.17	2.5224	20 10 6.4	0.716	20	7 28 9.72	2.3896	17 9 28.2	6.548
21	5 32 16.48	2.5212	20 9 19.4	0.851	21	7 30 32.98	2.3858	17 2 52.2	6.650
22	5 34 47.72	2.5199	20 8 24.3	0.985	22	7 32 56.01	2.3818	16 56 10.2	6.751
23	5 37 18.87	2.5185	+20 7 21.2	-1.118	23	7 35 18.80	2.3779	+16 49 22.1	-6.851
MARCH 26.					MARCH 28.				
0	5 39 49.94	2.5171	+20 6 10.1	-1.262	0	7 37 41.36	2.3740	+16 42 28.1	-6.950
1	5 42 20.92	2.5156	20 4 51.0	1.396	1	7 40 3.68	2.3700	16 35 28.1	7.048
2	5 44 51.81	2.5139	20 3 23.8	1.519	2	7 42 25.76	2.3660	16 28 22.3	7.144
3	5 47 22.59	2.5122	20 1 48.7	1.651	3	7 44 47.60	2.3621	16 21 10.8	7.240
4	5 49 53.27	2.5104	20 0 5.7	1.783	4	7 47 9.21	2.3582	16 13 53.5	7.335
5	5 52 23.84	2.5085	19 58 14.7	1.915	5	7 49 30.58	2.3541	16 6 30.6	7.428
6	5 54 54.29	2.5066	19 56 15.9	2.047	6	7 51 51.70	2.3500	15 59 2.1	7.522
7	5 57 24.63	2.5047	19 54 9.1	2.178	7	7 54 12.58	2.3461	15 51 28.0	7.613
8	5 59 54.85	2.5028	19 51 54.6	2.308	8	7 56 33.23	2.3421	15 43 48.5	7.708
9	6 2 24.94	2.5008	19 49 32.2	2.438	9	7 58 53.63	2.3379	15 36 3.6	7.793
10	6 4 54.89	2.4988	19 47 2.0	2.568	10	8 1 13.78	2.3339	15 28 13.3	7.882
11	6 7 24.72	2.4969	19 44 24.1	2.696	11	8 3 33.70	2.3299	15 20 17.8	7.969
12	6 9 54.40	2.4935	19 41 38.5	2.824	12	8 5 53.37	2.3258	15 12 17.0	8.056
13	6 12 23.94	2.4911	19 38 45.2	2.952	13	8 8 12.80	2.3218	15 4 11.1	8.140
14	6 14 53.33	2.4885	19 35 44.2	3.079	14	8 10 31.99	2.3178	14 56 0.2	8.224
15	6 17 22.56	2.4860	19 32 35.7	3.206	15	8 12 50.93	2.3137	14 47 44.2	8.308
16	6 19 51.65	2.4834	19 29 19.5	3.332	16	8 15 9.63	2.3097	14 39 23.3	8.390
17	6 22 20.57	2.4807	19 25 55.8	3.457	17	8 17 28.09	2.3057	14 30 57.4	8.471
18	6 24 49.33	2.4780	19 22 24.7	3.582	18	8 19 46.31	2.3017	14 22 26.8	8.550
19	6 27 17.93	2.4752	19 18 46.0	3.707	19	8 22 4.29	2.2976	14 13 51.4	8.628
20	6 29 46.35	2.4723	19 14 59.9	3.829	20	8 24 22.02	2.2936	14 5 11.4	8.706
21	6 32 14.61	2.4694	19 11 6.5	3.952	21	8 26 39.52	2.2896	13 56 26.7	8.783
22	6 34 42.68	2.4664	19 7 5.7	4.074	22	8 28 56.77	2.2855	13 47 37.5	8.858
23	6 37 10.58	2.4634	19 2 57.6	4.195	23	8 31 13.78	2.2816	13 38 43.7	8.933
24	6 39 38.29	2.4603	+18 58 42.3	-4.316	24	8 33 30.56	2.2776	+13 29 45.6	-9.005

GREENWICH MEAN TIME.

Hour.	Right Ascension.	Var. per Min.	Declination.	Var. per Min.	Hour.	Right Ascension.	Var. per Min.	Declination.	Var. per Min.
MARCH 29.					MARCH 31.				
	h m s	s	° "	"		h m s	s	° "	"
0	8 33 30.56	2.2776	+13 29 45.6	-9.005	0	10 18 41.14	2.1168	+5 14 29.6	-11.208
1	8 35 47.09	2.2736	13 20 43.1	9.077	1	10 20 48.07	2.1143	5 3 16.5	11.228
2	8 38 3.39	2.2697	13 11 36.3	9.148	2	10 22 54.85	2.1118	4 52 2.3	11.248
3	8 40 19.45	2.2658	13 2 25.3	9.218	3	10 25 1.48	2.1093	4 40 47.1	11.263
4	8 42 35.28	2.2618	12 53 10.2	9.286	4	10 27 7.97	2.1069	4 29 30.8	11.278
5	8 44 50.87	2.2579	12 43 51.0	9.354	5	10 29 14.31	2.1046	4 18 13.7	11.293
6	8 47 6.23	2.2540	12 34 27.7	9.420	6	10 31 20.52	2.1023	4 6 55.6	11.308
7	8 49 21.35	2.2502	12 25 0.6	9.485	7	10 33 26.59	2.1001	3 55 36.7	11.321
8	8 51 36.25	2.2463	12 15 29.5	9.550	8	10 35 32.53	2.0979	3 44 17.1	11.333
9	8 53 50.91	2.2425	12 5 54.6	9.613	9	10 37 38.34	2.0958	3 32 56.7	11.344
10	8 56 5.35	2.2388	11 56 16.0	9.675	10	10 39 44.02	2.0936	3 21 35.8	11.354
11	8 58 19.56	2.2349	11 46 33.6	9.736	11	10 41 49.57	2.0915	3 10 14.2	11.363
12	9 0 33.54	2.2311	11 36 47.7	9.795	12	10 43 55.00	2.0895	2 58 52.2	11.371
13	9 2 47.29	2.2274	11 26 58.2	9.853	13	10 46 0.31	2.0875	2 47 29.7	11.378
14	9 5 0.83	2.2238	11 17 5.3	9.911	14	10 48 5.50	2.0856	2 36 6.8	11.384
15	9 7 14.14	2.2200	11 7 8.9	9.968	15	10 50 10.58	2.0837	2 24 43.6	11.389
16	9 9 27.23	2.2163	10 57 9.2	10.023	16	10 52 15.54	2.0818	2 13 20.1	11.393
17	9 11 40.10	2.2128	10 47 6.2	10.077	17	10 54 20.39	2.0799	2 1 56.4	11.397
18	9 13 52.76	2.2092	10 37 0.0	10.129	18	10 56 25.13	2.0781	1 50 32.5	11.398
19	9 16 5.20	2.2056	10 26 50.7	10.182	19	10 58 29.76	2.0763	1 39 8.6	11.399
20	9 18 17.43	2.2020	10 16 38.2	10.233	20	11 0 34.29	2.0747	1 27 44.6	11.400
21	9 20 29.44	2.1985	10 6 22.8	10.282	21	11 2 38.72	2.0730	1 16 20.6	11.398
22	9 22 41.25	2.1951	9 56 4.4	10.330	22	11 4 43.05	2.0714	1 4 56.8	11.397
23	9 24 52.85	2.1916	+ 9 45 43.2	-10.378	23	11 6 47.29	2.0698	+0 53 33.0	-11.394
MARCH 30.					APRIL 1.				
0	9 27 4.24	2.1882	+ 9 35 19.1	-10.424	0	11 8 51.43	2.0683	+0 42 9.5	-11.390
1	9 29 15.43	2.1848	9 24 52.3	10.469	1	11 10 55.48	2.0668	0 30 46.2	11.386
2	9 31 26.41	2.1814	9 14 22.8	10.513	2	11 12 59.44	2.0653	0 19 23.2	11.380
3	9 33 37.20	2.1781	9 3 50.7	10.556	3	11 15 3.31	2.0638	+0 8 0.6	11.373
4	9 35 47.78	2.1748	8 53 16.1	10.598	4	11 17 7.10	2.0625	-0 3 21.5	11.365
5	9 37 58.17	2.1716	8 42 39.0	10.639	5	11 19 10.81	2.0612	0 14 43.2	11.357
6	9 40 8.37	2.1683	8 31 59.4	10.679	6	11 21 14.44	2.0600	0 26 4.4	11.348
7	9 42 18.37	2.1651	8 21 17.5	10.717	7	11 23 17.99	2.0588	0 37 24.9	11.337
8	9 44 28.18	2.1620	8 10 33.4	10.754	8	11 25 21.47	2.0574	0 48 44.8	11.326
9	9 46 37.81	2.1589	7 59 47.0	10.791	9	11 27 24.88	2.0563	1 0 4.0	11.313
10	9 48 47.25	2.1558	7 48 58.5	10.826	10	11 29 28.22	2.0551	1 11 22.4	11.300
11	9 50 56.50	2.1527	7 38 7.9	10.861	11	11 31 31.49	2.0540	1 22 40.0	11.286
12	9 53 5.57	2.1498	7 27 15.2	10.893	12	11 33 34.70	2.0530	1 33 56.7	11.271
13	9 55 14.47	2.1468	7 16 20.7	10.925	13	11 35 37.84	2.0519	1 45 12.5	11.255
14	9 57 23.18	2.1438	7 5 24.2	10.957	14	11 37 40.93	2.0509	1 56 27.3	11.238
15	9 59 31.73	2.1410	6 54 25.9	10.987	15	11 39 43.95	2.0499	2 7 41.1	11.220
16	10 1 40.10	2.1381	6 43 25.8	11.015	16	11 41 46.92	2.0491	2 18 53.7	11.202
17	10 3 48.30	2.1353	6 32 24.1	11.043	17	11 43 49.84	2.0483	2 30 5.2	11.183
18	10 5 56.33	2.1325	6 21 20.7	11.070	18	11 45 52.71	2.0474	2 41 15.5	11.163
19	10 8 4.20	2.1298	6 10 15.7	11.096	19	11 47 55.53	2.0466	2 52 24.6	11.142
20	10 10 11.90	2.1271	5 59 9.2	11.120	20	11 49 58.30	2.0458	3 3 32.3	11.119
21	10 12 19.45	2.1244	5 48 1.3	11.143	21	11 52 1.03	2.0451	3 14 38.7	11.094
22	10 14 26.83	2.1218	5 36 52.0	11.166	22	11 54 3.71	2.0444	3 25 43.7	11.070
23	10 16 34.06	2.1193	5 25 41.4	11.187	23	11 56 6.36	2.0438	3 36 47.1	11.046
24	10 18 41.14	2.1168	+ 5 14 29.6	-11.208	24	11 58 8.97	2.0432	-3 47 49.1	-11.020

GREENWICH MEAN TIME.

Hour.	Right Ascension.	Var. per Min.	Declination.	Var. per Min.	Hour.	Right Ascension.	Var. per Min.	Declination.	Var. per Min.
APRIL 2.					APRIL 4.				
0	h m s	s	° ' "	"	0	h m s	s	° ' "	"
0	11 58 8.97	2.0432	- 3 47 49.1	-11.020	0	13 36 7.15	2.0490	-11 51 40.9	-8.852
1	12 0 11.54	2.0426	3 58 49.5	10.993	1	13 38 10.11	2.0496	12 0 30.1	8.789
2	12 2 14.08	2.0420	4 9 48.3	10.966	2	13 40 13.10	2.0508	12 9 15.6	8.727
3	12 4 16.58	2.0415	4 20 45.4	10.937	3	13 42 16.14	2.0511	12 17 57.3	8.663
4	12 6 19.06	2.0412	4 31 40.7	10.908	4	13 44 19.23	2.0518	12 26 35.1	8.598
5	12 8 21.52	2.0407	4 42 34.3	10.878	5	13 46 22.35	2.0524	12 35 9.1	8.533
6	12 10 23.94	2.0403	4 53 26.1	10.848	6	13 48 25.52	2.0532	12 43 39.1	8.468
7	12 12 26.35	2.0399	5 4 16.0	10.816	7	13 50 28.73	2.0539	12 52 5.2	8.402
8	12 14 28.73	2.0395	5 15 4.0	10.783	8	13 52 31.99	2.0547	13 0 27.3	8.334
9	12 16 31.09	2.0393	5 25 49.9	10.749	9	13 54 35.29	2.0554	13 8 45.3	8.267
10	12 18 33.44	2.0390	5 36 33.9	10.716	10	13 56 38.64	2.0563	13 16 59.3	8.199
11	12 20 35.77	2.0388	5 47 15.8	10.680	11	13 58 42.04	2.0570	13 25 9.2	8.131
12	12 22 38.10	2.0386	5 57 55.5	10.644	12	14 0 45.48	2.0578	13 33 15.0	8.062
13	12 24 40.40	2.0383	6 8 33.1	10.608	13	14 2 48.97	2.0586	13 41 16.6	7.992
14	12 26 42.70	2.0383	6 19 8.5	10.571	14	14 4 52.51	2.0594	13 49 14.0	7.922
15	12 28 45.00	2.0382	6 29 41.6	10.533	15	14 6 56.10	2.0603	13 57 7.2	7.852
16	12 30 47.28	2.0381	6 40 12.4	10.493	16	14 8 59.74	2.0611	14 4 56.2	7.780
17	12 32 49.57	2.0381	6 50 40.8	10.453	17	14 11 3.43	2.0619	14 12 40.8	7.708
18	12 34 51.85	2.0380	7 1 6.8	10.413	18	14 13 7.17	2.0627	14 20 21.1	7.636
19	12 36 54.13	2.0380	7 11 30.3	10.371	19	14 15 10.95	2.0635	14 27 57.1	7.563
20	12 38 56.41	2.0381	7 21 51.3	10.329	20	14 17 14.79	2.0643	14 35 28.6	7.489
21	12 40 58.70	2.0382	7 32 9.8	10.287	21	14 19 18.67	2.0652	14 42 55.8	7.416
22	12 43 0.99	2.0383	7 42 25.7	10.243	22	14 21 22.61	2.0661	14 50 18.5	7.341
23	12 45 3.28	2.0383	- 7 52 38.9	-10.198	23	14 23 26.60	2.0669	-14 57 36.7	-7.266
APRIL 3.					APRIL 5.				
0	h m s	s	° ' "	"	0	h m s	s	° ' "	"
0	12 47 5.59	2.0386	- 8 2 49.4	-10.153	0	14 25 30.64	2.0678	-15 4 50.4	-7.190
1	12 49 7.91	2.0387	8 12 57.2	10.107	1	14 27 34.73	2.0686	15 11 59.5	7.114
2	12 51 10.23	2.0388	8 23 2.2	10.060	2	14 29 38.87	2.0694	15 19 4.1	7.038
3	12 53 12.57	2.0392	8 33 4.4	10.013	3	14 31 43.06	2.0703	15 26 4.1	6.961
4	12 55 14.93	2.0394	8 43 3.7	9.964	4	14 33 47.31	2.0712	15 32 59.4	6.883
5	12 57 17.30	2.0397	8 53 0.1	9.915	5	14 35 51.60	2.0720	15 39 50.1	6.807
6	12 59 19.69	2.0399	9 2 53.5	9.865	6	14 37 55.95	2.0729	15 46 36.2	6.728
7	13 1 22.09	2.0403	9 12 43.9	9.815	7	14 40 0.35	2.0737	15 53 17.5	6.649
8	13 3 24.52	2.0407	9 22 31.3	9.764	8	14 42 4.79	2.0745	15 59 54.1	6.570
9	13 5 26.97	2.0410	9 32 15.6	9.712	9	14 44 9.29	2.0754	16 6 25.9	6.490
10	13 7 29.44	2.0413	9 41 56.7	9.659	10	14 46 13.84	2.0763	16 12 52.9	6.410
11	13 9 31.93	2.0418	9 51 34.7	9.606	11	14 48 18.44	2.0771	16 19 15.1	6.330
12	13 11 34.46	2.0423	10 1 9.4	9.552	12	14 50 23.09	2.0779	16 25 32.5	6.249
13	13 13 37.01	2.0427	10 10 40.9	9.498	13	14 52 27.79	2.0788	16 31 45.0	6.168
14	13 15 39.58	2.0432	10 20 9.1	9.443	14	14 54 32.54	2.0796	16 37 52.6	6.086
15	13 17 42.19	2.0438	10 29 34.0	9.387	15	14 56 37.34	2.0803	16 43 55.3	6.004
16	13 19 44.83	2.0443	10 38 55.5	9.330	16	14 58 42.18	2.0812	16 49 53.1	5.922
17	13 21 47.50	2.0448	10 48 13.6	9.273	17	15 0 47.08	2.0820	16 55 45.9	5.838
18	13 23 50.20	2.0453	10 57 28.2	9.214	18	15 2 52.02	2.0828	17 1 33.7	5.756
19	13 25 52.93	2.0458	11 6 39.3	9.155	19	15 4 57.01	2.0836	17 7 16.6	5.673
20	13 27 55.70	2.0465	11 15 46.8	9.096	20	15 7 2.05	2.0844	17 12 54.4	5.588
21	13 29 58.51	2.0471	11 24 50.8	9.037	21	15 9 7.14	2.0852	17 18 27.1	5.503
22	13 32 1.35	2.0477	11 33 51.2	8.976	22	15 11 12.27	2.0858	17 23 54.8	5.419
23	13 34 4.23	2.0483	11 42 47.9	8.914	23	15 13 17.44	2.0866	17 29 17.4	5.334
24	13 36 7.15	2.0490	-11 51 40.9	-8.852	24	15 15 22.66	2.0874	-17 34 34.9	-5.248

## GREENWICH MEAN TIME.

Hour.	Right Ascension.	Var. per Min.	Declination.	Var. per Min.	Hour.	Right Ascension.	Var. per Min.	Declination.	Var. per Min.
APRIL 6.					APRIL 8.				
	h m s	s	° ' "	"		h m s	s	° ' "	"
0	15 15 22.66	2.0874	-17 34 34.9	-5.248	0	16 56 8.67	2.1043	-20 3 23.1	-0.587
1	15 17 27.93	2.0882	17 39 47.2	5.163	1	16 58 14.92	2.1043	20 4 13.5	0.798
2	15 19 33.24	2.0888	17 44 54.4	5.078	2	17 0 21.17	2.1040	20 4 58.2	0.698
3	15 21 38.59	2.0895	17 49 56.5	4.991	3	17 2 27.40	2.1038	20 5 37.3	0.603
4	15 23 43.98	2.0903	17 54 53.3	4.904	4	17 4 33.63	2.1037	20 6 10.8	0.512
5	15 25 49.42	2.0909	17 59 45.0	4.817	5	17 6 39.84	2.1034	20 6 38.7	0.418
6	15 27 54.89	2.0916	18 4 31.4	4.729	6	17 8 46.04	2.1033	20 7 1.0	0.324
7	15 30 0.41	2.0923	18 9 12.5	4.642	7	17 10 52.23	2.1030	20 7 17.6	0.230
8	15 32 5.96	2.0929	18 13 48.4	4.555	8	17 12 58.40	2.1027	20 7 28.6	0.137
9	15 34 11.56	2.0936	18 18 19.1	4.467	9	17 15 4.55	2.1024	20 7 34.0	-0.043
10	15 36 17.19	2.0941	18 22 44.4	4.378	10	17 17 10.69	2.1023	20 7 33.8	+0.061
11	15 38 22.85	2.0947	18 27 4.4	4.289	11	17 19 16.81	2.1018	20 7 27.9	0.144
12	15 40 28.55	2.0953	18 31 19.1	4.201	12	17 21 22.90	2.1014	20 7 16.5	0.237
13	15 42 34.29	2.0959	18 35 28.5	4.112	13	17 23 28.98	2.1011	20 6 59.5	0.331
14	15 44 40.06	2.0965	18 39 32.5	4.022	14	17 25 35.03	2.1007	20 6 36.8	0.426
15	15 46 45.87	2.0970	18 43 31.1	3.933	15	17 27 41.06	2.1003	20 6 8.4	0.520
16	15 48 51.70	2.0975	18 47 24.4	3.843	16	17 29 47.07	2.0999	20 5 34.4	0.613
17	15 50 57.57	2.0980	18 51 12.3	3.753	17	17 31 53.05	2.0994	20 4 54.9	0.704
18	15 53 3.46	2.0985	18 54 54.7	3.662	18	17 33 59.00	2.0989	20 4 9.9	0.797
19	15 55 9.39	2.0990	18 58 31.7	3.572	19	17 36 4.92	2.0985	20 3 19.3	0.889
20	15 57 15.34	2.0994	19 2 3.3	3.481	20	17 38 10.82	2.0980	20 2 23.2	0.981
21	15 59 21.32	2.0999	19 5 29.4	3.390	21	17 40 16.68	2.0974	20 1 21.6	1.073
22	16 1 27.33	2.1003	19 8 50.1	3.300	22	17 42 22.51	2.0969	20 0 14.4	1.167
23	16 3 33.36	2.1007	-19 12 5.3	-3.208	23	17 44 28.31	2.0964	-19 59 1.6	+1.260
APRIL 7.					APRIL 9.				
	h m s	s	° ' "	"		h m s	s	° ' "	"
0	16 5 39.41	2.1010	-19 15 15.1	-3.117	0	17 46 34.08	2.0959	-19 57 43.2	+1.358
1	16 7 45.48	2.1014	19 18 19.3	3.024	1	17 48 39.82	2.0953	19 56 19.2	1.446
2	16 9 51.58	2.1018	19 21 18.0	2.933	2	17 50 45.52	2.0947	19 54 49.7	1.538
3	16 11 57.70	2.1021	19 24 11.2	2.841	3	17 52 51.18	2.0940	19 53 14.7	1.629
4	16 14 3.83	2.1023	19 26 58.9	2.749	4	17 54 56.80	2.0934	19 51 34.2	1.721
5	16 16 9.98	2.1027	19 29 41.1	2.658	5	17 57 2.39	2.0928	19 49 48.2	1.813
6	16 18 16.15	2.1030	19 32 17.8	2.565	6	17 59 7.94	2.0922	19 47 56.6	1.905
7	16 20 22.34	2.1033	19 34 48.9	2.472	7	18 1 13.45	2.0915	19 45 59.6	1.996
8	16 22 28.54	2.1034	19 37 14.4	2.379	8	18 3 18.92	2.0908	19 43 57.1	2.088
9	16 24 34.75	2.1037	19 39 34.4	2.287	9	18 5 24.35	2.0902	19 41 49.1	2.178
10	16 26 40.98	2.1038	19 41 48.8	2.193	10	18 7 29.74	2.0894	19 39 35.7	2.269
11	16 28 47.21	2.1039	19 43 57.6	2.101	11	18 9 35.08	2.0887	19 37 16.8	2.360
12	16 30 53.45	2.1042	19 46 0.9	2.008	12	18 11 40.38	2.0879	19 34 52.5	2.451
13	16 32 59.71	2.1043	19 47 58.6	1.914	13	18 13 45.63	2.0872	19 32 22.7	2.543
14	16 35 5.97	2.1043	19 49 50.6	1.821	14	18 15 50.84	2.0865	19 29 47.5	2.635
15	16 37 12.23	2.1044	19 51 37.1	1.728	15	18 17 56.01	2.0858	19 27 6.9	2.727
16	16 39 18.50	2.1046	19 53 18.0	1.635	16	18 20 1.13	2.0849	19 24 20.9	2.819
17	16 41 24.78	2.1046	19 54 53.3	1.542	17	18 22 6.20	2.0841	19 21 29.5	2.911
18	16 43 31.05	2.1046	19 56 23.0	1.448	18	18 24 11.22	2.0833	19 18 32.8	2.999
19	16 45 37.33	2.1046	19 57 47.0	1.354	19	18 26 16.20	2.0825	19 15 30.7	3.089
20	16 47 43.60	2.1045	19 59 5.5	1.261	20	18 28 21.12	2.0817	19 12 23.2	3.180
21	16 49 49.87	2.1045	20 0 18.3	1.167	21	18 30 26.00	2.0809	19 9 10.4	3.268
22	16 51 56.14	2.1045	20 1 25.5	1.073	22	18 32 30.83	2.0801	19 5 52.2	3.357
23	16 54 2.41	2.1044	20 2 27.1	0.980	23	18 34 35.61	2.0793	19 2 28.8	3.434
24	16 56 8.67	2.1043	-20 3 23.1	-0.887	24	18 36 40.34	2.0784	-18 59 0.1	+3.522



GREENWICH MEAN TIME.

Hour.	Right Ascension.	Var. per Min.	Declination.	Var. per Min.	Hour.	Right Ascension.	Var. per Min.	Declination.	Var. per Min.
<b>APRIL 10.</b>					<b>APRIL 12.</b>				
	h m s	s	° ' "	"		h m s	s	° ' "	"
0	18 36 40.34	2.0784	-18 59 0.1	+3.533	0	20 15 27.94	2.0406	-14 33 33.3	+ 7.413
1	18 38 45.02	2.0775	18 55 26.0	3.612	1	20 17 30.36	2.0401	14 26 6.3	7.487
2	18 40 49.64	2.0767	18 51 46.7	3.688	2	20 19 32.75	2.0396	14 18 34.9	7.558
3	18 42 54.22	2.0759	18 48 2.2	3.766	3	20 21 35.11	2.0391	14 10 59.3	7.630
4	18 44 58.75	2.0750	18 44 12.4	3.874	4	20 23 37.44	2.0386	14 3 19.3	7.702
5	18 47 3.22	2.0741	18 40 17.3	3.961	5	20 25 39.74	2.0382	13 55 35.1	7.772
6	18 49 7.64	2.0733	18 36 17.1	4.047	6	20 27 42.02	2.0378	13 47 46.7	7.842
7	18 51 12.01	2.0724	18 32 11.7	4.133	7	20 29 44.28	2.0374	13 39 54.0	7.913
8	18 53 16.33	2.0715	18 28 1.1	4.220	8	20 31 46.51	2.0370	13 31 57.2	7.982
9	18 55 20.59	2.0706	18 23 45.3	4.306	9	20 33 48.72	2.0366	13 23 56.2	8.052
10	18 57 24.80	2.0698	18 19 24.4	4.392	10	20 35 50.92	2.0364	13 15 51.0	8.120
11	18 59 28.96	2.0689	18 14 58.3	4.478	11	20 37 53.09	2.0361	13 7 41.8	8.188
12	19 1 33.06	2.0680	18 10 27.1	4.563	12	20 39 55.25	2.0359	12 59 28.5	8.256
13	19 3 37.12	2.0672	18 5 50.8	4.647	13	20 41 57.40	2.0357	12 51 11.1	8.323
14	19 5 41.12	2.0663	18 1 9.5	4.731	14	20 43 59.53	2.0354	12 42 49.8	8.389
15	19 7 45.06	2.0655	17 56 23.1	4.816	15	20 46 1.65	2.0353	12 34 24.4	8.457
16	19 9 48.96	2.0646	17 51 31.6	4.900	16	20 48 3.76	2.0351	12 25 55.0	8.522
17	19 11 52.80	2.0638	17 46 35.1	4.983	17	20 50 5.86	2.0350	12 17 21.8	8.587
18	19 13 56.59	2.0630	17 41 33.6	5.067	18	20 52 7.96	2.0349	12 8 44.6	8.653
19	19 16 0.32	2.0621	17 36 27.1	5.150	19	20 54 10.05	2.0348	12 0 3.5	8.718
20	19 18 4.00	2.0610	17 31 15.6	5.233	20	20 56 12.14	2.0348	11 51 18.5	8.781
21	19 20 7.64	2.0602	17 25 59.1	5.316	21	20 58 14.22	2.0348	11 42 29.8	8.844
22	19 22 11.22	2.0593	17 20 37.7	5.398	22	21 0 16.31	2.0348	11 33 37.2	8.907
23	19 24 14.75	2.0585	-17 15 11.4	+5.479	23	21 2 18.40	2.0348	-11 24 40.9	+ 8.969
<b>APRIL 11.</b>					<b>APRIL 13.</b>				
0	19 26 18.22	2.0575	-17 9 40.2	+5.561	0	21 4 20.49	2.0349	-11 15 40.9	+ 9.032
1	19 28 21.65	2.0566	17 4 4.1	5.642	1	21 6 22.59	2.0351	11 6 37.1	9.093
2	19 30 25.03	2.0559	16 58 23.2	5.723	2	21 8 24.70	2.0352	10 57 29.7	9.154
3	19 32 28.36	2.0550	16 52 37.4	5.803	3	21 10 26.81	2.0353	10 48 18.6	9.215
4	19 34 31.63	2.0542	16 46 46.8	5.884	4	21 12 28.94	2.0355	10 39 3.9	9.274
5	19 36 34.86	2.0534	16 40 51.3	5.964	5	21 14 31.08	2.0356	10 29 45.7	9.333
6	19 38 38.04	2.0527	16 34 51.1	6.043	6	21 16 33.24	2.0362	10 20 23.9	9.393
7	19 40 41.18	2.0519	16 28 46.1	6.123	7	21 18 35.42	2.0365	10 10 58.5	9.451
8	19 42 44.27	2.0511	16 22 36.4	6.201	8	21 20 37.62	2.0368	10 1 29.7	9.508
9	19 44 47.31	2.0503	16 16 22.0	6.280	9	21 22 39.83	2.0371	9 51 57.5	9.566
10	19 46 50.30	2.0495	16 10 2.8	6.358	10	21 24 42.07	2.0376	9 42 21.8	9.623
11	19 48 53.25	2.0488	16 3 39.0	6.436	11	21 26 44.34	2.0381	9 32 42.8	9.678
12	19 50 56.16	2.0482	15 57 10.5	6.513	12	21 28 46.64	2.0386	9 23 0.4	9.734
13	19 52 59.03	2.0474	15 50 37.4	6.591	13	21 30 48.97	2.0391	9 13 14.7	9.789
14	19 55 1.85	2.0467	15 43 59.6	6.668	14	21 32 51.33	2.0396	9 3 25.7	9.843
15	19 57 4.63	2.0460	15 37 17.8	6.743	15	21 34 53.72	2.0402	8 53 33.5	9.897
16	19 59 7.37	2.0453	15 30 30.4	6.820	16	21 36 56.15	2.0409	8 43 38.1	9.950
17	20 1 10.07	2.0447	15 23 38.9	6.896	17	21 38 58.63	2.0416	8 33 39.5	10.003
18	20 3 12.73	2.0440	15 16 42.9	6.970	18	21 41 1.14	2.0423	8 23 37.7	10.055
19	20 5 15.35	2.0434	15 9 42.5	7.045	19	21 43 3.70	2.0430	8 13 32.9	10.106
20	20 7 17.94	2.0428	15 2 37.5	7.120	20	21 45 6.90	2.0438	8 3 25.0	10.157
21	20 9 20.49	2.0423	14 55 28.1	7.194	21	21 47 8.95	2.0447	7 53 14.1	10.207
22	20 11 23.01	2.0417	14 48 14.2	7.268	22	21 49 11.66	2.0456	7 43 0.2	10.257
23	20 13 25.49	2.0411	14 40 55.9	7.341	23	21 51 14.42	2.0464	7 32 43.3	10.305
24	20 15 27.94	2.0406	-14 33 33.3	+7.413	24	21 53 17.23	2.0474	- 7 22 23.6	+10.353

## GREENWICH MEAN TIME.

Hour.	Right Ascension.	Var. per Min.	Declination.	Var. per Min.	Hour.	Right Ascension.	Var. per Min.	Declination.	Var. per Min.
APRIL 14.					APRIL 16.				
	h m s	s	° ' "	"		h m s	s	° ' "	"
0	21 53 17.23	2.0474	-7 22 23.6	+10.353	0	23 33 29.40	2.1453	+ 1 35 45.7	+11.739
1	21 55 20.11	2.0484	7 12 1.0	10.401	1	23 35 38.21	2.1484	1 47 30.2	11.745
2	21 57 23.04	2.0494	7 1 35.5	10.448	2	23 37 47.21	2.1516	1 59 15.1	11.751
3	21 59 26.04	2.0505	6 51 7.3	10.493	3	23 39 56.40	2.1548	2 11 0.3	11.754
4	22 1 29.10	2.0516	6 40 36.3	10.539	4	23 42 5.79	2.1582	2 22 45.6	11.757
5	22 3 32.23	2.0528	6 30 2.6	10.583	5	23 44 15.38	2.1615	2 34 31.1	11.758
6	22 5 35.44	2.0540	6 19 26.3	10.628	6	23 46 25.17	2.1648	2 46 16.6	11.758
7	22 7 38.71	2.0552	6 8 47.3	10.672	7	23 48 35.16	2.1683	2 58 2.1	11.757
8	22 9 42.06	2.0566	5 58 5.7	10.714	8	23 50 45.36	2.1718	3 9 47.5	11.755
9	22 11 45.50	2.0579	5 47 21.6	10.756	9	23 52 55.78	2.1753	3 21 32.7	11.752
10	22 13 49.01	2.0592	5 36 35.0	10.797	10	23 55 6.40	2.1788	3 33 17.7	11.748
11	22 15 52.60	2.0607	5 25 46.0	10.838	11	23 57 17.24	2.1825	3 45 2.4	11.742
12	22 17 56.29	2.0621	5 14 54.5	10.878	12	23 59 28.30	2.1861	3 56 46.7	11.735
13	22 20 0.05	2.0635	5 4 0.7	10.916	13	0 1 39.57	2.1898	4 8 30.6	11.727
14	22 22 3.91	2.0652	4 53 4.6	10.954	14	0 3 51.07	2.1936	4 20 13.9	11.717
15	22 24 7.87	2.0667	4 42 6.2	10.992	15	0 6 2.80	2.1973	4 31 56.6	11.707
16	22 26 11.92	2.0683	4 31 5.5	11.029	16	0 8 14.75	2.2011	4 43 38.7	11.696
17	22 28 16.07	2.0701	4 20 2.7	11.064	17	0 10 26.93	2.2049	4 55 20.1	11.683
18	22 30 20.33	2.0718	4 8 57.8	11.100	18	0 12 39.34	2.2088	5 7 0.6	11.668
19	22 32 24.69	2.0735	3 57 50.7	11.135	19	0 14 51.99	2.2128	5 18 40.2	11.652
20	22 34 29.15	2.0753	3 46 41.6	11.168	20	0 17 4.87	2.2168	5 30 18.8	11.635
21	22 36 33.73	2.0773	3 35 30.6	11.200	21	0 19 18.00	2.2208	5 41 56.4	11.617
22	22 38 38.42	2.0792	3 24 17.6	11.222	22	0 21 31.36	2.2248	5 53 32.9	11.598
23	22 40 43.23	2.0812	-3 13 2.7	+11.263	23	0 23 44.97	2.2289	+ 6 5 8.1	+11.577
APRIL 15.					APRIL 17.				
0	22 42 48.16	2.0832	-3 1 46.0	+11.293	0	0 25 58.83	2.2330	+ 6 16 42.1	+11.555
1	22 44 53.21	2.0853	2 50 27.5	11.323	1	0 28 12.93	2.2371	6 28 14.7	11.532
2	22 46 58.39	2.0873	2 39 7.2	11.352	2	0 30 27.28	2.2413	6 39 45.9	11.507
3	22 49 3.69	2.0894	2 27 45.3	11.379	3	0 32 41.88	2.2455	6 51 15.5	11.480
4	22 51 9.12	2.0916	2 16 21.7	11.407	4	0 34 56.74	2.2498	7 2 43.5	11.453
5	22 53 14.68	2.0938	2 4 56.5	11.432	5	0 37 11.66	2.2541	7 14 9.8	11.424
6	22 55 20.38	2.0963	1 53 29.9	11.457	6	0 39 27.23	2.2583	7 25 34.4	11.394
7	22 57 26.23	2.0987	1 42 1.7	11.481	7	0 41 42.86	2.2627	7 36 57.1	11.362
8	22 59 32.22	2.1010	1 30 32.2	11.504	8	0 43 58.75	2.2671	7 48 17.8	11.328
9	23 1 38.35	2.1033	1 19 1.2	11.527	9	0 46 14.91	2.2715	7 59 36.5	11.294
10	23 3 44.62	2.1058	1 7 29.0	11.547	10	0 48 31.33	2.2759	8 10 53.1	11.259
11	23 5 51.05	2.1083	0 55 55.6	11.568	11	0 50 48.02	2.2804	8 22 7.6	11.222
12	23 7 57.62	2.1108	0 44 20.9	11.587	12	0 53 4.98	2.2848	8 33 19.7	11.183
13	23 10 4.35	2.1135	0 32 45.1	11.605	13	0 55 22.20	2.2893	8 44 29.5	11.143
14	23 12 11.24	2.1162	0 21 8.3	11.623	14	0 57 39.70	2.2939	8 55 36.8	11.101
15	23 14 18.29	2.1188	-0 9 30.4	11.639	15	0 59 57.47	2.2984	9 6 41.6	11.058
16	23 16 25.50	2.1215	+0 2 8.4	11.654	16	1 2 15.51	2.3030	9 17 43.8	11.013
17	23 18 32.87	2.1243	0 13 48.1	11.668	17	1 4 33.83	2.3077	9 28 43.2	10.968
18	23 20 40.42	2.1273	0 25 28.6	11.682	18	1 6 52.43	2.3123	9 39 39.9	10.921
19	23 22 48.14	2.1301	0 37 9.9	11.694	19	1 9 11.30	2.3168	9 50 33.7	10.872
20	23 24 56.03	2.1330	0 48 51.9	11.705	20	1 11 30.45	2.3215	10 1 24.5	10.822
21	23 27 4.10	2.1360	1 0 34.5	11.715	21	1 13 49.88	2.3262	10 12 12.3	10.770
22	23 29 12.35	2.1390	1 12 17.7	11.725	22	1 16 9.59	2.3308	10 22 56.9	10.716
23	23 31 20.78	2.1421	1 24 1.5	11.733	23	1 18 29.58	2.3356	10 33 38.2	10.662
24	23 33 29.40	2.1453	+1 35 45.7	+11.739	24	1 20 49.86	2.3403	+10 44 16.3	+10.607

GREENWICH MEAN TIME.

Hour.	Right Ascension.	Var. per Min.	Declination.	Var. per Min.	Hour.	Right Ascension.	Var. per Min.	Declination.	Var. per Min.
APRIL 18.					APRIL 20.				
	h m s	s	° ' "	"		h m s	s	° ' "	"
0	1 20 49.86	2.3403	+10 44 16.3	+10.607	0	3 18 26.18	2.5487	+17 41 0.9	+6.236
1	1 23 10.41	2.3449	10 54 51.0	10.548	1	3 20 59.20	2.5519	17 47 10.8	6.103
2	1 25 31.25	2.3497	11 5 22.1	10.489	2	3 23 32.41	2.5552	17 53 13.3	5.979
3	1 27 52.37	2.3544	11 15 49.7	10.429	3	3 26 5.82	2.5583	17 59 8.3	5.854
4	1 30 13.78	2.3592	11 26 13.6	10.367	4	3 28 39.40	2.5612	18 4 55.8	5.728
5	1 32 35.47	2.3639	11 36 33.7	10.303	5	3 31 13.16	2.5642	18 10 35.7	5.602
6	1 34 57.45	2.3687	11 46 50.0	10.239	6	3 33 47.10	2.5671	18 16 8.0	5.474
7	1 37 19.71	2.3734	11 57 2.4	10.173	7	3 36 21.21	2.5698	18 21 32.6	5.345
8	1 39 42.26	2.3782	12 7 10.7	10.104	8	3 38 55.47	2.5724	18 26 49.4	5.215
9	1 42 5.09	2.3828	12 17 14.9	10.034	9	3 41 29.90	2.5751	18 31 58.4	5.085
10	1 44 28.20	2.3875	12 27 14.8	9.963	10	3 44 4.48	2.5776	18 36 59.6	4.954
11	1 46 51.60	2.3923	12 37 10.5	9.892	11	3 46 39.21	2.5800	18 41 52.9	4.822
12	1 49 15.28	2.3971	12 47 1.8	9.818	12	3 49 14.08	2.5823	18 46 38.2	4.688
13	1 51 39.25	2.4018	12 56 48.6	9.742	13	3 51 49.08	2.5845	18 51 15.5	4.555
14	1 54 3.50	2.4065	13 6 30.8	9.665	14	3 54 24.22	2.5867	18 55 44.8	4.421
15	1 56 28.04	2.4113	13 16 8.4	9.588	15	3 56 59.48	2.5887	19 0 6.0	4.285
16	1 58 52.85	2.4160	13 25 41.3	9.508	16	3 59 34.86	2.5906	19 4 19.0	4.149
17	2 1 17.95	2.4207	13 35 9.3	9.426	17	4 2 10.35	2.5924	19 8 23.9	4.013
18	2 3 43.33	2.4253	13 44 32.4	9.343	18	4 4 45.95	2.5942	19 12 20.5	3.875
19	2 6 8.99	2.4299	13 53 50.5	9.258	19	4 7 21.65	2.5958	19 16 8.9	3.738
20	2 8 34.92	2.4345	14 3 3.4	9.173	20	4 9 57.45	2.5973	19 19 49.1	3.600
21	2 11 1.14	2.4391	14 12 11.2	9.087	21	4 12 33.33	2.5988	19 23 20.9	3.461
22	2 13 27.63	2.4438	14 21 13.8	8.998	22	4 15 9.30	2.6001	19 26 44.4	3.322
23	2 15 54.39	2.4483	+14 30 11.0	+ 8.908	23	4 17 45.34	2.6013	+19 29 59.5	+3.182
APRIL 19.					APRIL 21.				
0	2 18 21.43	2.4529	+14 39 2.7	+ 8.816	0	4 20 21.46	2.6025	+19 33 6.2	+3.041
1	2 20 48.74	2.4574	14 47 48.9	8.723	1	4 22 57.64	2.6035	19 36 4.4	2.900
2	2 23 16.32	2.4619	14 56 29.5	8.629	2	4 25 33.88	2.6044	19 38 54.2	2.759
3	2 25 44.17	2.4663	15 5 4.4	8.533	3	4 28 10.17	2.6052	19 41 35.5	2.618
4	2 28 12.28	2.4708	15 13 33.5	8.437	4	4 30 46.51	2.6059	19 44 8.3	2.475
5	2 30 40.66	2.4751	15 21 56.8	8.338	5	4 33 22.88	2.6064	19 46 32.5	2.333
6	2 33 9.29	2.4794	15 30 14.1	8.238	6	4 35 59.28	2.6069	19 48 48.3	2.192
7	2 35 38.19	2.4838	15 38 25.4	8.137	7	4 38 35.71	2.6073	19 50 55.5	2.048
8	2 38 7.34	2.4880	15 46 30.6	8.035	8	4 41 12.16	2.6077	19 52 54.1	1.905
9	2 40 36.75	2.4922	15 54 29.6	7.932	9	4 43 48.63	2.6078	19 54 44.1	1.763
10	2 43 6.41	2.4963	16 2 22.4	7.827	10	4 46 25.10	2.6078	19 56 25.6	1.619
11	2 45 36.31	2.5004	16 10 8.8	7.720	11	4 49 1.56	2.6077	19 57 58.4	1.476
12	2 48 6.46	2.5045	16 17 48.8	7.612	12	4 51 38.02	2.6076	19 59 22.7	1.333
13	2 50 36.85	2.5085	16 25 22.3	7.503	13	4 54 14.47	2.6073	20 0 38.3	1.188
14	2 53 7.48	2.5125	16 32 49.2	7.393	14	4 56 50.90	2.6069	20 1 45.3	1.045
15	2 55 38.35	2.5164	16 40 9.5	7.282	15	4 59 27.30	2.6063	20 2 43.7	0.901
16	2 58 9.45	2.5203	16 47 23.0	7.169	16	5 2 3.66	2.6057	20 3 33.4	0.758
17	3 0 40.78	2.5241	16 54 29.8	7.056	17	5 4 39.98	2.6050	20 4 14.6	0.615
18	3 3 12.34	2.5276	17 1 29.7	6.940	18	5 7 16.26	2.6042	20 4 47.2	0.471
19	3 5 44.11	2.5313	17 8 22.6	6.823	19	5 9 52.48	2.6033	20 5 11.1	0.328
20	3 8 16.10	2.5350	17 15 8.5	6.707	20	5 12 28.65	2.6023	20 5 26.5	0.184
21	3 10 48.31	2.5386	17 21 47.4	6.588	21	5 15 4.75	2.6011	20 5 33.2	+0.041
22	3 13 20.73	2.5420	17 28 19.1	6.469	22	5 17 40.78	2.6000	20 5 31.4	-0.101
23	3 15 53.35	2.5454	17 34 43.7	6.348	23	5 20 16.72	2.5984	20 5 21.1	0.244
24	3 18 26.18	2.5487	+17 41 0.9	+6.226	24	5 22 52.59	2.5970	+20 5 2.1	-0.387

GREENWICH MEAN TIME.

Hour.	Right Ascension.	Var. per Min.	Declination.	Var. per Min.	Hour.	Right Ascension.	Var. per Min.	Declination.	Var. per Min.
APRIL 22.					APRIL 24.				
	h m s	s	° ' "	"		h m s	s	° ' "	"
0	5 22 52.59	2.5970	+20 5 2.1	-0.387	0	7 24 7.75	2.4294	+17 13 12.8	-6.458
1	5 25 28.36	2.5953	20 4 34.7	0.528	1	7 26 33.31	2.4296	17 6 42.2	6.562
2	5 28 4.03	2.5937	20 3 58.7	0.671	2	7 28 58.58	2.4198	17 0 5.4	6.663
3	5 30 39.60	2.5919	20 3 14.2	0.813	3	7 31 23.56	2.4120	16 53 22.6	6.764
4	5 33 15.06	2.5901	20 2 21.2	0.953	4	7 33 48.25	2.4020	16 46 33.7	6.865
5	5 35 50.41	2.5881	20 1 19.8	1.093	5	7 36 12.64	2.4040	16 39 38.8	6.963
6	5 38 25.63	2.5860	20 0 10.0	1.234	6	7 38 36.73	2.3991	16 32 38.1	7.060
7	5 41 0.72	2.5838	19 58 51.7	1.374	7	7 41 0.53	2.3942	16 25 31.6	7.157
8	5 43 35.68	2.5815	19 57 25.1	1.513	8	7 43 24.03	2.3893	16 18 19.3	7.252
9	5 46 10.50	2.5791	19 55 50.1	1.652	9	7 45 47.23	2.3843	16 11 1.4	7.346
10	5 48 45.17	2.5766	19 54 6.9	1.790	10	7 48 10.14	2.3793	16 3 37.8	7.439
11	5 51 19.69	2.5741	19 52 15.3	1.928	11	7 50 32.74	2.3743	15 56 8.7	7.530
12	5 53 54.06	2.5714	19 50 15.5	2.066	12	7 52 55.04	2.3693	15 48 34.2	7.621
13	5 56 28.26	2.5686	19 48 7.4	2.203	13	7 55 17.05	2.3643	15 40 54.2	7.710
14	5 59 2.29	2.5658	19 45 51.2	2.339	14	7 57 38.75	2.3593	15 33 9.0	7.798
15	6 1 36.15	2.5629	19 43 26.9	2.473	15	8 0 0.16	2.3544	15 25 18.5	7.885
16	6 4 9.84	2.5599	19 40 54.4	2.606	16	8 2 21.27	2.3493	15 17 22.8	7.971
17	6 6 43.34	2.5568	19 38 13.9	2.743	17	8 4 42.07	2.3443	15 9 22.0	8.056
18	6 9 16.65	2.5535	19 35 25.3	2.876	18	8 7 2.58	2.3393	15 1 16.2	8.138
19	6 11 49.76	2.5503	19 32 28.8	3.008	19	8 9 22.79	2.3343	14 53 5.4	8.221
20	6 14 22.68	2.5470	19 29 24.4	3.139	20	8 11 42.70	2.3293	14 44 49.7	8.302
21	6 16 55.40	2.5436	19 26 12.1	3.271	21	8 14 2.31	2.3244	14 36 29.2	8.381
22	6 19 27.91	2.5401	19 22 51.9	3.402	22	8 16 21.63	2.3194	14 28 4.0	8.459
23	6 22 0.21	2.5365	+19 19 23.9	-3.531	23	8 18 40.65	2.3144	+14 19 34.1	-8.537
APRIL 23.					APRIL 25.				
	h m s	s	° ' "	"		h m s	s	° ' "	"
0	6 24 32.29	2.5328	+19 15 48.2	-3.659	0	8 20 59.37	2.3096	+14 10 59.6	-8.613
1	6 27 4.15	2.5291	19 12 4.8	3.787	1	8 23 17.80	2.3047	14 2 20.5	8.688
2	6 29 35.78	2.5253	19 8 13.7	3.914	2	8 25 35.93	2.2998	13 53 37.0	8.761
3	6 32 7.19	2.5215	19 4 15.1	4.040	3	8 27 53.77	2.2949	13 44 49.2	8.833
4	6 34 38.36	2.5175	19 0 8.9	4.166	4	8 30 11.32	2.2901	13 35 57.0	8.906
5	6 37 9.29	2.5136	18 55 55.3	4.289	5	8 32 28.58	2.2852	13 27 0.5	8.978
6	6 39 39.99	2.5096	18 51 34.2	4.413	6	8 34 45.55	2.2804	13 17 59.9	9.044
7	6 42 10.44	2.5054	18 47 5.8	4.535	7	8 37 2.23	2.2756	13 8 55.2	9.112
8	6 44 40.64	2.5013	18 42 30.0	4.657	8	8 39 18.62	2.2708	12 59 46.4	9.179
9	6 47 10.59	2.4971	18 37 47.0	4.777	9	8 41 34.73	2.2660	12 50 33.7	9.244
10	6 49 40.29	2.4928	18 32 56.8	4.897	10	8 43 50.56	2.2614	12 41 17.1	9.308
11	6 52 9.73	2.4885	18 27 59.4	5.015	11	8 46 6.10	2.2567	12 31 56.7	9.373
12	6 54 38.91	2.4841	18 22 55.0	5.133	12	8 48 21.36	2.2520	12 22 32.5	9.434
13	6 57 7.82	2.4797	18 17 43.5	5.249	13	8 50 36.34	2.2474	12 13 4.6	9.496
14	6 59 36.47	2.4753	18 12 25.1	5.364	14	8 52 51.05	2.2428	12 3 33.1	9.554
15	7 2 4.85	2.4707	18 6 59.8	5.478	15	8 55 5.48	2.2383	11 53 58.1	9.613
16	7 4 32.95	2.4661	18 1 27.7	5.592	16	8 57 19.64	2.2338	11 44 19.6	9.670
17	7 7 0.78	2.4616	17 55 48.8	5.704	17	8 59 33.53	2.2292	11 34 37.7	9.726
18	7 9 28.34	2.4570	17 50 3.2	5.815	18	9 1 47.14	2.2247	11 24 52.5	9.781
19	7 11 55.62	2.4523	17 44 11.0	5.924	19	9 4 0.49	2.2202	11 15 4.0	9.835
20	7 14 22.61	2.4476	17 38 12.3	6.033	20	9 6 13.58	2.2156	11 5 12.3	9.888
21	7 16 49.33	2.4429	17 32 7.0	6.142	21	9 8 26.40	2.2111	10 55 17.4	9.940
22	7 19 15.76	2.4381	17 25 55.3	6.248	22	9 10 38.96	2.2073	10 45 19.5	9.990
23	7 21 41.90	2.4333	17 19 37.2	6.354	23	9 12 51.26	2.2036	10 35 18.6	10.040
24	7 24 7.75	2.4284	+17 13 12.8	-6.458	24	9 15 3.31	2.1997	+10 25 14.7	-10.088

GREENWICH MEAN TIME.

Hour.	Right Ascension.	Var. per Min.	Declination.	Var. per Min.	Hour.	Right Ascension.	Var. per Min.	Declination.	Var. per Min.
APRIL 26.					APRIL 28.				
	h m s	s	° ' "	"		h m s	s	° ' "	"
0	9 15 3.31	2.1067	+10 25 14.7	-10.068	0	10 56 32.76	2.0480	+1 45 23.9	-11.192
1	9 17 15.10	2.1044	10 15 8.0	10.136	1	10 58 35.64	2.0470	1 34 12.4	11.192
2	9 19 26.64	2.1008	10 4 58.5	10.181	2	11 0 38.40	2.0452	1 23 0.9	11.190
3	9 21 37.98	2.1061	9 54 46.3	10.226	3	11 2 41.06	2.0434	1 11 49.6	11.188
4	9 23 48.97	2.1020	9 44 31.4	10.270	4	11 4 43.61	2.0416	1 0 38.4	11.186
5	9 25 59.77	2.1780	9 34 13.9	10.313	5	11 6 46.05	2.0398	0 49 27.4	11.181
6	9 28 10.38	2.1740	9 23 53.8	10.355	6	11 8 48.40	2.0383	0 38 16.7	11.177
7	9 30 20.65	2.1700	9 13 31.3	10.396	7	11 10 50.64	2.0366	0 27 6.2	11.171
8	9 32 30.73	2.1661	9 3 6.4	10.434	8	11 12 52.79	2.0352	0 15 56.2	11.164
9	9 34 40.58	2.1622	8 52 39.2	10.473	9	11 14 54.86	2.0337	+0 4 46.5	11.157
10	9 36 50.19	2.1583	8 42 9.7	10.511	10	11 16 56.83	2.0322	-0 6 22.7	11.149
11	9 38 59.58	2.1544	8 31 37.9	10.547	11	11 18 58.72	2.0308	0 17 31.4	11.140
12	9 41 8.74	2.1506	8 21 4.0	10.582	12	11 21 0.52	2.0293	0 28 39.5	11.130
13	9 43 17.68	2.1472	8 10 28.1	10.616	13	11 23 2.24	2.0281	0 39 47.0	11.120
14	9 45 26.40	2.1436	7 59 50.1	10.650	14	11 25 3.89	2.0268	0 50 53.9	11.109
15	9 47 34.91	2.1400	7 49 10.1	10.682	15	11 27 5.46	2.0256	1 2 0.1	11.096
16	9 49 43.20	2.1363	7 38 28.3	10.713	16	11 29 6.96	2.0244	1 13 5.4	11.083
17	9 51 51.27	2.1326	7 27 44.6	10.743	17	11 31 8.39	2.0232	1 24 10.0	11.069
18	9 53 59.14	2.1294	7 16 59.1	10.772	18	11 33 9.76	2.0222	1 35 13.7	11.054
19	9 56 6.80	2.1260	7 6 11.9	10.800	19	11 35 11.07	2.0212	1 46 16.5	11.039
20	9 58 14.26	2.1226	6 55 23.1	10.827	20	11 37 12.31	2.0202	1 57 18.4	11.023
21	10 0 21.51	2.1192	6 44 32.7	10.853	21	11 39 13.50	2.0192	2 8 19.2	11.006
22	10 2 28.57	2.1161	6 33 40.7	10.878	22	11 41 14.63	2.0184	2 19 19.0	10.987
23	10 4 35.44	2.1129	+ 6 22 47.3	-10.902	23	11 43 15.71	2.0176	-2 30 17.7	-10.968
APRIL 27.					APRIL 29.				
	h m s	s	° ' "	"		h m s	s	° ' "	"
0	10 6 42.12	2.1097	+ 6 11 52.5	-10.925	0	11 45 16.74	2.0168	-2 41 15.2	-10.948
1	10 8 48.60	2.1065	6 0 56.3	10.947	1	11 47 17.72	2.0160	2 52 11.5	10.928
2	10 10 54.90	2.1034	5 49 58.8	10.968	2	11 49 18.66	2.0152	3 3 6.6	10.908
3	10 13 1.02	2.1005	5 39 0.1	10.986	3	11 51 19.56	2.0147	3 14 0.4	10.886
4	10 15 6.96	2.0975	5 28 0.3	11.007	4	11 53 20.42	2.0141	3 24 52.9	10.863
5	10 17 12.72	2.0946	5 16 59.3	11.026	5	11 55 21.25	2.0135	3 35 43.9	10.839
6	10 19 18.31	2.0918	5 5 57.2	11.043	6	11 57 22.04	2.0129	3 46 33.6	10.815
7	10 21 23.73	2.0890	4 54 54.1	11.059	7	11 59 22.80	2.0124	3 57 21.7	10.789
8	10 23 28.98	2.0862	4 43 50.1	11.074	8	12 1 23.53	2.0120	4 8 8.3	10.763
9	10 25 34.07	2.0835	4 32 45.2	11.088	9	12 3 24.24	2.0117	4 18 53.3	10.737
10	10 27 39.00	2.0808	4 21 39.5	11.101	10	12 5 24.93	2.0113	4 29 36.7	10.710
11	10 29 43.77	2.0782	4 10 33.1	11.113	11	12 7 25.50	2.0109	4 40 18.5	10.682
12	10 31 48.38	2.0756	3 59 25.9	11.126	12	12 9 26.24	2.0106	4 50 58.5	10.652
13	10 33 52.84	2.0731	3 48 18.0	11.137	13	12 11 26.86	2.0102	5 1 36.8	10.622
14	10 35 57.15	2.0707	3 37 9.5	11.146	14	12 13 27.48	2.0102	5 12 13.2	10.592
15	10 38 1.52	2.0682	3 26 0.5	11.154	15	12 15 28.08	2.0099	5 22 47.8	10.561
16	10 40 5.34	2.0659	3 14 51.0	11.162	16	12 17 28.67	2.0096	5 33 20.5	10.529
17	10 42 9.23	2.0637	3 3 41.1	11.168	17	12 19 29.26	2.0092	5 43 51.3	10.497
18	10 44 12.96	2.0613	2 52 30.8	11.175	18	12 21 29.85	2.0088	5 54 20.1	10.463
19	10 46 16.59	2.0591	2 41 20.1	11.180	19	12 23 30.43	2.0087	6 4 46.8	10.428
20	10 48 20.07	2.0570	2 30 9.2	11.183	20	12 25 31.01	2.0087	6 15 11.5	10.393
21	10 50 23.43	2.0549	2 18 58.1	11.187	21	12 27 31.59	2.0086	6 25 34.0	10.358
22	10 52 26.66	2.0528	2 7 46.8	11.189	22	12 29 32.18	2.0086	6 35 54.4	10.322
23	10 54 29.77	2.0508	1 56 35.4	11.191	23	12 31 32.78	2.0100	6 46 12.6	10.284
24	10 56 32.76	2.0489	+ 1 45 23.9	-11.192	24	12 33 33.36	2.0102	-6 56 28.5	-10.246

GREENWICH MEAN TIME.

Hour.	Right Ascension.	Var. per Min.	Declination.	Var. per Min.	Hour.	Right Ascension.	Var. per Min.	Declination.	Var. per Min.
APRIL 30.					MAY 2.				
	h m s	s	° ' "	"		h m s	s	° ' "	"
0	12 33 33.88	2.0102	- 6 56 28.5	-10.246	0	14 10 45.88	2.0682	-14 11 26.5	-7.827
1	12 35 34.00	2.0104	7 6 42.1	10.308	1	14 12 48.81	2.0683	14 19 2.0	7.557
2	12 37 34.63	2.0106	7 16 53.4	10.168	2	14 14 51.80	2.0684	14 26 33.3	7.487
3	12 39 35.27	2.0108	7 27 2.3	10.128	3	14 16 54.86	2.0687	14 34 0.4	7.416
4	12 41 35.93	2.0112	7 37 8.7	10.087	4	14 18 58.00	2.0688	14 41 23.2	7.344
5	12 43 36.61	2.0115	7 47 12.7	10.046	5	14 21 1.20	2.0690	14 48 41.7	7.272
6	12 45 37.31	2.0118	7 57 14.2	10.005	6	14 23 4.48	2.0692	14 55 55.9	7.201
7	12 47 38.03	2.0122	8 7 13.1	9.961	7	14 25 7.82	2.0693	15 3 5.8	7.128
8	12 49 38.78	2.0127	8 17 9.5	9.918	8	14 27 11.24	2.0696	15 10 11.2	7.053
9	12 51 39.55	2.0131	8 27 3.2	9.873	9	14 29 14.73	2.0698	15 17 12.2	6.979
10	12 53 40.35	2.0136	8 36 54.2	9.828	10	14 31 18.80	2.0699	15 24 8.7	6.905
11	12 55 41.18	2.0141	8 46 42.5	9.782	11	14 33 21.93	2.0701	15 31 0.8	6.830
12	12 57 42.04	2.0147	8 56 28.0	9.735	12	14 35 25.63	2.0702	15 37 48.3	6.754
13	12 59 42.94	2.0153	9 6 10.7	9.688	13	14 37 29.40	2.0703	15 44 31.3	6.678
14	13 1 43.87	2.0158	9 15 50.5	9.640	14	14 39 33.25	2.0707	15 51 9.7	6.602
15	13 3 44.84	2.0165	9 25 27.5	9.592	15	14 41 37.16	2.0708	15 57 43.5	6.524
16	13 5 45.85	2.0171	9 35 1.5	9.543	16	14 43 41.15	2.0709	16 4 12.6	6.447
17	13 7 46.89	2.0178	9 44 32.6	9.493	17	14 45 45.20	2.0712	16 10 37.1	6.369
18	13 9 47.98	2.0186	9 54 0.6	9.442	18	14 47 49.33	2.0713	16 16 56.9	6.291
19	13 11 49.11	2.0192	10 3 25.6	9.391	19	14 49 53.52	2.0704	16 23 12.0	6.212
20	13 13 50.28	2.0199	10 12 47.5	9.339	20	14 51 57.78	2.0716	16 29 22.3	6.133
21	13 15 51.50	2.0208	10 22 6.3	9.287	21	14 54 2.11	2.0723	16 35 27.9	6.053
22	13 17 52.77	2.0216	10 31 21.9	9.233	22	14 56 6.51	2.0729	16 41 28.6	5.972
23	13 19 54.09	2.0222	-10 40 34.2	-9.178	23	14 58 10.98	2.0739	-16 47 24.6	-5.892
MAY 1.					MAY 3.				
	h m s	s	° ' "	"		h m s	s	° ' "	"
0	13 21 55.45	2.0232	-10 49 43.8	-9.124	0	15 0 15.51	2.0761	-16 53 15.6	-5.810
1	13 23 56.87	2.0241	10 58 49.1	9.069	1	15 2 20.11	2.0772	16 59 1.8	5.729
2	13 25 58.34	2.0249	11 7 51.6	9.013	2	15 4 24.77	2.0783	17 4 43.1	5.645
3	13 27 59.86	2.0258	11 16 50.7	8.957	3	15 6 29.50	2.0792	17 10 19.5	5.563
4	13 30 1.44	2.0268	11 25 46.4	8.900	4	15 8 34.29	2.0804	17 15 50.9	5.482
5	13 32 3.07	2.0277	11 34 38.7	8.842	5	15 10 39.15	2.0815	17 21 17.3	5.399
6	13 34 4.76	2.0286	11 43 27.4	8.783	6	15 12 44.07	2.0825	17 26 38.8	5.316
7	13 36 6.50	2.0296	11 52 12.7	8.724	7	15 14 49.05	2.0835	17 31 55.2	5.231
8	13 38 8.31	2.0307	12 0 54.3	8.664	8	15 16 54.09	2.0845	17 37 6.5	5.147
9	13 40 10.18	2.0316	12 9 32.4	8.604	9	15 18 59.19	2.0854	17 42 12.8	5.063
10	13 42 12.10	2.0326	12 18 6.8	8.543	10	15 21 4.94	2.0864	17 47 14.0	4.978
11	13 44 14.09	2.0337	12 26 37.6	8.482	11	15 23 9.56	2.0874	17 52 10.1	4.893
12	13 46 16.14	2.0348	12 35 4.6	8.419	12	15 25 14.83	2.0882	17 57 1.1	4.807
13	13 48 18.26	2.0358	12 43 27.9	8.357	13	15 27 20.16	2.0892	18 1 46.9	4.720
14	13 50 20.43	2.0368	12 51 47.4	8.293	14	15 29 25.54	2.0902	18 6 27.5	4.633
15	13 52 22.67	2.0379	13 0 3.1	8.229	15	15 31 30.98	2.0911	18 11 2.9	4.547
16	13 54 24.98	2.0391	13 8 14.9	8.165	16	15 33 36.47	2.0919	18 15 33.1	4.460
17	13 56 27.36	2.0402	13 16 22.9	8.100	17	15 35 42.01	2.0928	18 19 58.1	4.372
18	13 58 29.80	2.0413	13 24 26.9	8.033	18	15 37 47.60	2.0936	18 24 17.8	4.285
19	14 0 32.31	2.0424	13 32 26.9	7.968	19	15 39 53.24	2.0944	18 28 32.3	4.197
20	14 2 34.89	2.0435	13 40 23.0	7.901	20	15 41 58.93	2.0952	18 32 41.4	4.108
21	14 4 37.53	2.0447	13 48 15.0	7.833	21	15 44 4.66	2.0960	18 36 45.3	4.020
22	14 6 40.25	2.0458	13 56 2.9	7.765	22	15 46 10.44	2.0967	18 40 43.8	3.931
23	14 8 43.03	2.0469	14 3 46.8	7.697	23	15 48 16.26	2.0974	18 44 37.0	3.843
24	14 10 45.88	2.0482	-14 11 26.5	-7.627	24	15 50 22.13	2.0981	-18 48 24.9	-3.753

GREENWICH MEAN TIME.

Hour.	Right Ascension.	Var. per Min.	Declination.	Var. per Min.	Hour.	Right Ascension.	Var. per Min.	Declination.	Var. per Min.
MAY 4.					MAY 6.				
	h m s	s	° ' "	"		h m s	s	° ' "	"
0	15 50 22.13	2.0061	-18 48 24.9	-3.758	0	17 31 23.05	2.1002	-20 2 27.8	+0.693
1	15 52 28.03	2.0065	18 52 7.3	3.608	1	17 33 29.04	2.0005	20 1 43.4	0.787
2	15 54 33.96	2.0064	18 55 44.4	3.573	2	17 35 34.99	2.0000	20 0 53.4	0.879
3	15 56 39.96	2.1000	18 59 16.1	3.433	3	17 37 40.91	2.0003	19 59 57.9	0.972
4	15 58 45.98	2.1007	19 2 42.4	3.293	4	17 39 46.79	2.0076	19 58 56.8	1.064
5	16 0 52.04	2.1015	19 6 3.2	3.202	5	17 41 52.62	2.0008	19 57 50.2	1.157
6	16 2 58.13	2.1026	19 9 18.6	3.212	6	17 43 58.40	2.0000	19 56 38.0	1.248
7	16 5 4.25	2.1028	19 12 28.6	3.121	7	17 46 4.14	2.0003	19 55 20.4	1.340
8	16 7 10.41	2.1028	19 15 33.1	3.029	8	17 48 9.83	2.0045	19 53 57.2	1.433
9	16 9 16.59	2.1028	19 18 32.1	2.938	9	17 50 15.48	2.0037	19 52 28.5	1.524
10	16 11 22.80	2.1028	19 21 25.6	2.846	10	17 52 21.67	2.0028	19 50 54.3	1.616
11	16 13 29.04	2.1022	19 24 13.6	2.754	11	17 54 26.61	2.0019	19 49 14.6	1.707
12	16 15 35.30	2.1046	19 26 56.1	2.663	12	17 56 32.10	2.0011	19 47 29.5	1.798
13	16 17 41.59	2.1040	19 29 33.1	2.571	13	17 58 37.54	2.0002	19 45 38.9	1.889
14	16 19 47.89	2.1023	19 32 4.6	2.478	14	18 0 42.92	2.0002	19 43 42.8	1.980
15	16 21 54.22	2.1005	19 34 50.5	2.386	15	18 2 48.24	2.0003	19 41 41.3	2.071
16	16 24 0.56	2.1005	19 36 50.9	2.293	16	18 4 53.51	2.0073	19 39 34.3	2.161
17	16 26 6.92	2.1002	19 39 5.7	2.201	17	18 6 58.71	2.0003	19 37 22.0	2.251
18	16 28 13.30	2.1004	19 41 15.0	2.108	18	18 9 3.86	2.0003	19 35 4.2	2.341
19	16 30 19.69	2.1005	19 43 18.7	2.015	19	18 11 8.95	2.0043	19 32 41.1	2.431
20	16 32 26.09	2.1005	19 45 16.8	1.922	20	18 13 13.97	2.0032	19 30 12.5	2.521
21	16 34 32.50	2.1000	19 47 9.3	1.830	21	18 15 18.93	2.0032	19 27 38.6	2.609
22	16 36 38.92	2.1021	19 48 56.3	1.736	22	18 17 23.83	2.0011	19 24 59.4	2.698
23	16 38 45.35	2.1022	-19 50 37.6	-1.643	23	18 19 28.66	2.0000	-19 22 14.8	-2.788
MAY 5.					MAY 7.				
	h m s	s	° ' "	"		h m s	s	° ' "	"
0	16 40 51.78	2.1022	-19 52 13.4	-1.550	0	18 21 33.42	2.0006	-19 19 24.9	+3.876
1	16 42 58.21	2.1073	19 53 49.6	1.456	1	18 23 38.12	2.0078	19 16 29.7	2.964
2	16 45 4.65	2.1073	19 55 8.1	1.362	2	18 25 42.75	2.0006	19 13 29.2	3.053
3	16 47 11.08	2.1072	19 56 27.0	1.269	3	18 27 47.31	2.0045	19 10 23.4	3.140
4	16 49 17.51	2.1072	19 57 40.4	1.176	4	18 29 51.81	2.0044	19 7 12.4	3.228
5	16 51 23.94	2.1071	19 58 48.1	1.082	5	18 31 56.24	2.0032	19 3 56.1	3.315
6	16 53 30.36	2.1070	19 59 50.2	0.988	6	18 34 0.59	2.0019	19 0 34.6	3.402
7	16 55 36.78	2.1068	20 0 46.6	0.894	7	18 36 4.87	2.0007	18 57 7.9	3.489
8	16 57 43.18	2.1067	20 1 37.5	0.801	8	18 38 9.07	2.0003	18 53 35.9	3.576
9	16 59 49.58	2.1065	20 2 22.7	0.707	9	18 40 13.19	2.0002	18 49 58.8	3.661
10	17 1 55.96	2.1068	20 3 2.3	0.613	10	18 42 17.25	2.0070	18 46 16.6	3.747
11	17 4 2.33	2.1060	20 3 36.3	0.520	11	18 44 21.23	2.0058	18 42 29.2	3.833
12	17 6 8.68	2.1028	20 4 4.7	0.427	12	18 46 25.14	2.0046	18 38 36.7	3.919
13	17 8 15.02	2.1004	20 4 27.5	0.333	13	18 48 28.98	2.0033	18 34 39.0	4.003
14	17 10 21.33	2.1021	20 4 44.6	0.238	14	18 50 32.74	2.0020	18 30 36.3	4.088
15	17 12 27.63	2.1048	20 4 56.1	0.145	15	18 52 36.42	2.0007	18 26 28.5	4.173
16	17 14 33.90	2.1043	20 5 2.0	-0.052	16	18 54 40.02	2.0004	18 22 15.6	4.257
17	17 16 40.14	2.1028	20 5 2.3	+0.042	17	18 56 43.55	2.0002	18 17 57.7	4.340
18	17 18 46.36	2.1004	20 4 57.0	0.135	18	18 58 47.00	2.0000	18 13 34.8	4.423
19	17 20 52.55	2.1000	20 4 46.1	0.228	19	19 0 50.38	2.0006	18 9 6.9	4.507
20	17 22 58.72	2.1025	20 4 29.6	0.322	20	19 2 53.67	2.0048	18 4 34.0	4.589
21	17 25 4.85	2.1019	20 4 7.5	0.414	21	19 4 56.89	2.0030	17 59 56.2	4.672
22	17 27 10.95	2.1003	20 3 39.9	0.508	22	19 7 0.03	2.0028	17 55 13.4	4.754
23	17 29 17.02	2.1006	20 3 6.6	0.601	23	19 9 3.10	2.0004	17 50 25.7	4.835
24	17 31 23.05	2.1002	-20 2 27.8	+0.693	24	19 11 6.08	2.0001	-17 45 33.2	+4.916

## GREENWICH MEAN TIME.

Hour.	Right Ascension.	Var. per Min.	Declination.	Var. per Min.	Hour.	Right Ascension.	Var. per Min.	Declination.	Var. per Min.
MAY 8.					MAY 10.				
	h m s	s	° ' "	"		h m s	s	° ' "	"
0	19 11 6.08	2.0491	-17 45 33.2	+4.916	0	20 48 6.89	1.9994	-12 23 1.5	+9.264
1	19 13 8.99	2.0478	17 40 35.8	4.998	1	20 50 6.84	1.9999	12 14 37.8	8.438
2	19 15 11.82	2.0465	17 35 33.5	5.079	2	20 52 6.76	1.9994	12 6 10.4	8.567
3	19 17 14.57	2.0452	17 30 26.3	5.159	3	20 54 6.65	1.9979	11 57 39.4	8.647
4	19 19 17.24	2.0439	17 25 14.4	5.238	4	20 56 6.51	1.9975	11 49 4.8	8.697
5	19 21 19.84	2.0427	17 19 57.7	5.318	5	20 58 6.35	1.9971	11 40 28.6	8.798
6	19 23 22.36	2.0413	17 14 36.2	5.398	6	21 0 6.16	1.9968	11 31 44.9	8.726
7	19 25 24.80	2.0400	17 9 10.0	5.476	7	21 2 5.96	1.9965	11 23 59.6	8.794
8	19 27 27.16	2.0388	17 3 39.1	5.555	8	21 4 5.74	1.9963	11 14 10.8	8.843
9	19 29 29.45	2.0375	16 58 3.4	5.633	9	21 6 5.51	1.9960	11 5 18.6	8.899
10	19 31 31.66	2.0363	16 52 23.1	5.711	10	21 8 5.28	1.9958	10 56 22.9	8.966
11	19 33 33.80	2.0351	16 46 38.1	5.788	11	21 10 5.00	1.9955	10 47 23.9	9.013
12	19 35 35.87	2.0338	16 40 48.5	5.865	12	21 12 4.73	1.9955	10 38 21.4	9.065
13	19 37 37.85	2.0324	16 34 54.3	5.942	13	21 14 4.46	1.9954	10 29 15.7	9.123
14	19 39 39.76	2.0312	16 28 55.5	6.018	14	21 16 4.18	1.9953	10 20 6.6	9.179
15	19 41 41.60	2.0301	16 22 52.1	6.094	15	21 18 3.89	1.9953	10 10 54.2	9.234
16	19 43 43.37	2.0288	16 16 44.2	6.169	16	21 20 3.61	1.9953	10 1 38.5	9.288
17	19 45 45.06	2.0276	16 10 31.8	6.244	17	21 22 3.33	1.9954	9 52 19.7	9.341
18	19 47 46.68	2.0264	16 4 14.9	6.319	18	21 24 3.06	1.9955	9 42 57.6	9.394
19	19 49 48.23	2.0253	15 57 53.5	6.393	19	21 26 2.79	1.9956	9 33 32.4	9.447
20	19 51 49.71	2.0241	15 51 27.7	6.468	20	21 28 2.53	1.9958	9 24 4.0	9.498
21	19 53 51.12	2.0229	15 44 57.4	6.541	21	21 30 2.29	1.9961	9 14 32.6	9.549
22	19 55 52.46	2.0218	15 38 22.8	6.613	22	21 32 2.06	1.9963	9 4 58.1	9.601
23	19 57 53.73	2.0207	-15 31 43.8	+6.687	23	21 34 1.85	1.9965	- 8 55 20.5	+9.651
MAY 9.					MAY 11.				
	h m s	s	° ' "	"		h m s	s	° ' "	"
0	19 59 54.94	2.0196	-15 25 0.4	+6.759	0	21 36 1.65	1.9969	- 8 45 40.0	+9.701
1	20 1 56.08	2.0184	15 18 12.7	6.831	1	21 38 1.48	1.9973	8 35 56.4	9.751
2	20 3 57.15	2.0173	15 11 20.7	6.902	2	21 40 1.33	1.9978	8 26 9.9	9.798
3	20 5 58.16	2.0163	15 4 24.5	6.973	3	21 42 1.22	1.9983	8 16 20.6	9.847
4	20 7 59.11	2.0153	14 57 24.0	7.043	4	21 44 1.13	1.9988	8 6 28.3	9.895
5	20 10 0.00	2.0143	14 50 19.3	7.114	5	21 46 1.07	1.9993	7 56 33.2	9.943
6	20 12 0.82	2.0133	14 43 10.3	7.184	6	21 48 1.05	2.0000	7 46 35.3	9.993
7	20 14 1.59	2.0123	14 35 57.2	7.253	7	21 50 1.07	2.0008	7 36 34.6	10.044
8	20 16 2.30	2.0113	14 28 40.0	7.321	8	21 52 1.14	2.0014	7 26 31.2	10.079
9	20 18 2.95	2.0104	14 21 18.7	7.390	9	21 54 1.24	2.0021	7 16 25.1	10.124
10	20 20 3.55	2.0095	14 13 53.2	7.458	10	21 56 1.39	2.0029	7 6 16.3	10.169
11	20 22 4.09	2.0086	14 6 23.7	7.526	11	21 58 1.59	2.0038	6 56 4.8	10.213
12	20 24 4.58	2.0078	13 58 50.1	7.593	12	22 0 1.85	2.0048	6 45 50.8	10.268
13	20 26 5.02	2.0068	13 51 12.5	7.660	13	22 2 2.16	2.0058	6 35 34.2	10.326
14	20 28 5.40	2.0060	13 43 30.9	7.726	14	22 4 2.52	2.0068	6 25 15.1	10.339
15	20 30 5.74	2.0053	13 35 45.4	7.792	15	22 6 2.95	2.0077	6 14 53.5	10.381
16	20 32 6.03	2.0045	13 27 55.9	7.858	16	22 8 3.44	2.0088	6 4 29.4	10.423
17	20 34 6.28	2.0038	13 20 2.5	7.923	17	22 10 4.00	2.0099	5 54 2.9	10.461
18	20 36 6.49	2.0031	13 12 5.2	7.987	18	22 12 4.63	2.0111	5 43 34.1	10.500
19	20 38 6.65	2.0023	13 4 4.1	8.051	19	22 14 5.33	2.0123	5 33 2.9	10.540
20	20 40 6.77	2.0017	12 55 59.1	8.114	20	22 16 6.10	2.0136	5 22 29.3	10.578
21	20 42 6.85	2.0011	12 47 50.4	8.178	21	22 18 6.96	2.0150	5 11 53.5	10.615
22	20 44 6.90	2.0005	12 39 37.8	8.241	22	22 20 7.90	2.0165	5 1 15.5	10.653
23	20 46 6.91	1.9999	12 31 21.5	8.305	23	22 22 8.92	2.0178	4 50 35.3	10.693
24	20 48 6.89	1.9994	-12 23 1.5	+8.364	24	22 24 10.03	2.0193	- 4 39 53.0	+10.738



GREENWICH MEAN TIME.

Hour.	Right Ascension.	Var. per Min.	Declination.	Var. per Min.	Hour.	Right Ascension.	Var. per Min.	Declination.	Var. per Min.
MAY 12.					MAY 14.				
	h m s	s	° ' "	"		h m s	s	° ' "	"
0	22 24 10.03	2.0193	-4 39 53.0	+10.723	0	0 3 51.01	2.1555	+ 4 21 23.5	+11.497
1	22 26 11.23	2.0208	4 29 8.5	10.758	1	0 6 0.46	2.1597	4 32 53.1	11.480
2	22 28 12.53	2.0226	4 18 22.0	10.793	2	0 8 10.17	2.1640	4 44 22.2	11.481
3	22 30 13.93	2.0241	4 7 33.4	10.827	3	0 10 20.14	2.1683	4 55 50.8	11.472
4	22 32 15.42	2.0258	3 56 42.8	10.859	4	0 12 30.36	2.1726	5 7 18.8	11.461
5	22 34 17.02	2.0276	3 45 50.3	10.891	5	0 14 40.85	2.1771	5 18 46.1	11.440
6	22 36 18.73	2.0294	3 34 55.9	10.922	6	0 16 51.61	2.1815	5 30 12.7	11.437
7	22 38 20.55	2.0313	3 23 59.7	10.953	7	0 19 2.63	2.1859	5 41 38.5	11.423
8	22 40 22.48	2.0331	3 13 1.6	10.983	8	0 21 13.92	2.1905	5 53 3.4	11.407
9	22 42 24.52	2.0351	3 2 1.7	11.013	9	0 23 25.49	2.1952	6 4 27.3	11.390
10	22 44 26.69	2.0372	2 51 0.1	11.041	10	0 25 37.34	2.1998	6 15 50.2	11.372
11	22 46 28.98	2.0393	2 39 56.8	11.069	11	0 27 49.46	2.2044	6 27 12.0	11.353
12	22 48 31.40	2.0414	2 28 61.8	11.096	12	0 30 1.87	2.2092	6 38 32.6	11.333
13	22 50 33.95	2.0436	2 17 45.3	11.122	13	0 32 14.57	2.2140	6 49 51.9	11.311
14	22 52 36.63	2.0458	2 6 37.2	11.146	14	0 34 27.55	2.2188	7 1 9.9	11.288
15	22 54 39.45	2.0482	1 55 27.6	11.173	15	0 36 40.83	2.2237	7 12 26.5	11.265
16	22 56 42.41	2.0505	1 44 16.5	11.197	16	0 38 54.40	2.2287	7 23 41.7	11.240
17	22 58 45.51	2.0528	1 33 4.0	11.220	17	0 41 8.27	2.2338	7 34 55.3	11.213
18	23 0 48.75	2.0553	1 21 50.1	11.242	18	0 43 22.43	2.2389	7 46 7.2	11.184
19	23 2 52.15	2.0579	1 10 34.9	11.263	19	0 45 36.90	2.2438	7 57 17.4	11.155
20	23 4 55.70	2.0605	0 59 18.5	11.284	20	0 47 51.68	2.2488	8 8 25.8	11.124
21	23 6 59.41	2.0632	0 48 0.8	11.304	21	0 50 6.76	2.2539	8 19 32.3	11.092
22	23 9 3.28	2.0658	0 36 41.9	11.324	22	0 52 22.15	2.2591	8 30 36.9	11.059
23	23 11 7.31	2.0685	-0 25 21.9	+11.342	23	0 54 37.85	2.2643	+ 8 41 39.4	+11.024
MAY 13.					MAY 15.				
0	23 13 11.50	2.0713	-0 14 0.9	+11.359	0	0 56 53.86	2.2695	+ 8 52 39.8	+10.988
1	23 15 15.87	2.0742	-0 2 38.8	11.376	1	0 59 10.20	2.2749	9 3 38.0	10.951
2	23 17 20.41	2.0772	+0 8 44.2	11.392	2	1 1 26.85	2.2802	9 14 33.9	10.912
3	23 19 25.13	2.0802	0 20 8.2	11.407	3	1 3 43.82	2.2856	9 25 27.5	10.873
4	23 21 30.03	2.0832	0 31 33.0	11.420	4	1 6 1.12	2.2910	9 36 18.6	10.830
5	23 23 35.11	2.0862	0 42 58.6	11.433	5	1 8 18.74	2.2963	9 47 7.1	10.787
6	23 25 40.37	2.0893	0 54 25.0	11.446	6	1 10 36.68	2.3018	9 57 53.0	10.742
7	23 27 45.83	2.0925	1 5 52.1	11.458	7	1 12 54.95	2.3073	10 8 36.1	10.696
8	23 29 51.48	2.0958	1 17 19.9	11.468	8	1 15 13.56	2.3128	10 19 16.5	10.649
9	23 31 57.33	2.0992	1 28 48.2	11.476	9	1 17 32.49	2.3183	10 29 54.0	10.600
10	23 34 3.38	2.1026	1 40 17.0	11.484	10	1 19 51.76	2.3239	10 40 28.5	10.549
11	23 36 9.64	2.1060	1 51 46.3	11.492	11	1 22 11.36	2.3295	10 50 59.9	10.497
12	23 38 16.10	2.1094	2 3 16.1	11.499	12	1 24 31.30	2.3351	11 1 28.2	10.444
13	23 40 22.77	2.1130	2 14 46.2	11.504	13	1 26 51.57	2.3408	11 11 53.2	10.389
14	23 42 29.66	2.1166	2 26 16.6	11.508	14	1 29 12.19	2.3464	11 22 14.9	10.333
15	23 44 36.76	2.1202	2 37 47.2	11.512	15	1 31 33.14	2.3521	11 32 33.1	10.274
16	23 46 44.08	2.1239	2 49 18.0	11.515	16	1 33 54.44	2.3578	11 42 47.8	10.216
17	23 48 51.63	2.1278	3 0 49.0	11.517	17	1 36 16.07	2.3634	11 52 59.0	10.155
18	23 50 59.41	2.1315	3 12 20.0	11.517	18	1 38 38.05	2.3692	12 3 6.4	10.092
19	23 53 7.41	2.1353	3 23 51.0	11.516	19	1 41 0.38	2.3749	12 13 10.0	10.028
20	23 55 15.65	2.1393	3.35 21.9	11.514	20	1 43 23.04	2.3806	12 23 9.7	9.963
21	23 57 24.13	2.1433	3 46 52.7	11.511	21	1 45 46.05	2.3864	12 33 5.5	9.896
22	23 59 32.84	2.1473	3 58 23.2	11.507	22	1 48 9.41	2.3922	12 42 57.2	9.827
23	0 1 41.80	2.1514	4 9 53.5	11.503	23	1 50 33.11	2.3979	12 52 44.7	9.757
24	0 3 51.01	2.1555	+4 21 23.5	+11.497	24	1 52 57.16	2.4037	+13 2 28.0	+ 9.685

## GREENWICH MEAN TIME.

Hour.	Right Ascension.	Var. per Min.	Declination.	Var. per Min.	Hour.	Right Ascension.	Var. per Min.	Declination.	Var. per Min.
MAY 16.					MAY 18.				
	h m s	s	° ' "	"		h m s	s	° ' "	"
0	1 52 57.16	2.4037	+13 2 28.0	+9.885	0	3 54 29.81	2.6402	+18 55 56.0	+4.503
1	1 55 21.55	2.4094	13 12 6.9	9.612	1	3 57 8.32	2.6428	19 0 22.0	4.364
2	1 57 46.29	2.4152	13 21 41.4	9.537	2	3 59 47.00	2.6468	19 4 39.7	4.225
3	2 0 11.37	2.4209	13 31 11.4	9.461	3	4 2 25.87	2.6492	19 8 49.0	4.084
4	2 2 36.80	2.4267	13 40 36.7	9.385	4	4 5 4.91	2.6520	19 12 49.8	3.943
5	2 5 2.57	2.4324	13 49 57.3	9.308	5	4 7 44.11	2.6546	19 16 42.1	3.800
6	2 7 28.69	2.4382	13 59 13.1	9.222	6	4 10 23.46	2.6572	19 20 25.8	3.657
7	2 9 55.15	2.4439	14 8 24.0	9.139	7	4 13 2.97	2.6597	19 24 0.9	3.513
8	2 12 21.96	2.4497	14 17 29.8	9.055	8	4 15 42.62	2.6620	19 27 27.3	3.368
9	2 14 49.11	2.4553	14 26 30.6	8.970	9	4 18 22.41	2.6642	19 30 45.0	3.223
10	2 17 16.59	2.4609	14 35 26.2	8.882	10	4 21 2.32	2.6663	19 33 54.0	3.075
11	2 19 44.42	2.4667	14 44 16.5	8.793	11	4 23 42.36	2.6682	19 36 54.3	2.931
12	2 22 12.50	2.4723	14 53 1.4	8.703	12	4 26 22.51	2.6700	19 39 45.7	2.783
13	2 24 41.09	2.4778	15 1 40.9	8.612	13	4 29 2.76	2.6717	19 42 28.2	2.635
14	2 27 9.93	2.4835	15 10 14.8	8.518	14	4 31 43.12	2.6733	19 45 1.9	2.487
15	2 29 39.11	2.4891	15 18 43.0	8.423	15	4 34 23.56	2.6747	19 47 26.6	2.338
16	2 32 8.62	2.4946	15 27 5.5	8.327	16	4 37 4.08	2.6760	19 49 42.4	2.190
17	2 34 38.46	2.5000	15 35 22.2	8.228	17	4 39 44.68	2.6772	19 51 49.3	2.039
18	2 37 8.62	2.5054	15 43 32.9	8.128	18	4 42 25.35	2.6782	19 53 47.1	1.888
19	2 39 39.11	2.5109	15 51 37.6	8.028	19	4 45 6.07	2.6791	19 55 35.9	1.738
20	2 42 9.93	2.5163	15 59 36.2	7.925	20	4 47 46.84	2.6799	19 57 15.7	1.588
21	2 44 41.06	2.5216	16 7 28.6	7.821	21	4 50 27.66	2.6806	19 58 46.5	1.438
22	2 47 12.52	2.5269	16 15 14.7	7.715	22	4 53 8.51	2.6811	20 0 8.2	1.286
23	2 49 44.29	2.5321	+16 22 54.4	+7.608	23	4 55 49.39	2.6815	+20 1 20.8	+1.135
MAY 17.					MAY 19.				
0	2 52 16.37	2.5375	+16 30 27.7	+7.501	0	4 58 30.29	2.6817	+20 2 24.4	+0.983
1	2 54 48.76	2.5424	16 37 54.5	7.391	1	5 1 11.20	2.6818	20 3 18.8	0.831
2	2 57 21.46	2.5475	16 45 14.6	7.278	2	5 3 52.11	2.6818	20 4 4.1	0.679
3	2 59 54.46	2.5525	16 52 27.9	7.166	3	5 6 33.01	2.6816	20 4 40.3	0.528
4	3 2 27.76	2.5575	16 59 34.5	7.053	4	5 9 13.90	2.6813	20 5 7.5	0.377
5	3 5 1.36	2.5624	17 6 34.2	6.937	5	5 11 54.77	2.6808	20 5 25.5	0.224
6	3 7 35.25	2.5672	17 13 26.9	6.820	6	5 14 35.60	2.6802	20 5 34.4	+0.073
7	3 10 9.42	2.5719	17 20 12.6	6.702	7	5 17 16.40	2.6796	20 5 34.2	-0.079
8	3 12 43.88	2.5767	17 26 51.1	6.582	8	5 19 57.15	2.6787	20 5 24.9	0.230
9	3 15 18.62	2.5813	17 33 22.4	6.461	9	5 22 37.84	2.6778	20 5 6.6	0.381
10	3 17 53.63	2.5858	17 39 46.4	6.339	10	5 25 18.48	2.6767	20 4 39.2	0.533
11	3 20 28.91	2.5903	17 46 3.1	6.216	11	5 27 59.04	2.6758	20 4 2.7	0.683
12	3 23 4.46	2.5947	17 52 12.3	6.091	12	5 30 39.52	2.6749	20 3 17.2	0.833
13	3 25 40.27	2.5990	17 58 14.0	5.965	13	5 33 19.92	2.6739	20 2 22.7	0.984
14	3 28 16.34	2.6032	18 4 8.1	5.838	14	5 36 0.23	2.6729	20 1 19.1	1.134
15	3 30 52.65	2.6073	18 9 54.5	5.709	15	5 38 40.43	2.6691	20 0 6.6	1.283
16	3 33 29.21	2.6113	18 15 33.2	5.579	16	5 41 20.52	2.6672	19 58 45.1	1.432
17	3 36 6.01	2.6158	18 21 4.0	5.448	17	5 44 0.50	2.6652	19 57 14.7	1.580
18	3 38 43.04	2.6191	18 26 27.0	5.317	18	5 46 40.35	2.6630	19 55 35.5	1.728
19	3 41 20.30	2.6229	18 31 42.1	5.184	19	5 49 20.06	2.6606	19 53 47.3	1.877
20	3 43 57.79	2.6266	18 36 49.1	5.050	20	5 51 59.64	2.6584	19 51 50.3	2.023
21	3 46 35.49	2.6300	18 41 48.1	4.915	21	5 54 39.07	2.6559	19 49 44.5	2.170
22	3 49 13.39	2.6334	18 46 38.9	4.779	22	5 57 18.35	2.6533	19 47 29.9	2.316
23	3 51 51.50	2.6368	18 51 21.6	4.642	23	5 59 57.47	2.6506	19 45 6.6	2.461
24	3 54 29.81	2.6402	+18 55 56.0	+4.503	24	6 2 36.42	2.6477	+19 42 34.6	-2.005

GREENWICH MEAN TIME.

Hour.	Right Ascension.	Var. per Min.	Declination.	Var. per Min.	Hour.	Right Ascension.	Var. per Min.	Declination.	Var. per Min.
MAY 20.					MAY 22.				
	h m s	s	° ' "	"		h m s	s	° ' "	"
0	6 2 36.42	2.6477	+19 42 34.6	-2.605	0	8 4 41.89	2.4168	+15 9 53.3	-8.293
1	6 5 15.19	2.6447	19 39 54.0	2.749	1	8 7 6.69	2.4106	15 1 33.1	8.379
2	6 7 53.78	2.6416	19 37 4.7	2.893	2	8 9 31.15	2.4047	14 53 7.8	8.464
3	6 10 32.18	2.6384	19 34 6.9	3.034	3	8 11 55.25	2.3988	14 44 37.4	8.548
4	6 13 10.39	2.6352	19 31 0.6	3.176	4	8 14 19.01	2.3931	14 36 2.0	8.630
5	6 15 48.40	2.6319	19 27 45.8	3.317	5	8 16 42.42	2.3873	14 27 21.8	8.711
6	6 18 26.20	2.6282	19 24 22.6	3.456	6	8 19 5.48	2.3814	14 18 36.7	8.791
7	6 21 3.78	2.6245	19 20 51.1	3.595	7	8 21 28.19	2.3756	14 9 46.9	8.869
8	6 23 41.14	2.6208	19 17 11.2	3.733	8	8 23 50.55	2.3698	14 0 52.4	8.947
9	6 26 18.28	2.6170	19 13 23.1	3.870	9	8 26 12.57	2.3641	13 51 53.3	9.022
10	6 28 55.18	2.6131	19 9 26.8	4.006	10	8 28 34.24	2.3583	13 42 49.8	9.095
11	6 31 31.85	2.6091	19 5 22.4	4.141	11	8 30 55.57	2.3526	13 33 41.9	9.168
12	6 34 8.27	2.6049	19 1 9.9	4.276	12	8 33 16.55	2.3468	13 24 29.6	9.240
13	6 36 44.44	2.6008	18 56 49.3	4.409	13	8 35 37.19	2.3412	13 15 13.1	9.309
14	6 39 20.36	2.5965	18 52 20.8	4.540	14	8 37 57.49	2.3354	13 5 52.5	9.378
15	6 41 56.02	2.5921	18 47 44.5	4.671	15	8 40 17.44	2.3298	12 56 27.8	9.445
16	6 44 31.41	2.5876	18 43 0.3	4.802	16	8 42 37.06	2.3242	12 46 59.1	9.511
17	6 47 6.53	2.5831	18 38 8.3	4.930	17	8 44 56.34	2.3185	12 37 26.5	9.575
18	6 49 41.38	2.5785	18 33 8.7	5.058	18	8 47 15.28	2.3129	12 27 50.1	9.638
19	6 52 15.95	2.5738	18 28 1.4	5.184	19	8 49 33.89	2.3073	12 18 9.9	9.700
20	6 54 50.24	2.5691	18 22 46.6	5.309	20	8 51 52.16	2.3018	12 8 26.1	9.760
21	6 57 24.24	2.5643	18 17 24.3	5.433	21	8 54 10.10	2.2963	11 58 38.7	9.819
22	6 59 57.95	2.5593	18 11 54.6	5.557	22	8 56 27.71	2.2908	11 48 47.8	9.877
23	7 2 31.36	2.5544	+18 6 17.5	-5.679	23	8 58 44.99	2.2853	+11 38 53.4	-9.934
MAY 21.					MAY 23.				
	h m s	s	° ' "	"		h m s	s	° ' "	"
0	7 5 4.48	2.5494	+18 0 33.1	-5.799	0	9 1 1.95	2.2799	+11 28 55.7	-9.968
1	7 7 37.29	2.5443	17 54 41.6	5.918	1	9 3 18.58	2.2746	11 18 54.8	10.043
2	7 10 9.79	2.5391	17 48 43.0	6.036	2	9 5 34.90	2.2693	11 8 50.6	10.095
3	7 12 41.98	2.5339	17 42 37.3	6.153	3	9 7 50.89	2.2638	10 58 43.4	10.146
4	7 15 13.86	2.5287	17 36 24.7	6.268	4	9 10 6.56	2.2586	10 48 33.1	10.197
5	7 17 45.42	2.5233	17 30 5.2	6.382	5	9 12 21.92	2.2534	10 38 19.8	10.245
6	7 20 16.66	2.5180	17 23 38.9	6.495	6	9 14 36.97	2.2483	10 28 3.7	10.292
7	7 22 47.58	2.5127	17 17 5.8	6.607	7	9 16 51.71	2.2431	10 17 44.8	10.338
8	7 25 18.18	2.5072	17 10 26.1	6.716	8	9 19 6.14	2.2379	10 7 23.1	10.384
9	7 27 48.44	2.5017	17 3 39.9	6.825	9	9 21 20.26	2.2329	9 56 58.7	10.428
10	7 30 18.38	2.4963	16 56 47.1	6.933	10	9 23 34.09	2.2279	9 46 31.8	10.469
11	7 32 47.99	2.4907	16 49 47.9	7.039	11	9 25 47.61	2.2228	9 36 2.4	10.511
12	7 35 17.26	2.4850	16 42 42.4	7.143	12	9 28 0.83	2.2179	9 25 30.5	10.551
13	7 37 46.19	2.4794	16 35 30.7	7.247	13	9 30 13.76	2.2131	9 14 56.8	10.589
14	7 40 14.79	2.4738	16 28 12.8	7.349	14	9 32 26.40	2.2083	9 4 19.8	10.628
15	7 42 43.05	2.4681	16 20 48.8	7.450	15	9 34 38.75	2.2035	8 53 41.0	10.664
16	7 45 10.96	2.4624	16 13 18.8	7.548	16	9 36 50.82	2.1988	8 43 0.1	10.698
17	7 47 38.54	2.4567	16 5 43.0	7.646	17	9 39 2.60	2.1940	8 32 17.2	10.733
18	7 50 5.77	2.4509	15 58 1.8	7.743	18	9 41 14.10	2.1893	8 21 32.2	10.766
19	7 52 32.65	2.4452	15 50 13.8	7.838	19	9 43 25.32	2.1848	8 10 45.3	10.798
20	7 54 59.19	2.4395	15 42 20.7	7.932	20	9 45 36.27	2.1803	7 59 56.5	10.828
21	7 57 25.39	2.4338	15 34 22.0	8.024	21	9 47 46.95	2.1758	7 49 5.9	10.858
22	7 59 51.24	2.4279	15 26 17.8	8.115	22	9 49 57.36	2.1713	7 38 13.6	10.886
23	8 2 16.74	2.4221	15 18 8.2	8.204	23	9 52 7.51	2.1670	7 27 19.6	10.913
24	8 4 41.89	2.4163	+15 9 53.3	-8.293	24	9 54 17.40	2.1627	+ 7 16 24.0	-10.939

GREENWICH MEAN TIME.

Hour.	Right Ascension.	Var. per Min.	Declination.	Var. per Min.	Hour.	Right Ascension.	Var. per Min.	Declination.	Var. per Min.
MAY 24.					MAY 26.				
	h m s	s	° ' "	"		h m s	s	° ' "	"
0	9 54 17.40	2.1627	+7 16 24.0	-10.939	0	11 34 10.88	2.0215	-1 39 40.0	-11.046
1	9 56 27.03	2.1583	7 5 26.9	10.964	1	11 36 12.12	2.0200	1 50 42.2	11.028
2	9 58 36.40	2.1541	6 54 28.3	10.988	2	11 38 13.28	2.0186	2 1 43.3	11.008
3	10 0 45.52	2.1500	6 43 28.3	11.012	3	11 40 14.35	2.0171	2 12 43.2	10.988
4	10 2 54.40	2.1459	6 32 26.9	11.033	4	11 42 15.33	2.0157	2 23 41.9	10.968
5	10 5 3.03	2.1418	6 21 24.3	11.053	5	11 44 16.23	2.0144	2 34 39.3	10.945
6	10 7 11.41	2.1378	6 10 20.5	11.073	6	11 46 17.06	2.0132	2 45 35.3	10.923
7	10 9 19.56	2.1338	5 59 15.6	11.092	7	11 48 17.81	2.0118	2 56 30.0	10.900
8	10 11 27.47	2.1299	5 48 9.5	11.110	8	11 50 18.48	2.0107	3 7 23.3	10.876
9	10 13 35.15	2.1262	5 37 2.4	11.126	9	11 52 19.09	2.0096	3 18 15.1	10.851
10	10 15 42.61	2.1224	5 25 54.4	11.141	10	11 54 19.63	2.0084	3 29 5.4	10.826
11	10 17 49.84	2.1186	5 14 45.5	11.155	11	11 56 20.10	2.0074	3 39 54.2	10.800
12	10 19 56.84	2.1149	5 3 35.8	11.169	12	11 58 20.52	2.0065	3 50 41.4	10.773
13	10 22 3.63	2.1113	4 52 25.2	11.182	13	12 0 20.88	2.0056	4 1 26.9	10.745
14	10 24 10.20	2.1078	4 41 13.9	11.193	14	12 2 21.19	2.0048	4 12 10.8	10.717
15	10 26 16.57	2.1043	4 30 2.0	11.203	15	12 4 21.45	2.0040	4 22 53.0	10.689
16	10 28 22.72	2.1008	4 18 49.5	11.213	16	12 6 21.66	2.0031	4 33 33.4	10.660
17	10 30 28.67	2.0975	4 7 36.5	11.222	17	12 8 21.82	2.0024	4 44 12.0	10.630
18	10 32 34.42	2.0943	3 56 22.9	11.230	18	12 10 21.95	2.0018	4 54 48.8	10.597
19	10 34 39.98	2.0910	3 45 8.9	11.236	19	12 12 22.03	2.0011	5 5 23.6	10.563
20	10 36 45.34	2.0878	3 33 54.6	11.241	20	12 14 22.08	2.0005	5 15 56.6	10.528
21	10 38 50.51	2.0846	3 22 40.0	11.246	21	12 16 22.09	1.9999	5 26 27.6	10.500
22	10 40 55.49	2.0815	3 11 25.1	11.251	22	12 18 22.07	1.9995	5 36 56.6	10.468
23	10 43 0.29	2.0785	+3 0 9.9	-11.253	23	12 20 22.03	1.9991	-5 47 23.5	-10.433
MAY 25.					MAY 27.				
	h m s	s	° ' "	"		h m s	s	° ' "	"
0	10 45 4.91	2.0755	+2 48 54.7	-11.255	0	12 22 21.96	1.9986	-5 57 48.4	-10.397
1	10 47 9.35	2.0726	2 37 39.3	11.257	1	12 24 21.86	1.9983	6 8 11.1	10.361
2	10 49 13.62	2.0698	2 26 23.9	11.257	2	12 26 21.75	1.9980	6 18 31.7	10.324
3	10 51 17.72	2.0670	2 15 8.5	11.256	3	12 28 21.62	1.9978	6 28 50.0	10.287
4	10 53 21.66	2.0643	2 3 53.2	11.254	4	12 30 21.48	1.9975	6 39 6.1	10.250
5	10 55 25.43	2.0616	1 52 38.0	11.252	5	12 32 21.32	1.9973	6 49 20.0	10.213
6	10 57 29.05	2.0590	1 41 23.0	11.248	6	12 34 21.16	1.9972	6 59 31.5	10.175
7	10 59 32.51	2.0563	1 30 8.2	11.244	7	12 36 20.99	1.9971	7 9 40.6	10.138
8	11 1 35.81	2.0538	1 18 53.7	11.239	8	12 38 20.81	1.9970	7 19 47.4	10.098
9	11 3 38.97	2.0515	1 7 39.5	11.233	9	12 40 20.63	1.9970	7 29 51.7	10.051
10	11 5 41.99	2.0491	0 56 25.7	11.227	10	12 42 20.45	1.9971	7 39 53.5	10.000
11	11 7 44.86	2.0467	0 45 12.3	11.219	11	12 44 20.28	1.9973	7 49 52.8	9.967
12	11 9 47.59	2.0444	0 33 59.4	11.211	12	12 46 20.12	1.9973	7 59 49.5	9.923
13	11 11 50.19	2.0423	0 22 47.0	11.201	13	12 48 19.96	1.9974	8 9 43.6	9.881
14	11 13 52.66	2.0401	0 11 35.3	11.191	14	12 50 19.81	1.9975	8 19 35.2	9.837
15	11 15 55.00	2.0380	+0 0 24.1	-11.181	15	12 52 19.67	1.9978	8 29 24.0	9.791
16	11 17 57.22	2.0359	-0 10 46.4	-11.168	16	12 54 19.55	1.9981	8 39 10.1	9.746
17	11 19 59.31	2.0339	0 21 56.1	11.156	17	12 56 19.44	1.9983	8 48 53.5	9.700
18	11 22 1.29	2.0321	0 33 5.1	11.143	18	12 58 19.35	1.9987	8 58 34.1	9.653
19	11 24 3.16	2.0302	0 44 13.2	11.128	19	13 0 19.29	1.9992	9 8 11.9	9.606
20	11 26 4.91	2.0283	0 55 20.5	11.114	20	13 2 19.25	1.9995	9 17 46.8	9.558
21	11 28 6.56	2.0266	1 6 26.9	11.098	21	13 4 19.23	2.0000	9 27 18.8	9.508
22	11 30 8.10	2.0248	1 17 32.3	11.082	22	13 6 19.25	2.0005	9 36 47.9	9.461
23	11 32 9.54	2.0232	1 28 36.7	11.064	23	13 8 19.29	2.0009	9 46 14.1	9.411
24	11 34 10.88	2.0215	-1 39 40.0	-11.046	24	13 10 19.36	2.0014	-9 55 37.2	-9.360

GREENWICH MEAN TIME.

Hour.	Right Ascension.	Var. per Min.	Declination.	Var. per Min.	Hour.	Right Ascension.	Var. per Min.	Declination.	Var. per Min.
MAY 28.					MAY 30.				
	h m s	s	° ' "	"		h m s	s	° ' "	"
0	13 10 19.36	2.0014	- 9 55 37.2	-9.860	0	14 47 29.05	2.0630	-16 15 52.0	-6.275
1	13 12 19.46	2.0021	10 4 57.3	9.308	1	14 49 32.27	2.0643	16 22 6.2	6.108
2	13 14 19.61	2.0028	10 14 14.2	9.257	2	14 51 35.56	2.0656	16 28 15.8	6.121
3	13 16 19.79	2.0033	10 23 28.1	9.206	3	14 53 38.94	2.0669	16 34 20.7	6.043
4	13 18 20.00	2.0039	10 32 38.9	9.163	4	14 55 42.39	2.0683	16 40 20.9	5.965
5	13 20 20.26	2.0047	10 41 46.4	9.098	5	14 57 45.93	2.0696	16 46 16.5	5.887
6	13 22 20.56	2.0054	10 50 50.7	9.045	6	14 59 49.54	2.0708	16 52 7.3	5.807
7	13 24 20.91	2.0063	10 59 51.8	8.991	7	15 1 53.22	2.0721	16 57 53.3	5.728
8	13 26 21.31	2.0070	11 8 49.6	8.935	8	15 3 56.99	2.0734	17 3 94.6	5.648
9	13 28 21.75	2.0078	11 17 44.0	8.879	9	15 6 0.83	2.0746	17 9 11.0	5.567
10	13 30 22.24	2.0086	11 26 35.1	8.823	10	15 8 4.74	2.0758	17 14 42.6	5.487
11	13 32 22.78	2.0094	11 35 22.8	8.766	11	15 10 8.73	2.0772	17 20 9.4	5.406
12	13 34 23.37	2.0103	11 44 7.0	8.708	12	15 12 12.80	2.0784	17 25 31.3	5.323
13	13 36 24.02	2.0113	11 52 47.8	8.651	13	15 14 16.94	2.0797	17 30 48.2	5.241
14	13 38 24.72	2.0121	12 1 25.1	8.592	14	15 16 21.16	2.0708	17 36 0.2	5.159
15	13 40 25.47	2.0131	12 9 58.8	8.533	15	15 18 25.44	2.0720	17 41 7.3	5.077
16	13 42 26.29	2.0142	12 18 29.0	8.473	16	15 20 29.80	2.0733	17 46 9.4	4.993
17	13 44 27.17	2.0151	12 26 55.5	8.412	17	15 22 34.24	2.0745	17 51 6.5	4.910
18	13 46 28.10	2.0161	12 35 18.4	8.352	18	15 24 38.74	2.0756	17 55 58.6	4.826
19	13 48 29.10	2.0172	12 43 37.7	8.290	19	15 26 43.31	2.0768	18 0 45.6	4.741
20	13 50 30.17	2.0183	12 51 53.2	8.228	20	15 28 47.95	2.0779	18 5 27.5	4.657
21	13 52 31.29	2.0193	13 0 5.0	8.165	21	15 30 52.66	2.0791	18 10 4.4	4.572
22	13 54 32.48	2.0204	13 8 13.0	8.102	22	15 32 57.44	2.0802	18 14 36.1	4.487
23	13 56 33.74	2.0216	-13 16 17.2	-8.038	23	15 35 2.28	2.0813	-18 19 2.8	-4.402
MAY 29.					MAY 31.				
0	13 58 35.07	2.0227	-13 24 17.6	-7.974	0	15 37 7.19	2.0824	-18 23 24.3	-4.315
1	14 0 36.46	2.0238	13 32 14.1	7.909	1	15 39 12.17	2.0834	18 27 40.6	4.228
2	14 2 37.93	2.0250	13 40 6.7	7.844	2	15 41 17.20	2.0844	18 31 51.7	4.142
3	14 4 39.46	2.0262	13 47 55.4	7.778	3	15 43 22.30	2.0855	18 35 57.6	4.055
4	14 6 41.07	2.0274	13 55 40.0	7.711	4	15 45 27.46	2.0864	18 39 58.3	3.968
5	14 8 42.75	2.0286	14 3 20.7	7.645	5	15 47 32.67	2.0874	18 43 53.7	3.880
6	14 10 44.50	2.0298	14 10 57.4	7.578	6	15 49 37.95	2.0884	18 47 43.9	3.793
7	14 12 46.32	2.0310	14 18 30.0	7.509	7	15 51 43.28	2.0893	18 51 28.8	3.704
8	14 14 48.22	2.0323	14 25 58.5	7.440	8	15 53 48.66	2.0902	18 55 8.4	3.616
9	14 16 50.20	2.0336	14 33 22.8	7.371	9	15 55 54.10	2.0912	18 58 42.7	3.528
10	14 18 52.25	2.0347	14 40 43.0	7.302	10	15 57 59.60	2.0920	19 2 11.7	3.438
11	14 20 54.37	2.0359	14 47 59.0	7.232	11	16 0 5.14	2.0928	19 5 35.3	3.348
12	14 22 56.57	2.0372	14 55 10.8	7.161	12	16 2 10.73	2.0936	19 8 53.5	3.259
13	14 24 58.85	2.0386	15 2 18.3	7.090	13	16 4 16.37	2.0944	19 12 6.4	3.170
14	14 27 1.20	2.0399	15 9 21.6	7.018	14	16 6 22.06	2.0953	19 15 13.9	3.079
15	14 29 3.64	2.0413	15 16 20.5	6.946	15	16 8 27.80	2.0960	19 18 15.9	2.989
16	14 31 6.15	2.0424	15 23 15.1	6.873	16	16 10 33.58	2.0967	19 21 12.6	2.899
17	14 33 8.73	2.0438	15 30 5.3	6.800	17	16 12 39.40	2.0973	19 24 3.8	2.808
18	14 35 11.40	2.0450	15 36 51.1	6.727	18	16 14 45.26	2.0980	19 26 49.6	2.718
19	14 37 14.14	2.0464	15 43 32.5	6.653	19	16 16 51.16	2.0987	19 29 20.9	2.627
20	14 39 16.97	2.0478	15 50 9.4	6.578	20	16 18 57.10	2.0993	19 32 4.8	2.535
21	14 41 19.87	2.0490	15 56 41.9	6.503	21	16 21 3.07	2.0998	19 34 34.1	2.443
22	14 43 22.85	2.0503	16 3 9.8	6.428	22	16 23 9.08	2.1003	19 36 58.0	2.353
23	14 45 25.91	2.0517	16 9 33.2	6.352	23	16 25 15.11	2.1008	19 39 16.4	2.261
24	14 47 29.05	2.0530	-16 15 52.0	-6.275	24	16 27 21.18	2.1014	-19 41 29.3	-2.168

## GREENWICH MEAN TIME.

Hour.	Right Ascension.	Var. per Min.	Declination.	Var. per Min.	Hour.	Right Ascension.	Var. per Min.	Declination.	Var. per Min.
JUNE 1.					JUNE 8.				
	h m s	s	° ' "	"		h m s	s	° ' "	"
0	16 27 21.18	2.1014	-19 41 29.3	-2.168	0	18 8 11.16	2.0879	-19 38 35.4	+2.274
1	16 29 27.28	2.1018	19 43 36.6	2.077	1	18 10 16.41	2.0870	19 36 16.3	2.264
2	16 31 33.40	2.1023	19 45 38.5	1.985	2	18 12 21.60	2.0859	19 33 51.7	2.454
3	16 33 39.55	2.1027	19 47 34.8	1.892	3	18 14 26.72	2.0848	19 31 21.8	2.543
4	16 35 45.72	2.1030	19 49 25.5	1.799	4	18 16 31.78	2.0838	19 28 46.5	2.633
5	16 37 51.91	2.1033	19 51 10.7	1.707	5	18 18 36.77	2.0827	19 26 5.8	2.723
6	16 39 58.12	2.1037	19 52 50.4	1.614	6	18 20 41.70	2.0816	19 23 19.8	2.811
7	16 42 4.35	2.1040	19 54 24.4	1.521	7	18 22 46.56	2.0804	19 20 28.5	2.899
8	16 44 10.60	2.1043	19 55 52.9	1.429	8	18 24 51.35	2.0793	19 17 31.9	2.987
9	16 46 16.86	2.1044	19 57 15.9	1.336	9	18 26 56.07	2.0780	19 14 30.0	3.075
10	16 48 23.13	2.1046	19 58 33.2	1.243	10	18 29 <sup>o</sup> 0.71	2.0768	19 11 22.9	3.163
11	16 50 29.41	2.1048	19 59 45.0	1.150	11	18 31 5.28	2.0756	19 8 10.5	3.251
12	16 52 35.70	2.1048	20 0 51.2	1.056	12	18 33 9.78	2.0743	19 4 52.8	3.338
13	16 54 41.99	2.1049	20 1 51.7	0.963	13	18 35 14.20	2.0730	19 1 29.9	3.425
14	16 56 48.29	2.1050	20 2 46.7	0.870	14	18 37 18.54	2.0717	18 58 1.8	3.511
15	16 58 54.59	2.1050	20 3 36.1	0.777	15	18 39 22.80	2.0704	18 54 28.6	3.598
16	17 1 0.89	2.1050	20 4 19.9	0.683	16	18 41 26.99	2.0691	18 50 50.1	3.683
17	17 3 7.19	2.1050	20 4 58.1	0.590	17	18 43 31.09	2.0677	18 47 6.6	3.768
18	17 5 13.49	2.1049	20 5 30.7	0.496	18	18 45 35.11	2.0663	18 43 17.9	3.854
19	17 7 19.78	2.1048	20 5 57.6	0.403	19	18 47 39.05	2.0650	18 39 24.1	3.939
20	17 9 26.06	2.1046	20 6 19.0	0.310	20	18 49 42.91	2.0636	18 35 25.2	4.024
21	17 11 32.33	2.1045	20 6 34.8	0.216	21	18 51 46.68	2.0622	18 31 21.2	4.108
22	17 13 38.60	2.1043	20 6 44.9	0.123	22	18 53 50.37	2.0608	18 27 12.2	4.192
23	17 15 44.85	2.1040	-20 6 49.5	-0.029	23	18 55 53.97	2.0593	-18 22 58.1	+4.276
JUNE 2.					JUNE 4.				
0	17 17 51.08	2.1038	-20 6 48.4	+0.064	0	18 57 57.49	2.0578	-18 18 39.1	+4.359
1	17 19 57.30	2.1034	20 6 41.8	0.158	1	19 0 0.91	2.0563	18 14 15.0	4.443
2	17 22 3.49	2.1031	20 6 29.5	0.250	2	19 2 4.25	2.0550	18 9 46.0	4.524
3	17 24 9.67	2.1028	20 6 11.7	0.343	3	19 4 7.51	2.0535	18 5 12.1	4.607
4	17 26 15.82	2.1023	20 5 48.2	0.437	4	19 6 10.67	2.0520	18 0 33.2	4.689
5	17 28 21.95	2.1019	20 5 19.2	0.530	5	19 8 13.75	2.0505	17 55 49.4	4.770
6	17 30 28.05	2.1013	20 4 44.6	0.622	6	19 10 16.73	2.0490	17 51 0.8	4.851
7	17 32 34.12	2.1009	20 4 4.5	0.716	7	19 12 19.63	2.0475	17 46 7.3	4.932
8	17 34 40.16	2.1004	20 3 18.7	0.809	8	19 14 22.43	2.0459	17 41 9.0	5.013
9	17 36 46.17	2.0998	20 2 27.4	0.902	9	19 16 25.14	2.0444	17 36 5.9	5.092
10	17 38 52.14	2.0992	20 1 30.5	0.994	10	19 18 27.76	2.0429	17 30 58.0	5.173
11	17 40 58.08	2.0987	20 0 28.1	1.087	11	19 20 30.29	2.0414	17 25 45.3	5.260
12	17 43 3.98	2.0980	19 59 20.1	1.179	12	19 22 32.73	2.0398	17 20 28.0	5.348
13	17 45 9.84	2.0973	19 58 6.6	1.271	13	19 24 35.07	2.0383	17 15 5.9	5.407
14	17 47 15.66	2.0966	19 56 47.6	1.363	14	19 26 37.32	2.0368	17 9 39.1	5.485
15	17 49 21.43	2.0958	19 55 23.1	1.455	15	19 28 39.48	2.0353	17 4 7.7	5.563
16	17 51 27.16	2.0951	19 53 53.0	1.547	16	19 30 41.55	2.0338	16 58 31.7	5.639
17	17 53 32.84	2.0943	19 52 17.4	1.638	17	19 32 43.53	2.0322	16 52 51.0	5.716
18	17 55 38.48	2.0935	19 50 36.4	1.729	18	19 34 45.41	2.0306	16 47 5.8	5.792
19	17 57 44.06	2.0926	19 48 49.9	1.821	19	19 36 47.20	2.0290	16 41 16.0	5.868
20	17 59 49.59	2.0918	19 46 57.9	1.913	20	19 38 48.89	2.0275	16 35 21.7	5.943
21	18 1 55.07	2.0908	19 45 0.4	2.003	21	19 40 50.50	2.0260	16 29 22.8	6.018
22	18 4 0.49	2.0899	19 42 57.5	2.093	22	19 42 52.01	2.0244	16 23 19.5	6.092
23	18 6 5.86	2.0889	19 40 49.2	2.184	23	19 44 53.43	2.0229	16 17 11.8	6.166
24	18 8 11.16	2.0879	-19 38 35.4	+2.274	24	19 46 54.76	2.0214	-16 10 59.6	+6.240

GREENWICH MEAN TIME:

Hour.	Right Ascension.	Var. per Min.	Declination.	Var. per Min.	Hour.	Right Ascension.	Var. per Min.	Declination.	Var. per Min.
JUNE 5.					JUNE 7.				
	h m s	s	° ' "	"		h m s	s	° ' "	"
0	19 46 54.76	2.0214	-16 10 59.6	+6.240	0	21 22 27.62	1.9684	-9 55 46.1	+ 9.205
1	19 48 56.00	2.0220	16 4 43.0	6.213	1	21 24 25.71	1.9689	9 46 32.3	9.254
2	19 50 57.15	2.0224	15 58 22.1	6.235	2	21 26 23.78	1.9697	9 37 15.6	9.302
3	19 52 58.21	2.0169	15 51 56.8	6.458	3	21 28 21.83	1.9693	9 27 56.1	9.350
4	19 54 59.18	2.0154	15 45 27.2	6.530	4	21 30 19.86	1.9691	9 18 33.6	9.398
5	19 57 0.06	2.0129	15 38 53.2	6.601	5	21 32 17.88	1.9688	9 9 8.3	9.446
6	19 59 0.85	2.0124	15 32 15.1	6.671	6	21 34 15.88	1.9685	8 59 40.1	9.493
7	20 1 1.55	2.0119	15 25 32.7	6.742	7	21 36 13.86	1.9683	8 50 9.2	9.538
8	20 3 2.17	2.0094	15 18 46.1	6.812	8	21 38 11.84	1.9682	8 40 35.6	9.583
9	20 5 2.70	2.0081	15 11 55.3	6.881	9	21 40 9.81	1.9682	8 30 59.2	9.628
10	20 7 3.14	2.0067	15 5 0.4	6.950	10	21 42 7.78	1.9681	8 21 20.2	9.673
11	20 9 3.50	2.0053	14 58 1.8	7.018	11	21 44 5.74	1.9681	8 11 38.5	9.717
12	20 11 3.77	2.0038	14 50 58.2	7.087	12	21 46 3.71	1.9682	8 1 54.2	9.760
13	20 13 3.96	2.0025	14 43 50.9	7.154	13	21 48 1.68	1.9682	7 52 7.3	9.803
14	20 15 4.07	2.0011	14 36 39.7	7.221	14	21 49 59.65	1.9682	7 42 17.9	9.845
15	20 17 4.09	1.9998	14 29 24.4	7.288	15	21 51 57.63	1.9684	7 32 25.9	9.887
16	20 19 4.04	1.9984	14 22 5.2	7.353	16	21 53 55.62	1.9687	7 22 31.5	9.928
17	20 21 3.90	1.9971	14 14 42.0	7.419	17	21 55 53.63	1.9690	7 12 34.6	9.968
18	20 23 3.69	1.9958	14 7 14.9	7.484	18	21 57 51.66	1.9693	7 2 35.4	10.008
19	20 25 3.40	1.9945	13 59 43.9	7.548	19	21 59 49.70	1.9696	6 52 33.7	10.048
20	20 27 3.03	1.9932	13 52 9.1	7.613	20	22 1 47.77	1.9699	6 42 29.7	10.086
21	20 29 2.58	1.9920	13 44 30.4	7.677	21	22 3 45.86	1.9683	6 32 23.4	10.123
22	20 31 2.07	1.9908	13 36 47.9	7.740	22	22 5 43.97	1.9683	6 22 14.9	10.161
23	20 33 1.48	1.9895	-13 29 1.6	+7.805	23	22 7 42.12	1.9684	-6 12 4.1	+10.198
JUNE 6.					JUNE 8.				
	h m s	s	° ' "	"		h m s	s	° ' "	"
0	20 35 0.81	1.9883	-13 21 11.6	+7.865	0	22 9 40.30	1.9700	-6 1 51.1	+10.235
1	20 37 0.08	1.9872	13 13 17.8	7.927	1	22 11 38.52	1.9707	5 51 35.9	10.271
2	20 38 50.28	1.9861	13 5 20.4	7.988	2	22 13 36.78	1.9713	5 41 18.6	10.306
3	20 40 58.41	1.9850	12 57 19.3	8.048	3	22 15 35.08	1.9721	5 30 59.2	10.340
4	20 42 57.48	1.9839	12 49 14.6	8.108	4	22 17 33.43	1.9729	5 20 37.8	10.374
5	20 44 56.48	1.9828	12 41 6.3	8.168	5	22 19 31.83	1.9737	5 10 14.3	10.407
6	20 46 55.42	1.9818	12 32 54.4	8.228	6	22 21 30.27	1.9745	4 59 48.9	10.440
7	20 48 54.30	1.9808	12 24 39.0	8.286	7	22 23 28.78	1.9754	4 49 21.5	10.473
8	20 50 53.12	1.9798	12 16 20.1	8.344	8	22 25 27.34	1.9763	4 38 52.2	10.504
9	20 52 51.88	1.9788	12 7 57.7	8.402	9	22 27 25.96	1.9775	4 28 21.0	10.535
10	20 54 50.58	1.9779	11 59 31.9	8.459	10	22 29 24.64	1.9786	4 17 48.0	10.565
11	20 56 49.23	1.9771	11 51 2.6	8.516	11	22 31 23.39	1.9798	4 7 13.2	10.595
12	20 58 47.83	1.9763	11 42 30.0	8.572	12	22 33 22.22	1.9810	3 56 36.6	10.624
13	21 0 46.38	1.9754	11 33 54.0	8.627	13	22 35 21.11	1.9822	3 45 58.3	10.652
14	21 2 44.88	1.9746	11 25 14.8	8.682	14	22 37 20.08	1.9836	3 35 18.3	10.680
15	21 4 43.33	1.9738	11 16 32.2	8.737	15	22 39 19.14	1.9849	3 24 36.7	10.707
16	21 6 41.73	1.9731	11 7 46.3	8.791	16	22 41 18.27	1.9863	3 13 53.5	10.733
17	21 8 40.10	1.9724	10 58 57.3	8.844	17	22 43 17.50	1.9878	3 3 8.7	10.759
18	21 10 38.42	1.9718	10 50 5.0	8.897	18	22 45 16.81	1.9893	2 52 22.4	10.784
19	21 12 36.71	1.9711	10 41 9.6	8.950	19	22 47 16.22	1.9909	2 41 34.6	10.809
20	21 14 34.95	1.9705	10 32 11.0	9.003	20	22 49 15.72	1.9926	2 30 45.3	10.832
21	21 16 33.17	1.9700	10 23 9.3	9.053	21	22 51 15.33	1.9943	2 19 54.7	10.855
22	21 18 31.35	1.9694	10 14 4.6	9.103	22	22 53 15.04	1.9960	2 9 2.7	10.878
23	21 20 29.50	1.9689	10 4 56.9	9.154	23	22 55 14.85	1.9978	1 58 9.3	10.900
24	21 22 27.62	1.9684	-9 55 46.1	+9.205	24	22 57 14.78	1.9997	-1 47 14.7	+10.921

GREENWICH MEAN TIME.

Hour.	Right Ascension.	Var. per Min.	Declination.	Var. per Min.	Hour.	Right Ascension.	Var. per Min.	Declination.	Var. per Min.
JUNE 9.					JUNE 11.				
	h m s	s	° ' "	"		h m s	s	° ' "	"
0	22 57 14.78	1.9997	-1 47 14.7	+10.921	0	0 36 30.40	2.1891	+ 7 6 15.7	+10.998
1	22 59 14.81	2.0016	1 36 18.8	10.941	1	0 38 40.06	2.1638	7 17 13.1	10.946
2	23 1 14.97	2.0037	1 25 21.8	10.960	2	0 40 50.06	2.1667	7 28 9.2	10.923
3	23 3 15.25	2.0057	1 14 23.6	10.980	3	0 43 0.32	2.1735	7 39 3.8	10.898
4	23 5 15.65	2.0078	1 3 24.2	10.998	4	0 45 10.88	2.1785	7 49 56.9	10.872
5	23 7 16.18	2.0099	0 52 23.8	11.015	5	0 47 21.74	2.1834	8 0 48.4	10.844
6	23 9 16.84	2.0121	0 41 22.4	11.032	6	0 49 32.89	2.1884	8 11 38.2	10.816
7	23 11 17.63	2.0144	0 30 20.0	11.048	7	0 51 44.35	2.1936	8 22 26.3	10.787
8	23 13 18.57	2.0168	0 19 16.7	11.063	8	0 53 56.12	2.1987	8 33 12.6	10.758
9	23 15 19.64	2.0191	-0 8 12.5	11.078	9	0 56 8.19	2.2038	8 43 57.0	10.728
10	23 17 20.86	2.0216	+0 2 52.6	11.092	10	0 58 20.58	2.2091	8 54 39.4	10.699
11	23 19 22.23	2.0241	0 13 58.5	11.104	11	1 0 33.28	2.2144	9 5 19.8	10.667
12	23 21 23.75	2.0266	0 25 5.1	11.116	12	1 2 46.31	2.2198	9 15 58.2	10.621
13	23 23 25.42	2.0293	0 36 12.4	11.128	13	1 4 59.65	2.2251	9 26 34.3	10.583
14	23 25 27.26	2.0320	0 47 20.4	11.138	14	1 7 13.32	2.2305	9 37 8.2	10.546
15	23 27 29.26	2.0347	0 58 29.0	11.148	15	1 9 27.31	2.2359	9 47 39.8	10.507
16	23 29 31.42	2.0375	1 9 38.2	11.158	16	1 11 41.63	2.2415	9 58 9.0	10.466
17	23 31 33.76	2.0404	1 20 47.9	11.166	17	1 13 56.29	2.2471	10 8 35.7	10.423
18	23 33 36.27	2.0433	1 31 58.1	11.173	18	1 16 11.28	2.2527	10 18 59.8	10.380
19	23 35 38.96	2.0463	1 43 8.8	11.179	19	1 18 26.61	2.2583	10 29 21.8	10.336
20	23 37 41.83	2.0493	1 54 19.6	11.185	20	1 20 42.27	2.2639	10 39 40.1	10.290
21	23 39 44.88	2.0524	2 5 30.8	11.190	21	1 22 58.28	2.2697	10 49 56.1	10.243
22	23 41 48.12	2.0557	2 16 42.4	11.194	22	1 25 14.63	2.2754	11 0 9.3	10.195
23	23 43 51.56	2.0590	+2 27 54.1	+11.197	23	1 27 31.33	2.2813	+11 10 19.5	+10.144
JUNE 10.					JUNE 12.				
0	23 45 55.19	2.0621	+2 39 6.0	+11.200	0	1 29 48.38	2.2870	+11 20 26.6	+10.093
1	23 47 59.01	2.0654	2 50 18.0	11.201	1	1 32 5.77	2.2928	11 30 30.6	10.041
2	23 50 3.04	2.0689	3 1 30.1	11.201	2	1 34 23.52	2.2988	11 40 31.5	9.987
3	23 52 7.28	2.0723	3 12 42.1	11.201	3	1 36 41.62	2.3047	11 50 29.0	9.931
4	23 54 11.73	2.0760	3 23 54.2	11.200	4	1 39 0.08	2.3107	12 0 23.2	9.875
5	23 56 16.40	2.0798	3 35 6.1	11.197	5	1 41 18.90	2.3167	12 10 14.0	9.817
6	23 58 21.28	2.0837	3 46 17.8	11.194	6	1 43 38.08	2.3227	12 20 1.2	9.756
7	0 0 26.38	2.0878	3 57 29.4	11.190	7	1 45 57.62	2.3287	12 29 44.7	9.695
8	0 2 31.70	2.0907	4 8 40.6	11.185	8	1 48 17.52	2.3348	12 39 24.6	9.633
9	0 4 37.26	2.0946	4 19 51.6	11.179	9	1 50 37.79	2.3408	12 49 0.7	9.569
10	0 6 43.05	2.0984	4 31 2.1	11.172	10	1 52 58.42	2.3469	12 58 32.9	9.504
11	0 8 49.07	2.1023	4 42 12.2	11.164	11	1 55 19.42	2.3531	13 8 1.2	9.437
12	0 10 55.33	2.1063	4 53 21.8	11.156	12	1 57 40.79	2.3592	13 17 25.4	9.368
13	0 13 1.83	2.1104	5 4 30.9	11.148	13	2 0 2.53	2.3653	13 26 45.4	9.299
14	0 15 8.58	2.1146	5 15 39.3	11.134	14	2 2 24.63	2.3715	13 36 1.3	9.228
15	0 17 15.58	2.1188	5 26 47.0	11.128	15	2 4 47.11	2.3777	13 45 12.8	9.155
16	0 19 22.84	2.1231	5 37 54.0	11.110	16	2 7 9.96	2.3839	13 54 19.9	9.082
17	0 21 30.35	2.1273	5 49 0.2	11.096	17	2 9 33.18	2.3902	14 3 22.6	9.006
18	0 23 38.12	2.1317	6 0 5.5	11.081	18	2 11 56.78	2.3964	14 12 20.6	8.928
19	0 25 46.15	2.1361	6 11 9.9	11.065	19	2 14 20.75	2.4026	14 21 14.0	8.850
20	0 27 54.45	2.1406	6 22 13.3	11.048	20	2 16 45.09	2.4088	14 30 2.6	8.770
21	0 30 3.02	2.1452	6 33 15.6	11.030	21	2 19 9.80	2.4150	14 38 46.4	8.688
22	0 32 11.87	2.1498	6 44 16.9	11.011	22	2 21 34.89	2.4213	14 47 26.2	8.606
23	0 34 20.99	2.1544	6 55 16.9	10.990	23	2 24 0.35	2.4274	14 55 59.1	8.522
24	0 36 30.40	2.1591	+7 6 15.7	+10.968	24	2 26 26.18	2.4336	+15 4 27.8	+8.434



GREENWICH MEAN TIME.

Hour.	Right Ascension.			Var. per Min.	Declination.			Var. per Min.	Hour.	Right Ascension.			Var. per Min.	Declination.			Var. per Min.
JUNE 13.									JUNE 15.								
0	h	m	s	s	°	'	"	"	0	h	m	s	s	°	'	"	"
0	2	26	26.18	2.4336	+15	4	27.8	+8.434	0	4	29	42.16	2.6762	+19	42	56.8	+2.675
1	2	28	52.38	2.4366	15	12	51.2	8.247	1	4	32	22.82	2.6791	19	45	32.9	2.527
2	2	31	18.96	2.4400	15	21	9.4	8.209	2	4	35	3.65	2.6818	19	48	0.0	2.378
3	2	33	45.90	2.4422	15	29	22.3	8.168	3	4	37	44.63	2.6848	19	50	18.8	2.230
4	2	36	13.22	2.4464	15	37	29.6	8.075	4	4	40	25.77	2.6880	19	52	27.6	2.080
5	2	38	40.91	2.4445	15	45	31.3	7.982	5	4	43	7.06	2.6892	19	54	27.9	1.930
6	2	41	8.96	2.4706	15	53	27.4	7.887	6	4	45	48.48	2.6918	19	56	19.2	1.780
7	2	43	37.38	2.4768	16	1	17.8	7.791	7	4	48	30.02	2.6964	19	58	1.5	1.628
8	2	46	6.17	2.4828	16	9	2.3	7.693	8	4	51	11.69	2.6964	19	59	34.6	1.477
9	2	48	35.32	2.4888	16	16	40.9	7.603	9	4	53	53.47	2.6973	20	0	58.7	1.325
10	2	51	4.83	2.4948	16	24	13.5	7.492	10	4	56	35.36	2.6989	20	2	13.6	1.172
11	2	53	34.70	2.5008	16	31	40.0	7.380	11	4	59	17.34	2.7004	20	3	19.3	1.019
12	2	56	4.93	2.5068	16	39	0.3	7.266	12	5	1	59.41	2.7018	20	4	15.9	0.866
13	2	58	35.52	2.5127	16	46	14.3	7.180	13	5	4	41.56	2.7031	20	5	3.2	0.712
14	3	1	6.46	2.5186	16	53	21.9	7.073	14	5	7	23.78	2.7042	20	5	41.3	0.558
15	3	3	37.75	2.5245	17	0	23.1	6.966	15	5	10	6.06	2.7053	20	6	10.2	0.404
16	3	6	9.40	2.5303	17	7	17.8	6.856	16	5	12	48.40	2.7060	20	6	29.8	0.249
17	3	8	41.38	2.5360	17	14	5.8	6.744	17	5	15	30.78	2.7067	20	6	40.1	+0.093
18	3	11	13.72	2.5417	17	20	47.1	6.632	18	5	18	13.20	2.7072	20	6	41.2	-0.069
19	3	13	46.39	2.5473	17	27	21.6	6.518	19	5	20	55.64	2.7076	20	6	33.0	0.214
20	3	16	19.39	2.5528	17	33	49.2	6.408	20	5	23	38.11	2.7078	20	6	15.5	0.268
21	3	18	52.73	2.5584	17	40	9.9	6.296	21	5	26	20.58	2.7079	20	5	48.8	0.523
22	3	21	26.40	2.5638	17	46	23.5	6.187	22	5	29	3.06	2.7080	20	5	12.8	0.678
23	3	24	0.39	2.5693	+17	52	29.9	+6.048	23	5	31	45.54	2.7078	+20	4	27.5	-0.833
JUNE 14.									JUNE 16.								
0	3	26	34.71	2.5747	+17	58	29.2	+5.927	0	5	34	27.99	2.7074	+20	3	32.9	-0.987
1	3	29	9.35	2.5790	18	4	21.2	5.806	1	5	37	10.43	2.7070	20	2	29.1	1.141
2	3	31	44.30	2.5851	18	10	5.8	5.682	2	5	39	52.83	2.7068	20	1	16.0	1.295
3	3	34	19.56	2.5908	18	15	43.0	5.557	3	5	42	35.19	2.7068	19	59	53.7	1.449
4	3	36	55.13	2.5958	18	21	12.6	5.430	4	5	45	17.50	2.7047	19	58	22.1	1.602
5	3	39	30.99	2.6002	18	26	34.6	5.303	5	5	47	59.75	2.7037	19	56	41.4	1.755
6	3	42	7.15	2.6052	18	31	49.0	5.175	6	5	50	41.94	2.7028	19	54	51.5	1.906
7	3	44	43.61	2.6099	18	36	55.6	5.045	7	5	53	24.05	2.7012	19	52	52.4	2.062
8	3	47	20.34	2.6146	18	41	54.4	4.918	8	5	56	6.08	2.6997	19	50	44.1	2.213
9	3	49	57.36	2.6193	18	46	45.2	4.782	9	5	58	48.01	2.6981	19	48	26.8	2.364
10	3	52	34.65	2.6238	18	51	28.2	4.648	10	6	1	29.85	2.6964	19	46	0.4	2.515
11	3	55	12.21	2.6283	18	56	3.0	4.513	11	6	4	11.58	2.6945	19	43	25.0	2.666
12	3	57	50.04	2.6326	19	0	29.8	4.378	12	6	6	53.19	2.6925	19	40	40.5	2.817
13	4	0	28.12	2.6368	19	4	48.4	4.242	13	6	9	34.68	2.6904	19	37	47.0	2.965
14	4	3	6.45	2.6409	19	8	58.8	4.104	14	6	12	16.04	2.6881	19	34	44.7	3.113
15	4	5	45.03	2.6450	19	13	0.9	3.965	15	6	14	57.25	2.6857	19	31	33.4	3.262
16	4	8	23.85	2.6489	19	16	54.6	3.825	16	6	17	38.32	2.6832	19	28	13.2	3.409
17	4	11	2.90	2.6527	19	20	39.9	3.685	17	6	20	19.23	2.6805	19	24	44.3	3.556
18	4	13	42.17	2.6563	19	24	16.8	3.543	18	6	22	59.98	2.6778	19	21	6.5	3.702
19	4	16	21.66	2.6600	19	27	45.1	3.400	19	6	25	40.56	2.6749	19	17	20.1	3.846
20	4	19	1.87	2.6635	19	31	4.8	3.267	20	6	28	20.97	2.6719	19	13	25.0	3.990
21	4	21	41.28	2.6668	19	34	15.9	3.133	21	6	31	1.19	2.6687	19	9	21.3	4.133
22	4	24	21.38	2.6700	19	37	18.3	2.997	22	6	33	41.22	2.6654	19	5	9.0	4.276
23	4	27	1.68	2.6732	19	40	11.9	2.821	23	6	36	21.04	2.6621	19	0	48.2	4.418
24	4	29	42.16	2.6762	+19	42	56.8	+2.675	24	6	39	0.67	2.6587	+18	56	18.9	-4.568

GREENWICH MEAN TIME.

Hour.	Right Ascension.	Var. per Min.	Declination.	Var. per Min.	Hour.	Right Ascension.	Var. per Min.	Declination.	Var. per Min.
JUNE 17.					JUNE 19.				
	h m s	s	° ' "	"		h m s	s	° ' "	"
0	6 39 0.67	2.6567	+18 56 18.9	-4.558	0	8 41 4.50	2.4068	+12 59 53.5	-9.738
1	6 41 40.08	2.6550	18 51 41.3	4.607	1	8 43 28.82	2.4023	12 50 7.1	9.908
2	6 44 19.27	2.6513	18 46 55.3	4.835	2	8 45 52.76	2.3963	12 40 16.5	9.878
3	6 46 58.24	2.6476	18 42 1.1	4.972	3	8 48 16.38	2.3904	12 30 21.8	9.945
4	6 49 36.98	2.6437	18 36 58.7	5.108	4	8 50 39.63	2.3846	12 20 23.1	10.013
5	6 52 15.48	2.6397	18 31 48.1	5.243	5	8 53 2.53	2.3788	12 10 20.4	10.077
6	6 54 53.74	2.6356	18 26 29.5	5.377	6	8 55 25.06	2.3729	12 0 13.9	10.139
7	6 57 31.75	2.6313	18 21 2.8	5.510	7	8 57 47.28	2.3670	11 50 3.7	10.201
8	7 0 9.50	2.6271	18 15 28.3	5.641	8	9 0 9.12	2.3611	11 39 49.8	10.263
9	7 2 47.00	2.6227	18 9 45.9	5.772	9	9 2 30.62	2.3554	11 29 32.3	10.321
10	7 5 24.22	2.6182	18 3 55.7	5.901	10	9 4 51.77	2.3496	11 19 11.3	10.378
11	7 8 1.18	2.6137	17 57 57.8	6.028	11	9 7 12.57	2.3438	11 8 47.0	10.433
12	7 10 37.86	2.6090	17 51 52.3	6.155	12	9 9 33.03	2.3381	10 58 19.4	10.487
13	7 13 14.26	2.6043	17 45 39.2	6.281	13	9 11 53.14	2.3323	10 47 48.5	10.540
14	7 15 50.37	2.5995	17 39 18.6	6.404	14	9 14 12.91	2.3267	10 37 14.6	10.591
15	7 18 26.20	2.5946	17 32 50.7	6.527	15	9 16 32.34	2.3211	10 26 37.6	10.641
16	7 21 1.72	2.5896	17 26 15.4	6.648	16	9 18 51.44	2.3155	10 15 57.7	10.688
17	7 23 36.95	2.5847	17 19 32.9	6.768	17	9 21 10.20	2.3098	10 5 15.0	10.735
18	7 26 11.88	2.5796	17 12 43.3	6.886	18	9 23 28.62	2.3043	9 54 29.5	10.781
19	7 28 46.50	2.5745	17 5 46.6	7.003	19	9 25 46.72	2.2988	9 43 41.3	10.825
20	7 31 20.80	2.5692	16 58 42.9	7.118	20	9 28 4.48	2.2933	9 32 50.5	10.868
21	7 33 54.80	2.5639	16 51 32.4	7.233	21	9 30 21.92	2.2879	9 21 57.1	10.909
22	7 36 28.47	2.5585	16 44 15.0	7.346	22	9 32 39.03	2.2826	9 11 1.4	10.948
23	7 39 1.82	2.5532	+16 36 50.9	-7.457	23	9 34 55.83	2.2772	+ 9 0 3.3	-10.987
JUNE 18.					JUNE 20.				
	h m s	s	° ' "	"		h m s	s	° ' "	"
0	7 41 34.85	2.5478	+16 29 20.2	-7.566	0	9 37 12.29	2.2716	+ 8 49 3.0	-11.023
1	7 44 7.55	2.5428	16 21 43.0	7.674	1	9 39 28.45	2.2666	8 38 0.5	11.069
2	7 46 39.92	2.5377	16 13 59.3	7.782	2	9 41 44.28	2.2618	8 26 55.9	11.093
3	7 49 11.95	2.5311	16 6 9.2	7.887	3	9 43 59.80	2.2562	8 15 49.3	11.117
4	7 51 43.65	2.5255	15 58 12.9	7.990	4	9 46 15.02	2.2510	8 4 40.7	11.138
5	7 54 15.01	2.5198	15 50 10.4	8.092	5	9 48 29.92	2.2459	7 53 30.3	11.158
6	7 56 46.03	2.5142	15 42 1.9	8.192	6	9 50 44.53	2.2409	7 42 18.2	11.217
7	7 59 16.71	2.5085	15 33 47.3	8.292	7	9 52 58.83	2.2358	7 31 4.3	11.245
8	8 1 47.05	2.5027	15 25 26.8	8.389	8	9 55 12.83	2.2309	7 19 48.8	11.271
9	8 4 17.03	2.4968	15 17 0.6	8.485	9	9 57 26.54	2.2260	7 8 31.8	11.296
10	8 6 46.67	2.4911	15 8 28.6	8.580	10	9 59 39.95	2.2212	6 57 13.3	11.319
11	8 9 15.96	2.4853	14 59 51.0	8.673	11	10 1 53.08	2.2163	6 45 53.5	11.342
12	8 11 44.90	2.4794	14 51 7.8	8.764	12	10 4 5.91	2.2116	6 34 32.3	11.363
13	8 14 13.49	2.4735	14 42 19.3	8.853	13	10 6 18.47	2.2069	6 23 9.9	11.383
14	8 16 41.72	2.4676	14 33 25.4	8.942	14	10 8 30.74	2.2023	6 11 46.3	11.403
15	8 19 9.60	2.4617	14 24 26.2	9.029	15	10 10 42.73	2.1976	6 0 21.6	11.420
16	8 21 37.12	2.4558	14 15 21.9	9.113	16	10 12 54.45	2.1931	5 48 55.9	11.436
17	8 24 4.29	2.4498	14 6 12.6	9.197	17	10 15 5.90	2.1887	5 37 29.3	11.451
18	8 26 31.10	2.4439	13 56 58.3	9.279	18	10 17 17.09	2.1842	5 26 1.8	11.465
19	8 28 57.56	2.4380	13 47 39.1	9.360	19	10 19 28.00	2.1798	5 14 33.5	11.478
20	8 31 23.66	2.4321	13 38 15.2	9.438	20	10 21 38.66	2.1755	5 3 4.5	11.490
21	8 33 49.41	2.4261	13 28 46.5	9.516	21	10 23 49.06	2.1712	4 51 34.7	11.501
22	8 36 14.79	2.4202	13 19 13.3	9.591	22	10 25 59.20	2.1670	4 40 4.4	11.509
23	8 38 39.83	2.4143	13 9 35.6	9.665	23	10 28 9.10	2.1628	4 28 33.6	11.515
24	8 41 4.60	2.4083	+12 59 53.5	-9.738	24	10 30 18.74	2.1587	+ 4 17 2.3	-11.522

GREENWICH MEAN TIME.

Hour.	Right Ascension.	Var. per Min.	Declination.	Var. per Min.	Hour.	Right Ascension.	Var. per Min.	Declination.	Var. per Min.
JUNE 21.					JUNE 23.				
0	h m s	s	° ' "	"	0	h m s	s	° ' "	"
0	10 30 18.74	2.1587	+4 17 2.3	-11.525	0	12 10 18.70	2.0201	-4 45 52.9	-10.764
1	10 32 28.14	2.1547	4 5 30.6	11.532	1	12 12 20.46	2.0208	4 56 37.7	10.720
2	10 34 37.90	2.1507	3 53 58.5	11.537	2	12 14 22.15	2.0215	5 7 20.4	10.694
3	10 36 46.22	2.1468	3 42 26.2	11.540	3	12 16 23.76	2.0223	5 18 1.0	10.658
4	10 38 54.91	2.1430	3 30 53.7	11.543	4	12 18 25.30	2.0232	5 28 39.3	10.610
5	10 41 3.37	2.1391	3 19 21.0	11.545	5	12 20 26.78	2.0241	5 39 15.3	10.563
6	10 43 11.60	2.1353	3 7 48.3	11.546	6	12 22 28.19	2.0250	5 49 49.1	10.543
7	10 45 19.60	2.1316	2 56 15.5	11.546	7	12 24 29.54	2.0260	6 0 20.5	10.508
8	10 47 27.39	2.1280	2 44 42.8	11.544	8	12 26 30.83	2.0271	6 10 49.5	10.468
9	10 49 34.96	2.1244	2 33 10.2	11.542	9	12 28 32.07	2.0282	6 21 16.1	10.423
10	10 51 42.32	2.1209	2 21 37.8	11.538	10	12 30 33.25	2.0293	6 31 40.3	10.383
11	10 53 49.47	2.1174	2 10 5.6	11.534	11	12 32 34.39	2.0305	6 42 1.9	10.340
12	10 55 56.41	2.1140	1 58 33.7	11.529	12	12 34 35.47	2.0317	6 52 21.1	10.296
13	10 58 3.15	2.1107	1 47 2.1	11.523	13	12 36 36.51	2.0331	7 2 37.6	10.254
14	11 0 9.69	2.1074	1 35 30.9	11.516	14	12 38 37.52	2.0344	7 12 51.6	10.211
15	11 2 16.04	2.1042	1 24 0.2	11.508	15	12 40 38.48	2.0357	7 23 2.9	10.167
16	11 4 22.19	2.1010	1 12 30.0	11.498	16	12 42 39.40	2.0372	7 33 11.6	10.123
17	11 6 28.16	2.0979	1 1 0.4	11.488	17	12 44 40.30	2.0387	7 43 17.5	10.078
18	11 8 33.94	2.0948	0 49 31.4	11.478	18	12 46 41.16	2.0402	7 53 20.7	10.030
19	11 10 39.54	2.0918	0 38 3.1	11.466	19	12 48 42.00	2.0418	8 3 21.1	9.983
20	11 12 44.96	2.0889	0 26 35.5	11.453	20	12 50 42.81	2.0433	8 13 18.6	9.936
21	11 14 50.21	2.0861	0 15 8.8	11.439	21	12 52 43.59	2.0449	8 23 13.4	9.888
22	11 16 55.29	2.0832	+0 3 42.8	11.425	22	12 54 44.36	2.0467	8 33 5.2	9.839
23	11 19 0.19	2.0804	-0 7 42.2	-11.409	23	12 56 45.11	2.0484	-8 42 54.1	-9.790
JUNE 22.					JUNE 24.				
0	h m s	s	° ' "	"	0	h m s	s	° ' "	"
0	11 21 4.94	2.0778	-0 19 6.8	-11.393	0	12 58 45.85	2.0122	-8 52 40.0	-9.741
1	11 23 9.62	2.0751	0 30 29.4	11.376	1	13 0 46.58	2.0130	9 2 23.0	9.691
2	11 25 13.95	2.0726	0 41 51.4	11.358	2	13 2 47.29	2.0138	9 12 2.0	9.639
3	11 27 18.23	2.0701	0 53 12.4	11.340	3	13 4 48.00	2.0148	9 21 39.7	9.588
4	11 29 22.36	2.0676	1 4 32.2	11.320	4	13 6 48.71	2.0158	9 31 13.5	9.537
5	11 31 26.34	2.0651	1 15 50.8	11.299	5	13 8 49.41	2.0167	9 40 44.1	9.484
6	11 33 30.17	2.0628	1 27 8.1	11.278	6	13 10 50.11	2.0177	9 50 11.6	9.431
7	11 35 33.87	2.0605	1 38 24.1	11.256	7	13 12 50.81	2.0188	9 59 35.8	9.378
8	11 37 37.43	2.0583	1 49 38.8	11.233	8	13 14 51.52	2.0199	10 8 56.9	9.323
9	11 39 40.86	2.0561	2 0 52.1	11.210	9	13 16 52.24	2.0210	10 18 14.6	9.268
10	11 41 44.16	2.0540	2 12 4.0	11.185	10	13 18 52.96	2.0221	10 27 29.1	9.214
11	11 43 47.34	2.0519	2 23 14.3	11.160	11	13 20 53.69	2.0233	10 36 40.3	9.158
12	11 45 50.39	2.0498	2 34 23.1	11.134	12	13 22 54.44	2.0245	10 45 48.1	9.101
13	11 47 53.32	2.0479	2 45 30.4	11.107	13	13 24 55.20	2.0258	10 54 52.4	9.044
14	11 49 56.14	2.0461	2 56 36.0	11.079	14	13 26 55.98	2.0272	11 3 53.4	8.987
15	11 51 58.85	2.0443	3 7 39.9	11.051	15	13 28 56.78	2.0285	11 12 50.9	8.930
16	11 54 1.45	2.0424	3 18 42.1	11.023	16	13 30 57.60	2.0299	11 21 45.0	8.873
17	11 56 3.94	2.0407	3 29 42.6	10.993	17	13 32 58.45	2.0313	11 30 35.5	8.813
18	11 58 6.33	2.0390	3 40 41.2	10.963	18	13 34 59.31	2.0327	11 39 22.5	8.753
19	12 0 8.62	2.0373	3 51 38.1	10.932	19	13 37 0.21	2.0342	11 48 5.9	8.693
20	12 2 10.81	2.0358	4 2 33.0	10.899	20	13 39 1.13	2.0357	11 56 45.6	8.633
21	12 4 12.91	2.0343	4 13 26.0	10.867	21	13 41 2.09	2.0372	12 5 21.8	8.573
22	12 6 14.93	2.0328	4 24 17.0	10.833	22	13 43 3.08	2.0388	12 13 54.2	8.510
23	12 8 16.85	2.0314	4 35 6.0	10.799	23	13 45 4.10	2.0403	12 22 23.0	8.446
24	12 10 18.70	2.0301	-4 45 52.9	-10.764	24	13 47 5.16	2.0419	-12 30 48.0	-8.386

GREENWICH MEAN TIME.

Hour.	Right Ascension.	Var. per Min.	Declination.	Var. per Min.	Hour.	Right Ascension.	Var. per Min.	Declination.	Var. per Min.
JUNE 25.					JUNE 27.				
	h m s	s	° ' "	"		h m s	s	° ' "	"
0	13 47 5.16	2.0179	-12 30 48.0	-8.386	0	15 25 0.72	2.0663	-17 52 31.3	-4.855
1	13 49 6.25	2.0186	12 39 9.3	8.323	1	15 27 4.73	2.0674	17 57 20.1	4.771
2	13 51 7.39	2.0193	12 47 26.8	8.259	2	15 29 8.81	2.0685	18 2 3.8	4.693
3	13 53 8.56	2.0199	12 55 40.4	8.195	3	15 31 12.95	2.0696	18 6 42.6	4.604
4	13 55 9.78	2.0207	13 3 50.2	8.131	4	15 33 17.16	2.0707	18 11 16.3	4.530
5	13 57 11.04	2.0213	13 11 56.1	8.066	5	15 35 21.43	2.0718	18 15 45.0	4.455
6	13 59 12.34	2.0221	13 19 58.1	8.001	6	15 37 25.77	2.0728	18 20 8.5	4.380
7	14 1 13.69	2.0229	13 27 56.2	7.935	7	15 39 30.17	2.0739	18 24 26.9	4.305
8	14 3 15.09	2.0238	13 35 50.3	7.868	8	15 41 34.64	2.0749	18 28 40.3	4.230
9	14 5 16.54	2.0246	13 43 40.4	7.802	9	15 43 39.16	2.0760	18 32 48.4	4.155
10	14 7 18.04	2.0244	13 51 26.5	7.734	10	15 45 43.75	2.0770	18 36 51.5	4.080
11	14 9 19.59	2.0263	13 59 8.5	7.666	11	15 47 48.40	2.0780	18 40 49.3	4.005
12	14 11 21.19	2.0272	14 6 46.4	7.598	12	15 49 53.11	2.0790	18 44 41.9	3.934
13	14 13 22.85	2.0281	14 14 20.3	7.530	13	15 51 57.87	2.0799	18 48 29.4	3.864
14	14 15 24.56	2.0290	14 21 50.0	7.460	14	15 54 2.70	2.0809	18 52 11.6	3.789
15	14 17 26.33	2.0300	14 29 15.5	7.391	15	15 56 7.58	2.0818	18 55 48.5	3.717
16	14 19 28.16	2.0309	14 36 36.9	7.321	16	15 58 12.52	2.0828	18 59 20.2	3.644
17	14 21 30.04	2.0318	14 43 54.0	7.249	17	16 0 17.51	2.0837	19 2 46.6	3.569
18	14 23 31.98	2.0329	14 51 6.8	7.178	18	16 2 22.56	2.0846	19 6 7.7	3.494
19	14 25 33.99	2.0339	14 58 15.4	7.107	19	16 4 27.66	2.0854	19 9 23.5	3.419
20	14 27 36.05	2.0349	15 5 19.7	7.036	20	16 6 32.81	2.0863	19 12 34.0	3.344
21	14 29 38.18	2.0360	15 12 19.7	6.963	21	16 8 38.01	2.0871	19 15 39.2	3.269
22	14 31 40.37	2.0370	15 19 15.3	6.891	22	16 10 43.26	2.0879	19 18 39.0	3.194
23	14 33 42.62	2.0381	-15 26 6.6	-6.818	23	16 12 48.56	2.0888	-19 21 33.4	-3.119
JUNE 26.					JUNE 28.				
0	14 35 44.94	2.0392	-15 32 53.4	-6.743	0	16 14 53.91	2.0896	-19 24 22.5	-3.044
1	14 37 47.32	2.0402	15 39 35.8	6.669	1	16 16 59.31	2.0906	19 27 6.2	2.969
2	14 39 49.76	2.0413	15 46 13.7	6.595	2	16 19 4.74	2.0909	19 29 44.4	2.894
3	14 41 52.27	2.0424	15 52 47.2	6.520	3	16 21 10.22	2.0917	19 32 17.3	2.819
4	14 43 54.85	2.0436	15 59 16.1	6.445	4	16 23 15.75	2.0924	19 34 44.7	2.744
5	14 45 57.50	2.0447	16 5 40.6	6.369	5	16 25 21.31	2.0930	19 37 6.7	2.669
6	14 48 0.21	2.0458	16 12 0.4	6.293	6	16 27 26.91	2.0937	19 39 23.3	2.594
7	14 50 2.99	2.0469	16 18 15.7	6.217	7	16 29 32.55	2.0943	19 41 34.4	2.519
8	14 52 5.84	2.0480	16 24 26.4	6.140	8	16 31 38.22	2.0948	19 43 40.0	2.444
9	14 54 8.75	2.0491	16 30 32.4	6.062	9	16 33 43.93	2.0954	19 45 40.1	2.369
10	14 56 11.73	2.0503	16 36 33.8	5.984	10	16 35 49.67	2.0960	19 47 34.8	2.294
11	14 58 14.79	2.0515	16 42 30.5	5.906	11	16 37 55.44	2.0964	19 49 24.0	2.219
12	15 0 17.91	2.0526	16 48 22.5	5.827	12	16 40 1.24	2.0969	19 51 7.6	2.144
13	15 2 21.10	2.0538	16 54 9.7	5.748	13	16 42 7.07	2.0974	19 52 45.8	2.069
14	15 4 24.36	2.0549	16 59 52.3	5.669	14	16 44 12.93	2.0978	19 54 18.4	1.994
15	15 6 27.69	2.0560	17 5 30.0	5.589	15	16 46 18.81	2.0983	19 55 45.6	1.919
16	15 8 31.08	2.0572	17 11 3.0	5.509	16	16 48 24.72	2.0987	19 57 7.2	1.844
17	15 10 34.55	2.0583	17 16 31.1	5.428	17	16 50 30.65	2.0990	19 58 23.2	1.769
18	15 12 38.08	2.0595	17 21 54.4	5.348	18	16 52 36.59	2.0992	19 59 33.7	1.694
19	15 14 41.69	2.0607	17 27 12.8	5.267	19	16 54 42.56	2.0996	20 0 38.7	1.619
20	15 16 45.36	2.0618	17 32 26.4	5.185	20	16 56 48.54	2.0998	20 1 38.1	1.544
21	15 18 49.10	2.0628	17 37 35.0	5.103	21	16 58 54.53	2.1000	20 2 32.0	1.469
22	15 20 52.90	2.0640	17 42 38.7	5.021	22	17 1 0.54	2.1002	20 3 20.3	1.394
23	15 22 56.78	2.0652	17 47 37.5	4.938	23	17 3 6.56	2.1004	20 4 3.0	1.319
24	15 25 0.72	2.0663	-17 52 31.3	-4.855	24	17 5 12.59	2.1006	-20 4 40.2	-3.073

GREENWICH MEAN TIME.

Hour.	Right Ascension.	Var. per Min.	Declination.	Var. per Min.	Hour.	Right Ascension.	Var. per Min.	Declination.	Var. per Min.
JUNE 29.					JULY 1.				
	h m s	s	° ' "	"		h m s	s	° ' "	"
0	17 5 12.59	2.1006	-20 4 40.2	-0.873	0	18 45 37.43	2.0726	-18 46 15.7	+3.785
1	17 7 18.63	2.1007	20 5 11.8	0.489	1	18 47 41.74	2.0712	18 42 26.0	2.871
2	17 9 24.67	2.1007	20 5 37.8	0.263	2	18 49 45.98	2.0700	18 38 31.2	2.956
3	17 11 30.71	2.1008	20 5 58.3	0.206	3	18 51 50.14	2.0688	18 34 31.3	4.041
4	17 13 36.76	2.1008	20 6 13.2	0.202	4	18 53 54.23	2.0675	18 30 26.3	4.126
5	17 15 42.81	2.1008	20 6 22.5	0.109	5	18 55 58.24	2.0663	18 26 16.2	4.210
6	17 17 48.85	2.1007	20 6 26.3	-0.816	6	18 58 2.17	2.0649	18 22 1.1	4.293
7	17 19 54.89	2.1007	20 6 24.4	+0.077	7	19 0 6.03	2.0636	18 17 41.0	4.378
8	17 22 0.93	2.1008	20 6 17.0	0.169	8	19 2 9.80	2.0622	18 13 15.8	4.462
9	17 24 6.96	2.1004	20 6 4.1	0.262	9	19 4 13.49	2.0608	18 8 45.6	4.544
10	17 26 12.98	2.1008	20 5 45.5	0.266	10	19 6 17.30	2.0594	18 4 10.5	4.627
11	17 28 18.99	2.1001	20 5 21.4	0.448	11	19 8 20.62	2.0580	17 59 30.4	4.709
12	17 30 24.99	2.0996	20 4 51.7	0.543	12	19 10 24.06	2.0567	17 54 45.4	4.791
13	17 32 30.97	2.0996	20 4 16.4	0.684	13	19 12 27.42	2.0553	17 49 55.5	4.872
14	17 34 36.93	2.0998	20 3 35.6	0.780	14	19 14 30.69	2.0538	17 45 0.7	4.953
15	17 36 42.88	2.0999	20 2 49.3	0.819	15	19 16 33.88	2.0524	17 40 1.1	5.034
16	17 38 48.81	2.0987	20 1 57.3	0.912	16	19 18 36.98	2.0509	17 34 56.6	5.114
17	17 40 54.72	2.0983	20 0 59.9	1.008	17	19 20 39.99	2.0494	17 29 47.4	5.194
18	17 43 0.60	2.0978	19 59 56.9	1.097	18	19 22 42.91	2.0480	17 24 33.3	5.274
19	17 45 6.45	2.0973	19 58 48.3	1.183	19	19 24 45.75	2.0466	17 19 14.5	5.353
20	17 47 12.28	2.0969	19 57 34.3	1.260	20	19 26 48.50	2.0450	17 13 51.0	5.431
21	17 49 18.08	2.0964	19 56 14.7	1.373	21	19 28 51.15	2.0435	17 8 22.8	5.509
22	17 51 23.85	2.0959	19 54 49.8	1.464	22	19 30 53.72	2.0421	17 2 49.9	5.588
23	17 53 29.59	2.0953	-19 53 19.0	+1.556	23	19 32 56.20	2.0405	-16 57 12.3	+5.665
JUNE 30.					JULY 2.				
0	17 55 35.29	2.0947	-19 51 42.9	+1.545	0	19 34 58.68	2.0390	-16 51 30.1	+5.742
1	17 57 40.96	2.0941	19 50 1.3	1.730	1	19 37 0.87	2.0375	16 45 43.3	5.818
2	17 59 46.58	2.0934	19 48 14.2	1.830	2	19 39 3.08	2.0360	16 39 51.9	5.895
3	18 1 52.16	2.0928	19 46 21.7	1.921	3	19 41 5.19	2.0344	16 33 55.9	5.970
4	18 3 57.71	2.0921	19 44 23.7	2.012	4	19 43 7.21	2.0328	16 27 55.5	6.046
5	18 6 3.21	2.0912	19 42 20.2	2.108	5	19 45 9.13	2.0312	16 21 50.5	6.120
6	18 8 8.67	2.0906	19 40 11.3	2.198	6	19 47 10.97	2.0296	16 15 41.1	6.193
7	18 10 14.08	2.0898	19 37 57.0	2.284	7	19 49 12.71	2.0280	16 9 27.3	6.268
8	18 12 19.44	2.0890	19 35 37.2	2.374	8	19 51 14.36	2.0263	16 3 9.0	6.341
9	18 14 24.75	2.0882	19 33 12.1	2.463	9	19 53 15.92	2.0246	15 56 46.4	6.412
10	18 16 30.01	2.0873	19 30 41.6	2.554	10	19 55 17.39	2.0229	15 50 19.4	6.486
11	18 18 35.22	2.0864	19 28 5.6	2.643	11	19 57 18.76	2.0212	15 43 48.1	6.558
12	18 20 40.38	2.0854	19 25 24.4	2.732	12	19 59 20.05	2.0195	15 37 12.5	6.629
13	18 22 45.47	2.0844	19 22 87.7	2.822	13	20 1 21.24	2.0179	15 30 32.6	6.700
14	18 24 50.51	2.0835	19 19 45.7	2.911	14	20 3 22.34	2.0170	15 23 48.5	6.770
15	18 26 55.49	2.0825	19 16 48.4	2.999	15	20 5 23.35	2.0160	15 17 0.3	6.840
16	18 29 0.41	2.0815	19 13 45.8	3.088	16	20 7 24.26	2.0145	15 10 7.8	6.910
17	18 31 5.27	2.0805	19 10 37.9	3.176	17	20 9 25.09	2.0129	15 3 11.1	6.978
18	18 33 10.07	2.0794	19 7 24.7	3.264	18	20 11 25.83	2.0115	14 56 10.4	7.046
19	18 35 14.80	2.0783	19 4 6.2	3.352	19	20 13 26.47	2.0100	14 49 5.6	7.114
20	18 37 19.46	2.0772	19 0 42.5	3.438	20	20 15 27.03	2.0086	14 41 56.7	7.181
21	18 39 24.06	2.0761	18 57 13.6	3.525	21	20 17 27.49	2.0070	14 34 43.9	7.248
22	18 41 28.59	2.0748	18 53 39.5	3.612	22	20 19 27.87	2.0055	14 27 27.0	7.315
23	18 43 33.04	2.0737	18 50 0.2	3.698	23	20 21 28.16	2.0040	14 20 6.1	7.380
24	18 45 37.43	2.0725	-18 46 15.7	+3.785	24	20 23 28.37	2.0027	-14 12 41.4	+7.445

GREENWICH MEAN TIME.

Hour.	Right Ascension.	Var. per Min.	Declination.	Var. per Min.	Hour.	Right Ascension.	Var. per Min.	Declination.	Var. per Min.
JULY 3.					JULY 5.				
	h m s	s	° ' "	"		h m s	s	° ' "	"
0	20 23 28.37	2.0027	-14 12 41.4	+7.445	0	21 58 17.91	1.9687	-7 10 45.2	+ 9.913
1	20 25 28.48	2.0012	14 5 12.7	7.510	1	22 0 15.42	1.9685	7 0 49.3	9.936
2	20 27 28.51	1.9998	13 57 40.2	7.574	2	22 2 12.93	1.9684	6 50 51.2	9.967
3	20 29 28.46	1.9984	13 50 3.8	7.637	3	22 4 10.43	1.9684	6 40 50.9	10.023
4	20 31 28.32	1.9970	13 42 23.7	7.700	4	22 6 7.94	1.9684	6 30 48.5	10.068
5	20 33 28.10	1.9957	13 34 39.8	7.763	5	22 8 5.44	1.9683	6 20 44.0	10.088
6	20 35 27.80	1.9943	13 26 52.1	7.826	6	22 10 2.94	1.9684	6 10 37.4	10.126
7	20 37 27.42	1.9929	18 19 0.7	7.887	7	22 12 0.45	1.9683	6 0 28.9	10.158
8	20 39 26.95	1.9916	13 11 5.7	7.947	8	22 13 57.97	1.9683	5 50 18.4	10.193
9	20 41 26.41	1.9903	13 3 7.1	8.008	9	22 15 55.50	1.9683	5 40 5.9	10.223
10	20 43 25.78	1.9889	12 55 4.8	8.068	10	22 17 53.04	1.9682	5 29 51.6	10.254
11	20 45 25.08	1.9877	12 46 58.9	8.127	11	22 19 50.60	1.9682	5 19 35.4	10.285
12	20 47 24.30	1.9864	12 38 49.6	8.185	12	22 21 48.13	1.9682	5 9 17.4	10.315
13	20 49 23.45	1.9852	12 30 36.7	8.244	13	22 23 45.77	1.9681	4 58 57.6	10.345
14	20 51 22.52	1.9839	12 22 20.3	8.302	14	22 25 43.39	1.9681	4 48 36.0	10.373
15	20 53 21.52	1.9826	12 14 0.5	8.360	15	22 27 41.04	1.9610	4 38 12.3	10.401
16	20 55 20.45	1.9814	12 5 37.4	8.414	16	22 29 38.71	1.9615	4 27 47.9	10.429
17	20 57 19.31	1.9804	11 57 10.8	8.471	17	22 31 36.42	1.9621	4 17 21.3	10.455
18	20 59 18.10	1.9793	11 48 40.9	8.526	18	22 33 34.16	1.9627	4 6 53.3	10.481
19	21 1 16.82	1.9782	11 40 7.7	8.581	19	22 35 31.94	1.9633	3 56 23.6	10.507
20	21 3 15.48	1.9771	11 31 31.2	8.635	20	22 37 29.76	1.9641	3 45 52.4	10.533
21	21 5 14.07	1.9760	11 22 51.5	8.688	21	22 39 27.63	1.9648	3 35 19.3	10.559
22	21 7 12.60	1.9749	11 14 8.6	8.741	22	22 41 25.54	1.9654	3 24 45.7	10.579
23	21 9 11.06	1.9738	-11 5 22.6	+8.793	23	22 43 23.50	1.9661	-3 14 10.3	+10.603
JULY 4.					JULY 6.				
0	21 11 9.47	1.9728	-10 56 33.4	+8.846	0	22 45 21.51	1.9668	-3 3 33.5	+10.623
1	21 13 7.82	1.9720	10 47 41.1	8.906	1	22 47 19.58	1.9668	2 52 55.4	10.645
2	21 15 6.11	1.9711	10 38 45.7	8.968	2	22 49 17.70	1.9668	2 42 16.0	10.667
3	21 17 4.35	1.9702	10 29 47.4	9.030	3	22 51 15.89	1.9668	2 31 35.4	10.687
4	21 19 2.53	1.9693	10 20 46.0	9.093	4	22 53 14.14	1.9713	2 20 53.6	10.706
5	21 21 0.66	1.9685	10 11 41.7	9.157	5	22 55 12.45	1.9725	2 10 10.7	10.724
6	21 22 58.75	1.9677	10 2 34.4	9.220	6	22 57 10.84	1.9738	1 59 26.7	10.743
7	21 24 56.78	1.9668	9 53 24.3	9.283	7	22 59 9.30	1.9750	1 48 41.6	10.760
8	21 26 54.76	1.9661	9 44 11.3	9.346	8	23 1 7.84	1.9763	1 37 55.5	10.776
9	21 28 52.71	1.9654	9 34 55.5	9.407	9	23 3 6.46	1.9777	1 27 8.5	10.792
10	21 30 50.61	1.9647	9 25 36.9	9.468	10	23 5 5.16	1.9791	1 16 20.5	10.808
11	21 32 48.47	1.9640	9 16 15.6	9.528	11	23 7 3.95	1.9805	1 5 31.6	10.823
12	21 34 46.29	1.9633	9 6 51.6	9.588	12	23 9 2.83	1.9821	0 54 41.3	10.838
13	21 36 44.07	1.9626	8 57 24.9	9.647	13	23 11 1.80	1.9836	0 43 51.3	10.853
14	21 38 41.82	1.9620	8 47 55.6	9.711	14	23 13 0.86	1.9853	0 33 0.0	10.868
15	21 40 39.54	1.9613	8 38 23.6	9.774	15	23 15 0.03	1.9870	0 22 8.0	10.873
16	21 42 37.23	1.9613	8 28 49.1	9.836	16	23 16 59.30	1.9887	0 11 15.3	10.884
17	21 44 34.89	1.9608	8 19 12.1	9.898	17	23 18 58.67	1.9904	-0 0 21.9	10.894
18	21 46 32.52	1.9603	8 9 32.6	9.970	18	23 20 58.15	1.9923	+0 10 32.0	10.908
19	21 48 30.13	1.9600	7 59 50.6	9.990	19	23 22 57.74	1.9943	0 21 26.5	10.912
20	21 50 27.72	1.9597	7 50 6.2	9.990	20	23 24 57.45	1.9963	0 32 21.4	10.919
21	21 52 25.29	1.9593	7 40 19.4	9.990	21	23 26 57.28	1.9983	0 43 16.3	10.927
22	21 54 22.84	1.9591	7 30 30.3	9.988	22	23 28 57.23	2.0003	0 54 12.7	10.934
23	21 56 20.38	1.9589	7 20 38.9	9.976	23	23 30 57.31	2.0024	1 5 8.9	10.939
24	21 58 17.91	1.9587	- 7 10 45.2	+9.913	24	23 32 57.52	2.0045	+1 16 5.4	+10.943

GREENWICH MEAN TIME.

Hour.	Right Ascension.	Var. per Min.	Declination.	Var. per Min.	Hour.	Right Ascension.	Var. per Min.	Declination.	Var. per Min.
JULY 7.					JULY 9.				
0	h m s	s	° ' "	"	0	h m s	s	° ' "	"
0	23 32 57.52	2.0066	+1 16 5.4	+10.943	0	1 12 45.42	2.1751	+ 9 51 4.5	+10.159
1	23 34 57.86	2.0068	1 27 2.1	10.945	1	1 14 56.07	2.1800	10 1 12.8	10.118
2	23 36 58.33	2.0070	1 37 59.1	10.952	2	1 17 7.02	2.1849	10 11 18.7	10.077
3	23 38 58.94	2.0122	1 48 56.3	10.954	3	1 19 18.27	2.1900	10 21 22.0	10.033
4	23 40 59.69	2.0126	1 59 53.6	10.956	4	1 21 29.82	2.1950	10 31 22.7	9.990
5	23 43 0.50	2.0128	2 10 51.0	10.958	5	1 23 41.67	2.2000	10 41 20.8	9.945
6	23 45 1.64	2.0130	2 21 48.5	10.960	6	1 25 53.82	2.2050	10 51 16.1	9.909
7	23 47 2.84	2.0222	2 32 45.9	10.966	7	1 28 6.28	2.2102	11 1 8.7	9.863
8	23 49 4.19	2.0220	2 43 43.2	10.965	8	1 30 19.05	2.2154	11 10 58.3	9.803
9	23 51 5.71	2.0227	2 54 40.5	10.963	9	1 32 32.13	2.2207	11 20 45.0	9.758
10	23 53 7.39	2.0228	3 5 37.6	10.960	10	1 34 45.53	2.2259	11 30 28.7	9.703
11	23 55 9.23	2.0222	3 16 34.4	10.966	11	1 36 59.24	2.2312	11 40 9.3	9.651
12	23 57 11.25	2.0220	3 27 31.1	10.962	12	1 39 13.27	2.2366	11 49 46.8	9.598
13	23 59 13.43	2.0220	3 38 27.4	10.955	13	1 41 27.63	2.2420	11 59 21.0	9.543
14	0 1 15.80	2.0220	3 49 23.3	10.929	14	1 43 42.31	2.2474	12 8 52.0	9.486
15	0 3 18.34	2.0220	4 0 18.9	10.922	15	1 45 57.32	2.2528	12 18 19.5	9.430
16	0 5 21.07	2.0470	4 11 14.0	10.913	16	1 48 12.65	2.2583	12 27 43.6	9.373
17	0 7 23.98	2.0501	4 22 8.5	10.904	17	1 50 28.32	2.2638	12 37 4.2	9.313
18	0 9 27.08	2.0523	4 33 2.5	10.895	18	1 52 44.31	2.2693	12 46 21.2	9.253
19	0 11 30.38	2.0567	4 43 55.9	10.884	19	1 55 0.64	2.2750	12 55 34.5	9.190
20	0 13 33.88	2.0620	4 54 48.6	10.873	20	1 57 17.31	2.2806	13 4 44.0	9.127
21	0 15 37.57	2.0632	5 5 40.6	10.861	21	1 59 34.31	2.2863	13 13 49.7	9.063
22	0 17 41.47	2.0663	5 16 31.9	10.846	22	2 1 51.66	2.2920	13 22 51.6	8.996
23	0 19 45.58	2.0708	+5 27 22.3	+10.833	23	2 4 9.34	2.2976	+13 31 49.5	+ 8.931
JULY 8.					JULY 10.				
0	0 21 49.89	2.0727	+5 38 11.8	+10.817	0	2 6 27.37	2.3033	+13 40 43.3	+ 8.863
1	0 23 54.42	2.0778	5 49 0.3	10.801	1	2 8 45.74	2.3091	13 49 33.0	8.793
2	0 25 59.17	2.0831	5 59 47.9	10.784	2	2 11 4.46	2.3148	13 58 18.5	8.723
3	0 28 4.15	2.0882	6 10 34.4	10.766	3	2 13 23.52	2.3206	14 6 59.7	8.651
4	0 30 9.34	2.0885	6 21 19.8	10.748	4	2 15 42.93	2.3264	14 15 36.6	8.577
5	0 32 14.76	2.0928	6 32 4.1	10.728	5	2 18 2.69	2.3322	14 24 9.0	8.503
6	0 34 20.42	2.0982	6 42 47.1	10.707	6	2 20 22.80	2.3381	14 32 36.9	8.427
7	0 36 26.31	2.1001	6 53 28.9	10.685	7	2 22 43.26	2.3439	14 41 0.2	8.350
8	0 38 32.43	2.1041	7 4 9.3	10.663	8	2 25 4.07	2.3498	14 49 18.9	8.272
9	0 40 38.80	2.1082	7 14 48.3	10.638	9	2 27 25.23	2.3557	14 57 32.8	8.192
10	0 42 45.41	2.1123	7 25 25.8	10.613	10	2 29 46.75	2.3616	15 5 41.9	8.110
11	0 44 52.27	2.1164	7 36 1.9	10.587	11	2 32 8.62	2.3674	15 13 46.0	8.028
12	0 46 59.38	2.1205	7 46 36.3	10.560	12	2 34 30.84	2.3733	15 21 45.2	7.945
13	0 49 6.74	2.1249	7 57 9.1	10.533	13	2 36 53.41	2.3792	15 29 39.4	7.860
14	0 51 14.37	2.1293	8 7 40.3	10.504	14	2 39 16.34	2.3851	15 37 28.4	7.773
15	0 53 22.25	2.1335	8 18 9.6	10.473	15	2 41 39.62	2.3910	15 45 12.1	7.685
16	0 55 30.39	2.1380	8 28 37.1	10.443	16	2 44 3.26	2.3969	15 52 50.6	7.597
17	0 57 38.81	2.1425	8 39 2.8	10.412	17	2 46 27.25	2.4028	16 0 23.7	7.506
18	0 59 47.49	2.1469	8 49 26.5	10.378	18	2 48 51.59	2.4087	16 7 51.3	7.414
19	1 1 56.44	2.1513	8 59 48.2	10.345	19	2 51 16.29	2.4146	16 15 13.4	7.322
20	1 4 5.87	2.1568	9 10 7.9	10.310	20	2 53 41.33	2.4205	16 22 29.9	7.228
21	1 6 15.18	2.1609	9 20 25.4	10.273	21	2 56 6.73	2.4263	16 29 40.7	7.132
22	1 8 24.98	2.1657	9 30 40.7	10.236	22	2 58 32.47	2.4320	16 36 45.7	7.034
23	1 10 35.06	2.1705	9 40 53.7	10.198	23	3 0 58.57	2.4379	16 43 44.8	6.936
24	1 12 45.42	2.1761	+9 51 4.5	+10.159	24	3 3 25.02	2.4437	+16 50 38.0	+ 6.837

## GREENWICH MEAN TIME.

Hour.	Right Ascension.			Var. per Min.	Declination.			Var. per Min.	Hour.	Right Ascension.			Var. per Min.	Declination.			Var. per Min.
JULY 11.									JULY 13.								
	h	m	s	s	°	'	"	"		h	m	s	s	°	'	"	"
0	3	3	25.02	2.4437	+16	50	38.0	+0.637	0	5	6	29.00	2.6540	+20	1	17.4	+0.718
1	3	5	51.81	2.4494	16	57	25.2	0.736	1	5	9	8.36	2.6579	20	1	56.1	0.572
2	3	8	18.95	2.4553	17	4	6.3	0.633	2	5	11	47.84	2.6599	20	2	26.0	0.424
3	3	10	46.44	2.4610	17	10	41.2	0.530	3	5	14	27.43	2.6608	20	2	46.9	0.274
4	3	13	14.27	2.4667	17	17	9.9	0.426	4	5	17	7.14	2.6626	20	2	58.9	+0.126
5	3	15	42.44	2.4723	17	23	32.3	0.319	5	5	19	46.94	2.6642	20	3	2.0	-0.022
6	3	18	10.95	2.4779	17	29	48.2	0.212	6	5	22	26.84	2.6657	20	2	56.1	0.174
7	3	20	39.79	2.4835	17	35	57.7	0.108	7	5	25	6.82	2.6671	20	2	41.2	0.328
8	3	23	8.97	2.4891	17	42	0.6	0.003	8	5	27	46.89	2.6683	20	2	17.4	0.473
9	3	25	38.48	2.4947	17	47	56.9	0.893	9	5	30	27.02	2.6694	20	1	44.5	0.622
10	3	28	8.33	2.5002	17	53	46.5	0.770	10	5	33	7.22	2.6704	20	1	2.7	0.773
11	3	30	38.50	2.5056	17	59	29.3	0.656	11	5	35	47.47	2.6713	20	0	11.8	0.923
12	3	33	9.00	2.5110	18	5	5.2	0.541	12	5	38	27.77	2.6720	19	59	12.0	1.072
13	3	35	39.82	2.5163	18	10	34.2	0.426	13	5	41	8.11	2.6726	19	58	3.1	1.222
14	3	38	10.96	2.5216	18	15	56.2	0.308	14	5	43	48.48	2.6731	19	56	45.2	1.373
15	3	40	42.41	2.5268	18	21	11.2	0.190	15	5	46	28.88	2.6734	19	55	18.3	1.523
16	3	43	14.18	2.5321	18	26	19.0	0.069	16	5	49	9.29	2.6736	19	53	42.4	1.674
17	3	45	46.26	2.5373	18	31	19.5	0.948	17	5	51	49.71	2.6737	19	51	57.4	1.824
18	3	48	18.64	2.5423	18	36	12.8	0.827	18	5	54	30.13	2.6738	19	50	3.5	1.973
19	3	50	51.32	2.5473	18	40	58.7	0.703	19	5	57	10.54	2.6734	19	48	0.6	2.122
20	3	53	24.30	2.5522	18	45	37.2	0.579	20	5	59	50.94	2.6731	19	45	48.8	2.273
21	3	55	57.58	2.5571	18	50	8.2	0.453	21	6	2	31.31	2.6727	19	43	28.0	2.421
22	3	58	31.15	2.5618	18	54	31.6	0.327	22	6	5	11.66	2.6723	19	40	58.3	2.569
23	4	1	5.00	2.5666	+18	58	47.4	+0.199	23	6	7	51.97	2.6714	+19	38	19.6	-2.718
JULY 12.									JULY 14.								
0	4	3	39.14	2.5713	+19	2	55.5	+0.071	0	6	10	32.23	2.6706	+19	35	32.1	-2.866
1	4	6	13.55	2.5758	19	6	55.9	0.941	1	6	13	12.44	2.6696	19	32	35.7	3.014
2	4	8	48.24	2.5803	19	10	48.4	0.810	2	6	15	52.58	2.6685	19	29	30.4	3.162
3	4	11	23.19	2.5847	19	14	33.1	0.678	3	6	18	32.66	2.6673	19	26	16.8	3.308
4	4	13	58.40	2.5890	19	18	9.8	0.545	4	6	21	12.66	2.6660	19	22	53.4	3.454
5	4	16	33.87	2.5933	19	21	38.5	0.412	5	6	23	52.58	2.6646	19	19	21.8	3.599
6	4	19	9.60	2.5975	19	24	59.2	0.278	6	6	26	32.41	2.6632	19	15	41.5	3.744
7	4	21	45.57	2.6015	19	28	11.8	0.142	7	6	29	12.14	2.6618	19	11	52.5	3.888
8	4	24	21.78	2.6055	19	31	16.2	0.005	8	6	31	51.77	2.6604	19	7	54.9	4.032
9	4	26	58.23	2.6093	19	34	12.4	0.868	9	6	34	31.29	2.6576	19	3	48.6	4.176
10	4	29	34.90	2.6131	19	37	0.3	0.729	10	6	37	10.68	2.6555	18	59	33.8	4.318
11	4	32	11.80	2.6168	19	39	39.9	0.591	11	6	39	49.95	2.6534	18	55	10.5	4.459
12	4	34	48.92	2.6204	19	42	11.2	0.451	12	6	42	29.09	2.6512	18	50	38.7	4.601
13	4	37	26.25	2.6239	19	44	34.0	0.309	13	6	45	8.09	2.6488	18	45	58.4	4.741
14	4	40	3.79	2.6273	19	46	48.3	0.168	14	6	47	46.94	2.6463	18	41	9.8	4.879
15	4	42	41.52	2.6306	19	48	54.1	0.026	15	6	50	25.64	2.6437	18	36	12.9	5.018
16	4	45	19.45	2.6337	19	50	51.4	1.883	16	6	53	4.18	2.6409	18	31	7.7	5.155
17	4	47	57.56	2.6367	19	52	40.1	1.740	17	6	55	42.55	2.6381	18	25	54.8	5.291
18	4	50	35.85	2.6397	19	54	20.2	1.596	18	6	58	20.75	2.6352	18	20	32.8	5.427
19	4	53	14.32	2.6425	19	55	51.6	1.451	19	7	0	58.77	2.6322	18	15	3.1	5.562
20	4	55	52.95	2.6452	19	57	14.3	1.306	20	7	3	36.61	2.6291	18	9	25.4	5.694
21	4	58	31.74	2.6478	19	58	28.3	1.160	21	7	6	14.26	2.6258	18	3	39.8	5.826
22	5	1	10.68	2.6503	19	59	33.5	1.013	22	7	8	51.71	2.6225	17	57	46.3	5.958
23	5	3	49.77	2.6527	20	0	29.9	0.866	23	7	11	28.96	2.6191	17	51	44.9	6.088
24	5	6	29.00	2.6549	+20	1	17.4	+0.718	24	7	14	6.00	2.6156	+17	45	35.7	-6.218



GREENWICH MEAN TIME.

Hour.	Right Ascension.	Var. per Min.	Declination.	Var. per Min.	Hour.	Right Ascension.	Var. per Min.	Declination.	Var. per Min.
JULY 15.					JULY 17.				
0	7 14 6.00	2.6156	+17 45 35.7	-6.218	0	9 14 25.29	2.2948	+10 44 34.5	-10.742
1	7 16 42.83	2.6130	17 39 18.8	6.245	1	9 16 48.19	2.2790	10 33 48.3	10.798
2	7 19 19.44	2.6083	17 32 54.3	6.472	2	9 19 10.77	2.2738	10 22 58.7	10.853
3	7 21 55.83	2.6046	17 26 22.2	6.898	3	9 21 33.04	2.2696	10 12 5.9	10.906
4	7 24 31.99	2.6008	17 19 42.6	6.722	4	9 23 55.00	2.2654	10 1 10.0	10.957
5	7 27 7.92	2.5988	17 12 55.6	6.944	5	9 26 16.65	2.2622	9 50 11.1	11.006
6	7 29 43.61	2.5938	17 6 1.3	6.966	6	9 28 37.98	2.2590	9 39 9.3	11.054
7	7 32 19.06	2.5898	16 58 59.7	7.067	7	9 30 59.01	2.2479	9 28 4.6	11.102
8	7 34 54.26	2.5846	16 51 51.0	7.205	8	9 33 19.73	2.2428	9 16 57.1	11.147
9	7 37 29.21	2.5808	16 44 35.1	7.322	9	9 35 40.14	2.2376	9 5 47.0	11.190
10	7 40 3.90	2.5761	16 37 12.2	7.440	10	9 38 0.24	2.2326	8 54 34.3	11.232
11	7 42 38.34	2.5718	16 29 42.3	7.555	11	9 40 20.05	2.2276	8 43 19.2	11.273
12	7 45 12.51	2.5673	16 22 5.6	7.668	12	9 42 39.55	2.2226	8 32 1.6	11.312
13	7 47 46.41	2.5628	16 14 22.1	7.781	13	9 44 58.75	2.2176	8 20 41.8	11.348
14	7 50 20.04	2.5583	16 6 31.9	7.892	14	9 47 17.65	2.2126	8 9 19.8	11.385
15	7 52 53.40	2.5537	15 58 35.1	8.001	15	9 49 36.26	2.2076	7 57 55.6	11.420
16	7 55 26.48	2.5490	15 50 31.8	8.108	16	9 51 54.58	2.2026	7 46 29.4	11.453
17	7 57 59.27	2.5443	15 42 22.1	8.215	17	9 54 12.60	2.1976	7 35 1.3	11.484
18	8 0 31.79	2.5395	15 34 6.0	8.321	18	9 56 30.32	2.1926	7 23 31.3	11.514
19	8 3 4.01	2.5347	15 25 43.6	8.424	19	9 58 47.76	2.1878	7 11 59.6	11.543
20	8 5 35.95	2.5299	15 17 15.1	8.525	20	10 1 4.92	2.1830	7 0 26.2	11.570
21	8 8 7.60	2.5250	15 8 40.6	8.626	21	10 3 21.79	2.1782	6 48 51.2	11.596
22	8 10 38.95	2.5200	15 0 0.0	8.726	22	10 5 38.37	2.1741	6 37 14.7	11.620
23	8 13 10.00	2.5150	+14 51 13.5	-8.823	23	10 7 54.68	2.1695	+ 6 25 36.8	-11.643
JULY 16.					JULY 18.				
0	8 15 40.75	2.5100	+14 42 21.3	-8.918	0	10 10 10.71	2.1648	+ 6 13 57.5	-11.665
1	8 18 11.20	2.5049	14 33 23.3	9.013	1	10 12 26.46	2.1603	6 2 17.0	11.685
2	8 20 41.34	2.4999	14 24 19.7	9.106	2	10 14 41.94	2.1558	5 50 35.3	11.704
3	8 23 11.18	2.4948	14 15 10.6	9.197	3	10 16 57.16	2.1512	5 38 52.5	11.722
4	8 25 40.72	2.4898	14 5 56.1	9.286	4	10 19 12.10	2.1468	5 27 8.7	11.738
5	8 28 9.94	2.4847	13 56 36.3	9.374	5	10 21 26.78	2.1422	5 15 24.0	11.753
6	8 30 38.86	2.4798	13 47 11.2	9.461	6	10 23 41.20	2.1381	5 3 38.4	11.766
7	8 33 7.46	2.4741	13 37 41.0	9.546	7	10 25 55.35	2.1333	4 51 52.1	11.778
8	8 35 35.75	2.4689	13 28 5.7	9.629	8	10 28 9.25	2.1290	4 40 5.1	11.789
9	8 38 3.73	2.4637	13 18 25.5	9.710	9	10 30 22.90	2.1253	4 28 17.4	11.799
10	8 40 31.39	2.4583	13 8 40.5	9.790	10	10 32 36.29	2.1212	4 16 29.2	11.807
11	8 42 58.73	2.4531	12 58 50.7	9.869	11	10 34 49.44	2.1171	4 4 40.6	11.813
12	8 45 25.76	2.4478	12 48 56.2	9.946	12	10 37 2.34	2.1128	3 52 51.6	11.820
13	8 47 52.47	2.4425	12 38 57.2	10.021	13	10 39 15.00	2.1090	3 41 2.2	11.825
14	8 50 18.86	2.4372	12 28 53.7	10.095	14	10 41 27.42	2.1050	3 29 12.6	11.828
15	8 52 44.93	2.4319	12 18 45.8	10.167	15	10 43 39.60	2.1010	3 17 22.9	11.829
16	8 55 10.69	2.4267	12 8 33.7	10.237	16	10 45 51.54	2.1972	3 5 33.1	11.831
17	8 57 36.13	2.4212	11 58 17.4	10.306	17	10 48 3.26	2.1933	2 53 43.2	11.831
18	9 0 1.25	2.4160	11 47 57.0	10.373	18	10 50 14.74	2.1895	2 41 53.4	11.829
19	9 2 26.05	2.4107	11 37 32.7	10.438	19	10 52 26.90	2.1858	2 30 3.7	11.827
20	9 4 50.53	2.4054	11 27 4.4	10.502	20	10 54 37.04	2.1822	2 18 14.2	11.823
21	9 7 14.70	2.4001	11 16 32.4	10.564	21	10 56 47.86	2.1785	2 6 25.0	11.818
22	9 9 38.54	2.3948	11 5 56.7	10.626	22	10 58 58.46	2.1749	1 54 36.1	11.812
23	9 12 2.07	2.3896	10 55 17.3	10.685	23	11 1 8.85	2.1714	1 42 47.6	11.805
24	9 14 25.29	2.3843	+10 44 34.5	-10.742	24	11 3 19.03	2.1680	+ 1 30 59.5	-11.797

GREENWICH MEAN TIME.

Hour.	Right Ascension.	Var. per Min.	Declination.	Var. per Min.	Hour.	Right Ascension.	Var. per Min.	Declination.	Var. per Min.
JULY 19.					JULY 21.				
0	h m s	s	° ' "	"	0	h m s	s	° ' "	"
0	11 3 19.03	2.1680	+1 30 59.5	-11.797	0	12 44 20.82	2.0610	-7 27 22.7	-10.313
1	11 5 29.01	2.1646	1 19 12.0	11.788	1	12 46 24.45	2.0600	7 37 39.9	10.363
2	11 7 38.78	2.1612	1 7 25.0	11.777	2	12 48 28.01	2.0590	7 47 54.2	10.213
3	11 9 48.35	2.1578	0 55 38.8	11.765	3	12 50 31.52	2.0580	7 58 5.5	10.162
4	11 11 57.72	2.1545	0 43 53.2	11.753	4	12 52 34.97	2.0570	8 8 13.6	10.110
5	11 14 6.89	2.1513	0 32 8.4	11.739	5	12 54 38.36	2.0560	8 18 18.7	10.058
6	11 16 15.87	2.1482	0 20 24.5	11.724	6	12 56 41.71	2.0550	8 28 20.6	10.006
7	11 18 24.67	2.1450	+0 8 41.5	11.708	7	12 58 45.00	2.0545	8 38 19.4	9.953
8	11 20 33.27	2.1418	-0 3 0.5	11.692	8	13 0 48.25	2.0538	8 48 14.9	9.900
9	11 22 41.69	2.1388	0 14 41.5	11.674	9	13 2 51.46	2.0531	8 58 7.2	9.844
10	11 24 49.94	2.1359	0 26 21.4	11.656	10	13 4 54.62	2.0523	9 7 56.2	9.789
11	11 26 58.00	2.1330	0 38 0.2	11.637	11	13 6 57.74	2.0517	9 17 41.9	9.733
12	11 29 5.89	2.1302	0 49 37.8	11.616	12	13 9 0.83	2.0513	9 27 24.2	9.677
13	11 31 13.62	2.1274	1 1 14.1	11.593	13	13 11 3.89	2.0507	9 37 3.1	9.620
14	11 33 21.18	2.1247	1 12 49.0	11.571	14	13 13 6.91	2.0502	9 46 38.6	9.563
15	11 35 28.58	2.1219	1 24 22.6	11.548	15	13 15 9.90	2.0497	9 56 10.7	9.505
16	11 37 35.81	2.1193	1 35 54.8	11.523	16	13 17 12.87	2.0493	10 5 39.2	9.447
17	11 39 42.89	2.1167	1 47 25.4	11.498	17	13 19 15.81	2.0488	10 15 4.3	9.388
18	11 41 49.81	2.1142	1 58 54.6	11.472	18	13 21 18.72	2.0484	10 24 25.8	9.328
19	11 43 56.59	2.1117	2 10 22.1	11.444	19	13 23 21.62	2.0481	10 33 43.7	9.268
20	11 46 3.21	2.1092	2 21 47.9	11.417	20	13 25 24.49	2.0478	10 42 58.0	9.208
21	11 48 9.69	2.1068	2 33 12.1	11.388	21	13 27 27.35	2.0476	10 52 8.7	9.147
22	11 50 16.03	2.1045	2 44 34.5	11.358	22	13 29 30.20	2.0473	11 1 15.6	9.085
23	11 52 22.23	2.1022	-2 55 55.1	-11.328	23	13 31 33.03	2.0471	-11 10 18.9	-9.024
JULY 20.					JULY 22.				
0	h m s	s	° ' "	"	0	h m s	s	° ' "	"
0	11 54 28.29	2.0999	-3 7 13.8	-11.296	0	13 33 35.85	2.0469	-11 19 18.5	-8.961
1	11 56 34.22	2.0973	3 18 30.6	11.264	1	13 35 38.66	2.0468	11 28 14.2	8.900
2	11 58 40.02	2.0956	3 29 45.5	11.231	2	13 37 41.47	2.0468	11 37 6.2	8.834
3	12 0 45.69	2.0938	3 40 58.3	11.197	3	13 39 44.27	2.0467	11 45 54.3	8.770
4	12 2 51.25	2.0916	3 52 9.1	11.163	4	13 41 47.07	2.0467	11 54 38.6	8.706
5	12 4 56.68	2.0895	4 3 17.8	11.127	5	13 43 49.87	2.0467	12 3 18.9	8.640
6	12 7 1.99	2.0876	4 14 24.3	11.091	6	13 45 52.67	2.0467	12 11 55.4	8.573
7	12 9 7.19	2.0857	4 25 28.7	11.054	7	13 47 55.47	2.0467	12 20 27.9	8.506
8	12 11 12.27	2.0838	4 36 30.8	11.016	8	13 49 58.27	2.0468	12 28 56.5	8.443
9	12 13 17.25	2.0821	4 47 30.6	10.977	9	13 52 1.08	2.0469	12 37 21.1	8.376
10	12 15 22.12	2.0803	4 58 28.0	10.938	10	13 54 3.90	2.0471	12 45 41.6	8.308
11	12 17 26.89	2.0787	5 9 23.1	10.898	11	13 56 6.73	2.0473	12 53 58.1	8.241
12	12 19 31.56	2.0770	5 20 15.7	10.857	12	13 58 9.57	2.0473	13 2 10.5	8.173
13	12 21 36.13	2.0753	5 31 5.9	10.816	13	14 0 12.42	2.0476	13 10 18.8	8.104
14	12 23 40.60	2.0738	5 41 53.6	10.773	14	14 2 15.28	2.0478	13 18 23.0	8.035
15	12 25 44.99	2.0724	5 52 38.7	10.730	15	14 4 18.16	2.0482	13 26 23.0	7.965
16	12 27 49.29	2.0709	6 3 21.2	10.686	16	14 6 21.06	2.0484	13 34 18.8	7.895
17	12 29 53.50	2.0695	6 14 1.0	10.642	17	14 8 23.97	2.0487	13 42 10.4	7.825
18	12 31 57.63	2.0682	6 24 38.2	10.597	18	14 10 26.90	2.0491	13 49 57.8	7.754
19	12 34 1.68	2.0668	6 35 12.6	10.551	19	14 12 29.86	2.0495	13 57 40.9	7.683
20	12 36 5.65	2.0655	6 45 44.3	10.505	20	14 14 32.84	2.0498	14 5 19.7	7.611
21	12 38 9.55	2.0643	6 56 13.2	10.458	21	14 16 35.84	2.0502	14 12 54.2	7.539
22	12 40 13.37	2.0632	7 6 39.3	10.410	22	14 18 38.87	2.0507	14 20 24.4	7.467
23	12 42 17.13	2.0621	7 17 2.4	10.362	23	14 20 41.92	2.0511	14 27 50.2	7.394
24	12 44 20.82	2.0610	-7 27 22.7	-10.313	24	14 22 45.00	2.0516	-14 35 11.7	-7.321

GREENWICH MEAN TIME.

Hour.	Right Ascension.	Var. per Min.	Declination.	Var. per Min.	Hour.	Right Ascension.	Var. per Min.	Declination.	Var. per Min.
JULY 23.					JULY 25.				
	h m s	s	° ' "	"		h m s	s	° ' "	"
0	14 22 45.00	2.0610	-14 35 11.7	-7.321	0	16 1 58.51	2.0642	-18 55 22.5	-3.402
1	14 24 48.11	2.0621	14 42 28.7	7.246	1	16 4 3.58	2.0648	18 58 44.0	3.313
2	14 26 51.25	2.0626	14 49 41.2	7.173	2	16 6 8.69	2.0655	19 2 0.1	3.225
3	14 28 54.42	2.0631	14 56 49.4	7.098	3	16 8 13.84	2.0661	19 5 11.0	3.137
4	14 30 57.62	2.0636	15 3 53.0	7.023	4	16 10 19.02	2.0667	19 8 16.5	3.048
5	14 33 0.85	2.0642	15 10 52.2	6.948	5	16 12 24.24	2.0673	19 11 16.7	2.958
6	14 35 4.12	2.0648	15 17 46.8	6.872	6	16 14 29.50	2.0679	19 14 11.5	2.869
7	14 37 7.42	2.0653	15 24 36.8	6.796	7	16 16 34.79	2.0684	19 17 1.0	2.780
8	14 39 10.75	2.0659	15 31 22.3	6.720	8	16 18 40.11	2.0690	19 19 45.1	2.690
9	14 41 14.13	2.0666	15 38 3.2	6.643	9	16 20 45.47	2.0696	19 22 23.8	2.600
10	14 43 17.54	2.0671	15 44 39.5	6.566	10	16 22 50.86	2.0701	19 24 57.1	2.510
11	14 45 20.98	2.0678	15 51 11.1	6.488	11	16 24 56.28	2.0706	19 27 25.0	2.420
12	14 47 24.47	2.0684	15 57 38.1	6.411	12	16 27 1.73	2.0711	19 29 47.5	2.330
13	14 49 27.99	2.0691	16 4 0.4	6.333	13	16 29 7.21	2.0716	19 32 4.6	2.239
14	14 51 31.56	2.0698	16 10 18.0	6.254	14	16 31 12.72	2.0722	19 34 16.2	2.148
15	14 53 35.16	2.0704	16 16 30.9	6.175	15	16 33 18.25	2.0727	19 36 22.4	2.058
16	14 55 38.81	2.0711	16 22 39.0	6.096	16	16 35 23.81	2.0733	19 38 23.2	1.968
17	14 57 42.49	2.0718	16 28 42.4	6.016	17	16 37 29.40	2.0738	19 40 18.5	1.877
18	14 59 46.22	2.0725	16 34 40.9	5.936	18	16 39 35.01	2.0743	19 42 8.4	1.786
19	15 1 49.99	2.0733	16 40 34.7	5.857	19	16 41 40.64	2.0748	19 43 52.8	1.694
20	15 3 53.81	2.0740	16 46 23.7	5.776	20	16 43 46.30	2.0754	19 45 31.7	1.603
21	15 5 57.67	2.0747	16 52 7.8	5.694	21	16 45 51.97	2.0759	19 47 5.1	1.511
22	15 8 1.57	2.0753	16 57 47.9	5.613	22	16 47 57.67	2.0765	19 48 33.0	1.420
23	15 10 5.51	2.0761	-17 3 21.4	-5.532	23	16 50 3.38	2.0771	-19 49 55.5	-1.329
JULY 24.					JULY 26.				
	h m s	s	° ' "	"		h m s	s	° ' "	"
0	15 12 9.50	2.0768	-17 8 50.9	-5.450	0	16 52 9.11	2.0777	-19 51 12.5	-1.237
1	15 14 13.53	2.0776	17 14 15.4	5.368	1	16 54 14.86	2.0783	19 52 23.9	1.146
2	15 16 17.61	2.0784	17 19 35.0	5.286	2	16 56 20.62	2.0789	19 53 29.9	1.053
3	15 18 21.74	2.0791	17 24 49.7	5.203	3	16 58 26.39	2.0795	19 54 30.3	0.961
4	15 20 25.90	2.0798	17 29 59.4	5.119	4	17 0 32.17	2.0801	19 55 25.2	0.869
5	15 22 30.11	2.0806	17 35 4.0	5.036	5	17 2 37.97	2.0807	19 56 14.6	0.778
6	15 24 34.37	2.0813	17 40 3.7	4.953	6	17 4 43.78	2.0813	19 56 56.5	0.686
7	15 26 38.67	2.0821	17 44 58.4	4.869	7	17 6 49.59	2.0819	19 57 36.9	0.593
8	15 28 43.02	2.0828	17 49 48.0	4.784	8	17 8 55.41	2.0825	19 58 9.7	0.501
9	15 30 47.41	2.0836	17 54 32.5	4.700	9	17 11 1.23	2.0831	19 58 37.0	0.409
10	15 32 51.85	2.0843	17 59 12.0	4.615	10	17 13 7.06	2.0837	19 58 58.8	0.318
11	15 34 56.33	2.0850	18 3 46.3	4.530	11	17 15 12.89	2.0843	19 59 15.1	0.225
12	15 37 0.85	2.0858	18 8 15.6	4.445	12	17 17 18.73	2.0849	19 59 25.8	0.133
13	15 39 5.42	2.0866	18 12 39.7	4.359	13	17 19 24.66	2.0855	19 59 31.0	-0.040
14	15 41 10.04	2.0873	18 16 58.7	4.273	14	17 21 30.59	2.0861	19 59 30.6	+0.052
15	15 43 14.69	2.0879	18 21 12.5	4.187	15	17 23 36.22	2.0867	19 59 24.8	0.144
16	15 45 19.39	2.0887	18 25 21.2	4.101	16	17 25 42.04	2.0873	19 59 13.4	0.236
17	15 47 24.14	2.0894	18 29 24.6	4.014	17	17 27 47.85	2.0879	19 58 56.4	0.328
18	15 49 28.92	2.0901	18 33 22.9	3.928	18	17 29 53.66	2.0885	19 58 34.0	0.420
19	15 51 33.75	2.0908	18 37 16.0	3.841	19	17 31 59.46	2.0891	19 58 6.0	0.513
20	15 53 38.62	2.0915	18 41 3.8	3.753	20	17 34 5.25	2.0897	19 57 32.5	0.604
21	15 55 43.53	2.0922	18 44 46.4	3.666	21	17 36 11.08	2.0903	19 56 53.5	0.696
22	15 57 48.48	2.0929	18 48 23.7	3.578	22	17 38 16.80	2.0909	19 56 9.0	0.788
23	15 59 53.48	2.0936	18 51 55.7	3.490	23	17 40 22.55	2.0915	19 55 18.9	0.880
24	16 1 58.51	2.0942	-18 55 22.5	-3.402	24	17 42 28.29	2.0921	-19 54 23.4	+0.972

## GREENWICH MEAN TIME.

Hour.	Right Ascension.	Var. per Min.	Declination.	Var. per Min.	Hour.	Right Ascension.	Var. per Min.	Declination.	Var. per Min.
JULY 27.					JULY 29.				
	h m s	s	° ' "	"		h m s	s	° ' "	"
0	17 42 28.29	2.0654	-19 54 23.4	+0.972	0	19 22 17.95	2.0665	-17 24 58.8	+5.163
1	17 44 34.00	2.0651	19 53 22.8	1.063	1	19 24 21.30	2.0663	17 19 46.6	5.263
2	17 46 39.70	2.0648	19 52 15.8	1.155	2	19 26 24.58	2.0661	17 14 29.6	5.323
3	17 48 45.38	2.0644	19 51 3.7	1.247	3	19 28 27.79	2.0658	17 9 7.9	5.403
4	17 50 51.04	2.0641	19 49 46.2	1.338	4	19 30 30.92	2.0616	17 3 41.3	5.483
5	17 52 56.67	2.0637	19 48 23.2	1.429	5	19 32 33.98	2.0608	16 58 10.0	5.569
6	17 55 2.28	2.0633	19 46 54.7	1.520	6	19 34 36.96	2.0600	16 52 34.1	5.638
7	17 57 7.86	2.0628	19 45 20.8	1.612	7	19 36 39.86	2.0478	16 46 53.4	5.717
8	17 59 13.42	2.0623	19 43 41.8	1.703	8	19 38 42.69	2.0466	16 41 8.1	5.794
9	18 1 18.94	2.0618	19 41 58.5	1.793	9	19 40 45.45	2.0453	16 35 18.1	5.871
10	18 3 24.44	2.0612	19 40 6.2	1.884	10	19 42 48.12	2.0439	16 29 23.6	5.947
11	18 5 29.90	2.0608	19 38 10.4	1.975	11	19 44 50.72	2.0427	16 23 24.5	6.023
12	18 7 35.33	2.0602	19 36 9.2	2.065	12	19 46 53.24	2.0414	16 17 20.8	6.100
13	18 9 40.72	2.0596	19 34 2.6	2.155	13	19 48 55.69	2.0401	16 11 12.5	6.175
14	18 11 46.08	2.0590	19 31 50.6	2.245	14	19 50 58.05	2.0388	16 4 59.8	6.249
15	18 13 51.40	2.0584	19 29 33.2	2.335	15	19 53 0.34	2.0375	15 58 42.6	6.323
16	18 15 56.69	2.0578	19 27 10.4	2.425	16	19 55 2.55	2.0362	15 52 21.0	6.397
17	18 18 1.93	2.0570	19 24 42.2	2.515	17	19 57 4.68	2.0349	15 45 55.0	6.471
18	18 20 7.13	2.0563	19 22 8.6	2.603	18	19 59 6.74	2.0336	15 39 24.5	6.544
19	18 22 12.29	2.0556	19 19 29.7	2.692	19	20 1 8.71	2.0323	15 32 49.7	6.616
20	18 24 17.40	2.0548	19 16 45.5	2.782	20	20 3 10.61	2.0309	15 26 10.6	6.688
21	18 26 22.47	2.0541	19 13 55.9	2.871	21	20 5 12.42	2.0296	15 19 27.2	6.759
22	18 28 27.49	2.0533	19 11 1.0	2.959	22	20 7 14.16	2.0283	15 12 39.5	6.831
23	18 30 32.47	2.0525	-19 8 0.8	+3.048	23	20 9 15.82	2.0271	-15 5 47.5	+6.901
JULY 28.					JULY 30.				
	h m s	s	° ' "	"		h m s	s	° ' "	"
0	18 32 37.39	2.0516	-19 4 55.3	+3.235	0	20 11 17.41	2.0258	-14 58 51.4	+6.970
1	18 34 42.26	2.0508	19 1 44.6	3.323	1	20 13 18.91	2.0244	14 51 51.1	7.046
2	18 36 47.09	2.0500	18 58 28.6	3.411	2	20 15 20.34	2.0232	14 44 46.6	7.119
3	18 38 51.86	2.0790	18 55 7.3	3.498	3	20 17 21.69	2.0218	14 37 37.9	7.178
4	18 40 56.57	2.0781	18 51 40.8	3.485	4	20 19 22.96	2.0206	14 30 25.2	7.245
5	18 43 1.23	2.0773	18 48 9.1	3.572	5	20 21 24.16	2.0193	14 23 8.5	7.313
6	18 45 5.84	2.0763	18 44 32.2	3.658	6	20 23 25.28	2.0180	14 15 47.7	7.380
7	18 47 10.38	2.0753	18 40 50.1	3.745	7	20 25 26.32	2.0168	14 8 22.9	7.446
8	18 49 14.87	2.0743	18 37 2.8	3.831	8	20 27 27.29	2.0155	14 0 54.2	7.512
9	18 51 19.30	2.0733	18 33 10.4	3.917	9	20 29 28.18	2.0143	13 53 21.5	7.578
10	18 53 23.67	2.0723	18 29 12.8	4.002	10	20 31 29.00	2.0131	13 45 44.9	7.643
11	18 55 27.98	2.0713	18 25 10.2	4.087	11	20 33 29.75	2.0118	13 38 4.4	7.707
12	18 57 32.22	2.0702	18 21 2.4	4.172	12	20 35 30.42	2.0106	13 30 20.1	7.770
13	18 59 36.40	2.0692	18 16 49.6	4.256	13	20 37 31.02	2.0093	13 22 32.0	7.833
14	19 1 40.52	2.0681	18 12 31.7	4.341	14	20 39 31.54	2.0082	13 14 40.2	7.896
15	19 3 44.57	2.0669	18 8 8.7	4.424	15	20 41 32.00	2.0070	13 6 44.6	7.958
16	19 5 48.55	2.0658	18 8 40.8	4.508	16	20 43 32.38	2.0058	12 58 45.3	8.019
17	19 7 52.47	2.0646	17 59 7.8	4.591	17	20 45 32.70	2.0047	12 50 42.3	8.080
18	19 9 56.32	2.0636	17 54 29.9	4.674	18	20 47 32.94	2.0035	12 42 35.7	8.140
19	19 12 0.10	2.0624	17 49 47.0	4.757	19	20 49 33.12	2.0024	12 34 25.5	8.200
20	19 14 3.81	2.0613	17 44 59.1	4.838	20	20 51 33.23	2.0013	12 26 11.7	8.260
21	19 16 7.46	2.0601	17 40 6.4	4.920	21	20 53 33.27	2.0002	12 17 54.4	8.318
22	19 18 11.08	2.0588	17 35 8.7	5.002	22	20 55 33.25	1.9991	12 9 33.6	8.376
23	19 20 14.52	2.0577	17 30 6.2	5.083	23	20 57 33.16	1.9980	12 1 9.3	8.433
24	19 22 17.95	2.0565	-17 24 58.8	+5.163	24	20 59 33.01	1.9970	-11 52 41.7	+8.489

GREENWICH MEAN TIME.

Hour.	Right Ascension.	Var. per Min.	Declination.	Var. per Min.	Hour.	Right Ascension.	Var. per Min.	Declination.	Var. per Min.
JULY 31.					AUGUST 2.				
	h m s	s	° ' "	"		h m s	s	° ' "	"
0	20 59 33.01	1.9970	-11 52 41.7	+ 8.489	0	22 34 38.22	1.9763	-4 11 40.9	+10.466
1	21 1 32.80	1.9959	11 44 10.6	8.547	1	22 36 36.81	1.9768	4 1 12.2	10.490
2	21 3 32.52	1.9949	11 35 36.1	8.602	2	22 38 35.43	1.9772	3 50 42.1	10.514
3	21 5 32.19	1.9939	11 26 58.4	8.656	3	22 40 34.07	1.9776	3 40 10.5	10.537
4	21 7 31.79	1.9928	11 18 17.4	8.711	4	22 42 32.74	1.9782	3 29 37.7	10.558
5	21 9 31.33	1.9919	11 9 33.1	8.764	5	22 44 31.45	1.9787	3 19 3.5	10.581
6	21 11 30.82	1.9911	11 0 45.7	8.818	6	22 46 30.18	1.9793	3 8 28.0	10.602
7	21 13 30.26	1.9902	10 51 55.0	8.871	7	22 48 28.96	1.9799	2 57 51.8	10.622
8	21 15 29.64	1.9892	10 43 1.2	8.923	8	22 50 27.77	1.9805	2 47 13.4	10.641
9	21 17 28.96	1.9883	10 34 4.3	8.974	9	22 52 26.62	1.9811	2 36 34.4	10.660
10	21 19 28.24	1.9875	10 25 4.8	9.024	10	22 54 25.52	1.9820	2 25 54.2	10.678
11	21 21 27.46	1.9867	10 16 1.4	9.074	11	22 56 24.46	1.9828	2 15 13.1	10.694
12	21 23 26.64	1.9858	10 6 55.4	9.124	12	22 58 23.46	1.9837	2 4 30.9	10.712
13	21 25 25.76	1.9850	9 57 46.5	9.173	13	23 0 22.50	1.9845	1 53 47.7	10.727
14	21 27 24.84	1.9842	9 48 34.7	9.221	14	23 2 21.60	1.9855	1 43 3.7	10.742
15	21 29 23.88	1.9836	9 39 20.0	9.269	15	23 4 20.76	1.9864	1 32 18.7	10.756
16	21 31 22.87	1.9828	9 30 2.4	9.316	16	23 6 19.97	1.9874	1 21 33.0	10.768
17	21 33 21.82	1.9822	9 20 42.1	9.362	17	23 8 19.25	1.9885	1 10 46.5	10.782
18	21 35 20.73	1.9815	9 11 19.0	9.408	18	23 10 18.59	1.9897	0 59 59.2	10.794
19	21 37 19.60	1.9808	9 1 53.2	9.453	19	23 12 18.01	1.9908	0 49 11.2	10.806
20	21 39 18.43	1.9803	8 52 24.7	9.497	20	23 14 17.49	1.9919	0 38 22.6	10.815
21	21 41 17.23	1.9797	8 42 53.6	9.540	21	23 16 17.04	1.9932	0 27 33.4	10.824
22	21 43 15.99	1.9792	8 33 19.9	9.583	22	23 18 16.67	1.9945	0 16 43.7	10.833
23	21 45 14.73	1.9787	- 8 23 43.6	+ 9.626	23	23 20 16.38	1.9959	-0 5 53.5	+10.841
AUGUST 1.					AUGUST 3.				
0	21 47 13.43	1.9783	- 8 14 4.7	+ 9.668	0	23 22 16.18	1.9973	+0 4 57.2	+10.848
1	21 49 12.10	1.9777	8 4 23.4	9.708	1	23 24 16.06	1.9987	0 15 48.3	10.855
2	21 51 10.75	1.9773	7 54 39.7	9.749	2	23 26 16.02	2.0001	0 26 39.8	10.861
3	21 53 9.37	1.9768	7 44 53.5	9.789	3	23 28 16.07	2.0017	0 37 31.6	10.865
4	21 55 7.97	1.9765	7 35 5.0	9.828	4	23 30 16.22	2.0033	0 48 23.6	10.869
5	21 57 6.55	1.9762	7 25 14.1	9.867	5	23 32 16.46	2.0048	0 59 15.9	10.873
6	21 59 5.11	1.9758	7 15 21.0	9.904	6	23 34 16.80	2.0065	1 10 8.3	10.876
7	22 1 3.65	1.9756	7 5 25.6	9.941	7	23 36 17.24	2.0082	1 21 0.9	10.877
8	22 3 2.18	1.9753	6 55 28.1	9.978	8	23 38 17.78	2.0099	1 31 53.5	10.878
9	22 5 0.69	1.9751	6 45 28.3	10.013	9	23 40 18.43	2.0118	1 42 46.2	10.878
10	22 6 59.19	1.9750	6 35 26.5	10.048	10	23 42 19.19	2.0137	1 53 38.8	10.876
11	22 8 57.69	1.9748	6 25 22.5	10.083	11	23 44 20.07	2.0156	2 4 31.3	10.875
12	22 10 56.17	1.9747	6 15 16.5	10.117	12	23 46 21.06	2.0174	2 15 23.8	10.873
13	22 12 54.65	1.9747	6 5 8.5	10.149	13	23 48 22.16	2.0194	2 26 16.0	10.868
14	22 14 53.13	1.9746	5 54 58.6	10.181	14	23 50 23.39	2.0215	2 37 8.0	10.865
15	22 16 51.60	1.9746	5 44 46.8	10.213	15	23 52 24.74	2.0236	2 47 59.8	10.860
16	22 18 50.08	1.9747	5 34 33.0	10.244	16	23 54 26.22	2.0258	2 58 51.2	10.854
17	22 20 48.56	1.9748	5 24 17.5	10.274	17	23 56 27.83	2.0280	3 9 42.3	10.848
18	22 22 47.05	1.9749	5 14 0.1	10.304	18	23 58 29.58	2.0302	3 20 32.9	10.840
19	22 24 45.55	1.9750	5 3 41.0	10.333	19	0 0 31.45	2.0324	3 31 23.1	10.832
20	22 26 44.05	1.9752	4 53 20.2	10.360	20	0 2 33.47	2.0348	3 42 12.7	10.822
21	22 28 42.57	1.9754	4 42 57.8	10.388	21	0 4 35.63	2.0372	3 53 1.7	10.812
22	22 30 41.10	1.9757	4 32 33.7	10.414	22	0 6 37.93	2.0396	4 3 50.1	10.802
23	22 32 39.65	1.9760	4 22 8.1	10.440	23	0 8 40.38	2.0421	4 14 37.9	10.790
24	22 34 38.22	1.9763	- 4 11 40.9	+10.466	24	0 10 42.98	2.0447	+4 25 24.9	+10.777

GREENWICH MEAN TIME.

Hour.	Right Ascension.	Var. per Min.	Declination.	Var. per Min.	Hour.	Right Ascension.	Var. per Min.	Declination.	Var. per Min.
AUGUST 4.					AUGUST 6.				
	h m s	s	° ' "	"		h m s	s	° ' "	"
0	0 10 42.98	2.0447	+ 4 25 24.9	+10.777	0	1 52 39.67	2.2197	+12 30 33.1	+9.061
1	0 12 45.74	2.0472	4 36 11.1	10.768	1	1 54 52.99	2.2242	12 39 34.9	8.999
2	0 14 48.64	2.0498	4 46 56.5	10.749	2	1 57 6.58	2.2288	12 48 33.0	8.938
3	0 16 51.71	2.0525	4 57 41.0	10.734	3	1 59 20.45	2.2336	12 57 27.4	8.875
4	0 18 54.94	2.0553	5 8 24.6	10.718	4	2 1 34.01	2.2383	13 6 18.0	8.811
5	0 20 58.34	2.0580	5 19 7.1	10.700	5	2 3 49.04	2.2429	13 15 4.7	8.746
6	0 23 1.90	2.0608	5 29 48.6	10.683	6	2 6 3.76	2.2477	13 23 47.5	8.679
7	0 25 5.63	2.0637	5 40 29.0	10.663	7	2 8 18.76	2.2524	13 32 26.2	8.612
8	0 27 9.54	2.0667	5 51 8.2	10.643	8	2 10 34.05	2.2573	13 41 0.9	8.544
9	0 29 13.63	2.0696	6 1 46.2	10.623	9	2 12 49.63	2.2620	13 49 31.5	8.475
10	0 31 17.89	2.0726	6 12 23.0	10.602	10	2 15 5.49	2.2668	13 57 57.9	8.404
11	0 33 22.33	2.0756	6 22 58.4	10.579	11	2 17 21.64	2.2717	14 6 20.0	8.332
12	0 35 26.96	2.0788	6 33 32.5	10.557	12	2 19 38.00	2.2766	14 14 37.7	8.259
13	0 37 31.78	2.0819	6 44 5.2	10.532	13	2 21 54.83	2.2814	14 22 51.1	8.186
14	0 39 36.79	2.0851	6 54 36.3	10.506	14	2 24 11.86	2.2863	14 31 0.0	8.110
15	0 41 41.99	2.0883	7 5 5.9	10.479	15	2 26 29.18	2.2912	14 39 4.8	8.034
16	0 43 47.39	2.0917	7 15 33.8	10.453	16	2 28 46.80	2.2961	14 47 4.1	7.957
17	0 45 52.99	2.0950	7 26 0.2	10.425	17	2 31 4.71	2.3010	14 54 59.1	7.878
18	0 47 58.79	2.0983	7 36 24.8	10.395	18	2 33 22.92	2.3060	15 2 49.5	7.799
19	0 50 4.79	2.1018	7 46 47.6	10.365	19	2 35 41.43	2.3109	15 10 35.0	7.718
20	0 52 11.01	2.1053	7 57 8.6	10.334	20	2 38 0.23	2.3158	15 18 15.6	7.637
21	0 54 17.43	2.1088	8 7 27.7	10.303	21	2 40 19.33	2.3208	15 25 51.4	7.554
22	0 56 24.06	2.1124	8 17 44.9	10.270	22	2 42 38.73	2.3258	15 33 22.1	7.469
23	0 58 30.92	2.1161	+ 8 28 0.1	+10.236	23	2 44 58.42	2.3308	+15 40 47.7	+7.384
AUGUST 5.					AUGUST 7.				
0	1 0 37.99	2.1197	+ 8 38 13.2	+10.201	0	2 47 18.42	2.3358	+15 48 8.2	+7.298
1	1 2 45.28	2.1233	8 48 24.2	10.165	1	2 49 38.71	2.3407	15 55 23.5	7.211
2	1 4 52.79	2.1272	8 58 33.0	10.128	2	2 51 59.80	2.3457	16 2 33.5	7.123
3	1 7 0.54	2.1310	9 8 39.6	10.091	3	2 54 20.19	2.3507	16 9 38.2	7.033
4	1 9 8.51	2.1348	9 18 43.9	10.053	4	2 56 41.38	2.3557	16 16 37.5	6.943
5	1 11 16.71	2.1386	9 28 45.9	10.015	5	2 59 2.87	2.3606	16 23 31.8	6.850
6	1 13 25.14	2.1426	9 38 45.4	9.971	6	3 1 24.65	2.3655	16 30 19.5	6.757
7	1 15 33.82	2.1466	9 48 42.4	9.929	7	3 3 46.73	2.3705	16 37 2.1	6.663
8	1 17 42.73	2.1506	9 58 36.9	9.887	8	3 6 9.11	2.3754	16 43 39.1	6.568
9	1 19 51.88	2.1546	10 8 28.8	9.843	9	3 8 31.78	2.3803	16 50 10.3	6.473
10	1 22 1.28	2.1587	10 18 18.0	9.798	10	3 10 54.75	2.3853	16 56 35.8	6.375
11	1 24 10.92	2.1628	10 28 4.6	9.753	11	3 13 18.01	2.3901	17 2 55.3	6.276
12	1 26 20.81	2.1669	10 37 48.3	9.705	12	3 15 41.56	2.3949	17 9 8.9	6.177
13	1 28 30.95	2.1711	10 47 29.2	9.658	13	3 18 5.40	2.3998	17 15 16.5	6.077
14	1 30 41.34	2.1753	10 57 7.2	9.608	14	3 20 29.54	2.4046	17 21 18.1	5.975
15	1 32 51.99	2.1797	11 6 42.2	9.558	15	3 22 53.97	2.4095	17 27 13.5	5.872
16	1 35 2.90	2.1840	11 16 14.1	9.507	16	3 25 18.68	2.4143	17 33 2.7	5.768
17	1 37 14.07	2.1883	11 25 43.0	9.455	17	3 27 43.68	2.4191	17 38 45.6	5.663
18	1 39 25.49	2.1927	11 35 8.7	9.402	18	3 30 8.97	2.4238	17 44 22.2	5.558
19	1 41 37.19	2.1971	11 44 31.2	9.348	19	3 32 34.54	2.4285	17 49 52.5	5.451
20	1 43 49.14	2.2015	11 53 50.4	9.293	20	3 35 0.89	2.4333	17 55 16.3	5.342
21	1 46 1.37	2.2060	12 3 6.3	9.236	21	3 37 26.52	2.4378	18 0 33.5	5.233
22	1 48 13.86	2.2105	12 12 18.7	9.178	22	3 39 52.93	2.4424	18 5 44.2	5.123
23	1 50 26.63	2.2151	12 21 27.6	9.120	23	3 42 19.61	2.4469	18 10 48.3	5.013
24	1 52 39.67	2.2197	+12 30 33.1	+ 9.061	24	3 44 46.56	2.4515	+18 15 45.7	+4.901

GREENWICH MEAN TIME.

Hour.	Right Ascension.	Var. per Min.	Declination.	Var. per Min.	Hour.	Right Ascension.	Var. per Min.	Declination.	Var. per Min.
AUGUST 8.					AUGUST 10.				
	h m s	s	° ' "	"		h m s	s	° ' "	"
0	3 44 46.56	2.4515	+18 15 45.7	+4.801	0	5 46 32.34	2.5915	+19 46 12.4	-1.862
1	3 47 13.79	2.4561	18 20 36.4	4.788	1	5 49 7.87	2.5929	19 44 46.5	1.802
2	3 49 41.29	2.4606	18 25 20.2	4.673	2	5 51 43.45	2.5938	19 43 12.2	1.643
3	3 52 9.05	2.4646	18 29 57.1	4.568	3	5 54 19.07	2.5939	19 41 29.4	1.783
4	3 54 37.07	2.4683	18 34 27.2	4.443	4	5 56 54.71	2.5943	19 39 38.2	1.923
5	3 57 5.36	2.4726	18 38 50.2	4.326	5	5 59 30.38	2.5947	19 37 38.6	2.063
6	3 59 33.90	2.4779	18 43 6.2	4.206	6	6 2 6.07	2.5949	19 35 30.6	2.203
7	4 2 2.70	2.4821	18 47 15.1	4.088	7	6 4 41.77	2.5951	19 33 14.2	2.343
8	4 4 31.75	2.4863	18 51 16.8	3.968	8	6 7 17.48	2.5952	19 30 49.4	2.483
9	4 7 1.05	2.4903	18 55 11.3	3.843	9	6 9 53.19	2.5952	19 28 16.2	2.623
10	4 9 30.59	2.4943	18 58 58.6	3.728	10	6 12 28.90	2.5950	19 25 34.6	2.763
11	4 12 0.37	2.4984	19 2 38.6	3.604	11	6 15 4.59	2.5947	19 22 44.7	2.902
12	4 14 30.40	2.5025	19 6 11.1	3.481	12	6 17 40.26	2.5943	19 19 46.4	3.041
13	4 17 0.65	2.5062	19 9 36.3	3.358	13	6 20 15.91	2.5939	19 16 39.8	3.179
14	4 19 31.14	2.5100	19 12 54.0	3.233	14	6 22 51.53	2.5934	19 13 24.9	3.318
15	4 22 1.85	2.5136	19 16 4.2	3.107	15	6 25 27.12	2.5928	19 10 1.7	3.455
16	4 24 32.79	2.5174	19 19 6.8	2.981	16	6 28 2.66	2.5920	19 6 30.3	3.592
17	4 27 3.94	2.5210	19 22 1.9	2.853	17	6 30 38.16	2.5912	19 2 50.7	3.729
18	4 29 35.31	2.5246	19 24 49.2	2.726	18	6 33 13.00	2.5903	18 59 2.8	3.866
19	4 32 6.89	2.5281	19 27 28.9	2.597	19	6 35 48.99	2.5893	18 55 6.8	4.002
20	4 34 38.68	2.5315	19 30 0.8	2.468	20	6 38 24.31	2.5880	18 51 2.6	4.138
21	4 37 10.67	2.5348	19 32 25.0	2.338	21	6 40 59.55	2.5868	18 46 50.3	4.273
22	4 39 42.86	2.5381	19 34 41.3	2.206	22	6 43 34.73	2.5856	18 42 29.9	4.407
23	4 42 15.24	2.5412	+19 36 49.7	+2.075	23	6 46 9.82	2.5842	+18 38 1.5	-4.540
AUGUST 9.					AUGUST 11.				
	h m s	s	° ' "	"		h m s	s	° ' "	"
0	4 44 47.81	2.5443	+19 38 50.3	+1.943	0	6 48 44.83	2.5827	+18 33 25.1	-4.673
1	4 47 20.56	2.5473	19 40 42.9	1.810	1	6 51 19.74	2.5810	18 28 40.7	4.807
2	4 49 53.49	2.5509	19 42 27.5	1.677	2	6 53 54.55	2.5793	18 23 48.3	4.938
3	4 52 26.59	2.5531	19 44 4.1	1.543	3	6 56 29.26	2.5776	18 18 48.1	5.069
4	4 54 59.86	2.5559	19 45 32.7	1.408	4	6 59 3.86	2.5758	18 13 40.0	5.199
5	4 57 33.30	2.5580	19 46 53.1	1.273	5	7 1 38.35	2.5738	18 8 24.2	5.329
6	5 0 6.89	2.5612	19 48 5.5	1.138	6	7 4 12.72	2.5718	18 3 0.5	5.458
7	5 2 40.64	2.5637	19 49 9.6	1.001	7	7 6 46.96	2.5697	17 57 29.2	5.586
8	5 5 14.53	2.5661	19 50 5.6	0.865	8	7 9 21.08	2.5675	17 51 50.2	5.713
9	5 7 48.57	2.5684	19 50 53.4	0.728	9	7 11 55.06	2.5652	17 46 3.6	5.839
10	5 10 22.74	2.5706	19 51 33.0	0.591	10	7 14 28.90	2.5628	17 40 9.5	5.965
11	5 12 57.04	2.5728	19 52 4.3	0.453	11	7 17 2.60	2.5605	17 34 7.8	6.089
12	5 15 31.47	2.5749	19 52 27.9	0.315	12	7 19 36.16	2.5579	17 27 58.8	6.213
13	5 18 6.03	2.5769	19 52 42.1	0.178	13	7 22 9.55	2.5553	17 21 42.3	6.336
14	5 20 40.69	2.5786	19 52 48.6	+0.038	14	7 24 42.80	2.5527	17 15 18.5	6.458
15	5 23 15.46	2.5804	19 52 46.7	-0.102	15	7 27 15.88	2.5499	17 8 47.4	6.578
16	5 25 50.34	2.5821	19 52 36.4	0.041	16	7 29 48.79	2.5472	17 2 9.2	6.698
17	5 28 25.81	2.5837	19 52 17.8	0.080	17	7 32 21.54	2.5443	16 55 23.7	6.817
18	5 31 0.38	2.5852	19 51 50.8	0.019	18	7 34 54.11	2.5414	16 48 31.2	6.933
19	5 33 35.53	2.5864	19 51 15.5	0.059	19	7 37 26.51	2.5384	16 41 31.7	7.049
20	5 36 10.75	2.5877	19 50 31.7	0.090	20	7 39 58.72	2.5353	16 34 25.3	7.165
21	5 38 46.05	2.5889	19 49 39.5	0.040	21	7 42 30.75	2.5323	16 27 11.9	7.280
22	5 41 21.42	2.5900	19 48 38.9	1.000	22	7 45 2.59	2.5291	16 19 51.7	7.393
23	5 43 56.85	2.5910	19 47 29.9	1.221	23	7 47 34.24	2.5258	16 12 24.8	7.504
24	5 46 32.34	2.5918	+19 46 12.4	-1.862	24	7 50 5.69	2.5225	+16 4 51.2	-7.615

GREENWICH MEAN TIME.

Hour.	Right Ascension.	Var. per Min.	Declination.	Var. per Min.	Hour.	Right Ascension.	Var. per Min.	Declination.	Var. per Min.
AUGUST 12.					AUGUST 14.				
	h m s	s	° ' "	"		h m s	s	° ' "	"
0	7 50 5.69	2.5225	+16 4 51.2	-7.615	0	9 46 43.01	2.3311	+8 17 22.0	-11.307
1	7 52 36.94	2.5192	15 57 11.0	7.725	1	9 49 2.75	2.3271	8 6 2.3	11.345
2	7 55 7.99	2.5158	15 49 24.2	7.833	2	9 51 22.25	2.3230	7 54 40.3	11.386
3	7 57 38.83	2.5123	15 41 31.0	7.940	3	9 53 41.51	2.3190	7 43 16.0	11.424
4	8 0 9.46	2.5088	15 33 31.4	8.046	4	9 56 0.53	2.3150	7 31 49.4	11.461
5	8 2 39.89	2.5053	15 25 25.5	8.150	5	9 58 19.31	2.3111	7 20 20.7	11.495
6	8 5 10.10	2.5017	15 17 13.4	8.253	6	10 0 37.86	2.3072	7 8 50.0	11.528
7	8 7 40.09	2.4980	15 8 55.1	8.356	7	10 2 56.17	2.3032	6 57 17.3	11.561
8	8 10 9.86	2.4943	15 0 30.7	8.457	8	10 5 14.24	2.2993	6 45 42.7	11.591
9	8 12 39.41	2.4907	14 52 0.3	8.556	9	10 7 32.08	2.2954	6 34 6.4	11.619
10	8 15 8.74	2.4868	14 43 24.0	8.654	10	10 9 49.69	2.2916	6 22 28.4	11.648
11	8 17 37.83	2.4829	14 34 41.8	8.751	11	10 12 7.07	2.2878	6 10 48.7	11.674
12	8 20 6.69	2.4792	14 25 53.9	8.846	12	10 14 24.22	2.2839	5 59 7.5	11.699
13	8 22 35.33	2.4753	14 17 0.3	8.940	13	10 16 41.14	2.2802	5 47 24.9	11.721
14	8 25 3.73	2.4714	14 8 1.1	9.033	14	10 18 57.84	2.2764	5 35 41.0	11.743
15	8 27 31.90	2.4675	13 58 56.4	9.123	15	10 21 14.31	2.2728	5 23 55.8	11.764
16	8 29 59.83	2.4635	13 49 46.3	9.213	16	10 23 30.57	2.2691	5 12 9.3	11.783
17	8 32 27.52	2.4595	13 40 30.9	9.302	17	10 25 46.60	2.2654	5 0 21.8	11.800
18	8 34 54.97	2.4555	13 31 10.1	9.390	18	10 28 2.42	2.2618	4 48 33.3	11.817
19	8 37 22.18	2.4515	13 21 44.2	9.478	19	10 30 18.02	2.2583	4 36 43.8	11.832
20	8 39 49.15	2.4474	13 12 13.3	9.565	20	10 32 33.41	2.2547	4 24 53.5	11.845
21	8 42 15.87	2.4433	13 2 37.3	9.651	21	10 34 48.58	2.2512	4 13 2.4	11.857
22	8 44 42.35	2.4393	12 52 56.4	9.722	22	10 37 3.55	2.2477	4 1 10.7	11.866
23	8 47 8.58	2.4351	+12 43 10.7	-9.802	23	10 39 18.30	2.2442	+3 49 18.3	-11.873
AUGUST 13.					AUGUST 15.				
0	8 49 34.56	2.4310	+12 33 20.2	-9.880	0	10 41 32.85	2.2406	+3 37 25.4	-11.886
1	8 52 0.30	2.4268	12 23 25.1	9.956	1	10 43 47.20	2.2375	3 25 32.0	11.898
2	8 54 25.78	2.4227	12 13 25.5	10.031	2	10 46 1.85	2.2342	3 13 38.3	11.906
3	8 56 51.02	2.4185	12 3 21.4	10.106	3	10 48 15.30	2.2308	3 1 44.3	11.913
4	8 59 16.00	2.4143	11 53 12.8	10.178	4	10 50 29.06	2.2276	2 49 50.0	11.916
5	9 1 40.74	2.4102	11 43 0.0	10.248	5	10 52 42.61	2.2243	2 37 55.7	11.917
6	9 4 5.22	2.4060	11 32 43.1	10.317	6	10 54 55.97	2.2212	2 26 1.2	11.916
7	9 6 29.46	2.4018	11 22 22.0	10.386	7	10 57 9.15	2.2180	2 14 6.8	11.916
8	9 8 53.44	2.3975	11 11 56.8	10.452	8	10 59 22.13	2.2148	2 2 12.5	11.914
9	9 11 17.16	2.3933	11 1 27.8	10.516	9	11 1 34.93	2.2118	1 50 18.3	11.911
10	9 13 40.64	2.3893	10 50 54.9	10.580	10	11 3 47.55	2.2088	1 38 24.4	11.907
11	9 16 3.87	2.3850	10 40 18.2	10.642	11	11 5 59.99	2.2058	1 26 30.7	11.901
12	9 18 26.84	2.3808	10 29 37.9	10.701	12	11 8 12.24	2.2028	1 14 37.5	11.893
13	9 20 49.56	2.3766	10 18 54.1	10.760	13	11 10 24.32	2.1999	1 2 44.7	11.876
14	9 23 12.03	2.3724	10 8 6.7	10.818	14	11 12 36.23	2.1970	0 50 52.4	11.857
15	9 25 34.25	2.3682	9 57 16.0	10.873	15	11 14 47.96	2.1942	0 39 0.7	11.836
16	9 27 56.21	2.3640	9 46 22.0	10.927	16	11 16 59.53	2.1914	0 27 9.7	11.813
17	9 30 17.93	2.3599	9 35 24.8	10.980	17	11 19 10.93	2.1886	0 15 19.5	11.831
18	9 32 39.40	2.3556	9 24 24.4	11.031	18	11 21 22.16	2.1859	+0 3 30.0	11.818
19	9 35 0.62	2.3514	9 13 21.1	11.080	19	11 23 33.24	2.1833	-0 8 18.6	11.802
20	9 37 21.59	2.3474	9 2 14.8	11.129	20	11 25 44.15	2.1806	0 20 6.2	11.785
21	9 39 42.31	2.3433	8 51 5.6	11.176	21	11 27 54.90	2.1779	0 31 52.8	11.766
22	9 42 2.79	2.3393	8 39 53.7	11.221	22	11 30 5.50	2.1754	0 43 38.4	11.739
23	9 44 23.02	2.3352	8 28 39.1	11.264	23	11 32 15.95	2.1729	0 55 22.8	11.709
24	9 46 43.01	2.3311	+ 8 17 22.0	-11.307	24	11 34 26.25	2.1704	-1 7 6.0	-11.709



GREENWICH MEAN TIME.

Hour.	Right Ascension.	Var. per Min.	Declination.	Var. per Min.	Hour.	Right Ascension.	Var. per Min.	Declination.	Var. per Min.
AUGUST 16.					AUGUST 18.				
0	h m s	s	° ' "	"	0	h m s	s	° ' "	"
0	11 34 26.25	2.1704	-1 7 6.0	-11.700	0	13 16 31.01	2.0073	-9 47 16.7	-9.648
1	11 36 36.40	2.1080	1 18 47.9	11.088	1	13 18 36.83	2.0086	9 56 53.7	9.586
2	11 38 46.41	2.1656	1 30 28.5	11.064	2	13 20 42.00	2.0099	10 6 27.0	9.524
3	11 40 56.27	2.1632	1 42 7.6	11.440	3	13 22 48.34	2.0053	10 15 56.6	9.463
4	11 43 6.00	2.1808	1 53 45.3	11.616	4	13 24 54.04	2.0047	10 25 22.5	9.399
5	11 45 15.58	2.1888	2 5 21.5	11.890	5	13 26 59.70	2.0042	10 34 44.5	9.335
6	11 47 25.03	2.1864	2 16 56.1	11.263	6	13 29 5.84	2.0087	10 44 2.7	9.271
7	11 49 34.35	2.1543	2 28 29.1	11.535	7	13 31 10.94	2.0082	10 53 17.0	9.207
8	11 51 43.54	2.1521	2 40 0.8	11.806	8	13 33 16.52	2.0028	11 2 27.5	9.142
9	11 53 52.60	2.1499	2 51 29.8	11.476	9	13 35 22.07	2.0023	11 11 34.0	9.075
10	11 56 1.53	2.1478	3 2 57.4	11.445	10	13 37 27.59	2.0018	11 20 36.5	9.008
11	11 58 10.34	2.1458	3 14 23.2	11.413	11	13 39 33.09	2.0014	11 29 35.0	8.942
12	12 0 19.03	2.1439	3 25 47.0	11.281	12	13 41 38.56	2.0010	11 38 29.5	8.875
13	12 2 27.61	2.1419	3 37 8.9	11.248	13	13 43 44.01	2.0007	11 47 20.0	8.807
14	12 4 36.06	2.1400	3 48 28.7	11.312	14	13 45 49.45	2.0004	11 56 6.3	8.738
15	12 6 44.41	2.1382	3 59 46.3	11.276	15	13 47 54.86	2.0001	12 4 48.6	8.669
16	12 8 52.64	2.1363	4 11 1.8	11.240	16	13 50 0.26	2.0000	12 13 26.6	8.600
17	12 11 0.76	2.1345	4 22 15.1	11.203	17	13 52 5.65	2.0000	12 22 0.5	8.530
18	12 13 8.78	2.1328	4 33 26.1	11.164	18	13 54 11.01	2.0000	12 30 30.2	8.459
19	12 15 16.69	2.1310	4 44 34.8	11.126	19	13 56 16.37	2.0002	12 38 55.6	8.388
20	12 17 24.50	2.1294	4 55 41.2	11.085	20	13 58 21.71	2.0000	12 47 16.8	8.317
21	12 19 32.22	2.1278	5 6 45.0	11.043	21	14 0 27.05	2.0000	12 55 33.6	8.244
22	12 21 39.83	2.1261	5 17 46.4	11.003	22	14 2 32.37	2.0000	13 3 46.1	8.173
23	12 23 47.35	2.1246	-5 28 45.3	-10.960	23	14 4 37.68	2.0000	-13 11 54.3	-8.100
AUGUST 17.					AUGUST 19.				
0	h m s	s	° ' "	"	0	h m s	s	° ' "	"
0	12 25 54.78	2.1231	-5 39 41.6	-10.916	0	14 6 43.00	2.0000	-13 19 58.1	-8.027
1	12 28 2.12	2.1217	5 50 35.2	10.872	1	14 8 48.30	2.0000	13 27 57.5	7.963
2	12 30 9.38	2.1202	6 1 26.2	10.827	2	14 10 53.60	2.0000	13 35 52.4	7.898
3	12 32 16.54	2.1188	6 12 14.4	10.781	3	14 12 58.89	2.0000	13 43 42.9	7.834
4	12 34 23.63	2.1174	6 22 59.9	10.734	4	14 15 4.19	2.0000	13 51 28.9	7.770
5	12 36 30.63	2.1160	6 33 42.5	10.686	5	14 17 9.48	2.0000	13 59 10.4	7.704
6	12 38 37.55	2.1148	6 44 22.2	10.638	6	14 19 14.77	2.0000	14 6 47.4	7.638
7	12 40 44.40	2.1135	6 54 59.1	10.590	7	14 21 20.06	2.0000	14 14 19.8	7.572
8	12 42 51.17	2.1122	7 5 33.0	10.539	8	14 23 25.35	2.0000	14 21 47.6	7.505
9	12 44 57.86	2.1110	7 16 3.8	10.488	9	14 25 30.65	2.0000	14 29 10.8	7.438
10	12 47 4.49	2.1099	7 26 31.6	10.438	10	14 27 35.95	2.0000	14 36 29.4	7.371
11	12 49 11.05	2.1088	7 36 56.3	10.386	11	14 29 41.25	2.0000	14 43 43.3	7.303
12	12 51 17.54	2.1078	7 47 17.9	10.333	12	14 31 46.56	2.0000	14 50 52.5	7.235
13	12 53 23.96	2.1068	7 57 36.3	10.279	13	14 33 51.87	2.0000	14 57 57.1	7.167
14	12 55 30.33	2.1057	8 7 51.4	10.225	14	14 35 57.20	2.0000	15 4 56.9	7.098
15	12 57 36.64	2.1048	8 18 3.3	10.171	15	14 38 2.52	2.0000	15 11 52.0	7.029
16	12 59 42.88	2.1037	8 28 11.9	10.115	16	14 40 7.86	2.0001	15 18 42.3	6.960
17	13 1 49.08	2.1027	8 38 17.1	10.060	17	14 42 13.21	2.0002	15 25 27.8	6.891
18	13 3 55.21	2.1018	8 48 19.0	10.003	18	14 44 18.56	2.0000	15 32 8.6	6.822
19	13 6 1.30	2.1011	8 58 17.4	9.944	19	14 46 23.92	2.0000	15 38 44.5	6.753
20	13 8 7.34	2.1003	9 8 12.3	9.887	20	14 48 29.30	2.0000	15 45 15.5	6.684
21	13 10 13.33	2.0994	9 18 3.8	9.828	21	14 50 34.68	2.0000	15 51 41.7	6.615
22	13 12 19.27	2.0986	9 27 51.7	9.768	22	14 52 40.08	2.0001	15 58 3.0	6.546
23	13 14 25.16	2.0978	9 37 36.0	9.708	23	14 54 45.49	2.0000	16 4 19.4	6.477
24	13 16 31.01	2.0973	-9 47 16.7	-9.648	24	14 56 50.91	2.0004	-16 10 30.9	-6.150

GREENWICH MEAN TIME.

Hour.	Right Ascension.	Var. per Min.	Declination.	Var. per Min.	Hour.	Right Ascension.	Var. per Min.	Declination.	Var. per Min.
AUGUST 20.					AUGUST 22.				
	h m s	s	° ' "	"		h m s	s	° ' "	"
0	14 56 50.91	2.0004	-16 10 30.9	-6.150	0	16 37 27.38	2.0000	-19 26 20.8	-1.938
1	14 58 56.34	2.0007	16 16 37.4	6.068	1	16 39 33.38	2.0000	19 28 14.3	1.847
2	15 1 1.79	2.0000	16 22 39.0	5.985	2	16 41 39.38	2.0000	19 30 2.4	1.755
3	15 3 7.25	2.0012	16 28 35.6	5.902	3	16 43 45.37	2.0000	19 31 45.0	1.664
4	15 5 12.73	2.0013	16 34 27.2	5.818	4	16 45 51.37	2.0000	19 33 22.1	1.573
5	15 7 18.21	2.0016	16 40 13.8	5.735	5	16 47 57.36	2.0000	19 34 53.8	1.482
6	15 9 23.72	2.0019	16 45 55.4	5.651	6	16 50 3.35	2.0000	19 36 19.9	1.390
7	15 11 29.24	2.0021	16 51 31.9	5.567	7	16 52 9.34	2.0000	19 37 40.6	1.298
8	15 13 34.77	2.0023	16 57 3.4	5.482	8	16 54 15.32	2.0007	19 38 55.7	1.207
9	15 15 40.32	2.0026	17 2 29.7	5.397	9	16 56 21.30	2.0007	19 40 5.4	1.116
10	15 17 45.88	2.0028	17 7 51.0	5.313	10	16 58 27.28	2.0005	19 41 9.6	1.023
11	15 19 51.46	2.0031	17 13 7.2	5.228	11	17 0 33.24	2.0003	19 42 8.2	0.932
12	15 21 57.05	2.0033	17 18 18.3	5.142	12	17 2 39.20	2.0002	19 43 1.4	0.841
13	15 24 2.66	2.0037	17 23 24.2	5.056	13	17 4 45.15	2.0001	19 43 49.1	0.749
14	15 26 8.29	2.0030	17 28 24.9	4.969	14	17 6 51.09	2.0000	19 44 31.3	0.657
15	15 28 13.93	2.0041	17 33 20.5	4.883	15	17 8 57.01	2.0007	19 45 7.9	0.565
16	15 30 19.58	2.0048	17 38 10.9	4.798	16	17 11 2.93	2.0006	19 45 39.1	0.473
17	15 32 25.25	2.0047	17 42 56.2	4.711	17	17 13 8.84	2.0003	19 46 4.7	0.382
18	15 34 30.94	2.0049	17 47 36.2	4.623	18	17 15 14.73	2.0000	19 46 24.9	0.291
19	15 36 36.64	2.0052	17 52 11.0	4.536	19	17 17 20.60	2.0078	19 46 39.6	0.199
20	15 38 42.36	2.0054	17 56 40.5	4.448	20	17 19 26.46	2.0076	19 46 48.8	0.107
21	15 40 48.09	2.0057	18 1 4.8	4.362	21	17 21 32.31	2.0073	19 46 52.4	-0.015
22	15 42 53.84	2.0060	18 5 23.9	4.274	22	17 23 38.14	2.0070	19 46 50.6	+0.076
23	15 44 59.61	2.0062	-18 9 37.7	-4.186	23	17 25 43.95	2.0067	-19 46 43.3	+0.166
AUGUST 21.					AUGUST 23.				
	h m s	s	° ' "	"		h m s	s	° ' "	"
0	15 47 5.38	2.0064	-18 13 46.2	-4.098	0	17 27 49.74	2.0068	-19 46 30.5	+0.250
1	15 49 11.18	2.0067	18 17 49.4	4.011	1	17 29 55.51	2.0060	19 46 12.2	0.350
2	15 51 16.98	2.0068	18 21 47.3	3.921	2	17 32 1.26	2.0056	19 45 48.5	0.441
3	15 53 22.80	2.0072	18 25 39.9	3.833	3	17 34 6.98	2.0053	19 45 19.3	0.533
4	15 55 28.64	2.0073	18 29 27.2	3.743	4	17 36 12.69	2.0049	19 44 44.6	0.624
5	15 57 34.48	2.0075	18 33 9.1	3.654	5	17 38 18.37	2.0044	19 44 4.4	0.715
6	15 59 40.34	2.0078	18 36 45.7	3.565	6	17 40 24.02	2.0040	19 43 18.8	0.806
7	16 1 46.21	2.0079	18 40 16.9	3.476	7	17 42 29.65	2.0037	19 42 27.7	0.898
8	16 3 52.09	2.0082	18 43 42.8	3.387	8	17 44 35.26	2.0032	19 41 31.1	0.988
9	16 5 57.99	2.0083	18 47 3.3	3.297	9	17 46 40.83	2.0027	19 40 29.1	1.078
10	16 8 3.89	2.0085	18 50 18.4	3.207	10	17 48 46.38	2.0023	19 39 21.7	1.169
11	16 10 9.81	2.0088	18 53 28.1	3.117	11	17 50 51.89	2.0017	19 38 8.8	1.260
12	16 12 15.74	2.0088	18 56 32.4	3.027	12	17 52 57.38	2.0012	19 36 50.5	1.350
13	16 14 21.67	2.0089	18 59 31.3	2.937	13	17 55 2.83	2.0006	19 35 26.8	1.440
14	16 16 27.61	2.0091	19 2 24.8	2.847	14	17 57 8.25	2.0000	19 33 57.7	1.530
15	16 18 33.56	2.0093	19 5 12.9	2.757	15	17 59 13.63	2.0006	19 32 23.2	1.620
16	16 20 39.52	2.0094	19 7 55.6	2.666	16	18 1 18.99	2.0000	19 30 43.3	1.711
17	16 22 45.49	2.0096	19 10 32.8	2.575	17	18 3 24.30	2.0003	19 28 57.9	1.801
18	16 24 51.46	2.0096	19 13 4.6	2.484	18	18 5 29.58	2.0077	19 27 7.2	1.890
19	16 26 57.44	2.0097	19 15 30.9	2.393	19	18 7 34.82	2.0071	19 25 11.2	1.979
20	16 29 3.42	2.0098	19 17 51.8	2.303	20	18 9 40.03	2.0064	19 23 9.7	2.069
21	16 31 9.41	2.0098	19 20 7.2	2.212	21	18 11 45.19	2.0058	19 21 2.9	2.158
22	16 33 15.40	2.0098	19 22 17.2	2.121	22	18 13 50.32	2.0052	19 18 50.8	2.246
23	16 35 21.39	2.0098	19 24 21.7	2.030	23	18 15 55.41	2.0044	19 16 33.4	2.335
24	16 37 27.38	2.0099	-19 26 20.8	-1.938	24	18 18 0.45	2.0037	-19 14 10.6	+2.424

GREENWICH MEAN TIME.

Hour.	Right Ascension.	Var. per Min.	Declination.	Var. per Min.	Hour.	Right Ascension.	Var. per Min.	Declination.	Var. per Min.
AUGUST 24.					AUGUST 26.				
0	h m s	s	° ' "	"	0	h m s	s	° ' "	"
0	18 18 0.45	2.0887	-19 14 10.6	+2.424	0	19 57 0.67	2.0888	-15 40 20.6	+6.368
1	18 20 5.45	2.0890	19 11 42.5	2.513	1	19 59 2.97	2.0879	15 33 56.3	6.448
2	18 22 10.41	2.0893	19 9 9.1	2.601	2	20 1 5.22	2.0869	15 27 27.5	6.515
3	18 24 15.32	2.0815	19 6 30.4	2.689	3	20 3 7.40	2.0858	15 20 54.5	6.588
4	18 26 20.19	2.0808	19 3 46.4	2.777	4	20 5 9.52	2.0848	15 14 17.0	6.660
5	18 28 25.01	2.0800	19 0 57.2	2.864	5	20 7 11.58	2.0838	15 7 35.9	6.732
6	18 30 29.79	2.0793	18 58 2.7	2.952	6	20 9 13.58	2.0829	15 0 49.2	6.803
7	18 32 34.52	2.0784	18 55 3.0	3.039	7	20 11 15.63	2.0819	14 53 58.9	6.874
8	18 34 39.20	2.0776	18 51 58.0	3.126	8	20 13 17.41	2.0808	14 47 4.3	6.945
9	18 36 43.83	2.0768	18 48 47.9	3.213	9	20 15 19.23	2.0799	14 40 5.5	7.015
10	18 38 48.41	2.0759	18 45 32.5	3.299	10	20 17 21.00	2.0790	14 33 2.5	7.085
11	18 40 52.94	2.0751	18 42 12.0	3.386	11	20 19 22.71	2.0780	14 25 55.8	7.153
12	18 42 57.42	2.0743	18 38 46.2	3.473	12	20 21 24.36	2.0270	14 18 44.1	7.222
13	18 45 1.86	2.0735	18 35 15.3	3.558	13	20 23 25.95	2.0260	14 11 28.7	7.291
14	18 47 6.24	2.0726	18 31 39.3	3.643	14	20 25 27.48	2.0252	14 4 9.2	7.358
15	18 49 10.56	2.0716	18 27 58.2	3.728	15	20 27 28.97	2.0243	13 56 45.7	7.426
16	18 51 14.83	2.0708	18 24 11.9	3.814	16	20 29 30.39	2.0233	13 49 18.1	7.493
17	18 53 19.05	2.0698	18 20 20.5	3.898	17	20 31 31.76	2.0224	13 41 46.6	7.558
18	18 55 23.21	2.0689	18 16 24.1	3.983	18	20 33 33.08	2.0215	13 34 11.2	7.623
19	18 57 27.32	2.0680	18 12 22.6	4.068	19	20 35 34.34	2.0206	13 26 31.8	7.689
20	18 59 31.37	2.0670	18 8 16.0	4.152	20	20 37 35.55	2.0198	13 18 48.5	7.754
21	19 1 35.36	2.0661	18 4 4.4	4.235	21	20 39 36.71	2.0189	13 11 1.3	7.818
22	19 3 39.30	2.0652	17 59 47.8	4.318	22	20 41 37.82	2.0181	13 3 10.3	7.882
23	19 5 43.18	2.0642	-17 55 26.2	+4.401	23	20 43 38.88	2.0173	-12 55 15.5	+7.944
AUGUST 25.					AUGUST 27.				
0	19 7 47.00	2.0632	-17 50 59.7	+4.484	0	20 45 39.89	2.0163	-12 47 17.0	+8.007
1	19 9 50.76	2.0623	17 46 28.1	4.567	1	20 47 40.84	2.0155	12 39 14.6	8.070
2	19 11 54.47	2.0613	17 41 51.7	4.648	2	20 49 41.75	2.0148	12 31 8.6	8.130
3	19 13 58.12	2.0603	17 37 10.3	4.731	3	20 51 42.62	2.0141	12 22 59.0	8.192
4	19 16 1.71	2.0593	17 32 24.0	4.813	4	20 53 43.44	2.0133	12 14 45.6	8.253
5	19 18 5.23	2.0583	17 27 32.8	4.894	5	20 55 44.21	2.0125	12 6 28.7	8.312
6	19 20 8.70	2.0573	17 22 36.7	4.975	6	20 57 44.94	2.0118	11 58 8.2	8.371
7	19 22 12.11	2.0563	17 17 35.8	5.055	7	20 59 45.63	2.0111	11 49 44.2	8.430
8	19 24 15.46	2.0553	17 12 30.1	5.135	8	21 1 46.27	2.0103	11 41 16.6	8.488
9	19 26 18.75	2.0543	17 7 19.6	5.215	9	21 3 46.87	2.0098	11 32 45.6	8.545
10	19 28 21.97	2.0533	17 2 4.9	5.294	10	21 5 47.44	2.0091	11 24 11.2	8.603
11	19 30 25.14	2.0523	16 56 44.8	5.373	11	21 7 47.96	2.0084	11 15 39.3	8.660
12	19 32 28.24	2.0512	16 51 19.5	5.453	12	21 9 48.45	2.0078	11 6 52.1	8.715
13	19 34 31.28	2.0502	16 45 50.0	5.531	13	21 11 48.90	2.0072	10 58 7.5	8.770
14	19 36 34.26	2.0492	16 40 15.8	5.609	14	21 13 49.31	2.0066	10 49 19.7	8.824
15	19 38 37.18	2.0481	16 34 36.9	5.688	15	21 15 49.69	2.0061	10 40 28.6	8.879
16	19 40 40.03	2.0471	16 28 53.3	5.764	16	21 17 50.04	2.0055	10 31 34.2	8.932
17	19 42 42.83	2.0461	16 23 5.2	5.841	17	21 19 50.35	2.0050	10 22 36.7	8.985
18	19 44 45.56	2.0450	16 17 12.4	5.918	18	21 21 50.64	2.0046	10 13 36.0	9.037
19	19 46 48.23	2.0440	16 11 15.1	5.993	19	21 23 50.90	2.0041	10 4 32.3	9.088
20	19 48 50.84	2.0430	16 5 13.2	6.069	20	21 25 51.13	2.0036	9 55 25.4	9.140
21	19 50 53.39	2.0420	15 59 6.8	6.146	21	21 27 51.33	2.0031	9 46 15.5	9.191
22	19 52 55.88	2.0410	15 52 55.8	6.220	22	21 29 51.50	2.0028	9 37 2.5	9.240
23	19 54 58.31	2.0399	15 46 40.4	6.293	23	21 31 51.66	2.0024	9 27 46.7	9.288
24	19 57 0.67	2.0388	-15 40 20.6	+6.368	24	21 33 51.79	2.0020	-9 18 27.9	+9.338

## GREENWICH MEAN TIME.

Hour.	Right Ascension.	Var. per Min.	Declination.	Var. per Min.	Hour.	Right Ascension.	Var. per Min.	Declination.	Var. per Min.
AUGUST 28.					AUGUST 30.				
	h m s	s	° ' "	"		h m s	s	° ' "	"
0	21 33 51.79	2.0020	-9 18 27.9	+ 9.338	0	23 10 5.32	2.0198	-1 7 31.4	+10.833
1	21 35 51.90	2.0017	9 9 6.1	9.898	1	23 12 6.54	2.0219	0 56 41.0	10.846
2	21 37 51.99	2.0014	8 59 41.6	9.433	2	23 14 7.84	2.0223	0 45 49.9	10.857
3	21 39 52.07	2.0011	8 50 14.2	9.479	3	23 16 9.22	2.0226	0 34 58.2	10.868
4	21 41 52.12	2.0008	8 40 44.1	9.525	4	23 18 10.67	2.0249	0 24 5.8	10.878
5	21 43 52.16	2.0006	8 31 11.2	9.570	5	23 20 12.21	2.0263	0 13 12.9	10.886
6	21 45 52.19	2.0004	8 21 35.7	9.615	6	23 22 13.83	2.0277	-0 2 19.5	10.894
7	21 47 52.21	2.0003	8 11 57.4	9.659	7	23 24 15.53	2.0282	+0 8 34.4	10.902
8	21 49 52.22	2.0001	8 2 16.6	9.702	8	23 26 17.33	2.0297	0 19 28.7	10.908
9	21 51 52.22	1.9999	7 52 33.2	9.744	9	23 28 19.21	2.0322	0 30 23.3	10.913
10	21 53 52.21	1.9998	7 42 47.3	9.787	10	23 30 21.19	2.0328	0 41 18.2	10.917
11	21 55 52.20	1.9998	7 32 58.8	9.828	11	23 32 23.26	2.0353	0 52 13.3	10.921
12	21 57 52.18	1.9997	7 23 7.9	9.868	12	23 34 25.43	2.0370	1 3 8.7	10.923
13	21 59 52.16	1.9997	7 13 14.6	9.908	13	23 36 27.70	2.0387	1 14 4.1	10.925
14	22 1 52.14	1.9998	7 3 19.0	9.947	14	23 38 30.07	2.0404	1 24 59.7	10.926
15	22 3 52.13	1.9998	6 53 21.0	9.986	15	23 40 32.55	2.0423	1 35 55.2	10.926
16	22 5 52.12	1.9998	6 43 20.7	10.023	16	23 42 35.14	2.0440	1 46 50.3	10.926
17	22 7 52.11	1.9999	6 33 18.2	10.060	17	23 44 37.83	2.0458	1 57 46.3	10.923
18	22 9 52.11	2.0001	6 23 13.5	10.097	18	23 46 40.63	2.0477	2 8 41.6	10.921
19	22 11 52.12	2.0003	6 13 6.6	10.132	19	23 48 43.55	2.0497	2 19 36.8	10.918
20	22 13 52.14	2.0004	6 2 57.7	10.167	20	23 50 46.59	2.0516	2 30 31.7	10.913
21	22 15 52.17	2.0007	5 52 46.6	10.202	21	23 52 49.74	2.0536	2 41 26.3	10.907
22	22 17 52.22	2.0010	5 42 33.5	10.234	22	23 54 53.02	2.0557	2 52 20.5	10.901
23	22 19 52.29	2.0013	-5 32 18.5	+10.267	23	23 56 56.42	2.0578	+3 3 14.4	+10.894
AUGUST 29.					AUGUST 31.				
	h m s	s	° ' "	"		h m s	s	° ' "	"
0	22 21 52.37	2.0016	-5 22 1.5	+10.309	0	23 58 59.95	2.0598	+3 14 7.8	+10.886
1	22 23 52.48	2.0020	5 11 42.6	10.330	1	0 1 3.60	2.0620	3 25 0.7	10.877
2	22 25 52.61	2.0023	5 1 21.9	10.350	2	0 3 7.39	2.0642	3 35 58.0	10.867
3	22 27 52.76	2.0028	4 50 59.4	10.360	3	0 5 11.30	2.0664	3 46 44.7	10.856
4	22 29 52.94	2.0032	4 40 35.1	10.420	4	0 7 15.36	2.0688	3 57 35.7	10.843
5	22 31 53.14	2.0037	4 30 9.0	10.448	5	0 9 19.55	2.0710	4 8 25.9	10.831
6	22 33 53.38	2.0043	4 19 41.4	10.474	6	0 11 23.83	2.0734	4 19 15.4	10.818
7	22 35 53.65	2.0048	4 9 12.1	10.502	7	0 13 28.36	2.0758	4 30 4.0	10.803
8	22 37 53.96	2.0054	3 58 41.2	10.528	8	0 15 32.98	2.0782	4 40 51.7	10.787
9	22 39 54.30	2.0060	3 48 8.8	10.553	9	0 17 37.74	2.0807	4 51 38.4	10.770
10	22 41 54.68	2.0067	3 37 34.9	10.577	10	0 19 42.66	2.0833	5 2 24.1	10.753
11	22 43 55.10	2.0074	3 26 59.6	10.600	11	0 21 47.73	2.0858	5 13 8.7	10.733
12	22 45 55.57	2.0082	3 16 22.9	10.623	12	0 23 52.95	2.0883	5 23 52.1	10.714
13	22 47 56.08	2.0089	3 5 44.8	10.645	13	0 25 58.33	2.0910	5 34 34.4	10.694
14	22 49 56.64	2.0098	2 55 5.5	10.666	14	0 28 3.87	2.0937	5 45 15.4	10.673
15	22 51 57.25	2.0108	2 44 24.9	10.687	15	0 30 9.57	2.0963	5 55 55.1	10.650
16	22 53 57.91	2.0114	2 33 43.1	10.706	16	0 32 15.43	2.0990	6 6 33.4	10.627
17	22 55 58.62	2.0123	2 23 0.2	10.725	17	0 34 21.45	2.1018	6 17 10.3	10.602
18	22 57 59.39	2.0133	2 12 16.1	10.743	18	0 36 27.65	2.1047	6 27 45.6	10.576
19	23 0 0.22	2.0143	2 1 31.0	10.760	19	0 38 34.01	2.1075	6 38 19.4	10.550
20	23 2 1.11	2.0153	1 50 44.9	10.777	20	0 40 40.55	2.1104	6 48 51.6	10.523
21	23 4 2.06	2.0164	1 39 57.8	10.792	21	0 42 47.26	2.1133	6 59 22.2	10.495
22	23 6 3.08	2.0175	1 29 9.9	10.807	22	0 44 54.15	2.1163	7 9 51.0	10.465
23	23 8 4.16	2.0187	1 18 21.0	10.821	23	0 47 1.22	2.1193	7 20 18.0	10.434
24	23 10 5.32	2.0198	-1 7 31.4	+10.833	24	0 49 8.47	2.1223	+7 30 43.1	+10.403

GREENWICH MEAN TIME.

Hour.	Right Ascension.	Var. per Min.	Declination.	Var. per Min.	Hour.	Right Ascension.	Var. per Min.	Declination.	Var. per Min.
SEPTEMBER 1.					SEPTEMBER 3.				
	h m s	s	° ' "	"		h m s	s	° ' "	"
0	0 49 8.47	2.1223	+ 7 30 43.1	+10.403	0	2 35 3.56	2.2991	+14 54 18.0	+7.678
1	0 51 15.90	2.1253	7 41 6.4	10.371	1	2 37 21.63	2.3032	15 1 56.2	7.566
2	0 53 23.51	2.1284	7 51 27.6	10.337	2	2 39 39.94	2.3073	15 9 29.5	7.513
3	0 55 31.31	2.1316	8 1 46.8	10.303	3	2 41 58.50	2.3113	15 16 57.7	7.428
4	0 57 39.30	2.1348	8 12 4.0	10.268	4	2 44 17.29	2.3153	15 24 20.8	7.342
5	0 59 47.49	2.1380	8 22 18.9	10.231	5	2 46 36.33	2.3193	15 31 38.7	7.256
6	1 1 55.86	2.1412	8 32 31.7	10.193	6	2 48 55.61	2.3233	15 38 51.5	7.169
7	1 4 4.43	2.1445	8 42 42.1	10.155	7	2 51 15.13	2.3273	15 45 59.0	7.080
8	1 6 13.20	2.1478	8 52 50.3	10.116	8	2 53 34.89	2.3313	15 53 1.1	6.990
9	1 8 22.17	2.1512	9 2 56.0	10.074	9	2 55 54.89	2.3353	15 59 57.8	6.900
10	1 10 31.34	2.1545	9 12 59.2	10.033	10	2 58 15.13	2.3396	16 6 49.1	6.809
11	1 12 40.71	2.1578	9 23 0.0	9.991	11	3 0 35.60	2.3433	16 13 34.9	6.717
12	1 14 50.28	2.1613	9 32 58.1	9.947	12	3 2 56.32	2.3473	16 20 15.1	6.623
13	1 17 0.06	2.1648	9 42 53.6	9.903	13	3 5 17.27	2.3512	16 26 49.7	6.528
14	1 19 10.05	2.1688	9 52 46.4	9.857	14	3 7 38.46	2.3551	16 33 18.5	6.433
15	1 21 20.25	2.1718	10 2 36.4	9.809	15	3 9 59.88	2.3590	16 39 41.7	6.337
16	1 23 30.66	2.1753	10 12 23.5	9.762	16	3 12 21.64	2.3629	16 45 59.0	6.240
17	1 25 41.28	2.1788	10 22 7.8	9.713	17	3 14 43.43	2.3668	16 52 10.5	6.142
18	1 27 52.12	2.1824	10 31 49.1	9.663	18	3 17 5.55	2.3706	16 58 16.0	6.043
19	1 30 3.17	2.1861	10 41 27.4	9.612	19	3 19 27.90	2.3744	17 4 15.6	5.943
20	1 32 14.45	2.1896	10 51 2.6	9.560	20	3 21 50.48	2.3783	17 10 9.2	5.842
21	1 34 25.94	2.1933	11 0 34.6	9.507	21	3 24 13.29	2.3820	17 15 56.7	5.740
22	1 36 37.65	2.1971	11 10 3.5	9.456	22	3 26 36.32	2.3858	17 21 38.0	5.638
23	1 38 49.59	2.2008	+11 19 29.0	+9.398	23	3 28 59.58	2.3896	+17 27 13.2	+5.534
SEPTEMBER 2.					SEPTEMBER 4.				
0	1 41 1.75	2.2045	+11 28 51.2	+9.342	0	3 31 23.06	2.3932	+17 32 42.1	+5.429
1	1 43 14.13	2.2083	11 38 10.0	9.285	1	3 33 46.76	2.3968	17 38 4.7	5.324
2	1 45 26.74	2.2121	11 47 25.4	9.227	2	3 36 10.68	2.4004	17 43 21.0	5.218
3	1 47 39.58	2.2159	11 56 37.2	9.167	3	3 38 34.81	2.4040	17 48 30.9	5.111
4	1 49 52.65	2.2198	12 5 45.4	9.106	4	3 40 59.16	2.4077	17 53 34.3	5.003
5	1 52 5.95	2.2236	12 14 49.9	9.045	5	3 43 23.73	2.4112	17 58 31.2	4.894
6	1 54 19.48	2.2275	12 23 50.8	8.982	6	3 45 48.50	2.4147	18 3 21.6	4.785
7	1 56 33.25	2.2313	12 32 47.8	8.918	7	3 48 13.49	2.4182	18 8 5.4	4.674
8	1 58 47.24	2.2352	12 41 41.0	8.854	8	3 50 38.68	2.4215	18 12 42.5	4.563
9	2 1 1.47	2.2392	12 50 30.3	8.789	9	3 53 4.07	2.4248	18 17 12.9	4.451
10	2 3 15.94	2.2431	12 59 15.7	8.722	10	3 55 29.66	2.4282	18 21 36.6	4.338
11	2 5 30.64	2.2470	13 7 56.9	8.653	11	3 57 55.45	2.4314	18 25 53.5	4.225
12	2 7 45.58	2.2510	13 16 34.1	8.586	12	4 0 21.48	2.4347	18 30 3.6	4.110
13	2 10 0.76	2.2549	13 25 7.2	8.516	13	4 2 47.61	2.4379	18 34 6.7	3.995
14	2 12 16.17	2.2589	13 33 36.0	8.444	14	4 5 13.98	2.4411	18 38 3.0	3.879
15	2 14 31.83	2.2630	13 42 0.5	8.373	15	4 7 40.54	2.4442	18 41 52.2	3.763
16	2 16 47.73	2.2669	13 50 20.7	8.300	16	4 10 7.28	2.4472	18 45 34.5	3.646
17	2 19 3.86	2.2709	13 58 36.5	8.225	17	4 12 34.20	2.4502	18 49 9.7	3.528
18	2 21 20.24	2.2749	14 6 47.7	8.150	18	4 15 1.30	2.4532	18 52 37.8	3.409
19	2 23 36.85	2.2789	14 14 54.5	8.074	19	4 17 28.58	2.4560	18 55 58.8	3.290
20	2 25 53.71	2.2830	14 22 56.6	7.997	20	4 19 56.02	2.4588	18 59 12.6	3.170
21	2 28 10.81	2.2870	14 30 54.1	7.919	21	4 22 23.64	2.4617	19 2 19.2	3.049
22	2 30 28.15	2.2911	14 38 46.9	7.840	22	4 24 51.42	2.4645	19 5 18.5	2.928
23	2 32 45.74	2.2951	14 46 34.9	7.759	23	4 27 19.36	2.4670	19 8 10.8	2.807
24	2 35 3.56	2.2991	+14 54 18.0	+7.678	24	4 29 47.46	2.4697	+19 10 55.3	+2.684

GREENWICH MEAN TIME.

Hour.	Right Ascension.	Var. per Min.	Declination.	Var. per Min.	Hour.	Right Ascension.	Var. per Min.	Declination.	Var. per Min.
SEPTEMBER 5.					SEPTEMBER 7.				
	h m s	s	° ' "	"		h m s	s	° ' "	"
0	4 29 47.46	2.4697	+19 10 55.3	+2.684	0	6 30 1.06	2.5112	+18 52 14.6	-3.533
1	4 32 15.72	2.4722	19 13 32.7	2.662	1	6 32 31.70	2.5102	18 48 40.6	3.630
2	4 34 44.12	2.4746	19 16 2.7	2.438	2	6 35 2.28	2.5092	18 44 59.0	3.736
3	4 37 12.67	2.4771	19 18 25.3	2.315	3	6 37 32.80	2.5081	18 41 9.9	3.852
4	4 39 41.37	2.4794	19 20 40.5	2.190	4	6 40 3.25	2.5068	18 37 13.2	4.008
5	4 42 10.20	2.4817	19 22 48.1	2.065	5	6 42 33.62	2.5056	18 33 8.9	4.134
6	4 44 39.17	2.4840	19 24 48.3	1.940	6	6 45 3.92	2.5043	18 28 57.1	4.238
7	4 47 8.28	2.4862	19 26 40.9	1.813	7	6 47 34.14	2.5029	18 24 37.9	4.362
8	4 49 37.51	2.4882	19 28 25.9	1.688	8	6 50 4.27	2.5014	18 20 11.3	4.506
9	4 52 6.86	2.4902	19 30 3.4	1.561	9	6 52 84.31	2.4999	18 15 37.2	4.629
10	4 54 36.33	2.4922	19 31 33.2	1.433	10	6 55 4.26	2.4984	18 10 55.8	4.752
11	4 57 5.92	2.4941	19 32 55.4	1.306	11	6 57 34.12	2.4968	18 6 7.0	4.873
12	4 59 35.62	2.4958	19 34 9.9	1.178	12	7 0 3.88	2.4951	18 1 11.0	4.994
13	5 2 5.42	2.4976	19 35 16.7	1.049	13	7 2 33.53	2.4932	17 56 7.7	5.116
14	5 4 35.33	2.4993	19 36 15.8	0.921	14	7 5 3.06	2.4913	17 50 57.1	5.236
15	5 7 5.34	2.5009	19 37 7.2	0.793	15	7 7 32.49	2.4896	17 45 39.4	5.354
16	5 9 35.44	2.5024	19 37 50.9	0.663	16	7 10 1.81	2.4876	17 40 14.6	5.473
17	5 12 5.63	2.5039	19 38 26.8	0.532	17	7 12 31.00	2.4855	17 34 42.7	5.591
18	5 14 35.91	2.5053	19 38 54.9	0.403	18	7 15 0.07	2.4835	17 29 3.7	5.708
19	5 17 6.26	2.5066	19 39 15.2	0.273	19	7 17 29.02	2.4814	17 23 17.8	5.823
20	5 19 36.70	2.5078	19 39 27.7	0.143	20	7 19 57.84	2.4793	17 17 24.9	5.939
21	5 22 7.20	2.5089	19 39 32.4	+0.013	21	7 22 26.53	2.4771	17 11 25.1	6.054
22	5 24 37.77	2.5101	19 39 29.2	-0.118	22	7 24 55.09	2.4748	17 5 18.4	6.168
23	5 27 8.41	2.5111	+19 39 18.3	-0.248	23	7 27 23.51	2.4725	+16 59 4.9	-6.282
SEPTEMBER 6.					SEPTEMBER 8.				
0	5 29 39.10	2.5120	+19 38 59.5	-0.379	0	7 29 51.79	2.4701	+16 52 44.6	-6.393
1	5 32 9.85	2.5128	19 38 32.8	0.510	1	7 32 19.92	2.4677	16 46 17.7	6.504
2	5 34 40.64	2.5136	19 37 58.3	0.641	2	7 34 47.91	2.4653	16 39 44.1	6.615
3	5 37 11.48	2.5143	19 37 15.9	0.773	3	7 37 15.75	2.4628	16 33 3.9	6.725
4	5 39 42.36	2.5149	19 36 25.6	0.903	4	7 39 43.44	2.4602	16 26 17.1	6.833
5	5 42 13.27	2.5154	19 35 27.5	1.034	5	7 42 10.97	2.4575	16 19 23.9	6.941
6	5 44 44.21	2.5159	19 34 21.5	1.166	6	7 44 38.34	2.4549	16 12 24.2	7.048
7	5 47 15.18	2.5163	19 33 7.6	1.297	7	7 47 5.56	2.4523	16 5 18.2	7.153
8	5 49 46.17	2.5166	19 31 45.9	1.428	8	7 49 32.62	2.4496	15 58 5.8	7.258
9	5 52 17.17	2.5168	19 30 16.3	1.559	9	7 51 59.51	2.4468	15 50 47.2	7.362
10	5 54 48.19	2.5170	19 28 38.8	1.690	10	7 54 26.24	2.4441	15 43 22.4	7.465
11	5 57 19.21	2.5171	19 26 53.5	1.820	11	7 56 52.80	2.4413	15 35 51.4	7.567
12	5 59 50.24	2.5171	19 25 0.4	1.951	12	7 59 19.19	2.4383	15 28 14.4	7.668
13	6 2 21.26	2.5170	19 22 59.4	2.083	13	8 1 45.40	2.4354	15 20 31.3	7.768
14	6 4 52.28	2.5168	19 20 50.5	2.213	14	8 4 11.44	2.4326	15 12 42.3	7.866
15	6 7 23.28	2.5166	19 18 33.9	2.343	15	8 6 37.31	2.4297	15 4 47.4	7.963
16	6 9 54.27	2.5163	19 16 9.4	2.473	16	8 9 3.00	2.4267	14 56 46.7	8.060
17	6 12 25.24	2.5159	19 13 37.2	2.603	17	8 11 28.51	2.4237	14 48 40.2	8.155
18	6 14 56.18	2.5154	19 10 57.1	2.733	18	8 13 53.84	2.4206	14 40 28.1	8.249
19	6 17 27.09	2.5149	19 8 9.3	2.861	19	8 16 18.98	2.4176	14 32 10.3	8.343
20	6 19 57.97	2.5143	19 5 13.8	2.990	20	8 18 43.95	2.4146	14 23 46.9	8.435
21	6 22 28.81	2.5137	19 2 10.5	3.119	21	8 21 8.73	2.4114	14 15 18.1	8.526
22	6 24 59.61	2.5129	18 58 59.5	3.247	22	8 23 33.32	2.4083	14 6 43.8	8.616
23	6 27 30.36	2.5121	18 55 40.9	3.374	23	8 25 57.72	2.4052	13 58 4.2	8.704
24	6 30 1.06	2.5112	+18 52 14.6	-3.503	24	8 28 21.94	2.4021	+13 49 19.3	-8.792

GREENWICH MEAN TIME.

Hour.	Right Ascension.	Var. per Min.	Declination.	Var. per Min.	Hour.	Right Ascension.	Var. per Min.	Declination.	Var. per Min.
SEPTEMBER 9.					SEPTEMBER 11.				
	h m s	s	° ' "	"		h m s	s	° ' "	"
0	8 28 21.94	2.4021	+13 49 19.3	-8.792	0	10 19 58.46	2.2618	+5 30 30.0	-11.492
1	8 30 45.97	2.2668	13 40 29.2	8.878	1	10 22 13.48	2.2490	5 18 59.8	11.515
2	8 33 9.80	2.2667	13 31 34.0	8.963	2	10 24 28.34	2.2463	5 7 28.2	11.538
3	8 35 33.45	2.2625	13 22 33.7	9.047	3	10 26 43.04	2.2487	4 55 55.3	11.560
4	8 37 56.90	2.2603	13 13 28.4	9.129	4	10 28 57.58	2.2610	4 44 21.1	11.580
5	8 40 20.16	2.2661	13 4 18.2	9.211	5	10 31 11.96	2.2663	4 32 45.7	11.598
6	8 42 43.23	2.2629	12 55 3.1	9.291	6	10 33 26.18	2.2357	4 21 9.3	11.616
7	8 45 6.11	2.2797	12 45 43.3	9.370	7	10 35 40.24	2.2332	4 9 31.8	11.633
8	8 47 28.79	2.2763	12 36 18.7	9.448	8	10 37 54.16	2.2307	3 57 53.4	11.647
9	8 49 51.27	2.2731	12 26 49.5	9.524	9	10 40 7.92	2.2281	3 46 14.2	11.660
10	8 52 13.56	2.2698	12 17 15.8	9.599	10	10 42 21.53	2.2256	3 34 34.2	11.673
11	8 54 35.65	2.2666	12 7 37.6	9.673	11	10 44 34.99	2.2231	3 22 53.4	11.685
12	8 56 57.55	2.2633	11 57 55.0	9.746	12	10 46 48.30	2.2207	3 11 12.0	11.694
13	8 59 19.25	2.2600	11 48 8.1	9.818	13	10 49 1.47	2.2183	2 59 30.1	11.708
14	9 1 40.75	2.2568	11 38 16.9	9.888	14	10 51 14.50	2.2159	2 47 47.7	11.710
15	9 4 2.06	2.2535	11 28 21.6	9.956	15	10 53 27.38	2.2136	2 36 4.9	11.717
16	9 6 23.17	2.2503	11 18 22.2	10.024	16	10 55 40.13	2.2113	2 24 21.7	11.722
17	9 8 44.09	2.2470	11 8 18.7	10.091	17	10 57 52.74	2.2090	2 12 38.3	11.725
18	9 11 4.81	2.2437	10 58 11.3	10.155	18	11 0 5.21	2.2068	2 0 54.7	11.728
19	9 13 25.33	2.2404	10 48 0.1	10.218	19	11 2 17.55	2.2046	1 49 11.0	11.728
20	9 15 45.66	2.2373	10 37 45.1	10.282	20	11 4 29.76	2.2024	1 37 27.3	11.728
21	9 18 5.80	2.2340	10 27 26.3	10.343	21	11 6 41.84	2.2003	1 25 43.6	11.728
22	9 20 25.74	2.2307	10 17 3.9	10.403	22	11 8 53.79	2.1981	1 14 0.0	11.725
23	9 22 45.48	2.2275	+10 6 38.0	-10.460	23	11 11 5.61	2.1960	+1 2 16.6	-11.722
SEPTEMBER 10.					SEPTEMBER 12.				
	h m s	s	° ' "	"		h m s	s	° ' "	"
0	9 25 5.04	2.2243	+ 9 56 8.7	-10.518	0	11 13 17.31	2.1940	+0 50 33.4	-11.717
1	9 27 24.40	2.2210	9 45 35.9	10.574	1	11 15 28.89	2.1920	0 38 50.6	11.711
2	9 29 43.56	2.2178	9 34 59.8	10.628	2	11 17 40.35	2.1900	0 27 8.1	11.704
3	9 32 2.54	2.2147	9 24 20.5	10.682	3	11 19 51.69	2.1880	0 15 26.1	11.695
4	9 34 21.32	2.2115	9 13 38.0	10.733	4	11 22 2.91	2.1861	+0 3 44.7	11.686
5	9 36 39.92	2.2083	9 2 52.5	10.783	5	11 24 14.02	2.1843	-0 7 56.1	11.674
6	9 38 58.32	2.2052	8 52 4.0	10.833	6	11 26 25.02	2.1823	0 19 86.2	11.663
7	9 41 16.54	2.2021	8 41 12.6	10.881	7	11 28 35.90	2.1805	0 31 15.6	11.650
8	9 43 34.57	2.2000	8 30 18.3	10.928	8	11 30 46.68	2.1788	0 42 54.2	11.636
9	9 45 52.42	2.2058	8 19 21.3	10.973	9	11 32 57.35	2.1770	0 54 31.9	11.621
10	9 48 10.07	2.2028	8 8 21.6	11.017	10	11 35 7.92	2.1753	1 6 8.7	11.605
11	9 50 27.55	2.2006	7 57 19.3	11.059	11	11 37 18.39	2.1736	1 17 44.5	11.587
12	9 52 44.84	2.2066	7 46 14.5	11.100	12	11 39 28.75	2.1718	1 29 19.1	11.568
13	9 55 1.94	2.2036	7 35 7.3	11.140	13	11 41 39.01	2.1703	1 40 52.6	11.548
14	9 57 18.87	2.2006	7 23 57.7	11.178	14	11 43 49.18	2.1688	1 52 24.9	11.528
15	9 59 35.61	2.2776	7 12 45.9	11.216	15	11 45 59.26	2.1672	2 3 56.9	11.506
16	10 1 52.18	2.2747	7 1 31.8	11.252	16	11 48 9.24	2.1656	2 15 25.6	11.483
17	10 4 8.57	2.2718	6 50 15.7	11.288	17	11 50 19.13	2.1641	2 26 53.9	11.459
18	10 6 24.79	2.2688	6 38 57.5	11.320	18	11 52 28.93	2.1626	2 38 20.7	11.433
19	10 8 40.83	2.2658	6 27 37.3	11.352	19	11 54 38.64	2.1612	2 49 45.9	11.406
20	10 10 56.69	2.2630	6 16 15.3	11.382	20	11 56 48.27	2.1608	3 1 9.6	11.381
21	10 13 12.39	2.2602	6 4 51.5	11.411	21	11 58 57.82	2.1585	3 12 31.6	11.352
22	10 15 27.91	2.2573	5 53 26.0	11.439	22	12 1 7.29	2.1571	3 23 51.8	11.323
23	10 17 43.27	2.2546	5 41 58.8	11.467	23	12 3 16.67	2.1558	3 35 10.3	11.293
24	10 19 58.46	2.2518	+ 5 30 30.0	-11.492	24	12 5 25.98	2.1545	-3 46 26.9	-11.262

GREENWICH MEAN TIME.

Hour.	Right Ascension.	Var. per Min.	Declination.	Var. per Min.	Hour.	Right Ascension.	Var. per Min.	Declination.	Var. per Min.
SEPTEMBER 13.					SEPTEMBER 15.				
	h m s	s	° ' "	"		h m s	s	° ' "	"
0	12 5 25.98	2.1545	- 3 46 26.9	-11.262	0	13 47 53.78	2.1237	-11 53 49.9	-8.742
1	12 7 35.21	2.1533	3 57 41.7	11.320	1	13 50 1.20	2.1235	12 2 32.3	8.672
2	12 9 44.37	2.1520	4 8 54.4	11.195	2	13 52 8.60	2.1233	12 11 10.5	8.601
3	12 11 53.45	2.1508	4 20 5.1	11.162	3	13 54 16.00	2.1231	12 19 44.4	8.529
4	12 14 2.47	2.1496	4 31 13.8	11.127	4	13 56 23.39	2.1229	12 28 14.0	8.458
5	12 16 11.42	2.1486	4 42 20.3	11.090	5	13 58 30.78	2.1231	12 36 39.3	8.385
6	12 18 20.30	2.1475	4 53 24.6	11.053	6	14 0 38.16	2.1229	12 45 0.2	8.312
7	12 20 29.12	2.1464	5 4 26.7	11.015	7	14 2 45.53	2.1228	12 53 16.7	8.238
8	12 22 37.87	2.1453	5 15 26.4	10.978	8	14 4 52.90	2.1228	13 1 28.8	8.164
9	12 24 46.56	2.1443	5 26 23.8	10.936	9	14 7 0.28	2.1227	13 9 36.4	8.090
10	12 26 55.19	2.1433	5 37 18.7	10.895	10	14 9 7.62	2.1227	13 17 39.6	8.015
11	12 29 3.76	2.1424	5 48 11.2	10.853	11	14 11 14.98	2.1226	13 25 38.2	7.939
12	12 31 12.28	2.1415	5 59 1.1	10.810	12	14 13 22.38	2.1226	13 33 32.3	7.863
13	12 33 20.74	2.1406	6 9 48.4	10.767	13	14 15 29.68	2.1225	13 41 21.8	7.787
14	12 35 29.15	2.1398	6 20 33.1	10.723	14	14 17 37.08	2.1225	13 49 6.7	7.710
15	12 37 37.51	2.1389	6 31 15.1	10.677	15	14 19 44.38	2.1225	13 56 47.0	7.633
16	12 39 45.82	2.1381	6 41 54.3	10.630	16	14 21 51.73	2.1224	14 4 22.6	7.554
17	12 41 54.08	2.1373	6 52 30.7	10.583	17	14 23 59.07	2.1224	14 11 53.5	7.476
18	12 44 2.29	2.1365	7 3 4.3	10.536	18	14 26 6.42	2.1224	14 19 19.7	7.398
19	12 46 10.46	2.1358	7 13 35.0	10.487	19	14 28 13.76	2.1224	14 26 41.2	7.318
20	12 48 18.58	2.1351	7 24 2.7	10.437	20	14 30 21.11	2.1224	14 33 57.9	7.238
21	12 50 26.67	2.1344	7 34 27.4	10.386	21	14 32 28.45	2.1224	14 41 9.8	7.158
22	12 52 34.71	2.1337	7 44 49.0	10.335	22	14 34 35.80	2.1225	14 48 16.9	7.078
23	12 54 42.71	2.1330	- 7 55 7.6	-10.283	23	14 36 43.15	2.1226	-14 55 19.2	-6.998
SEPTEMBER 14.					SEPTEMBER 16.				
	h m s	s	° ' "	"		h m s	s	° ' "	"
0	12 56 50.67	2.1324	- 8 5 23.0	-10.230	0	14 38 50.50	2.1225	-15 2 16.6	-6.916
1	12 58 58.60	2.1318	8 15 35.2	10.176	1	14 40 57.85	2.1225	15 9 9.1	6.833
2	13 1 6.49	2.1313	8 25 44.1	10.121	2	14 43 5.20	2.1225	15 15 56.6	6.752
3	13 3 14.35	2.1308	8 35 49.7	10.066	3	14 45 12.55	2.1226	15 22 39.3	6.670
4	13 5 22.18	2.1302	8 45 52.0	10.010	4	14 47 19.90	2.1226	15 29 17.0	6.587
5	13 7 29.97	2.1297	8 55 50.9	9.953	5	14 49 27.26	2.1227	15 35 49.7	6.508
6	13 9 37.74	2.1293	9 5 46.4	9.896	6	14 51 34.62	2.1226	15 42 17.4	6.419
7	13 11 45.48	2.1288	9 15 38.4	9.838	7	14 53 41.97	2.1226	15 48 40.0	6.336
8	13 13 53.19	2.1283	9 25 26.9	9.778	8	14 55 49.33	2.1227	15 54 57.7	6.252
9	13 16 0.87	2.1278	9 35 11.8	9.718	9	14 57 56.69	2.1228	16 1 10.2	6.167
10	13 18 8.53	2.1274	9 44 53.1	9.658	10	15 0 4.06	2.1228	16 7 17.7	6.083
11	13 20 16.16	2.1271	9 54 30.8	9.597	11	15 2 11.42	2.1227	16 13 20.1	5.998
12	13 22 23.78	2.1268	10 4 4.8	9.535	12	15 4 18.78	2.1228	16 19 17.4	5.912
13	13 24 31.37	2.1263	10 13 35.0	9.473	13	15 6 26.15	2.1228	16 25 9.5	5.825
14	13 26 38.94	2.1260	10 23 1.5	9.409	14	15 8 33.51	2.1228	16 30 56.4	5.739
15	13 28 46.49	2.1258	10 32 24.1	9.345	15	15 10 40.88	2.1228	16 36 38.2	5.653
16	13 30 54.03	2.1255	10 41 42.9	9.281	16	15 12 48.24	2.1228	16 42 14.8	5.567
17	13 33 1.55	2.1252	10 50 57.8	9.216	17	15 14 55.61	2.1228	16 47 46.2	5.480
18	13 35 9.05	2.1248	11 0 8.8	9.150	18	15 17 2.97	2.1227	16 53 12.4	5.393
19	13 37 16.53	2.1247	11 9 15.8	9.083	19	15 19 10.33	2.1228	16 58 33.3	5.305
20	13 39 24.01	2.1245	11 18 18.8	9.017	20	15 21 17.70	2.1228	17 3 49.0	5.218
21	13 41 31.47	2.1243	11 27 17.8	8.948	21	15 23 25.06	2.1227	17 8 59.4	5.130
22	13 43 38.92	2.1240	11 36 12.6	8.879	22	15 25 32.42	2.1227	17 14 4.5	5.042
23	13 45 46.35	2.1238	11 45 3.3	8.811	23	15 27 39.78	2.1226	17 19 4.4	4.953
24	13 47 53.78	2.1237	-11 53 49.9	-8.742	24	15 29 47.13	2.1226	-17 23 58.9	-4.864



GREENWICH MEAN TIME.

Hour.	Right Ascension.	Var. per Min.	Declination.	Var. per Min.	Hour.	Right Ascension.	Var. per Min.	Declination.	Var. per Min.
SEPTEMBER 17.					SEPTEMBER 19.				
	h m s	s	° ' "	"		h m s	s	° ' "	"
0	15 29 47.13	2.1225	-17 23 58.9	-4.864	0	17 11 24.85	2.1070	-19 32 43.1	-0.475
1	15 31 54.48	2.1225	17 28 48.1	4.775	1	17 13 31.25	2.1064	19 33 8.8	0.383
2	15 34 1.83	2.1224	17 33 31.9	4.686	2	17 15 37.62	2.1058	19 33 29.1	0.293
3	15 36 9.17	2.1223	17 38 10.4	4.598	3	17 17 43.94	2.1050	19 33 43.9	0.200
4	15 38 16.51	2.1223	17 42 43.6	4.508	4	17 19 50.22	2.1043	19 33 53.1	0.108
5	15 40 23.85	2.1223	17 47 11.3	4.418	5	17 21 56.46	2.1037	19 33 56.9	-0.018
6	15 42 31.18	2.1221	17 51 33.7	4.328	6	17 24 2.66	2.1029	19 33 55.2	+0.074
7	15 44 38.50	2.1220	17 55 50.7	4.238	7	17 26 8.81	2.1022	19 33 48.0	0.165
8	15 46 45.82	2.1219	18 0 2.3	4.148	8	17 28 14.92	2.1014	19 33 35.4	0.257
9	15 48 53.13	2.1218	18 4 8.5	4.058	9	17 30 20.98	2.1006	19 33 17.2	0.348
10	15 51 0.43	2.1216	18 8 9.2	3.967	10	17 32 26.99	2.0998	19 32 53.6	0.438
11	15 53 7.72	2.1214	18 12 4.5	3.877	11	17 34 32.96	2.0991	19 32 24.6	0.529
12	15 55 15.00	2.1213	18 15 54.4	3.786	12	17 36 38.88	2.0983	19 31 50.1	0.620
13	15 57 22.27	2.1212	18 19 38.8	3.695	13	17 38 44.75	2.0974	19 31 10.2	0.710
14	15 59 29.54	2.1210	18 23 17.8	3.604	14	17 40 50.57	2.0966	19 30 24.9	0.801
15	16 1 36.79	2.1208	18 26 51.3	3.513	15	17 42 56.34	2.0958	19 29 34.1	0.892
16	16 3 44.03	2.1206	18 30 19.3	3.422	16	17 45 2.06	2.0949	19 28 37.9	0.982
17	16 5 51.26	2.1204	18 33 41.9	3.331	17	17 47 7.73	2.0941	19 27 36.3	1.072
18	16 7 58.48	2.1202	18 36 59.0	3.238	18	17 49 13.35	2.0932	19 26 29.3	1.161
19	16 10 5.68	2.1199	18 40 10.5	3.147	19	17 51 18.91	2.0923	19 25 17.0	1.251
20	16 12 12.87	2.1197	18 43 16.6	3.056	20	17 53 24.42	2.0914	19 23 59.2	1.341
21	16 14 20.04	2.1193	18 46 17.2	2.964	21	17 55 29.88	2.0905	19 22 36.1	1.430
22	16 16 27.19	2.1191	18 49 12.3	2.872	22	17 57 35.28	2.0895	19 21 7.6	1.519
23	16 18 34.33	2.1189	-18 52 1.8	-2.780	23	17 59 40.62	2.0886	-19 19 33.8	+1.608
SEPTEMBER 18.					SEPTEMBER 20.				
0	16 20 41.46	2.1186	-18 54 45.9	-2.688	0	18 1 45.91	2.0877	-19 17 54.6	+1.698
1	16 22 48.56	2.1182	18 57 24.4	2.596	1	18 3 51.14	2.0867	19 16 10.1	1.786
2	16 24 55.64	2.1178	18 59 57.4	2.504	2	18 5 56.31	2.0858	19 14 20.3	1.874
3	16 27 2.70	2.1175	19 2 24.9	2.412	3	18 8 1.43	2.0848	19 12 25.2	1.963
4	16 29 9.74	2.1172	19 4 46.8	2.319	4	18 10 6.49	2.0838	19 10 24.8	2.051
5	16 31 16.76	2.1168	19 7 3.2	2.228	5	18 12 11.49	2.0828	19 8 19.1	2.139
6	16 33 23.76	2.1164	19 9 14.1	2.135	6	18 14 16.42	2.0818	19 6 8.1	2.227
7	16 35 30.73	2.1160	19 11 19.4	2.043	7	18 16 21.30	2.0808	19 3 51.9	2.313
8	16 37 37.68	2.1156	19 13 19.2	1.951	8	18 18 26.12	2.0798	19 1 30.5	2.401
9	16 39 44.60	2.1152	19 15 13.5	1.858	9	18 20 30.87	2.0788	18 59 3.8	2.488
10	16 41 51.50	2.1148	19 17 2.2	1.766	10	18 22 35.57	2.0778	18 56 31.9	2.575
11	16 43 58.37	2.1143	19 18 45.4	1.673	11	18 24 40.20	2.0767	18 53 54.8	2.662
12	16 46 5.21	2.1138	19 20 23.0	1.581	12	18 26 44.77	2.0757	18 51 12.5	2.748
13	16 48 12.03	2.1133	19 21 55.1	1.489	13	18 28 49.28	2.0746	18 48 25.0	2.834
14	16 50 18.81	2.1128	19 23 21.7	1.397	14	18 30 53.72	2.0735	18 45 32.4	2.920
15	16 52 25.57	2.1123	19 24 42.7	1.304	15	18 32 58.10	2.0725	18 42 34.6	3.007
16	16 54 32.29	2.1118	19 25 58.2	1.212	16	18 35 2.42	2.0714	18 39 31.6	3.092
17	16 56 38.98	2.1113	19 27 8.1	1.120	17	18 37 6.67	2.0703	18 36 23.6	3.177
18	16 58 45.64	2.1107	19 28 12.6	1.028	18	18 39 10.86	2.0693	18 33 10.4	3.262
19	17 0 52.26	2.1101	19 29 11.5	0.935	19	18 41 14.98	2.0682	18 29 52.2	3.346
20	17 2 58.85	2.1096	19 30 4.8	0.843	20	18 43 19.04	2.0671	18 26 28.9	3.431
21	17 5 5.41	2.1090	19 30 52.7	0.752	21	18 45 23.03	2.0660	18 23 0.5	3.515
22	17 7 11.93	2.1083	19 31 35.0	0.659	22	18 47 26.96	2.0649	18 19 27.1	3.599
23	17 9 18.41	2.1077	19 32 11.8	0.568	23	18 49 30.82	2.0638	18 15 48.6	3.683
24	17 11 24.85	2.1070	-19 32 43.1	-0.475	24	18 51 34.62	2.0628	-18 12 5.2	+3.766

GREENWICH MEAN TIME.

Hour.	Right Ascension.	Var. per Min.	Declination.	Var. per Min.	Hour.	Right Ascension.	Var. per Min.	Declination.	Var. per Min.
SEPTEMBER 21.					SEPTEMBER 23.				
	h m s	s	° ' "	"		h m s	s	° ' "	"
0	18 51 34.62	2.0628	-18 12 5.2	+3.766	0	20 29 22.57	2.0153	-13 41 14.2	+7.382
1	18 53 38.35	2.0616	18 8 16.7	3.849	1	20 31 23.47	2.0146	13 33 49.3	7.448
2	18 55 42.01	2.0605	18 4 23.3	3.932	2	20 33 24.32	2.0139	13 26 20.5	7.513
3	18 57 45.61	2.0594	18 0 24.9	4.015	3	20 35 25.14	2.0133	13 18 47.8	7.578
4	18 59 49.14	2.0583	17 56 21.5	4.098	4	20 37 25.91	2.0126	13 11 11.2	7.643
5	19 1 52.61	2.0573	17 52 13.2	4.179	5	20 39 26.65	2.0120	13 3 30.7	7.708
6	19 3 56.01	2.0561	17 48 0.0	4.260	6	20 41 27.35	2.0113	12 55 46.5	7.769
7	19 5 59.34	2.0550	17 43 42.0	4.342	7	20 43 28.01	2.0108	12 47 58.4	7.833
8	19 8 2.61	2.0539	17 39 19.0	4.423	8	20 45 28.64	2.0103	12 40 6.5	7.895
9	19 10 5.81	2.0528	17 34 51.2	4.504	9	20 47 29.23	2.0096	12 32 11.0	7.957
10	19 12 8.94	2.0517	17 30 18.5	4.584	10	20 49 29.79	2.0091	12 24 11.7	8.019
11	19 14 12.01	2.0507	17 25 41.1	4.664	11	20 51 30.32	2.0086	12 16 8.7	8.080
12	19 16 15.02	2.0496	17 20 58.8	4.745	12	20 53 30.82	2.0081	12 8 2.1	8.141
13	19 18 17.96	2.0484	17 16 11.7	4.824	13	20 55 31.29	2.0077	11 59 51.8	8.201
14	19 20 20.83	2.0473	17 11 19.9	4.903	14	20 57 31.74	2.0073	11 51 38.0	8.260
15	19 22 23.63	2.0463	17 6 23.4	4.982	15	20 59 32.16	2.0068	11 43 20.6	8.320
16	19 24 26.38	2.0452	17 1 22.1	5.061	16	21 1 32.55	2.0064	11 34 59.6	8.378
17	19 26 29.05	2.0441	16 56 16.1	5.139	17	21 3 32.93	2.0061	11 26 35.2	8.437
18	19 28 31.67	2.0430	16 51 5.4	5.217	18	21 5 33.28	2.0057	11 18 7.2	8.494
19	19 30 34.22	2.0419	16 45 50.1	5.294	19	21 7 33.61	2.0053	11 9 35.9	8.551
20	19 32 36.70	2.0408	16 40 30.1	5.372	20	21 9 33.92	2.0051	11 1 1.1	8.608
21	19 34 39.12	2.0396	16 35 5.5	5.448	21	21 11 34.22	2.0048	10 52 22.9	8.664
22	19 36 41.48	2.0388	16 29 36.3	5.525	22	21 13 34.50	2.0046	10 43 41.4	8.719
23	19 38 43.78	2.0378	-16 24 2.5	+5.602	23	21 15 34.77	2.0044	-10 34 56.6	+8.774
SEPTEMBER 22.					SEPTEMBER 24.				
0	19 40 46.02	2.0368	-16 18 24.1	+5.678	0	21 17 35.03	2.0042	-10 26 8.5	+8.828
1	19 42 48.19	2.0357	16 12 41.2	5.753	1	21 19 35.27	2.0039	10 17 17.2	8.883
2	19 44 50.30	2.0347	16 6 53.8	5.828	2	21 21 35.50	2.0036	10 8 22.6	8.937
3	19 46 52.35	2.0337	16 1 1.9	5.903	3	21 23 35.73	2.0033	9 59 24.8	8.989
4	19 48 54.34	2.0327	15 55 5.5	5.977	4	21 25 35.95	2.0037	9 50 23.9	9.041
5	19 50 56.27	2.0318	15 49 4.7	6.051	5	21 27 36.17	2.0037	9 41 19.9	9.093
6	19 52 58.15	2.0308	15 42 59.4	6.124	6	21 29 36.39	2.0036	9 32 12.8	9.144
7	19 54 59.96	2.0297	15 36 49.8	6.198	7	21 31 36.60	2.0036	9 23 2.6	9.195
8	19 57 1.71	2.0288	15 30 35.7	6.271	8	21 33 36.82	2.0037	9 13 49.4	9.245
9	19 59 3.41	2.0278	15 24 17.3	6.345	9	21 35 37.04	2.0037	9 4 33.2	9.294
10	20 1 5.05	2.0269	15 17 54.5	6.416	10	21 37 37.26	2.0036	8 55 14.1	9.343
11	20 3 6.64	2.0260	15 11 27.4	6.487	11	21 39 37.49	2.0036	8 45 52.1	9.391
12	20 5 8.17	2.0251	15 4 56.1	6.558	12	21 41 37.73	2.0041	8 36 27.2	9.438
13	20 7 9.65	2.0242	14 58 20.5	6.629	13	21 43 37.98	2.0043	8 26 59.5	9.486
14	20 9 11.07	2.0233	14 51 40.6	6.700	14	21 45 38.25	2.0045	8 17 28.9	9.533
15	20 11 12.44	2.0224	14 44 56.5	6.769	15	21 47 38.52	2.0047	8 7 55.6	9.578
16	20 13 13.76	2.0216	14 38 8.3	6.839	16	21 49 38.81	2.0050	7 58 19.6	9.623
17	20 15 15.03	2.0208	14 31 15.8	6.909	17	21 51 39.12	2.0053	7 48 40.9	9.668
18	20 17 16.25	2.0199	14 24 19.2	6.978	18	21 53 39.45	2.0057	7 38 59.5	9.712
19	20 19 17.42	2.0192	14 17 18.5	7.046	19	21 55 39.80	2.0060	7 29 15.5	9.764
20	20 21 18.55	2.0183	14 10 13.7	7.113	20	21 57 40.17	2.0064	7 19 29.0	9.798
21	20 23 19.62	2.0175	14 3 4.9	7.181	21	21 59 40.57	2.0069	7 9 39.8	9.840
22	20 25 20.65	2.0167	13 55 52.0	7.248	22	22 1 41.00	2.0073	6 59 48.2	9.880
23	20 27 21.63	2.0160	13 48 35.1	7.315	23	22 3 41.45	2.0078	6 49 54.2	9.921
24	20 29 22.57	2.0153	-13 41 14.2	+7.382	24	22 5 41.93	2.0083	-6 39 57.7	+9.962

GREENWICH MEAN TIME.

Hour.	Right Ascension.	Var. per Min.	Declination.	Var. per Min.	Hour.	Right Ascension.	Var. per Min.	Declination.	Var. per Min.
SEPTEMBER 25.					SEPTEMBER 27.				
	h m s	s	° ' "	"		h m s	s	° ' "	"
0	22 5 41.93	2.0083	-6 39 57.7	+9.962	0	23 43 24.14	2.0769	+1 50 19.7	+10.990
1	22 7 42.45	2.0080	6 29 58.8	10.001	1	23 45 28.83	2.0763	2 1 19.1	10.989
2	22 9 43.01	2.0086	6 19 57.6	10.039	2	23 47 33.66	2.0817	2 12 18.4	10.988
3	22 11 43.60	2.0102	6 9 54.1	10.078	3	23 49 38.63	2.0841	2 23 17.7	10.988
4	22 13 44.23	2.0109	5 59 48.3	10.115	4	23 51 43.75	2.0866	2 34 16.9	10.985
5	22 15 44.91	2.0116	5 49 40.3	10.151	5	23 53 49.02	2.0901	2 45 15.9	10.982
6	22 17 45.62	2.0123	5 39 30.2	10.187	6	23 55 54.44	2.0916	2 56 14.7	10.977
7	22 19 46.39	2.0122	5 29 17.9	10.223	7	23 58 0.01	2.0943	3 7 13.1	10.971
8	22 21 47.20	2.0129	5 19 3.5	10.258	8	0 0 5.75	2.0989	3 18 11.2	10.964
9	22 23 48.06	2.0143	5 8 47.0	10.292	9	0 2 11.64	2.0995	3 29 8.8	10.957
10	22 25 48.97	2.0157	4 58 28.5	10.324	10	0 4 17.69	2.1023	3 40 6.0	10.948
11	22 27 49.94	2.0166	4 48 8.1	10.356	11	0 6 23.90	2.1048	3 51 2.6	10.938
12	22 29 50.96	2.0175	4 37 45.8	10.388	12	0 8 30.27	2.1076	4 1 58.6	10.928
13	22 31 52.04	2.0185	4 27 21.6	10.419	13	0 10 36.81	2.1104	4 12 53.9	10.916
14	22 33 53.18	2.0196	4 16 55.5	10.449	14	0 12 43.52	2.1133	4 23 48.5	10.903
15	22 35 54.39	2.0207	4 6 27.7	10.478	15	0 14 50.40	2.1162	4 34 42.3	10.890
16	22 37 55.66	2.0217	3 55 58.1	10.507	16	0 16 57.46	2.1191	4 45 35.3	10.875
17	22 39 56.99	2.0228	3 45 26.8	10.535	17	0 19 4.69	2.1219	4 56 27.3	10.859
18	22 41 58.40	2.0241	3 34 53.9	10.563	18	0 21 12.09	2.1248	5 7 18.3	10.842
19	22 43 59.88	2.0253	3 24 19.8	10.590	19	0 23 19.67	2.1279	5 18 8.3	10.824
20	22 46 1.43	2.0265	3 13 43.2	10.614	20	0 25 27.44	2.1310	5 28 57.2	10.806
21	22 48 3.06	2.0278	3 3 5.6	10.639	21	0 27 35.39	2.1340	5 39 44.9	10.784
22	22 50 4.76	2.0291	2 52 26.5	10.663	22	0 29 43.52	2.1371	5 50 31.3	10.763
23	22 52 6.55	2.0305	-2 41 46.1	+10.686	23	0 31 51.84	2.1403	+6 1 16.5	+10.742
SEPTEMBER 26.					SEPTEMBER 28.				
0	22 54 8.42	2.0319	-2 31 4.2	+10.709	0	0 34 0.35	2.1434	+6 12 0.3	+10.718
1	22 56 10.38	2.0333	2 20 21.0	10.730	1	0 36 9.05	2.1466	6 22 42.6	10.693
2	22 58 12.42	2.0348	2 9 36.6	10.751	2	0 38 17.94	2.1498	6 33 23.5	10.668
3	23 0 14.56	2.0363	1 58 50.9	10.772	3	0 40 27.08	2.1531	6 44 2.8	10.641
4	23 2 16.78	2.0378	1 48 4.0	10.790	4	0 42 36.31	2.1563	6 54 40.4	10.613
5	23 4 19.10	2.0395	1 37 16.1	10.808	5	0 44 45.79	2.1597	7 5 16.4	10.585
6	23 6 21.52	2.0412	1 26 27.0	10.827	6	0 46 55.48	2.1631	7 15 50.6	10.554
7	23 8 24.04	2.0428	1 15 36.9	10.843	7	0 49 5.36	2.1663	7 26 22.9	10.523
8	23 10 26.66	2.0444	1 4 45.9	10.858	8	0 51 15.44	2.1697	7 36 53.4	10.492
9	23 12 29.37	2.0462	0 53 53.9	10.873	9	0 53 25.73	2.1733	7 47 21.9	10.459
10	23 14 32.20	2.0480	0 43 1.1	10.887	10	0 55 36.23	2.1767	7 57 48.3	10.423
11	23 16 35.13	2.0499	0 32 7.5	10.900	11	0 57 46.93	2.1802	8 8 12.7	10.388
12	23 18 38.18	2.0517	0 21 13.1	10.913	12	0 59 57.85	2.1837	8 18 34.9	10.351
13	23 20 41.33	2.0535	-0 10 18.0	10.924	13	1 2 8.97	2.1872	8 28 54.8	10.313
14	23 22 44.60	2.0554	+0 0 37.8	10.935	14	1 4 20.31	2.1908	8 39 12.5	10.274
15	23 24 47.99	2.0575	0 11 34.2	10.944	15	1 6 31.86	2.1943	8 49 27.7	10.233
16	23 26 51.50	2.0595	0 22 31.1	10.953	16	1 8 43.62	2.1978	8 59 40.5	10.192
17	23 28 55.13	2.0615	0 33 28.5	10.961	17	1 10 55.60	2.2015	9 9 50.8	10.150
18	23 30 58.88	2.0636	0 44 26.4	10.968	18	1 13 7.80	2.2052	9 19 58.5	10.107
19	23 33 2.76	2.0658	0 55 24.6	10.973	19	1 15 20.22	2.2089	9 30 3.6	10.062
20	23 35 6.77	2.0679	1 6 23.2	10.979	20	1 17 32.87	2.2126	9 40 5.9	10.016
21	23 37 10.91	2.0702	1 17 22.1	10.983	21	1 19 45.73	2.2162	9 50 5.5	9.969
22	23 39 15.19	2.0724	1 28 21.1	10.985	22	1 21 58.81	2.2199	10 0 2.2	9.921
23	23 41 19.60	2.0746	1 39 20.3	10.988	23	1 24 12.12	2.2238	10 9 55.9	9.871
24	23 43 24.14	2.0769	+1 50 19.7	+10.990	24	1 26 25.06	2.2275	+10 19 46.7	+9.821

GREENWICH MEAN TIME.

Hour.	Right Ascension.	Var. per Min.	Declination.	Var. per Min.	Hour.	Right Ascension.	Var. per Min.	Declination.	Var. per Min.
SEPTEMBER 29.					OCTOBER 1.				
	h m s	s	° ' "	"		h m s	s	° ' "	"
0	1 26 25.66	2.2275	+10 19 46.7	+0.821	0	3 17 46.42	2.4066	+16 51 6.8	+6.061
1	1 28 39.42	2.2312	10 29 34.4	0.769	1	3 20 11.93	2.4119	16 57 7.3	5.957
2	1 30 53.40	2.2360	10 39 19.0	0.717	2	3 22 35.85	2.4182	17 3 1.0	5.852
3	1 33 7.62	2.2388	10 49 0.4	0.663	3	3 25 0.86	2.4184	17 8 49.5	5.746
4	1 35 22.06	2.2437	10 58 38.5	0.607	4	3 27 26.06	2.4216	17 14 31.1	5.639
5	1 37 36.74	2.2465	11 8 13.2	0.550	5	3 29 51.45	2.4247	17 20 6.2	5.532
6	1 39 51.64	2.2503	11 17 44.5	0.493	6	3 32 17.02	2.4278	17 25 34.9	5.423
7	1 42 6.78	2.2543	11 27 12.4	0.435	7	3 34 42.79	2.4309	17 30 57.0	5.313
8	1 44 22.15	2.2581	11 36 36.7	0.374	8	3 37 8.73	2.4338	17 36 12.5	5.203
9	1 46 37.75	2.2619	11 45 57.3	0.313	9	3 39 34.85	2.4368	17 41 21.4	5.093
10	1 48 53.58	2.2658	11 55 14.2	0.261	10	3 42 1.15	2.4396	17 46 23.6	4.981
11	1 51 9.65	2.2698	12 4 27.4	0.198	11	3 44 27.63	2.4427	17 51 19.1	4.868
12	1 53 25.95	2.2737	12 13 36.8	0.133	12	3 46 54.27	2.4454	17 56 7.8	4.755
13	1 55 42.49	2.2776	12 22 42.2	0.068	13	3 49 21.08	2.4482	18 0 49.7	4.642
14	1 57 59.26	2.2814	12 31 43.7	0.001	14	3 51 48.05	2.4506	18 5 24.8	4.527
15	2 0 16.26	2.2853	12 40 41.1	0.033	15	3 54 15.18	2.4535	18 9 52.9	4.410
16	2 2 33.50	2.2893	12 49 34.4	0.063	16	3 56 42.47	2.4562	18 14 14.0	4.294
17	2 4 50.97	2.2932	12 58 23.5	0.093	17	3 59 9.92	2.4587	18 18 28.2	4.178
18	2 7 8.68	2.2972	13 7 8.4	0.121	18	4 1 37.61	2.4611	18 22 35.4	4.060
19	2 9 26.63	2.3011	13 15 48.9	0.149	19	4 4 5.25	2.4635	18 26 35.4	3.942
20	2 11 44.81	2.3049	13 24 25.1	0.176	20	4 6 33.13	2.4658	18 30 28.4	3.823
21	2 14 3.22	2.3088	13 32 56.6	0.200	21	4 9 1.15	2.4681	18 34 14.2	3.703
22	2 16 21.87	2.3128	13 41 23.9	0.224	22	4 11 29.30	2.4703	18 37 52.8	3.583
23	2 18 40.75	2.3166	+13 49 46.5	+0.247	23	4 13 57.59	2.4725	+18 41 24.2	+3.463
SEPTEMBER 30.					OCTOBER 2.				
	h m s	s	° ' "	"		h m s	s	° ' "	"
0	2 20 59.86	2.3205	+13 58 4.4	+0.269	0	4 16 26.00	2.4746	+18 44 48.3	+3.341
1	2 23 19.21	2.3244	14 6 17.6	0.190	1	4 18 54.54	2.4767	18 48 5.1	3.220
2	2 25 38.79	2.3283	14 14 26.0	0.100	2	4 21 23.20	2.4786	18 51 14.7	3.098
3	2 27 58.60	2.3322	14 22 29.6	0.018	3	4 23 51.97	2.4804	18 54 16.8	2.974
4	2 30 18.65	2.3360	14 30 28.2	0.035	4	4 26 20.85	2.4823	18 57 11.6	2.852
5	2 32 38.92	2.3398	14 38 21.8	0.051	5	4 28 49.84	2.4841	18 59 59.0	2.728
6	2 34 59.43	2.3437	14 46 10.8	0.067	6	4 31 18.94	2.4858	19 2 38.9	2.603
7	2 37 20.16	2.3474	14 53 53.8	0.081	7	4 33 48.13	2.4873	19 5 11.4	2.478
8	2 39 41.12	2.3513	15 1 32.0	0.093	8	4 36 17.42	2.4889	19 7 36.3	2.353
9	2 42 2.31	2.3550	15 9 5.0	0.106	9	4 38 46.80	2.4903	19 9 53.8	2.228
10	2 44 23.72	2.3588	15 16 32.7	0.117	10	4 41 16.26	2.4918	19 12 3.7	2.102
11	2 46 45.36	2.3625	15 23 55.0	0.126	11	4 43 45.81	2.4931	19 14 6.0	1.976
12	2 49 7.22	2.3662	15 31 11.8	0.134	12	4 46 15.43	2.4943	19 16 0.8	1.849
13	2 51 29.30	2.3699	15 38 23.1	0.141	13	4 48 45.13	2.4956	19 17 47.9	1.722
14	2 53 51.61	2.3736	15 45 28.9	0.146	14	4 51 14.90	2.4967	19 19 27.4	1.595
15	2 56 14.13	2.3772	15 52 29.0	0.150	15	4 53 44.73	2.4977	19 20 59.3	1.468
16	2 58 36.87	2.3808	15 59 23.4	0.153	16	4 56 14.62	2.4986	19 22 23.5	1.340
17	3 0 59.83	2.3844	16 6 12.1	0.156	17	4 58 44.56	2.4995	19 23 40.1	1.212
18	3 3 23.00	2.3880	16 12 55.0	0.158	18	5 1 14.56	2.5003	19 24 48.9	1.083
19	3 5 46.89	2.3915	16 19 32.0	0.160	19	5 3 44.00	2.5010	19 25 50.1	0.956
20	3 8 9.98	2.3949	16 26 3.0	0.161	20	5 6 14.68	2.5017	19 26 43.6	0.827
21	3 10 33.78	2.3984	16 32 28.1	0.162	21	5 8 44.80	2.5023	19 27 29.3	0.698
22	3 12 57.79	2.4018	16 38 47.1	0.163	22	5 11 14.95	2.5028	19 28 7.3	0.569
23	3 15 22.00	2.4053	16 45 0.0	0.164	23	5 13 45.13	2.5033	19 28 37.6	0.441
24	3 17 46.42	2.4088	+16 51 6.8	+0.165	24	5 16 15.34	2.5038	+19 29 0.2	+0.312

GREENWICH MEAN TIME.

Hour.	Right Ascension.	Var. per Min.	Declination.	Var. per Min.	Hour.	Right Ascension.	Var. per Min.	Declination.	Var. per Min.
OCTOBER 3.					OCTOBER 5.				
0	5 16 15.34	2.5036	+19 29 0.2	+0.312	0	7 15 26.71	2.4280	+17 18 32.3	-5.362
1	5 18 45.56	2.5038	19 29 15.0	0.183	1	7 17 52.91	2.4283	17 12 53.5	5.702
2	5 21 15.80	2.5040	19 29 22.1	+0.053	2	7 20 18.94	2.4284	17 7 8.1	5.810
3	5 23 46.04	2.5041	19 29 21.4	-0.077	3	7 22 44.80	2.4287	17 1 16.3	5.918
4	5 26 16.29	2.5042	19 29 12.9	0.206	4	7 25 10.50	2.4288	16 55 18.0	6.024
5	5 28 46.54	2.5042	19 28 56.8	0.324	5	7 27 36.02	2.4289	16 49 13.4	6.130
6	5 31 16.79	2.5040	19 28 32.8	0.443	6	7 30 1.37	2.4210	16 43 2.4	6.237
7	5 33 47.02	2.5088	19 28 1.2	0.563	7	7 32 26.54	2.4180	16 36 45.0	6.341
8	5 36 17.25	2.5086	19 27 21.7	0.722	8	7 34 51.53	2.4151	16 30 21.5	6.443
9	5 38 47.45	2.5032	19 26 34.6	0.850	9	7 37 16.35	2.4121	16 23 51.8	6.547
10	5 41 17.63	2.5028	19 25 39.7	0.979	10	7 39 40.98	2.4090	16 17 15.9	6.649
11	5 43 47.79	2.5023	19 24 37.1	1.108	11	7 42 5.43	2.4060	16 10 33.9	6.749
12	5 46 17.91	2.5018	19 23 26.8	1.236	12	7 44 29.70	2.4028	16 3 46.0	6.849
13	5 48 48.00	2.5011	19 22 8.8	1.364	13	7 46 53.77	2.3998	15 56 52.0	6.949
14	5 51 18.04	2.5003	19 20 43.1	1.493	14	7 49 17.67	2.3967	15 49 52.1	7.047
15	5 53 48.04	2.4996	19 19 9.7	1.620	15	7 51 41.37	2.3935	15 42 46.4	7.143
16	5 56 17.99	2.4988	19 17 28.7	1.748	16	7 54 4.89	2.3903	15 35 34.9	7.240
17	5 58 47.89	2.4978	19 15 40.0	1.875	17	7 56 28.21	2.3871	15 28 17.6	7.335
18	6 1 17.73	2.4966	19 13 43.7	2.003	18	7 58 51.34	2.3839	15 20 54.7	7.429
19	6 3 47.51	2.4958	19 11 39.7	2.129	19	8 1 14.28	2.3808	15 13 26.1	7.522
20	6 6 17.22	2.4946	19 9 28.2	2.255	20	8 3 37.03	2.3775	15 5 52.0	7.614
21	6 8 46.86	2.4933	19 7 9.1	2.382	21	8 5 59.58	2.3743	14 58 12.4	7.706
22	6 11 16.42	2.4921	19 4 42.4	2.508	22	8 8 21.94	2.3710	14 50 27.3	7.796
23	6 13 45.91	2.4906	+19 2 8.2	-2.633	23	8 10 44.10	2.3677	+14 42 36.9	-7.885
OCTOBER 4.					OCTOBER 6.				
0	6 16 15.32	2.4892	+18 59 26.5	-2.758	0	8 13 6.06	2.3644	+14 34 41.1	-7.973
1	6 18 44.63	2.4878	18 56 37.3	2.882	1	8 15 27.83	2.3612	14 26 40.1	8.060
2	6 21 13.86	2.4863	18 53 40.7	3.006	2	8 17 49.40	2.3579	14 18 33.9	8.147
3	6 23 42.99	2.4848	18 50 36.6	3.130	3	8 20 10.78	2.3546	14 10 22.5	8.232
4	6 26 12.03	2.4831	18 47 25.1	3.253	4	8 22 31.95	2.3513	14 2 6.1	8.315
5	6 28 40.96	2.4813	18 44 6.3	3.375	5	8 24 52.93	2.3480	13 53 44.7	8.398
6	6 31 9.79	2.4795	18 40 40.1	3.498	6	8 27 13.71	2.3447	13 45 18.3	8.480
7	6 33 38.50	2.4777	18 37 6.6	3.619	7	8 29 34.29	2.3413	13 36 47.1	8.561
8	6 36 7.11	2.4758	18 33 25.8	3.741	8	8 31 54.67	2.3381	13 28 11.0	8.641
9	6 38 35.59	2.4738	18 29 37.7	3.861	9	8 34 14.86	2.3348	13 19 30.2	8.719
10	6 41 3.96	2.4718	18 25 42.5	3.981	10	8 36 34.85	2.3315	13 10 44.7	8.797
11	6 43 32.21	2.4697	18 21 40.0	4.101	11	8 38 54.64	2.3282	13 1 54.6	8.873
12	6 46 0.33	2.4675	18 17 30.4	4.219	12	8 41 14.23	2.3249	12 52 59.9	8.949
13	6 48 28.31	2.4653	18 13 13.7	4.338	13	8 43 33.63	2.3216	12 44 0.7	9.023
14	6 50 56.16	2.4631	18 8 49.9	4.455	14	8 45 52.82	2.3183	12 34 57.2	9.096
15	6 53 23.88	2.4608	18 4 19.1	4.572	15	8 48 11.83	2.3151	12 25 49.2	9.168
16	6 55 51.46	2.4584	17 59 41.3	4.688	16	8 50 30.63	2.3118	12 16 37.0	9.239
17	6 58 18.89	2.4560	17 54 56.6	4.803	17	8 52 49.24	2.3086	12 7 20.5	9.309
18	7 0 46.18	2.4534	17 50 4.9	4.918	18	8 55 7.66	2.3053	11 57 59.9	9.378
19	7 3 13.32	2.4511	17 45 6.4	5.033	19	8 57 25.88	2.3021	11 48 35.2	9.445
20	7 5 40.31	2.4486	17 40 1.0	5.148	20	8 59 43.91	2.2988	11 39 6.5	9.511
21	7 8 7.15	2.4460	17 34 48.9	5.263	21	9 2 1.74	2.2956	11 29 33.9	9.577
22	7 10 33.83	2.4433	17 29 30.0	5.370	22	9 4 19.38	2.2924	11 19 57.3	9.642
23	7 13 0.35	2.4407	17 24 4.5	5.481	23	9 6 36.83	2.2893	11 10 16.9	9.704
24	7 15 26.71	2.4380	+17 18 32.3	-5.592	24	9 8 54.10	2.2862	+11 0 32.8	-9.766

GREENWICH MEAN TIME.

Hour.	Right Ascension.	Var. per Min.	Declination.	Var. per Min.	Hour.	Right Ascension.	Var. per Min.	Declination.	Var. per Min.
OCTOBER 7.					OCTOBER 9.				
	h m s	s	° ' "	"		h m s	s	° ' "	"
0	9 8 54.10	2.2862	+11 0 32.8	- 9.706	0	10 55 27.85	2.1657	+2 22 14.1	-11.391
1	9 11 11.17	2.2839	10 50 45.0	9.837	1	10 57 37.75	2.1641	2 10 50.4	11.395
2	9 13 28.05	2.2798	10 40 53.6	9.887	2	10 59 47.54	2.1628	1 59 28.4	11.402
3	9 15 44.75	2.2768	10 30 58.6	9.945	3	11 1 57.23	2.1607	1 48 2.2	11.405
4	9 18 1.26	2.2737	10 21 0.2	10.002	4	11 4 6.82	2.1592	1 36 37.8	11.408
5	9 20 17.59	2.2706	10 10 58.4	10.058	5	11 6 16.33	2.1577	1 25 13.2	11.410
6	9 22 33.73	2.2675	10 0 53.2	10.114	6	11 8 25.74	2.1561	1 13 48.6	11.411
7	9 24 49.69	2.2645	9 50 44.7	10.168	7	11 10 35.06	2.1546	1 2 23.9	11.410
8	9 27 5.47	2.2616	9 40 33.1	10.220	8	11 12 44.29	2.1531	0 50 59.4	11.408
9	9 29 21.08	2.2586	9 30 18.3	10.273	9	11 14 53.43	2.1517	0 39 34.9	11.407
10	9 31 36.50	2.2556	9 20 0.4	10.322	10	11 17 2.50	2.1504	0 28 10.6	11.403
11	9 33 51.75	2.2527	9 9 39.6	10.372	11	11 19 11.48	2.1490	0 16 46.6	11.398
12	9 36 6.82	2.2498	8 59 15.8	10.420	12	11 21 20.38	2.1477	+0 5 22.9	11.392
13	9 38 21.72	2.2469	8 48 49.2	10.467	13	11 23 29.20	2.1464	-0 6 0.4	11.385
14	9 40 36.45	2.2440	8 38 19.8	10.513	14	11 25 37.95	2.1452	0 17 23.3	11.377
15	9 42 51.00	2.2412	8 27 47.7	10.558	15	11 27 46.63	2.1440	0 28 45.6	11.368
16	9 45 5.39	2.2385	8 17 12.9	10.602	16	11 29 55.23	2.1428	0 40 7.4	11.358
17	9 47 19.62	2.2357	8 6 35.5	10.643	17	11 32 3.77	2.1417	0 51 28.5	11.347
18	9 49 33.67	2.2330	7 55 55.7	10.684	18	11 34 12.24	2.1406	1 2 49.0	11.334
19	9 51 47.57	2.2302	7 45 13.4	10.725	19	11 36 20.64	2.1396	1 14 8.6	11.321
20	9 54 1.30	2.2275	7 34 28.7	10.764	20	11 38 28.99	2.1386	1 25 27.5	11.307
21	9 56 14.87	2.2248	7 23 41.7	10.802	21	11 40 37.27	2.1375	1 36 45.5	11.292
22	9 58 28.28	2.2222	7 12 52.5	10.838	22	11 42 45.49	2.1366	1.48 2.5	11.275
23	10 0 41.54	2.2197	+ 7 2 1.1	-10.874	23	11 44 53.66	2.1357	-1 59 18.5	-11.258
OCTOBER 8.					OCTOBER 10.				
0	10 2 54.64	2.2171	+ 6 51 7.6	-10.908	0	11 47 1.78	2.1348	-2 10 33.5	-11.240
1	10 5 7.59	2.2145	6 40 12.1	10.941	1	11 49 9.83	2.1338	2 21 47.3	11.220
2	10 7 20.38	2.2120	6 29 14.7	10.973	2	11 51 17.84	2.1331	2 32 59.9	11.199
3	10 9 33.03	2.2097	6 18 15.3	11.004	3	11 53 25.80	2.1323	2 44 11.2	11.178
4	10 11 45.54	2.2072	6 7 14.2	11.033	4	11 55 33.72	2.1315	2 55 21.3	11.157
5	10 13 57.89	2.2048	5 56 11.3	11.062	5	11 57 41.58	2.1308	3 6 30.0	11.133
6	10 16 10.11	2.2024	5 45 6.7	11.090	6	11 59 49.41	2.1302	3 17 37.2	11.108
7	10 18 22.18	2.2000	5 34 0.5	11.117	7	12 1 57.20	2.1294	3 28 43.0	11.083
8	10 20 34.11	2.1978	5 22 52.7	11.142	8	12 4 4.94	2.1288	3 39 47.2	11.056
9	10 22 45.91	2.1955	5 11 43.5	11.166	9	12 6 12.65	2.1283	3 50 49.7	11.029
10	10 24 57.57	2.1933	5 0 32.8	11.188	10	12 8 20.33	2.1277	4 1 50.7	11.002
11	10 27 9.10	2.1912	4 49 20.9	11.210	11	12 10 27.97	2.1271	4 12 49.9	10.972
12	10 29 20.51	2.1890	4 38 7.6	11.231	12	12 12 35.58	2.1266	4 23 47.3	10.941
13	10 31 31.78	2.1868	4 26 53.2	11.250	13	12 14 43.16	2.1262	4 34 42.8	10.910
14	10 33 42.92	2.1847	4 15 37.6	11.269	14	12 16 50.72	2.1258	4 45 36.5	10.878
15	10 35 53.94	2.1826	4 4 20.9	11.287	15	12 18 58.25	2.1253	4 56 28.2	10.845
16	10 38 4.83	2.1806	3 53 3.2	11.302	16	12 21 5.75	2.1249	5 7 17.9	10.812
17	10 40 15.61	2.1787	3 41 44.7	11.317	17	12 23 13.24	2.1246	5 18 5.6	10.777
18	10 42 26.27	2.1767	3 30 25.2	11.332	18	12 25 20.70	2.1242	5 28 51.1	10.740
19	10 44 36.81	2.1748	3 19 4.9	11.343	19	12 27 28.14	2.1238	5 39 34.4	10.703
20	10 46 47.24	2.1728	3 7 44.0	11.355	20	12 29 35.56	2.1236	5 50 15.5	10.666
21	10 48 57.55	2.1710	2 56 22.3	11.366	21	12 31 42.97	2.1233	6 0 54.3	10.627
22	10 51 7.76	2.1692	2 45 0.1	11.375	22	12 33 50.36	2.1231	6 11 30.7	10.588
23	10 53 17.86	2.1674	2 33 37.3	11.383	23	12 35 57.74	2.1229	6 22 4.8	10.548
24	10 55 27.85	2.1657	+ 2 22 14.1	-11.391	24	12 38 5.11	2.1227	-6 32 36.4	-10.506

GREENWICH MEAN TIME.

Hour.	Right Ascension.	Var. per Min.	Declination.	Var. per Min.	Hour.	Right Ascension.	Var. per Min.	Declination.	Var. per Min.
OCTOBER 11.					OCTOBER 13.				
0	12 38 5.11	2.1237	- 6 32 36.4	-10.506	0	14 20 6.22	2.1236	-13 53 49.2	-7.600
1	12 40 12.46	2.1235	6 43 5.5	10.463	1	14 22 14.19	2.1235	14 1 22.9	7.523
2	12 42 19.81	2.1233	6 53 32.0	10.430	2	14 24 22.18	2.1235	14 8 51.9	7.445
3	12 44 27.14	2.1232	7 3 55.9	10.377	3	14 26 30.20	2.1235	14 16 16.3	7.368
4	12 46 34.47	2.1232	7 14 17.2	10.333	4	14 28 38.23	2.1241	14 23 36.0	7.289
5	12 48 41.80	2.1231	7 24 35.7	10.286	5	14 30 46.29	2.1245	14 30 51.0	7.211
6	12 50 49.12	2.1230	7 34 51.5	10.239	6	14 32 54.37	2.1245	14 38 1.3	7.131
7	12 52 56.44	2.1230	7 45 4.4	10.192	7	14 35 2.47	2.1243	14 45 6.7	7.051
8	12 55 3.76	2.1219	7 55 14.5	10.144	8	14 37 10.60	2.1256	14 52 7.4	6.971
9	12 57 11.07	2.1219	8 5 21.7	10.095	9	14 39 18.74	2.1258	14 59 3.2	6.890
10	12 59 18.39	2.1220	8 15 25.9	10.044	10	14 41 26.90	2.1263	15 5 54.2	6.809
11	13 1 25.71	2.1221	8 25 27.0	9.993	11	14 43 35.09	2.1266	15 12 40.3	6.727
12	13 3 33.04	2.1222	8 35 25.1	9.942	12	14 45 43.29	2.1268	15 19 21.5	6.645
13	13 5 40.37	2.1223	8 45 20.1	9.890	13	14 47 51.51	2.1272	15 25 57.7	6.563
14	13 7 47.71	2.1223	8 55 11.9	9.836	14	14 49 59.75	2.1275	15 32 29.0	6.480
15	13 9 55.05	2.1224	9 5 0.4	9.783	15	14 52 8.01	2.1278	15 38 55.3	6.398
16	13 12 2.40	2.1226	9 14 45.8	9.728	16	14 54 16.28	2.1280	15 45 16.5	6.312
17	13 14 9.76	2.1228	9 24 27.8	9.672	17	14 56 24.57	2.1283	15 51 32.8	6.228
18	13 16 17.13	2.1229	9 34 6.4	9.615	18	14 58 32.88	2.1286	15 57 43.9	6.143
19	13 18 24.51	2.1231	9 43 41.6	9.558	19	15 0 41.20	2.1288	16 3 50.0	6.058
20	13 20 31.90	2.1233	9 53 13.4	9.501	20	15 2 49.54	2.1291	16 9 50.9	5.973
21	13 22 39.31	2.1236	10 2 41.7	9.443	21	15 4 57.89	2.1292	16 15 46.8	5.888
22	13 24 46.73	2.1238	10 12 6.5	9.383	22	15 7 6.26	2.1295	16 21 37.4	5.801
23	13 26 54.16	2.1240	-10 21 27.6	-9.323	23	15 9 14.63	2.1297	-16 27 22.9	-5.715
OCTOBER 12.					OCTOBER 14.				
0	13 29 1.61	2.1243	-10 30 45.2	-9.262	0	15 11 23.02	2.1299	-16 33 3.2	-5.628
1	13 31 9.07	2.1245	10 39 59.0	9.199	1	15 13 31.42	2.1401	16 38 38.3	5.541
2	13 33 16.55	2.1248	10 49 9.1	9.137	2	15 15 39.83	2.1402	16 44 8.1	5.453
3	13 35 24.05	2.1252	10 58 15.5	9.075	3	15 17 48.25	2.1403	16 49 32.7	5.366
4	13 37 31.57	2.1254	11 7 18.1	9.011	4	15 19 56.67	2.1405	16 54 52.0	5.278
5	13 39 39.10	2.1257	11 16 16.8	8.947	5	15 22 5.11	2.1407	17 0 6.0	5.189
6	13 41 46.65	2.1260	11 25 11.7	8.882	6	15 24 13.55	2.1407	17 5 14.7	5.101
7	13 43 54.22	2.1263	11 34 2.6	8.815	7	15 26 21.99	2.1408	17 10 18.1	5.013
8	13 46 1.81	2.1267	11 42 49.5	8.748	8	15 28 30.44	2.1408	17 15 16.1	4.922
9	13 48 9.43	2.1271	11 51 32.4	8.682	9	15 30 38.89	2.1409	17 20 8.7	4.833
10	13 50 17.06	2.1273	12 0 11.3	8.614	10	15 32 47.35	2.1409	17 24 56.0	4.743
11	13 52 24.71	2.1277	12 8 46.1	8.546	11	15 34 55.80	2.1409	17 29 37.9	4.653
12	13 54 32.38	2.1281	12 17 16.8	8.477	12	15 37 4.26	2.1409	17 34 14.4	4.563
13	13 56 40.06	2.1285	12 25 43.3	8.407	13	15 39 12.71	2.1408	17 38 45.5	4.473
14	13 58 47.80	2.1288	12 34 5.6	8.336	14	15 41 21.16	2.1408	17 43 11.1	4.383
15	14 0 55.54	2.1292	12 42 23.6	8.265	15	15 43 29.61	2.1408	17 47 31.3	4.292
16	14 3 3.30	2.1295	12 50 37.4	8.193	16	15 45 38.06	2.1408	17 51 46.1	4.200
17	14 5 11.08	2.1299	12 58 46.8	8.121	17	15 47 46.50	2.1408	17 55 55.3	4.108
18	14 7 18.89	2.1303	13 6 51.9	8.049	18	15 49 54.93	2.1404	17 59 59.1	4.017
19	14 9 26.72	2.1308	13 14 52.7	7.976	19	15 52 3.35	2.1408	18 3 57.4	3.926
20	14 11 34.58	2.1312	13 22 49.0	7.901	20	15 54 11.77	2.1402	18 7 50.2	3.834
21	14 13 42.46	2.1315	13 30 40.8	7.826	21	15 56 20.17	2.1399	18 11 37.5	3.742
22	14 15 50.36	2.1318	13 38 28.1	7.751	22	15 58 28.56	2.1396	18 15 19.2	3.650
23	14 17 58.28	2.1322	13 46 10.9	7.676	23	16 0 36.94	2.1396	18 18 55.5	3.558
24	14 20 6.22	2.1326	-13 53 49.2	-7.600	24	16 2 45.31	2.1393	-18 22 26.2	-3.466

GREENWICH MEAN TIME.

Hour.	Right Ascension.	Var. per Min.	Declination.	Var. per Min.	Hour.	Right Ascension.	Var. per Min.	Declination.	Var. per Min.
OCTOBER 15.					OCTOBER 17.				
	h m s	s	° ' "	"		h m s	s	° ' "	"
0	16 2 45.31	2.1303	-18 22 26.2	-3.465	0	17 44 44.19	2.1018	-19 21 39.0	+0.978
1	16 4 53.66	2.1300	18 25 51.3	3.373	1	17 46 50.26	2.1006	19 20 37.6	1.068
2	16 7 1.99	2.1387	18 29 10.9	3.280	2	17 48 56.26	2.0993	19 19 30.8	1.158
3	16 9 10.30	2.1384	18 32 24.9	3.188	3	17 51 2.18	2.0981	19 18 18.7	1.243
4	16 11 18.60	2.1381	18 35 33.4	3.095	4	17 53 8.02	2.0967	19 17 1.1	1.337
5	16 13 26.87	2.1377	18 38 36.3	3.002	5	17 55 13.78	2.0954	19 15 38.2	1.426
6	16 15 35.12	2.1373	18 41 33.6	2.908	6	17 57 19.47	2.0941	19 14 10.0	1.515
7	16 17 43.35	2.1370	18 44 25.3	2.816	7	17 59 25.07	2.0928	19 12 36.4	1.603
8	16 19 51.56	2.1365	18 47 11.5	2.723	8	18 1 30.60	2.0914	19 10 57.6	1.692
9	16 21 59.73	2.1360	18 49 52.0	2.629	9	18 3 36.04	2.0900	19 9 13.4	1.781
10	16 24 7.88	2.1356	18 52 27.0	2.536	10	18 5 41.40	2.0886	19 7 23.9	1.868
11	16 26 16.00	2.1351	18 54 56.3	2.443	11	18 7 46.67	2.0872	19 5 29.2	1.956
12	16 28 24.09	2.1346	18 57 20.1	2.349	12	18 9 51.86	2.0858	19 3 29.2	2.043
13	16 30 32.15	2.1341	18 59 38.2	2.255	13	18 11 56.97	2.0844	19 1 24.0	2.131
14	16 32 40.18	2.1335	19 1 50.7	2.162	14	18 14 1.99	2.0830	18 59 13.5	2.218
15	16 34 48.17	2.1329	19 3 57.7	2.069	15	18 16 6.93	2.0816	18 56 57.8	2.305
16	16 36 56.13	2.1323	19 5 59.0	1.975	16	18 18 11.78	2.0801	18 54 36.9	2.391
17	16 39 4.04	2.1317	19 7 54.7	1.882	17	18 20 16.54	2.0787	18 52 10.9	2.478
18	16 41 11.93	2.1310	19 9 44.8	1.789	18	18 22 21.22	2.0773	18 49 39.6	2.563
19	16 43 19.77	2.1303	19 11 29.4	1.696	19	18 24 25.81	2.0758	18 47 3.3	2.648
20	16 45 27.57	2.1297	19 13 8.3	1.602	20	18 26 30.81	2.0743	18 44 21.8	2.735
21	16 47 35.33	2.1290	19 14 41.6	1.508	21	18 28 34.72	2.0728	18 41 35.1	2.820
22	16 49 43.04	2.1282	19 16 9.3	1.415	22	18 30 39.05	2.0713	18 38 43.4	2.904
23	16 51 50.71	2.1275	-19 17 31.4	-1.322	23	18 32 43.28	2.0698	-18 35 46.6	+2.988
OCTOBER 16.					OCTOBER 18.				
	h m s	s	° ' "	"		h m s	s	° ' "	"
0	16 53 58.34	2.1267	-19 18 47.9	-1.228	0	18 34 47.43	2.0683	-18 32 44.8	+3.073
1	16 56 5.92	2.1258	19 19 58.8	1.135	1	18 36 51.48	2.0668	18 29 37.9	3.157
2	16 58 13.44	2.1250	19 21 4.1	1.042	2	18 38 55.45	2.0653	18 26 25.9	3.241
3	17 0 20.92	2.1242	19 22 3.8	0.949	3	18 40 59.32	2.0638	18 23 9.0	3.324
4	17 2 28.35	2.1233	19 22 58.0	0.857	4	18 43 3.11	2.0623	18 19 47.0	3.407
5	17 4 35.72	2.1224	19 23 46.6	0.763	5	18 45 6.80	2.0608	18 16 20.1	3.489
6	17 6 43.04	2.1215	19 24 29.6	0.670	6	18 47 10.41	2.0593	18 12 48.3	3.572
7	17 8 50.30	2.1206	19 25 7.0	0.578	7	18 49 13.92	2.0578	18 9 11.5	3.654
8	17 10 57.51	2.1197	19 25 38.9	0.486	8	18 51 17.35	2.0563	18 5 29.8	3.736
9	17 13 4.66	2.1187	19 26 5.3	0.393	9	18 53 20.68	2.0548	18 1 43.2	3.818
10	17 15 11.75	2.1177	19 26 26.0	0.300	10	18 55 23.92	2.0533	17 57 51.7	3.899
11	17 17 18.78	2.1167	19 26 41.3	0.206	11	18 57 27.07	2.0518	17 53 55.3	3.979
12	17 19 25.75	2.1157	19 26 51.0	0.116	12	18 59 30.14	2.0503	17 49 54.2	4.059
13	17 21 32.66	2.1146	19 26 55.2	-0.023	13	19 1 33.11	2.0488	17 45 48.2	4.140
14	17 23 39.50	2.1136	19 26 53.8	+0.068	14	19 3 35.99	2.0473	17 41 37.4	4.220
15	17 25 46.28	2.1124	19 26 47.0	0.160	15	19 5 38.78	2.0458	17 37 21.8	4.300
16	17 27 52.99	2.1113	19 26 34.6	0.252	16	19 7 41.48	2.0443	17 33 1.4	4.378
17	17 29 59.64	2.1102	19 26 16.8	0.343	17	19 9 44.09	2.0428	17 28 36.4	4.457
18	17 32 6.21	2.1090	19 25 53.5	0.434	18	19 11 46.61	2.0413	17 24 6.6	4.536
19	17 34 12.72	2.1079	19 25 24.7	0.526	19	19 13 49.04	2.0398	17 19 32.1	4.614
20	17 36 19.16	2.1068	19 24 50.4	0.617	20	19 15 51.39	2.0383	17 14 52.9	4.692
21	17 38 25.53	2.1055	19 24 10.7	0.707	21	19 17 53.64	2.0368	17 10 9.1	4.769
22	17 40 31.82	2.1043	19 23 25.6	0.798	22	19 19 55.81	2.0354	17 5 20.6	4.846
23	17 42 38.04	2.1031	19 22 35.0	0.888	23	19 21 57.89	2.0340	17 0 27.6	4.923
24	17 44 44.19	2.1018	-19 21 39.0	+0.978	24	19 23 59.89	2.0325	-16 55 29.9	+4.999



GREENWICH MEAN TIME.

Hour.	Right Ascension.			Var. per Min.	Declination.	Var. per Min.	Hour.	Right Ascension.			Var. per Min.	Declination.	Var. per Min.
<b>OCTOBER 19.</b>						<b>OCTOBER 21.</b>							
	h	m	s	"	"		h	m	s	"	"		"
0	19	23	59.89	2.0225	-16 55 29.9	+4.999	0	21	0	10.41	1.9820	-11 34 47.1	+ 8.208
1	19	26	1.79	2.0310	16 50 27.7	5.975	1	21	2	9.37	1.9824	11 28 32.9	8.266
2	19	28	3.61	2.0397	16 45 20.9	5.151	2	21	4	8.30	1.9830	11 18 15.2	8.322
3	19	30	5.35	2.0483	16 40 9.6	5.326	3	21	6	7.21	1.9817	11 9 54.3	8.377
4	19	32	7.00	2.0568	16 34 58.8	5.501	4	21	8	6.10	1.9814	11 1 30.0	8.432
5	19	34	8.56	2.0654	16 29 33.5	5.376	5	21	10	4.98	1.9811	10 53 2.4	8.487
6	19	36	10.05	2.0741	16 24 8.7	5.450	6	21	12	3.83	1.9806	10 44 31.6	8.541
7	19	38	11.45	2.0826	16 18 39.5	5.323	7	21	14	2.67	1.9806	10 35 57.5	8.595
8	19	40	12.76	2.0913	16 13 5.9	5.597	8	21	16	1.50	1.9804	10 27 20.2	8.648
9	19	42	14.00	2.0999	16 7 27.9	5.670	9	21	18	0.32	1.9803	10 18 39.7	8.702
10	19	44	15.16	2.1086	16 1 45.5	5.743	10	21	19	59.13	1.9801	10 9 56.0	8.753
11	19	46	16.23	2.1173	15 55 58.7	5.815	11	21	21	57.93	1.9800	10 1 9.3	8.805
12	19	48	17.23	2.1260	15 50 7.7	5.887	12	21	23	56.73	1.9800	9 52 19.4	8.857
13	19	50	18.15	2.1347	15 44 12.3	5.959	13	21	25	55.53	1.9800	9 43 26.5	8.907
14	19	52	18.99	2.1434	15 38 12.6	6.030	14	21	27	54.33	1.9800	9 34 30.6	8.958
15	19	54	19.76	2.1522	15 32 8.7	6.100	15	21	29	53.13	1.9801	9 25 31.6	9.008
16	19	56	20.45	2.1610	15 26 0.6	6.171	16	21	31	51.94	1.9802	9 16 29.6	9.057
17	19	58	21.07	2.0697	15 19 48.2	6.242	17	21	33	50.75	1.9803	9 7 24.8	9.105
18	20	0	21.62	2.0685	15 13 31.6	6.311	18	21	35	49.57	1.9804	8 58 17.0	9.154
19	20	2	22.09	2.0673	15 7 10.9	6.379	19	21	37	48.40	1.9807	8 49 6.3	9.202
20	20	4	22.50	2.0662	15 0 46.1	6.448	20	21	39	47.25	1.9809	8 39 52.7	9.249
21	20	6	22.83	2.0649	14 54 17.1	6.517	21	21	41	46.11	1.9812	8 30 36.4	9.296
22	20	8	23.09	2.0638	14 47 44.0	6.586	22	21	43	44.99	1.9815	8 21 17.2	9.343
23	20	10	23.29	2.0626	-14 41 6.8	+6.653	23	21	45	43.89	1.9819	- 8 11 55.3	+ 9.388
<b>OCTOBER 20.</b>						<b>OCTOBER 22.</b>							
0	20	12	23.42	2.0617	-14 34 25.6	+6.720	0	21	47	42.81	1.9822	- 8 2 30.6	+ 9.438
1	20	14	23.49	2.0606	14 27 40.4	6.787	1	21	49	41.76	1.9827	7 53 3.3	9.478
2	20	16	23.49	1.9605	14 20 51.2	6.853	2	21	51	40.73	1.9832	7 43 33.3	9.522
3	20	18	23.43	1.9605	14 13 58.0	6.919	3	21	53	39.74	1.9838	7 34 0.7	9.566
4	20	20	23.31	1.9675	14 7 0.9	6.985	4	21	55	38.78	1.9843	7 24 25.4	9.609
5	20	22	23.13	1.9665	13 59 59.8	7.051	5	21	57	37.85	1.9848	7 14 47.6	9.651
6	20	24	22.89	1.9655	13 52 54.8	7.115	6	21	59	36.96	1.9855	7 5 7.3	9.693
7	20	26	22.59	1.9646	13 45 46.0	7.179	7	22	1	36.11	1.9863	6 55 24.5	9.734
8	20	28	22.24	1.9637	13 38 33.3	7.244	8	22	3	35.31	1.9871	6 45 39.2	9.775
9	20	30	21.84	1.9628	13 31 16.7	7.308	9	22	5	34.55	1.9877	6 35 51.5	9.815
10	20	32	21.38	1.9619	13 23 56.4	7.370	10	22	7	33.83	1.9885	6 26 1.4	9.855
11	20	34	20.87	1.9612	13 16 32.3	7.433	11	22	9	33.17	1.9894	6 16 8.9	9.893
12	20	36	20.32	1.9605	13 9 4.4	7.495	12	22	11	32.56	1.9903	6 6 14.2	9.931
13	20	38	19.71	1.9595	13 1 32.9	7.557	13	22	13	32.00	1.9913	5 56 17.2	9.969
14	20	40	19.06	1.9586	12 53 57.6	7.619	14	22	15	31.51	1.9923	5 46 17.9	10.006
15	20	42	18.36	1.9581	12 46 18.6	7.680	15	22	17	31.07	1.9933	5 36 16.5	10.043
16	20	44	17.63	1.9574	12 38 36.0	7.740	16	22	19	30.70	1.9943	5 26 12.8	10.079
17	20	46	16.85	1.9567	12 30 49.8	7.800	17	22	21	30.39	1.9954	5 16 7.0	10.115
18	20	48	16.06	1.9561	12 23 0.0	7.860	18	22	23	30.15	1.9966	5 5 59.0	10.150
19	20	50	15.18	1.9555	12 15 6.8	7.919	19	22	25	29.98	1.9978	4 55 49.0	10.183
20	20	52	14.29	1.9545	12 7 9.7	7.978	20	22	27	29.88	1.9990	4 45 37.0	10.217
21	20	54	13.36	1.9543	11 59 9.2	8.037	21	22	29	29.86	2.0003	4 35 22.9	10.251
22	20	56	12.41	1.9538	11 51 5.3	8.094	22	22	31	29.92	2.0017	4 25 6.9	10.283
23	20	58	11.42	1.9533	11 42 57.9	8.152	23	22	33	30.06	2.0031	4 14 48.9	10.315
24	21	0	10.41	1.9530	-11 34 47.1	+8.208	24	22	35	30.29	2.0045	- 4 4 29.1	+10.345

GREENWICH MEAN TIME.

Hour.	Right Ascension.	Var. per Min.	Declination.	Var. per Min.	Hour.	Right Ascension.	Var. per Min.	Declination.	Var. per Min.
OCTOBER 23.					OCTOBER 25.				
	h m s	s	° ' "	"		h m s	s	° ' "	"
0	22 35 30.29	2.0045	-4 4 29.1	+10.345	0	0 14 13.92	2.1267	+ 4 33 15.4	+10.301
1	22 37 30.60	2.0050	3 54 7.5	10.375	1	0 16 21.63	2.1303	4 44 9.2	10.360
2	22 39 31.00	2.0074	3 43 44.1	10.404	2	0 18 29.55	2.1330	4 55 2.2	10.378
3	22 41 31.49	2.0090	3 33 19.0	10.433	3	0 20 37.70	2.1377	5 5 54.5	10.364
4	22 43 32.08	2.0107	3 22 52.2	10.462	4	0 22 46.07	2.1414	5 16 45.9	10.350
5	22 45 32.77	2.0123	3 12 23.6	10.490	5	0 24 54.67	2.1452	5 27 36.5	10.335
6	22 47 33.56	2.0140	3 1 53.5	10.516	6	0 27 3.50	2.1490	5 38 26.1	10.318
7	22 49 34.45	2.0157	2 51 21.8	10.542	7	0 29 12.55	2.1528	5 49 14.7	10.301
8	22 51 35.44	2.0175	2 40 48.5	10.567	8	0 31 21.84	2.1568	6 0 2.2	10.283
9	22 53 36.55	2.0194	2 30 13.8	10.591	9	0 33 31.37	2.1608	6 10 48.6	10.263
10	22 55 37.77	2.0213	2 19 37.6	10.615	10	0 35 41.13	2.1648	6 21 33.7	10.242
11	22 57 39.10	2.0232	2 9 0.0	10.638	11	0 37 51.14	2.1688	6 32 17.6	10.220
12	22 59 40.55	2.0251	1 58 21.0	10.661	12	0 40 1.38	2.1728	6 43 0.1	10.197
13	23 1 42.11	2.0271	1 47 40.7	10.683	13	0 42 11.87	2.1769	6 53 41.2	10.172
14	23 3 43.80	2.0292	1 36 59.1	10.703	14	0 44 22.61	2.1810	7 4 20.7	10.147
15	23 5 45.62	2.0313	1 26 16.3	10.723	15	0 46 33.59	2.1852	7 14 58.8	10.121
16	23 7 47.56	2.0335	1 15 32.4	10.742	16	0 48 44.83	2.1893	7 25 35.2	10.592
17	23 9 49.64	2.0358	1 4 47.3	10.761	17	0 50 56.31	2.1936	7 36 9.8	10.563
18	23 11 51.85	2.0379	0 54 1.1	10.778	18	0 53 8.06	2.1978	7 46 42.7	10.533
19	23 13 54.19	2.0402	0 43 13.9	10.796	19	0 55 20.65	2.2020	7 57 13.8	10.502
20	23 15 56.68	2.0426	0 32 25.6	10.812	20	0 57 32.30	2.2064	8 7 42.9	10.469
21	23 17 59.30	2.0450	0 21 36.5	10.827	21	0 59 44.82	2.2108	8 18 10.1	10.435
22	23 20 2.08	2.0475	-0 10 46.4	10.842	22	1 1 57.59	2.2150	8 28 35.1	10.400
23	23 22 5.00	2.0498	+0 0 4.5	+10.855	23	1 4 10.62	2.2194	+ 8 38 58.1	+10.364
OCTOBER 24.					OCTOBER 26.				
0	23 24 8.06	2.0524	+0 10 56.2	+10.868	0	1 6 23.92	2.2239	+ 8 49 18.8	+10.326
1	23 26 11.29	2.0551	0 21 48.6	10.879	1	1 8 37.49	2.2284	8 59 37.2	10.283
2	23 28 14.67	2.0577	0 32 41.7	10.891	2	1 10 51.33	2.2328	9 9 53.3	10.243
3	23 30 18.21	2.0603	0 43 35.5	10.901	3	1 13 5.43	2.2373	9 20 6.9	10.206
4	23 32 21.91	2.0630	0 54 29.8	10.910	4	1 15 19.80	2.2418	9 30 18.0	10.164
5	23 34 25.77	2.0658	1 5 24.7	10.919	5	1 17 34.44	2.2463	9 40 26.6	10.120
6	23 36 29.80	2.0686	1 16 20.1	10.927	6	1 19 49.36	2.2509	9 50 32.4	10.074
7	23 38 34.00	2.0715	1 27 15.9	10.933	7	1 22 4.55	2.2555	10 0 35.5	10.029
8	23 40 38.38	2.0743	1 38 12.0	10.938	8	1 24 20.02	2.2601	10 10 35.9	9.982
9	23 42 42.92	2.0772	1 49 8.5	10.944	9	1 26 35.76	2.2647	10 20 33.3	9.932
10	23 44 47.65	2.0802	2 0 5.3	10.948	10	1 28 51.78	2.2693	10 30 27.7	9.882
11	23 46 52.55	2.0833	2 11 2.2	10.951	11	1 31 8.07	2.2739	10 40 19.1	9.830
12	23 48 57.65	2.0864	2 21 59.4	10.953	12	1 33 24.65	2.2786	10 50 7.3	9.778
13	23 51 2.92	2.0894	2 32 56.6	10.953	13	1 35 41.50	2.2833	10 59 52.4	9.724
14	23 53 8.38	2.0926	2 43 53.8	10.954	14	1 37 58.64	2.2880	11 9 34.2	9.668
15	23 55 14.03	2.0958	2 54 51.1	10.953	15	1 40 16.06	2.2927	11 19 12.6	9.612
16	23 57 19.87	2.0990	3 5 48.2	10.951	16	1 42 33.76	2.2974	11 28 47.6	9.553
17	23 59 25.91	2.1023	3 16 45.2	10.948	17	1 44 51.75	2.3021	11 38 19.0	9.494
18	0 1 32.15	2.1057	3 27 42.0	10.945	18	1 47 10.01	2.3068	11 47 46.9	9.433
19	0 3 38.60	2.1091	3 38 38.6	10.941	19	1 49 28.56	2.3115	11 57 11.0	9.372
20	0 5 45.24	2.1125	3 49 34.9	10.934	20	1 51 47.39	2.3163	12 6 31.5	9.309
21	0 7 52.10	2.1160	4 0 30.7	10.928	21	1 54 6.51	2.3210	12 15 48.1	9.244
22	0 9 59.16	2.1194	4 11 26.2	10.920	22	1 56 25.91	2.3257	12 25 0.8	9.173
23	0 12 6.43	2.1230	4 22 21.1	10.910	23	1 58 45.59	2.3304	12 34 9.5	9.111
24	0 14 13.92	2.1267	+4 33 15.4	+10.901	24	2 1 5.56	2.3352	+12 43 14.1	+ 9.043

GREENWICH MEAN TIME.

Hour.	Right Ascension.	Var. per Min.	Declination.	Var. per Min.	Hour.	Right Ascension.	Var. per Min.	Declination.	Var. per Min.
<b>OCTOBER 27.</b>					<b>OCTOBER 29.</b>				
	h m s	s	° ' "	"		h m s	s	° ' "	"
0	2 1 5.56	2.2352	+12 43 14.1	+9.043	0	3 58 13.38	2.5292	+18 14 30.8	+4.318
1	2 3 25.81	2.2399	12 52 14.6	8.973	1	4 0 45.21	2.5318	18 18 46.2	4.195
2	2 5 46.35	2.2446	13 1 10.9	8.902	2	4 3 17.20	2.5344	18 22 54.2	4.071
3	2 8 7.16	2.2493	13 10 2.8	8.829	3	4 5 49.34	2.5369	18 26 54.7	3.946
4	2 10 28.26	2.2541	13 18 50.4	8.756	4	4 8 21.63	2.5394	18 30 47.7	3.819
5	2 12 49.65	2.2588	13 27 33.5	8.681	5	4 10 54.07	2.5417	18 34 33.0	3.693
6	2 15 11.31	2.2634	13 36 12.1	8.604	6	4 13 26.64	2.5439	18 38 10.8	3.566
7	2 17 33.26	2.2681	13 44 46.0	8.527	7	4 15 59.34	2.5461	18 41 40.9	3.438
8	2 19 55.48	2.2728	13 53 15.3	8.448	8	4 18 32.17	2.5482	18 45 3.3	3.308
9	2 22 17.99	2.2774	14 1 39.8	8.368	9	4 21 5.12	2.5502	18 48 17.9	3.179
10	2 24 40.77	2.2820	14 9 59.4	8.287	10	4 23 38.19	2.5522	18 51 24.8	3.050
11	2 27 3.83	2.2867	14 18 14.2	8.204	11	4 26 11.38	2.5540	18 54 23.9	2.920
12	2 29 27.17	2.2913	14 26 23.9	8.119	12	4 28 44.67	2.5556	18 57 15.2	2.789
13	2 31 50.78	2.2958	14 34 28.5	8.033	13	4 31 18.05	2.5572	18 59 58.6	2.658
14	2 34 14.67	2.4004	14 42 27.9	7.947	14	4 33 51.54	2.5588	19 2 34.1	2.526
15	2 36 38.83	2.4049	14 50 22.2	7.860	15	4 36 25.11	2.5602	19 5 1.7	2.393
16	2 39 3.26	2.4094	14 58 11.1	7.770	16	4 38 58.76	2.5615	19 7 21.3	2.261
17	2 41 27.96	2.4139	15 5 54.6	7.680	17	4 41 32.49	2.5628	19 9 33.0	2.128
18	2 43 52.93	2.4183	15 13 32.7	7.588	18	4 44 6.30	2.5639	19 11 36.6	1.994
19	2 46 18.16	2.4228	15 21 5.2	7.495	19	4 46 40.16	2.5649	19 13 32.3	1.861
20	2 48 43.66	2.4271	15 28 32.1	7.402	20	4 49 14.09	2.5659	19 15 19.9	1.727
21	2 51 9.41	2.4314	15 35 53.4	7.307	21	4 51 48.07	2.5668	19 16 59.5	1.593
22	2 53 35.43	2.4358	15 43 8.9	7.209	22	4 54 22.10	2.5676	19 18 31.1	1.458
23	2 56 1.71	2.4401	+15 50 18.5	+7.112	23	4 56 56.18	2.5683	+19 19 54.5	+1.323
<b>OCTOBER 28.</b>					<b>OCTOBER 30.</b>				
0	2 58 28.24	2.4443	+15 57 22.3	+7.013	0	4 59 30.29	2.5688	+19 21 9.9	+1.188
1	3 0 55.02	2.4484	16 4 20.1	6.913	1	5 2 4.43	2.5692	19 22 17.1	1.053
2	3 3 22.05	2.4526	16 11 11.9	6.812	2	5 4 38.59	2.5696	19 23 16.2	0.918
3	3 5 49.33	2.4567	16 17 57.5	6.709	3	5 7 12.78	2.5698	19 24 7.2	0.783
4	3 8 16.85	2.4607	16 24 37.0	6.606	4	5 9 46.97	2.5699	19 24 50.1	0.648
5	3 10 44.61	2.4648	16 31 10.2	6.501	5	5 12 21.17	2.5701	19 25 24.9	0.512
6	3 13 12.61	2.4687	16 37 37.1	6.395	6	5 14 55.38	2.5700	19 25 51.5	0.376
7	3 15 40.85	2.4726	16 43 57.6	6.288	7	5 17 29.57	2.5698	19 26 10.0	0.240
8	3 18 9.32	2.4763	16 50 11.7	6.181	8	5 20 3.76	2.5697	19 26 20.3	+0.104
9	3 20 38.01	2.4801	16 56 19.3	6.072	9	5 22 37.93	2.5693	19 26 22.5	-0.081
10	3 23 6.93	2.4839	17 2 20.3	5.962	10	5 25 12.07	2.5688	19 26 16.6	0.167
11	3 25 36.08	2.4876	17 8 14.7	5.851	11	5 27 46.19	2.5683	19 26 2.5	0.303
12	3 28 5.44	2.4912	17 14 2.4	5.738	12	5 30 20.27	2.5677	19 25 40.3	0.438
13	3 30 35.02	2.4948	17 19 43.3	5.625	13	5 32 54.31	2.5669	19 25 10.0	0.573
14	3 33 4.81	2.4982	17 25 17.4	5.511	14	5 35 28.30	2.5662	19 24 31.5	0.708
15	3 35 34.80	2.5016	17 30 44.6	5.395	15	5 38 2.25	2.5653	19 23 45.0	0.842
16	3 38 5.00	2.5050	17 36 4.8	5.279	16	5 40 36.13	2.5642	19 22 50.4	0.977
17	3 40 35.40	2.5083	17 41 18.1	5.163	17	5 43 9.95	2.5631	19 21 47.7	1.112
18	3 43 5.99	2.5114	17 46 24.4	5.045	18	5 45 43.70	2.5619	19 20 37.0	1.246
19	3 45 36.77	2.5146	17 51 23.5	4.926	19	5 48 17.38	2.5606	19 19 18.2	1.380
20	3 48 7.74	2.5177	17 56 15.5	4.806	20	5 50 50.97	2.5592	19 17 51.4	1.513
21	3 50 38.89	2.5207	18 1 0.2	4.685	21	5 53 24.48	2.5578	19 16 16.7	1.646
22	3 53 10.22	2.5235	18 5 37.7	4.565	22	5 55 57.90	2.5562	19 14 33.9	1.779
23	3 55 41.71	2.5263	18 10 8.0	4.443	23	5 58 31.22	2.5545	19 12 43.2	1.912
24	3 58 13.38	2.5292	+18 14 30.8	+4.318	24	6 1 4.44	2.5528	+19 10 44.5	-2.043

GREENWICH MEAN TIME.

Hour.	Right Ascension.	Var. per Min.	Declination.	Var. per Min.	Hour.	Right Ascension.	Var. per Min.	Declination.	Var. per Min.
OCTOBER 31.					NOVEMBER 2.				
	h m s	s	° ' "	"		h m s	s	° ' "	"
0	6 1 4.44	2.5538	+19 10 44.5	-2.043	0	8 0 14.85	2.2663	+15 13 23.7	-7.512
1	6 3 37.55	2.5500	19 8 38.0	2.175	1	8 2 38.32	2.2691	15 5 50.3	7.601
2	6 6 10.55	2.5490	19 6 23.5	2.306	2	8 5 1.54	2.2648	14 58 11.6	7.690
3	6 8 43.43	2.5470	19 4 1.3	2.436	3	8 7 24.50	2.2666	14 50 27.5	7.778
4	6 11 16.19	2.5440	19 1 31.2	2.567	4	8 9 47.21	2.2703	14 42 38.2	7.865
5	6 13 48.82	2.5428	18 58 53.3	2.697	5	8 12 9.66	2.2721	14 34 43.7	7.951
6	6 16 21.32	2.5405	18 56 7.6	2.825	6	8 14 31.86	2.2678	14 26 44.1	8.035
7	6 18 53.68	2.5381	18 53 14.3	2.953	7	8 16 53.80	2.2636	14 18 39.5	8.118
8	6 21 25.89	2.5357	18 50 13.2	3.082	8	8 19 15.49	2.2593	14 10 29.9	8.201
9	6 23 57.96	2.5333	18 47 4.5	3.208	9	8 21 36.92	2.2551	14 2 15.4	8.282
10	6 26 29.88	2.5307	18 43 48.2	3.335	10	8 23 58.10	2.2508	13 53 56.1	8.362
11	6 29 1.64	2.5281	18 40 24.3	3.461	11	8 26 19.02	2.2466	13 45 32.0	8.440
12	6 31 33.25	2.5253	18 36 52.9	3.586	12	8 28 39.69	2.2424	13 37 3.3	8.518
13	6 34 4.68	2.5225	18 33 14.0	3.711	13	8 31 0.11	2.2382	13 28 29.9	8.594
14	6 36 35.95	2.5197	18 29 27.6	3.834	14	8 33 20.27	2.2339	13 19 52.0	8.670
15	6 39 7.04	2.5168	18 25 33.9	3.957	15	8 35 40.18	2.2296	13 11 9.5	8.744
16	6 41 37.96	2.5138	18 21 32.7	4.080	16	8 37 59.84	2.2256	13 2 22.7	8.817
17	6 44 8.69	2.5107	18 17 24.3	4.202	17	8 40 19.25	2.2213	12 53 31.5	8.888
18	6 46 39.24	2.5077	18 13 8.5	4.323	18	8 42 38.40	2.2172	12 44 36.1	8.959
19	6 49 9.61	2.5045	18 8 45.6	4.442	19	8 44 57.31	2.2131	12 35 36.4	9.029
20	6 51 39.78	2.5012	18 4 15.5	4.562	20	8 47 15.97	2.2090	12 26 32.6	9.097
21	6 54 9.75	2.4978	17 59 38.2	4.680	21	8 49 34.38	2.2048	12 17 24.8	9.164
22	6 56 39.52	2.4946	17 54 53.9	4.797	22	8 51 52.54	2.2007	12 8 12.9	9.231
23	6 59 9.10	2.4912	+17 50 2.6	-4.913	23	8 54 10.46	2.2067	+11 58 57.1	-9.295
NOVEMBER 1.					NOVEMBER 3.				
0	7 1 38.46	2.4877	+17 45 4.3	-5.029	0	8 56 28.14	2.2026	+11 49 37.5	-9.359
1	7 4 7.62	2.4842	17 39 59.1	5.144	1	8 58 45.57	2.2085	11 40 14.0	9.422
2	7 6 36.56	2.4806	17 34 47.0	5.258	2	9 1 2.76	2.2045	11 30 46.9	9.483
3	7 9 5.29	2.4770	17 29 28.1	5.372	3	9 3 19.71	2.2005	11 21 16.1	9.543
4	7 11 33.80	2.4733	17 24 2.4	5.483	4	9 5 36.42	2.2766	11 11 41.7	9.603
5	7 14 2.09	2.4697	17 18 30.1	5.594	5	9 7 52.90	2.2727	11 2 3.8	9.661
6	7 16 30.16	2.4659	17 12 51.1	5.704	6	9 10 9.14	2.2688	10 52 22.4	9.718
7	7 18 58.00	2.4622	17 7 5.6	5.813	7	9 12 25.15	2.2649	10 42 37.7	9.773
8	7 21 25.62	2.4583	17 1 13.5	5.922	8	9 14 40.93	2.2610	10 32 49.6	9.828
9	7 23 53.00	2.4544	16 55 15.0	6.029	9	9 16 56.47	2.2572	10 22 58.4	9.881
10	7 26 20.15	2.4506	16 49 10.0	6.135	10	9 19 11.79	2.2534	10 13 3.9	9.933
11	7 28 47.07	2.4467	16 42 58.8	6.240	11	9 21 26.88	2.2497	10 3 6.4	9.984
12	7 31 13.75	2.4427	16 36 41.2	6.345	12	9 23 41.75	2.2459	9 53 5.8	10.035
13	7 33 40.19	2.4387	16 30 17.4	6.448	13	9 25 56.39	2.2422	9 43 2.2	10.084
14	7 36 6.39	2.4347	16 23 47.5	6.549	14	9 28 10.81	2.2385	9 32 55.7	10.131
15	7 38 32.35	2.4306	16 17 11.5	6.651	15	9 30 25.01	2.2346	9 22 46.5	10.178
16	7 40 58.06	2.4265	16 10 29.4	6.751	16	9 32 39.00	2.2314	9 12 34.4	10.224
17	7 43 23.53	2.4224	16 3 41.4	6.849	17	9 34 52.78	2.2278	9 2 19.6	10.268
18	7 45 48.75	2.4183	15 56 47.5	6.947	18	9 37 6.34	2.2243	8 52 2.3	10.311
19	7 48 13.73	2.4143	15 49 47.8	7.044	19	9 39 19.69	2.2208	8 41 42.3	10.354
20	7 50 38.46	2.4100	15 42 42.2	7.140	20	9 41 32.83	2.2173	8 31 19.8	10.394
21	7 53 2.93	2.4058	15 35 31.0	7.234	21	9 43 45.77	2.2139	8 20 55.0	10.434
22	7 55 27.16	2.4017	15 28 14.1	7.328	22	9 45 58.50	2.2105	8 10 27.7	10.473
23	7 57 51.13	2.3974	15 20 51.7	7.420	23	9 48 11.03	2.2073	7 59 58.2	10.511
24	8 0 14.85	2.3933	+15 13 23.7	-7.512	24	9 50 23.37	2.2040	+ 7 49 26.4	-10.548

GREENWICH MEAN TIME.

Hour.	Right Ascension.	Var. per Min.	Declination.	Var. per Min.	Hour.	Right Ascension.	Var. per Min.	Declination.	Var. per Min.
<b>NOVEMBER 4.</b>					<b>NOVEMBER 6.</b>				
	h m s	s	° ' "	"		h m s	s	° ' "	"
0	9 50 23.37	2.2040	+7 49 28.4	-10.548	0	11 33 13.63	2.0065	-0 59 13.0	-11.006
1	9 52 35.51	2.2007	7 38 52.4	10.563	1	11 35 19.51	2.0075	1 10 18.3	11.002
2	9 54 47.45	2.1976	7 28 16.4	10.618	2	11 37 25.83	2.0084	1 21 22.8	11.008
3	9 56 59.21	2.1946	7 17 38.3	10.682	3	11 39 31.08	2.0094	1 32 26.5	11.054
4	9 59 10.77	2.1912	7 6 58.2	10.664	4	11 41 36.78	2.0045	1 43 29.3	11.030
5	10 1 22.15	2.1882	6 56 16.2	10.715	5	11 43 42.42	2.0036	1 54 31.2	11.023
6	10 3 33.35	2.1851	6 45 32.4	10.745	6	11 45 48.01	2.0026	2 5 32.1	11.007
7	10 5 44.36	2.1821	6 34 46.8	10.774	7	11 47 53.55	2.0019	2 16 32.0	10.988
8	10 7 55.20	2.1792	6 23 59.5	10.803	8	11 49 59.04	2.0011	2 27 30.7	10.969
9	10 10 5.86	2.1762	6 13 10.5	10.829	9	11 52 4.48	2.0003	2 38 28.3	10.950
10	10 12 16.34	2.1733	6 2 20.0	10.855	10	11 54 9.88	2.0007	2 49 24.7	10.929
11	10 14 26.66	2.1706	5 51 27.9	10.880	11	11 56 15.24	2.0000	3 0 19.8	10.908
12	10 16 36.81	2.1678	5 40 34.4	10.904	12	11 58 20.56	2.0004	3 11 13.7	10.886
13	10 18 46.79	2.1650	5 29 39.4	10.927	13	12 0 25.85	2.0078	3 22 6.1	10.862
14	10 20 56.61	2.1623	5 18 43.1	10.948	14	12 2 31.10	2.0078	3 32 57.1	10.838
15	10 23 6.27	2.1606	5 7 45.6	10.969	15	12 4 36.32	2.0083	3 43 46.7	10.814
16	10 25 15.78	2.1572	4 56 46.8	10.989	16	12 6 41.51	2.0083	3 54 34.8	10.788
17	10 27 25.13	2.1546	4 45 46.9	11.006	17	12 8 46.68	2.0080	4 5 21.2	10.761
18	10 29 34.33	2.1521	4 34 45.9	11.026	18	12 10 51.83	2.0056	4 16 6.1	10.734
19	10 31 43.38	2.1496	4 23 43.8	11.043	19	12 12 56.95	2.0032	4 26 49.3	10.705
20	10 33 52.28	2.1472	4 12 40.8	11.058	20	12 15 2.05	2.0040	4 37 30.7	10.676
21	10 36 1.04	2.1448	4 1 36.9	11.072	21	12 17 7.14	2.0047	4 48 10.4	10.646
22	10 38 9.66	2.1426	3 50 32.2	11.085	22	12 19 12.21	2.0043	4 58 48.2	10.615
23	10 40 18.14	2.1403	+3 39 26.7	-11.098	23	12 21 17.26	2.0042	-5 9 24.2	-10.583
<b>NOVEMBER 5.</b>					<b>NOVEMBER 7.</b>				
	h m s	s	° ' "	"		h m s	s	° ' "	"
0	10 42 26.49	2.1381	+3 28 20.4	-11.110	0	12 23 22.31	2.0041	-5 19 58.2	-10.551
1	10 44 34.71	2.1356	3 17 13.5	11.120	1	12 25 27.35	2.0039	5 30 30.3	10.518
2	10 46 42.79	2.1337	3 6 6.0	11.130	2	12 27 32.38	2.0038	5 41 0.3	10.483
3	10 48 50.75	2.1317	2 54 57.9	11.138	3	12 29 37.41	2.0038	5 51 28.2	10.448
4	10 50 58.59	2.1297	2 43 49.4	11.146	4	12 31 42.44	2.0038	6 1 54.1	10.413
5	10 53 6.31	2.1276	2 32 40.4	11.153	5	12 33 47.46	2.0038	6 12 17.7	10.376
6	10 55 13.90	2.1257	2 21 31.1	11.158	6	12 35 52.49	2.0038	6 22 39.1	10.338
7	10 57 21.39	2.1238	2 10 21.5	11.163	7	12 37 57.51	2.0038	6 32 58.2	10.299
8	10 59 28.76	2.1219	1 59 11.6	11.166	8	12 40 2.55	2.0040	6 43 15.0	10.260
9	11 1 36.02	2.1201	1 48 1.6	11.168	9	12 42 7.59	2.0041	6 53 29.4	10.220
10	11 3 43.17	2.1182	1 36 51.4	11.171	10	12 44 12.64	2.0042	7 3 41.4	10.179
11	11 5 50.22	2.1163	1 25 41.1	11.172	11	12 46 17.70	2.0044	7 13 50.9	10.138
12	11 7 57.16	2.1144	1 14 30.8	11.171	12	12 48 22.77	2.0047	7 23 57.9	10.096
13	11 10 4.01	2.1124	1 3 20.6	11.170	13	12 50 27.86	2.0049	7 34 2.4	10.053
14	11 12 10.77	2.1118	0 52 10.4	11.168	14	12 52 32.96	2.0052	7 44 4.2	10.008
15	11 14 17.43	2.1108	0 41 0.5	11.164	15	12 54 38.08	2.0054	7 54 3.3	9.963
16	11 16 24.00	2.1098	0 29 50.7	11.161	16	12 56 43.21	2.0056	8 3 59.8	9.918
17	11 18 30.48	2.1078	0 18 41.2	11.156	17	12 58 48.37	2.0052	8 13 53.4	9.871
18	11 20 36.88	2.1059	+0 7 32.0	11.150	18	13 0 53.55	2.0056	8 23 44.3	9.824
19	11 22 43.19	2.1046	-0 3 26.8	11.143	19	13 2 58.76	2.0070	8 33 32.3	9.776
20	11 24 49.43	2.1033	0 14 45.1	11.135	20	13 5 3.99	2.0074	8 43 17.4	9.728
21	11 26 55.59	2.1020	0 25 53.0	11.127	21	13 7 9.25	2.0078	8 52 59.6	9.678
22	11 29 1.67	2.1008	0 37 0.3	11.116	22	13 9 14.53	2.0083	9 2 38.8	9.628
23	11 31 7.69	2.0997	0 48 6.9	11.106	23	13 11 19.85	2.0088	9 12 15.0	9.578
24	11 33 13.63	2.0986	-0 59 13.0	-11.095	24	13 13 25.19	2.0092	-9 21 48.1	-9.526

GREENWICH MEAN TIME.

Hour.	Right Ascension.	Var. per Min.	Declination.	Var. per Min.	Hour.	Right Ascension.	Var. per Min.	Declination.	Var. per Min.
NOVEMBER 8.					NOVEMBER 10.				
	h m s	s	° ' "	"		h m s	s	° ' "	"
0	13 13 25.19	2.0693	- 9 21 48.1	-9.525	0	14 54 33.71	2.1265	-15 46 25.0	-6.263
1	13 15 30.57	2.0699	9 31 18.0	9.473	1	14 56 41.32	2.1273	15 52 38.3	6.181
2	13 17 35.98	2.0705	9 40 44.8	9.420	2	14 58 48.98	2.1281	15 58 46.7	6.098
3	13 19 41.43	2.0711	9 50 8.4	9.366	3	15 0 56.69	2.1288	16 4 50.1	6.016
4	13 21 46.91	2.0717	9 59 28.7	9.311	4	15 3 4.43	2.1294	16 10 48.6	5.933
5	13 23 52.43	2.0723	10 8 45.7	9.256	5	15 5 12.22	2.1301	16 16 42.1	5.849
6	13 25 57.98	2.0729	10 17 59.4	9.200	6	15 7 20.04	2.1308	16 22 30.5	5.765
7	13 28 3.58	2.0737	10 27 9.7	9.143	7	15 9 27.91	2.1314	16 28 13.9	5.681
8	13 30 9.22	2.0743	10 36 16.6	9.086	8	15 11 35.81	2.1320	16 33 52.2	5.596
9	13 32 14.89	2.0749	10 45 20.0	9.027	9	15 13 43.75	2.1327	16 39 25.4	5.511
10	13 34 20.61	2.0757	10 54 19.8	8.968	10	15 15 51.73	2.1333	16 44 53.5	5.426
11	13 36 26.37	2.0763	11 3 16.2	8.909	11	15 17 59.74	2.1338	16 50 16.5	5.339
12	13 38 32.17	2.0771	11 12 8.9	8.848	12	15 20 7.79	2.1344	16 55 34.2	5.253
13	13 40 38.02	2.0779	11 20 58.0	8.788	13	15 22 15.87	2.1349	17 0 46.8	5.167
14	13 42 43.92	2.0787	11 29 43.4	8.725	14	15 24 23.98	2.1354	17 5 54.2	5.080
15	13 44 49.86	2.0793	11 38 25.0	8.663	15	15 26 32.12	2.1359	17 10 56.4	4.993
16	13 46 55.84	2.1003	11 47 3.0	8.601	16	15 28 40.29	2.1364	17 15 53.3	4.904
17	13 49 1.88	2.1010	11 55 37.1	8.538	17	15 30 48.49	2.1369	17 20 44.9	4.816
18	13 51 7.96	2.1018	12 4 7.3	8.472	18	15 32 56.72	2.1373	17 25 31.2	4.728
19	13 53 14.09	2.1025	12 12 33.7	8.408	19	15 35 4.97	2.1377	17 30 12.3	4.640
20	13 55 20.26	2.1033	12 20 56.2	8.342	20	15 37 13.24	2.1381	17 34 48.0	4.550
21	13 57 26.49	2.1042	12 29 14.7	8.275	21	15 39 21.54	2.1385	17 39 18.3	4.461
22	13 59 32.77	2.1050	12 37 29.2	8.208	22	15 41 29.86	2.1388	17 43 43.3	4.372
23	14 1 39.09	2.1058	-12 45 39.7	-8.141	23	15 43 38.20	2.1391	-17 48 2.9	-4.283
NOVEMBER 9.					NOVEMBER 11.				
	h m s	s	° ' "	"		h m s	s	° ' "	"
0	14 3 45.47	2.1067	-12 53 46.1	-8.073	0	15 45 46.55	2.1398	-17 52 17.2	-4.193
1	14 5 51.89	2.1075	13 1 48.4	8.008	1	15 47 54.92	2.1397	17 56 26.0	4.102
2	14 7 58.37	2.1084	13 9 46.5	7.933	2	15 50 3.31	2.1399	18 0 29.4	4.012
3	14 10 1.40	2.1093	13 17 40.4	7.864	3	15 52 11.71	2.1401	18 4 27.4	3.921
4	14 12 11.48	2.1101	13 25 30.2	7.793	4	15 54 20.12	2.1403	18 8 19.9	3.829
5	14 14 18.11	2.1110	13 33 15.6	7.722	5	15 56 28.54	2.1405	18 12 6.9	3.738
6	14 16 24.80	2.1118	13 40 56.8	7.650	6	15 58 36.98	2.1406	18 15 48.5	3.647
7	14 18 31.53	2.1127	13 48 33.6	7.578	7	16 0 45.41	2.1406	18 19 24.6	3.555
8	14 20 38.32	2.1135	13 56 6.1	7.505	8	16 2 53.85	2.1407	18 22 55.1	3.463
9	14 22 45.15	2.1143	14 3 34.2	7.431	9	16 5 2.30	2.1408	18 26 20.2	3.372
10	14 24 52.04	2.1153	14 10 57.8	7.357	10	16 7 10.75	2.1408	18 29 39.7	3.280
11	14 26 58.98	2.1161	14 18 17.0	7.282	11	16 9 19.20	2.1408	18 32 53.8	3.188
12	14 29 5.97	2.1169	14 25 31.6	7.207	12	16 11 27.64	2.1407	18 36 2.2	3.094
13	14 31 13.01	2.1178	14 32 41.8	7.131	13	16 13 36.08	2.1407	18 39 5.1	3.003
14	14 33 20.10	2.1187	14 39 47.3	7.054	14	16 15 44.52	2.1406	18 42 2.5	2.910
15	14 35 27.25	2.1195	14 46 48.3	6.978	15	16 17 52.95	2.1404	18 44 54.3	2.817
16	14 37 34.44	2.1203	14 53 44.6	6.900	16	16 20 1.37	2.1403	18 47 40.5	2.723
17	14 39 41.68	2.1211	15 0 36.3	6.822	17	16 22 9.78	2.1401	18 50 21.1	2.630
18	14 41 48.97	2.1219	15 7 23.3	6.743	18	16 24 18.18	2.1398	18 52 56.1	2.538
19	14 43 56.31	2.1228	15 14 5.5	6.665	19	16 26 26.56	2.1396	18 55 25.6	2.444
20	14 46 3.70	2.1235	15 20 43.1	6.586	20	16 28 34.93	2.1393	18 57 49.4	2.351
21	14 48 11.13	2.1243	15 27 15.8	6.506	21	16 30 43.28	2.1390	19 0 7.7	2.258
22	14 50 18.61	2.1251	15 33 43.7	6.425	22	16 32 51.61	2.1386	19 2 20.3	2.163
23	14 52 26.14	2.1258	15 40 6.8	6.344	23	16 34 59.91	2.1383	19 4 27.3	2.070
24	14 54 33.71	2.1265	-15 46 25.0	-6.263	24	16 37 8.20	2.1378	-19 6 28.7	-1.977

GREENWICH MEAN TIME.

hr.	Right Ascension.	Var. per Min.	Declination.	Var. per Min.	Hour.	Right Ascension.	Var. per Min.	Declination.	Var. per Min.
NOVEMBER 12.					NOVEMBER 14.				
	h m s	s	' "	"		h m s	s	' "	"
0	16 37 8.20	2.1376	-19 6 28.7	-1.977	0	18 18 42.95	2.0644	-18 54 43.2	+2.407
1	16 39 16.45	2.1375	19 8 24.5	1.883	1	18 20 47.96	2.0637	18 52 16.2	2.403
2	16 41 24.68	2.1370	19 10 14.7	1.789	2	18 22 52.87	2.0610	18 49 44.0	2.579
3	16 43 32.89	2.1365	19 11 59.2	1.696	3	18 24 57.68	2.0708	18 47 6.7	2.664
4	16 45 41.06	2.1358	19 13 38.2	1.608	4	18 27 2.38	2.0775	18 44 24.3	2.750
5	16 47 49.19	2.1351	19 15 11.5	1.508	5	18 29 6.98	2.0768	18 41 36.7	2.835
6	16 49 57.30	2.1346	19 16 39.2	1.415	6	18 31 11.48	2.0741	18 38 44.1	2.919
7	16 52 5.36	2.1341	19 18 1.3	1.321	7	18 33 15.87	2.0723	18 35 46.4	3.003
8	16 54 13.39	2.1336	19 19 17.7	1.228	8	18 35 20.16	2.0705	18 32 43.7	3.088
9	16 56 21.38	2.1331	19 20 28.6	1.135	9	18 37 24.33	2.0687	18 29 35.9	3.171
10	16 58 29.32	2.1326	19 21 33.9	1.041	10	18 39 28.40	2.0670	18 26 23.2	3.254
11	17 0 37.22	2.1318	19 22 33.5	0.947	11	18 41 32.37	2.0652	18 23 5.4	3.337
12	17 2 45.08	2.1306	19 23 27.5	0.853	12	18 43 36.22	2.0633	18 19 42.8	3.419
13	17 4 52.89	2.1298	19 24 15.9	0.760	13	18 45 39.96	2.0614	18 16 15.1	3.502
14	17 7 0.65	2.1288	19 24 58.7	0.667	14	18 47 43.59	2.0606	18 12 42.6	3.585
15	17 9 8.35	2.1279	19 25 35.9	0.574	15	18 49 47.11	2.0578	18 9 5.1	3.665
16	17 11 16.00	2.1271	19 26 7.6	0.481	16	18 51 50.53	2.0560	18 5 22.8	3.746
17	17 13 23.60	2.1262	19 26 33.6	0.388	17	18 53 53.83	2.0541	18 1 35.6	3.827
18	17 15 31.14	2.1252	19 26 54.1	0.295	18	18 55 57.02	2.0522	17 57 43.6	3.907
19	17 17 38.62	2.1243	19 27 9.0	0.202	19	18 58 0.10	2.0503	17 53 46.8	3.987
20	17 19 46.05	2.1233	19 27 18.3	0.109	20	19 0 3.06	2.0485	17 49 45.2	4.067
21	17 21 53.41	2.1224	19 27 22.1	-0.017	21	19 2 5.92	2.0466	17 45 38.8	4.146
22	17 24 0.70	2.1210	19 27 20.3	+0.076	22	19 4 8.67	2.0448	17 41 27.7	4.224
23	17 26 7.93	2.1200	-19 27 13.0	+0.168	23	19 6 11.30	2.0429	-17 37 11.9	+4.303
NOVEMBER 13.					NOVEMBER 15.				
	h m s	s	' "	"		h m s	s	' "	"
0	17 28 15.10	2.1186	-19 27 0.2	+0.260	0	19 8 13.82	2.0411	-17 32 51.4	+4.380
1	17 30 22.19	2.1176	19 26 41.8	0.358	1	19 10 16.23	2.0392	17 28 26.3	4.458
2	17 32 29.21	2.1164	19 26 17.9	0.443	2	19 12 18.52	2.0373	17 23 56.5	4.536
3	17 34 36.16	2.1153	19 25 48.6	0.535	3	19 14 20.70	2.0354	17 19 22.0	4.613
4	17 36 43.04	2.1141	19 25 13.7	0.627	4	19 16 22.77	2.0336	17 14 43.0	4.688
5	17 38 49.85	2.1128	19 24 33.3	0.718	5	19 18 24.73	2.0317	17 9 59.4	4.764
6	17 40 56.57	2.1114	19 23 47.5	0.809	6	19 20 26.57	2.0298	17 5 11.3	4.840
7	17 43 3.22	2.1102	19 22 56.2	0.900	7	19 22 28.30	2.0280	17 0 18.6	4.915
8	17 45 9.79	2.1088	19 21 59.5	0.990	8	19 24 29.93	2.0262	16 55 21.5	4.990
9	17 47 16.28	2.1075	19 20 57.4	1.081	9	19 26 31.44	2.0243	16 50 19.8	5.065
10	17 49 22.69	2.1061	19 19 49.8	1.172	10	19 28 32.84	2.0224	16 45 13.7	5.138
11	17 51 29.01	2.1046	19 18 36.8	1.261	11	19 30 34.13	2.0206	16 40 3.2	5.212
12	17 53 35.24	2.1032	19 17 18.5	1.351	12	19 32 35.31	2.0188	16 34 48.3	5.285
13	17 55 41.39	2.1018	19 15 54.7	1.441	13	19 34 36.38	2.0169	16 29 29.0	5.358
14	17 57 47.45	2.1003	19 14 25.6	1.530	14	19 36 37.34	2.0151	16 24 5.4	5.430
15	17 59 53.42	2.0988	19 12 51.2	1.618	15	19 38 38.19	2.0133	16 18 37.4	5.503
16	18 1 59.30	2.0973	19 11 11.4	1.706	16	19 40 38.94	2.0116	16 13 5.1	5.574
17	18 4 5.09	2.0958	19 9 26.3	1.796	17	19 42 39.58	2.0098	16 7 28.5	5.645
18	18 6 10.79	2.0942	19 7 35.9	1.884	18	19 44 40.11	2.0080	16 1 47.7	5.715
19	18 8 16.39	2.0926	19 5 40.2	1.972	19	19 46 40.54	2.0063	15 56 2.7	5.785
20	18 10 21.90	2.0910	19 3 39.3	2.060	20	19 48 40.86	2.0045	15 50 13.5	5.855
21	18 12 27.31	2.0893	19 1 33.1	2.147	21	19 50 41.08	2.0028	15 44 20.1	5.925
22	18 14 32.62	2.0877	18 59 21.7	2.234	22	19 52 41.19	2.0011	15 38 22.5	5.993
23	18 16 37.83	2.0861	18 57 5.0	2.321	23	19 54 41.21	1.9994	15 32 20.9	6.062
24	18 18 42.95	2.0844	-18 54 43.2	+2.407	24	19 56 41.12	1.9976	-15 26 15.1	+6.130

GREENWICH MEAN TIME.

Hour.	Right Ascension.	Var. per Min.	Declination.	Var. per Min.	Hour.	Right Ascension.	Var. per Min.	Declination.	Var. per Min.
NOVEMBER 16.					NOVEMBER 18.				
	h m s	s	' "	"		h m s	s	' "	"
0	19 56 41.12	1.9976	-15 26 15.1	+6.130	0	21 31 3.85	1.9461	-9 22 0.4	+8.873
1	19 58 40.92	1.9959	15 20 5.3	6.198	1	21 33 0.61	1.9460	9 13 6.6	8.920
2	20 0 40.63	1.9943	15 13 51.4	6.265	2	21 34 57.37	1.9458	9 4 10.0	8.965
3	20 2 40.24	1.9928	15 7 33.5	6.332	3	21 36 54.11	1.9456	8 55 10.8	9.010
4	20 4 39.76	1.9911	15 1 11.6	6.398	4	21 38 50.84	1.9455	8 46 8.8	9.055
5	20 6 39.17	1.9894	14 54 45.7	6.464	5	21 40 47.57	1.9455	8 37 4.2	9.098
6	20 8 38.49	1.9879	14 48 15.9	6.529	6	21 42 44.30	1.9455	8 27 57.0	9.142
7	20 10 37.72	1.9863	14 41 42.2	6.593	7	21 44 41.03	1.9455	8 18 47.2	9.185
8	20 12 36.85	1.9848	14 35 4.7	6.658	8	21 46 37.76	1.9455	8 9 34.8	9.228
9	20 14 35.89	1.9833	14 28 23.2	6.723	9	21 48 34.49	1.9456	8 0 19.9	9.269
10	20 16 34.84	1.9818	14 21 37.9	6.787	10	21 50 31.23	1.9456	7 51 2.5	9.311
11	20 18 33.71	1.9803	14 14 48.8	6.850	11	21 52 27.98	1.9460	7 41 42.6	9.353
12	20 20 32.48	1.9788	14 7 55.9	6.913	12	21 54 24.75	1.9463	7 32 20.2	9.393
13	20 22 31.16	1.9773	14 0 59.3	6.975	13	21 56 21.53	1.9465	7 22 55.4	9.433
14	20 24 29.76	1.9760	13 53 58.9	7.037	14	21 58 18.33	1.9468	7 13 28.3	9.473
15	20 26 28.28	1.9747	13 46 54.9	7.098	15	22 0 15.15	1.9472	7 3 58.7	9.512
16	20 28 26.72	1.9733	13 39 47.1	7.160	16	22 2 11.99	1.9476	6 54 26.9	9.550
17	20 30 25.07	1.9718	13 32 35.7	7.220	17	22 4 8.86	1.9481	6 44 52.7	9.588
18	20 32 23.34	1.9706	13 25 20.7	7.280	18	22 6 5.76	1.9487	6 35 16.3	9.625
19	20 34 21.54	1.9693	13 18 2.1	7.340	19	22 8 2.70	1.9493	6 25 37.7	9.663
20	20 36 19.66	1.9681	13 10 39.9	7.399	20	22 9 59.67	1.9498	6 15 56.8	9.699
21	20 38 17.71	1.9668	13 3 14.2	7.458	21	22 11 56.68	1.9505	6 6 13.8	9.735
22	20 40 15.68	1.9657	12 55 45.0	7.516	22	22 13 53.73	1.9512	5 56 28.6	9.770
23	20 42 13.59	1.9645	-12 48 12.3	+7.574	23	22 15 50.82	1.9519	-5 46 41.4	+9.805
NOVEMBER 17.					NOVEMBER 19.				
	h m s	s	' "	"		h m s	s	' "	"
0	20 44 11.42	1.9633	-12 40 36.1	+7.632	0	22 17 47.96	1.9526	-5 36 52.0	+9.840
1	20 46 9.19	1.9622	12 32 56.5	7.688	1	22 19 45.15	1.9536	5 27 0.6	9.873
2	20 48 6.90	1.9612	12 25 13.5	7.745	2	22 21 42.39	1.9545	5 17 7.2	9.907
3	20 50 4.53	1.9601	12 17 27.1	7.802	3	22 23 39.69	1.9555	5 7 11.8	9.939
4	20 52 2.11	1.9592	12 9 37.3	7.857	4	22 25 37.05	1.9565	4 57 14.5	9.971
5	20 53 59.63	1.9582	12 1 44.3	7.912	5	22 27 34.47	1.9576	4 47 15.3	10.003
6	20 55 57.09	1.9572	11 53 47.9	7.968	6	22 29 31.96	1.9588	4 37 14.2	10.034
7	20 57 54.49	1.9563	11 45 48.2	8.022	7	22 31 29.52	1.9598	4 27 11.2	10.065
8	20 59 51.84	1.9554	11 37 45.3	8.075	8	22 33 27.14	1.9610	4 17 6.4	10.095
9	21 1 49.14	1.9546	11 29 39.2	8.128	9	22 35 24.84	1.9622	4 6 59.8	10.124
10	21 3 46.39	1.9538	11 21 29.9	8.181	10	22 37 22.62	1.9637	3 56 51.5	10.153
11	21 5 43.59	1.9530	11 13 17.5	8.233	11	22 39 20.48	1.9650	3 46 41.5	10.181
12	21 7 40.75	1.9522	11 5 1.9	8.286	12	22 41 18.42	1.9664	3 36 29.8	10.208
13	21 9 37.87	1.9516	10 56 43.2	8.338	13	22 43 16.45	1.9679	3 26 16.5	10.235
14	21 11 34.94	1.9508	10 48 21.4	8.388	14	22 45 14.57	1.9695	3 16 1.6	10.262
15	21 13 31.97	1.9503	10 39 56.6	8.439	15	22 47 12.79	1.9711	3 5 45.1	10.288
16	21 15 28.97	1.9497	10 31 28.7	8.489	16	22 49 11.10	1.9727	2 55 27.1	10.313
17	21 17 25.93	1.9490	10 22 57.9	8.538	17	22 51 9.51	1.9743	2 45 7.6	10.338
18	21 19 22.85	1.9485	10 14 24.1	8.588	18	22 53 8.02	1.9761	2 34 46.6	10.362
19	21 21 19.75	1.9481	10 5 47.3	8.638	19	22 55 6.64	1.9779	2 24 24.2	10.385
20	21 23 16.62	1.9476	9 57 7.6	8.688	20	22 57 5.37	1.9798	2 14 0.4	10.408
21	21 25 13.46	1.9472	9 48 25.1	8.733	21	22 59 4.22	1.9818	2 3 35.3	10.429
22	21 27 10.28	1.9468	9 39 39.7	8.781	22	23 1 3.18	1.9836	1 53 8.9	10.451
23	21 29 7.08	1.9464	9 30 51.4	8.828	23	23 3 2.25	1.9856	1 42 41.2	10.472
24	21 31 3.85	1.9461	-9 22 0.4	+8.873	24	23 5 1.45	1.9876	-1 32 12.3	+10.492



GREENWICH MEAN TIME.

Hour.	Right Ascension.	Var. per Min.	Declination.	Var. per Min.	Hour.	Right Ascension.	Var. per Min.	Declination.	Var. per Min.
<b>NOVEMBER 20.</b>					<b>NOVEMBER 22.</b>				
0	h m s	s	° ' "	"	0	h m s	s	° ' "	"
1	23 5 1.45	1.9878	-1 32 12.3	+10.492	0	0 43 52.05	2.1516	+ 7 0 17.0	+10.533
2	23 7 0.78	1.9889	1 21 42.2	10.512	1	0 46 1.28	2.1563	7 10 48.3	10.510
3	23 9 0.24	1.9900	1 11 10.9	10.530	2	0 48 10.80	2.1610	7 21 18.2	10.487
4	23 12 59.82	1.9944	1 0 38.6	10.548	3	0 50 20.60	2.1656	7 31 46.7	10.463
5	23 14 59.41	1.9966	0 50 5.2	10.566	4	0 52 30.70	2.1707	7 42 13.7	10.437
6	23 16 59.41	2.0013	0 39 30.7	10.583	5	0 54 41.08	2.1756	7 52 39.1	10.410
7	23 18 59.56	2.0066	0 28 55.3	10.598	6	0 56 51.76	2.1805	8 3 2.9	10.383
8	23 20 59.86	2.0068	0 18 19.0	10.613	7	0 59 2.74	2.1854	8 13 25.0	10.353
9	23 23 0.31	2.0068	-0 7 41.7	10.628	8	1 1 14.01	2.1908	8 23 45.3	10.323
10	23 25 0.92	2.0115	+0 2 56.4	10.642	9	1 3 25.58	2.1954	8 34 3.8	10.293
11	23 27 1.69	2.0141	0 13 35.3	10.655	10	1 5 37.46	2.2006	8 44 20.4	10.260
12	23 29 2.61	2.0166	0 24 15.0	10.668	11	1 7 49.65	2.2057	8 54 35.0	10.226
13	23 31 3.71	2.0197	0 34 55.4	10.679	12	1 10 2.14	2.2108	9 4 47.5	10.192
14	23 33 4.97	2.0224	0 45 36.5	10.691	13	1 12 14.95	2.2161	9 14 58.0	10.156
15	23 35 6.40	2.0254	0 56 18.3	10.701	14	1 14 28.07	2.2213	9 25 6.2	10.118
16	23 37 8.02	2.0291	1 7 0.6	10.709	15	1 16 41.60	2.2266	9 35 12.1	10.079
17	23 39 9.81	2.0313	1 17 43.4	10.718	16	1 18 55.26	2.2319	9 45 15.7	10.040
18	23 41 11.78	2.0344	1 28 26.8	10.727	17	1 21 9.33	2.2372	9 55 16.9	9.998
19	23 43 13.94	2.0375	1 39 10.6	10.733	18	1 23 23.72	2.2426	10 5 15.5	9.956
20	23 45 16.28	2.0407	1 49 54.8	10.740	19	1 25 38.44	2.2480	10 15 11.6	9.913
21	23 47 18.82	2.0440	2 0 39.4	10.745	20	1 27 53.48	2.2534	10 25 5.1	9.868
22	23 49 21.56	2.0473	2 11 24.2	10.750	21	1 30 8.85	2.2589	10 34 55.8	9.822
23	23 51 24.49	2.0506	2 22 9.4	10.754	22	1 32 24.55	2.2644	10 44 43.7	9.774
			+2 32 54.7	+10.757	23	1 34 40.58	2.2699	+10 54 28.7	+ 9.726
<b>NOVEMBER 21.</b>					<b>NOVEMBER 23.</b>				
0	23 53 27.63	2.0540	+2 43 40.2	+10.759	0	1 36 56.94	2.2754	+11 4 10.8	+ 9.676
1	23 55 30.97	2.0574	2 54 25.8	10.760	1	1 39 13.63	2.2810	11 13 49.8	9.624
2	23 57 34.52	2.0610	3 5 11.4	10.760	2	1 41 30.66	2.2866	11 23 25.7	9.572
3	23 59 38.29	2.0646	3 15 57.0	10.760	3	1 43 48.02	2.2922	11 32 58.4	9.518
4	0 1 42.27	2.0683	3 26 42.6	10.759	4	1 46 5.73	2.2979	11 42 27.8	9.463
5	0 3 46.47	2.0718	3 37 28.1	10.757	5	1 48 23.77	2.3035	11 51 53.9	9.406
6	0 5 50.89	2.0755	3 48 13.4	10.753	6	1 50 42.15	2.3093	12 1 16.5	9.348
7	0 7 55.53	2.0793	3 58 58.5	10.750	7	1 53 0.88	2.3149	12 10 35.6	9.288
8	0 10 0.41	2.0832	4 9 43.4	10.745	8	1 55 19.94	2.3206	12 19 51.0	9.227
9	0 12 5.51	2.0871	4 20 27.9	10.738	9	1 57 39.35	2.3263	12 29 2.8	9.166
10	0 14 10.86	2.0910	4 31 12.0	10.732	10	1 59 59.10	2.3321	12 38 10.9	9.102
11	0 16 16.43	2.0949	4 41 55.7	10.724	11	2 2 19.20	2.3378	12 47 15.0	9.037
12	0 18 22.25	2.0991	4 52 38.9	10.715	12	2 4 39.64	2.3435	12 56 15.3	8.971
13	0 20 28.32	2.1032	5 3 21.5	10.706	13	2 7 0.42	2.3493	13 5 11.5	8.903
14	0 22 34.63	2.1073	5 14 3.6	10.696	14	2 9 21.55	2.3551	13 14 3.6	8.833
15	0 24 41.20	2.1115	5 24 45.0	10.683	15	2 11 43.03	2.3606	13 22 51.5	8.763
16	0 26 48.01	2.1156	5 35 25.6	10.670	16	2 14 4.85	2.3666	13 31 35.2	8.690
17	0 28 55.09	2.1201	5 46 5.4	10.657	17	2 16 27.02	2.3722	13 40 14.5	8.618
18	0 31 2.42	2.1244	5 56 44.4	10.643	18	2 18 49.53	2.3781	13 48 49.4	8.543
19	0 33 10.02	2.1288	6 7 22.5	10.627	19	2 21 12.39	2.3839	13 57 19.7	8.468
20	0 35 17.88	2.1333	6 17 59.6	10.609	20	2 23 35.60	2.3897	14 5 45.5	8.390
21	0 37 26.01	2.1378	6 28 35.6	10.592	21	2 25 59.15	2.3953	14 14 6.5	8.311
22	0 39 34.42	2.1423	6 39 10.6	10.573	22	2 28 23.04	2.4011	14 22 22.8	8.231
23	0 41 43.09	2.1469	6 49 44.4	10.553	23	2 30 47.28	2.4068	14 30 34.2	8.149
24	0 43 52.05	2.1516	+7 0 17.0	+10.533	24	2 33 11.86	2.4125	+14 38 40.7	+ 8.066

## GREENWICH MEAN TIME.

Hour.	Right Ascension.	Var. per Min.	Declination.	Var. per Min.	Hour.	Right Ascension.	Var. per Min.	Declination.	Var. per Min.
NOVEMBER 24.					NOVEMBER 26.				
0	h m s	s	' "	"	0	h m s	s	' "	"
0	2 33 11.86	2.4125	+14 38 40.7	+8.066	0	4 34 47.41	2.6277	+19 5 0.4	+2.585
1	2 35 36.78	2.4182	14 46 42.1	7.981	1	4 37 25.14	2.6300	19 7 31.3	2.447
2	2 38 2.04	2.4239	14 54 38.4	7.896	2	4 40 3.01	2.6323	19 9 54.0	2.308
3	2 40 27.65	2.4296	15 2 29.6	7.808	3	4 42 41.02	2.6345	19 12 8.2	2.168
4	2 42 53.59	2.4352	15 10 15.4	7.719	4	4 45 19.15	2.6365	19 14 14.1	2.028
5	2 45 19.87	2.4408	15 17 55.9	7.629	5	4 47 57.40	2.6384	19 16 11.5	1.887
6	2 47 46.48	2.4463	15 25 30.9	7.538	6	4 50 35.76	2.6403	19 18 0.5	1.745
7	2 50 13.43	2.4519	15 33 0.4	7.445	7	4 53 14.23	2.6419	19 19 40.9	1.603
8	2 52 40.71	2.4574	15 40 24.3	7.351	8	4 55 52.79	2.6435	19 21 12.9	1.462
9	2 55 8.32	2.4629	15 47 42.5	7.255	9	4 58 31.45	2.6449	19 22 36.3	1.318
10	2 57 36.26	2.4683	15 54 54.9	7.158	10	5 1 10.18	2.6463	19 23 51.1	1.175
11	3 0 4.52	2.4738	16 2 1.5	7.060	11	5 3 49.00	2.6475	19 24 57.3	1.033
12	3 2 33.11	2.4792	16 9 2.1	6.960	12	5 6 27.88	2.6485	19 25 55.0	0.889
13	3 5 2.02	2.4845	16 15 56.7	6.859	13	5 9 6.82	2.6494	19 26 44.0	0.745
14	3 7 31.25	2.4898	16 22 45.2	6.757	14	5 11 45.81	2.6503	19 27 24.4	0.601
15	3 10 0.79	2.4950	16 29 27.5	6.653	15	5 14 24.85	2.6510	19 27 56.1	0.458
16	3 12 30.65	2.5003	16 36 3.5	6.548	16	5 17 3.93	2.6516	19 28 19.3	0.313
17	3 15 0.82	2.5053	16 42 33.2	6.442	17	5 19 43.04	2.6520	19 28 33.7	0.168
18	3 17 31.29	2.5104	16 48 56.5	6.333	18	5 22 22.17	2.6523	19 28 39.5	+0.024
19	3 20 2.07	2.5155	16 55 13.2	6.224	19	5 25 1.31	2.6524	19 28 36.6	-0.120
20	3 22 33.15	2.5204	17 1 23.4	6.115	20	5 27 40.46	2.6526	19 28 25.1	0.265
21	3 25 4.52	2.5253	17 7 27.0	6.003	21	5 30 19.62	2.6525	19 28 4.8	0.410
22	3 27 36.19	2.5303	17 13 23.8	5.890	22	5 32 58.76	2.6523	19 27 35.9	0.553
23	3 30 8.15	2.5351	+17 19 13.8	+5.777	23	5 35 37.89	2.6520	+19 26 58.4	-0.698
NOVEMBER 25.					NOVEMBER 27.				
0	3 32 40.40	2.5398	+17 24 57.0	+5.662	0	5 38 17.00	2.6516	+19 26 12.1	-0.843
1	3 35 12.92	2.5444	17 30 33.2	5.545	1	5 40 56.08	2.6510	19 25 17.2	0.987
2	3 37 45.73	2.5490	17 36 2.4	5.428	2	5 43 35.12	2.6503	19 24 13.7	1.130
3	3 40 18.80	2.5535	17 41 24.5	5.309	3	5 46 14.12	2.6495	19 23 1.6	1.274
4	3 42 52.15	2.5580	17 46 39.5	5.189	4	5 48 53.06	2.6486	19 21 40.8	1.418
5	3 45 25.76	2.5623	17 51 47.2	5.068	5	5 51 31.95	2.6476	19 20 11.4	1.561
6	3 47 59.63	2.5666	17 56 47.6	4.946	6	5 54 10.77	2.6463	19 18 33.5	1.703
7	3 50 33.75	2.5708	18 1 40.7	4.823	7	5 56 49.51	2.6450	19 16 47.0	1.846
8	3 53 8.12	2.5748	18 6 26.4	4.699	8	5 59 28.17	2.6437	19 14 52.0	1.988
9	3 55 42.73	2.5789	18 11 4.6	4.573	9	6 2 6.75	2.6422	19 12 48.4	2.130
10	3 58 17.59	2.5828	18 15 35.2	4.448	10	6 4 45.23	2.6405	19 10 36.4	2.270
11	4 0 52.67	2.5867	18 19 58.3	4.320	11	6 7 23.61	2.6387	19 8 16.0	2.411
12	4 3 27.99	2.5904	18 24 13.6	4.192	12	6 10 1.87	2.6368	19 5 47.1	2.553
13	4 6 3.52	2.5941	18 28 21.3	4.063	13	6 12 40.02	2.6348	19 3 9.7	2.692
14	4 8 39.28	2.5977	18 32 21.1	3.932	14	6 15 18.05	2.6328	19 0 24.1	2.830
15	4 11 15.24	2.6012	18 36 13.1	3.802	15	6 17 55.95	2.6305	18 57 30.1	2.969
16	4 13 51.42	2.6046	18 39 57.3	3.670	16	6 20 33.71	2.6282	18 54 27.8	3.107
17	4 16 27.79	2.6078	18 43 33.5	3.537	17	6 23 11.33	2.6257	18 51 17.3	3.243
18	4 19 4.35	2.6108	18 47 1.7	3.403	18	6 25 48.79	2.6232	18 47 58.6	3.380
19	4 21 41.09	2.6139	18 50 21.8	3.268	19	6 28 26.11	2.6206	18 44 31.7	3.517
20	4 24 18.02	2.6169	18 53 33.9	3.133	20	6 31 3.26	2.6178	18 40 56.6	3.652
21	4 26 55.12	2.6198	18 56 37.8	2.998	21	6 33 40.25	2.6150	18 37 13.5	3.785
22	4 29 32.39	2.6225	18 59 33.6	2.861	22	6 36 17.06	2.6120	18 33 22.4	3.918
23	4 32 9.82	2.6252	19 2 21.1	2.723	23	6 38 53.69	2.6090	18 29 23.3	4.051
24	4 34 47.41	2.6277	+19 5 0.4	+2.585	24	6 41 30.14	2.6058	+18 25 16.3	-4.183

GREENWICH MEAN TIME.

Hour.	Right Ascension.	Var. per Min.	Declination.	Var. per Min.	Hour.	Right Ascension.	Var. per Min.	Declination.	Var. per Min.
<b>NOVEMBER 28.</b>					<b>NOVEMBER 30.</b>				
0	h m s	s	° ' "	"	0	h m s	s	° ' "	"
0	6 41 30.14	2.8088	+18 25 16.3	-4.183	0	8 41 40.56	2.3888	+12 53 25.8	-9.163
1	6 44 6.39	2.8026	18 21 1.3	4.214	1	8 44 3.55	2.3807	12 44 13.9	9.235
2	6 46 42.45	2.8003	18 16 38.6	4.444	2	8 46 26.24	2.3755	12 34 57.8	9.304
3	6 49 18.90	2.8068	18 12 8.0	4.573	3	8 48 48.61	2.3703	12 25 37.4	9.373
4	6 51 53.95	2.8024	18 7 29.8	4.701	4	8 51 10.68	2.3653	12 16 13.0	9.440
5	6 54 29.39	2.8088	18 2 43.9	4.828	5	8 53 32.44	2.3602	12 6 44.6	9.507
6	6 57 4.61	2.8042	17 57 50.4	4.954	6	8 55 53.90	2.3551	11 57 12.2	9.572
7	6 59 39.61	2.8014	17 52 49.4	5.079	7	8 58 15.05	2.3500	11 47 36.0	9.635
8	7 2 14.38	2.8775	17 47 40.9	5.208	8	9 0 35.90	2.3450	11 37 56.0	9.698
9	7 4 48.91	2.8737	17 42 25.0	5.327	9	9 2 56.45	2.3400	11 28 12.3	9.758
10	7 7 23.22	2.8698	17 37 1.7	5.449	10	9 5 16.70	2.3350	11 18 25.0	9.818
11	7 9 57.28	2.8657	17 31 31.1	5.570	11	9 7 36.65	2.3300	11 8 34.2	9.876
12	7 12 31.10	2.8615	17 25 53.3	5.689	12	9 9 56.30	2.3250	10 58 39.9	9.932
13	7 15 4.66	2.8573	17 20 8.4	5.808	13	9 12 15.65	2.3201	10 48 42.3	9.987
14	7 17 37.97	2.8531	17 14 16.4	5.926	14	9 14 34.71	2.3153	10 38 41.5	10.041
15	7 20 11.03	2.8488	17 8 17.3	6.042	15	9 16 53.48	2.3103	10 28 37.4	10.094
16	7 22 43.83	2.8444	17 2 11.4	6.157	16	9 19 11.95	2.3055	10 18 30.2	10.146
17	7 25 16.36	2.8399	16 55 58.5	6.272	17	9 21 30.14	2.3008	10 8 19.9	10.196
18	7 27 48.62	2.8354	16 49 38.8	6.384	18	9 23 48.04	2.2959	9 58 6.7	10.245
19	7 30 20.61	2.8309	16 43 12.4	6.495	19	9 26 5.65	2.2912	9 47 50.5	10.293
20	7 32 52.33	2.8263	16 36 39.4	6.606	20	9 28 22.98	2.2865	9 37 31.6	10.339
21	7 35 23.77	2.8218	16 29 59.7	6.715	21	9 30 40.03	2.2818	9 27 9.8	10.385
22	7 37 54.94	2.8171	16 23 13.6	6.823	22	9 32 56.80	2.2772	9 16 45.4	10.428
23	7 40 25.82	2.8123	+16 16 21.0	-6.930	23	9 35 13.29	2.2726	+ 9 6 18.4	-10.471
<b>NOVEMBER 29.</b>					<b>DECEMBER 1.</b>				
0	7 42 56.41	2.8074	+16 9 22.0	-7.036	0	9 37 29.51	2.2680	+ 8 55 48.9	-10.512
1	7 45 28.71	2.8027	16 2 16.7	7.140	1	9 39 45.45	2.2635	8 45 17.0	10.552
2	7 47 56.73	2.8078	15 55 5.2	7.243	2	9 42 1.13	2.2591	8 34 42.7	10.590
3	7 50 26.45	2.8029	15 47 47.6	7.343	3	9 44 16.54	2.2546	8 24 6.2	10.628
4	7 52 55.88	2.8080	15 40 24.0	7.443	4	9 46 31.68	2.2502	8 13 27.4	10.664
5	7 55 25.01	2.8030	15 32 54.4	7.543	5	9 48 46.56	2.2458	8 2 46.5	10.699
6	7 57 53.84	2.8781	15 25 18.9	7.640	6	9 51 1.18	2.2415	7 52 3.5	10.733
7	8 0 22.38	2.8731	15 17 37.6	7.736	7	9 53 15.54	2.2372	7 41 18.5	10.766
8	8 2 50.61	2.8680	15 9 50.6	7.830	8	9 55 29.65	2.2331	7 30 31.6	10.798
9	8 5 18.54	2.8630	15 1 58.0	7.923	9	9 57 43.51	2.2288	7 19 42.8	10.828
10	8 7 46.17	2.8579	14 53 59.8	8.016	10	9 59 57.11	2.2247	7 8 52.3	10.857
11	8 10 13.49	2.8528	14 45 56.1	8.106	11	10 2 10.47	2.2207	6 58 0.0	10.885
12	8 12 40.50	2.8478	14 37 47.1	8.196	12	10 4 23.59	2.2167	6 47 6.1	10.911
13	8 15 7.21	2.8425	14 29 32.6	8.285	13	10 6 36.47	2.2127	6 36 10.7	10.937
14	8 17 33.60	2.8373	14 21 12.9	8.371	14	10 8 49.11	2.2087	6 25 13.7	10.962
15	8 19 59.69	2.8323	14 12 48.1	8.457	15	10 11 1.51	2.2048	6 14 15.3	10.985
16	8 22 25.47	2.8271	14 4 18.1	8.541	16	10 13 13.69	2.2010	6 3 15.5	11.007
17	8 24 50.94	2.8219	13 55 43.2	8.623	17	10 15 25.63	2.1972	5 52 14.5	11.028
18	8 27 16.10	2.8168	13 47 3.4	8.704	18	10 17 37.35	2.1935	5 41 12.2	11.048
19	8 29 40.96	2.8117	13 38 18.7	8.784	19	10 19 48.85	2.1898	5 30 8.8	11.067
20	8 32 5.50	2.8064	13 29 29.3	8.863	20	10 22 0.13	2.1862	5 19 4.2	11.085
21	8 34 29.73	2.8013	13 20 35.2	8.939	21	10 24 11.19	2.1825	5 7 58.6	11.101
22	8 36 53.65	2.8061	13 11 36.6	9.015	22	10 26 22.03	2.1790	4 56 52.1	11.116
23	8 39 17.28	2.8009	13 2 33.4	9.090	23	10 28 32.67	2.1755	4 45 44.7	11.131
24	8 41 40.56	2.8058	+12 53 25.8	-9.163	24	10 30 43.09	2.1720	+ 4 34 36.4	-11.144

GREENWICH MEAN TIME.

Hour.	Right Ascension.	Var. per Min.	Declination.	Var. per Min.	Hour.	Right Ascension.	Var. per Min.	Declination.	Var. per Min.
DECEMBER 2.					DECEMBER 4.				
	h m s	s	° ' "	"		h m s	s	° ' "	"
0	10 30 43.09	2.1720	+4 34 36.4	-11.144	0	12 12 2.53	2.0701	-4 17 9.1	-10.668
1	10 32 53.31	2.1667	4 23 27.4	11.157	1	12 14 6.71	2.0693	4 27 48.3	10.638
2	10 35 3.33	2.1633	4 12 17.6	11.168	2	12 16 10.84	2.0684	4 38 25.6	10.606
3	10 37 13.15	2.1621	4 1 7.2	11.178	3	12 18 14.92	2.0677	4 49 1.0	10.573
4	10 39 22.78	2.1589	3 49 56.2	11.187	4	12 20 18.96	2.0669	4 59 34.4	10.540
5	10 41 32.22	2.1557	3 38 44.7	11.195	5	12 22 22.95	2.0663	5 10 5.8	10.506
6	10 43 41.46	2.1525	3 27 32.8	11.203	6	12 24 26.91	2.0656	5 20 35.1	10.472
7	10 45 50.52	2.1496	3 16 20.4	11.209	7	12 26 30.82	2.0649	5 31 2.4	10.437
8	10 47 59.41	2.1466	3 5 7.7	11.213	8	12 28 34.70	2.0645	5 41 27.6	10.401
9	10 50 8.11	2.1435	2 53 54.8	11.218	9	12 30 38.56	2.0640	5 51 50.5	10.363
10	10 52 18.63	2.1407	2 42 41.6	11.222	10	12 32 42.38	2.0634	6 2 11.2	10.327
11	10 54 24.99	2.1378	2 31 28.2	11.223	11	12 34 46.17	2.0630	6 12 29.7	10.289
12	10 56 33.17	2.1350	2 20 14.8	11.224	12	12 36 49.94	2.0627	6 22 45.9	10.250
13	10 58 41.19	2.1323	2 9 1.3	11.224	13	12 38 53.69	2.0623	6 32 59.7	10.210
14	11 0 49.05	2.1297	1 57 47.9	11.223	14	12 40 57.42	2.0620	6 43 11.1	10.168
15	11 2 56.75	2.1270	1 46 34.5	11.222	15	12 43 1.13	2.0618	6 53 20.0	10.128
16	11 5 4.29	2.1244	1 35 21.3	11.219	16	12 45 4.83	2.0616	7 3 26.5	10.087
17	11 7 11.68	2.1219	1 24 8.2	11.216	17	12 47 8.52	2.0613	7 13 30.5	10.045
18	11 9 18.92	2.1194	1 12 55.4	11.211	18	12 49 12.19	2.0612	7 23 31.9	10.002
19	11 11 26.01	2.1170	1 1 42.9	11.205	19	12 51 15.86	2.0612	7 33 30.7	9.958
20	11 13 32.96	2.1147	0 50 30.8	11.199	20	12 53 19.53	2.0611	7 43 26.8	9.913
21	11 15 39.77	2.1124	0 39 19.0	11.192	21	12 55 23.19	2.0610	7 53 20.3	9.868
22	11 17 46.45	2.1102	0 28 7.8	11.183	22	12 57 26.85	2.0610	8 3 11.0	9.822
23	11 19 52.90	2.1079	+0 16 57.0	-11.174	23	12 59 30.51	2.0611	-8 12 58.9	-9.775
DECEMBER 3.					DECEMBER 5.				
0	11 21 59.40	2.1058	+0 5 46.9	-11.164	0	13 1 34.18	2.0612	-8 22 44.0	-9.728
1	11 24 5.68	2.1037	-0 5 22.7	11.153	1	13 3 37.85	2.0613	8 32 26.3	9.681
2	11 26 11.84	2.1018	0 16 31.5	11.141	2	13 5 41.53	2.0614	8 42 5.7	9.633
3	11 28 17.89	2.0998	0 27 39.6	11.128	3	13 7 45.22	2.0616	8 51 42.2	9.583
4	11 30 23.81	2.0978	0 38 46.9	11.115	4	13 9 48.92	2.0618	9 1 15.6	9.533
5	11 32 29.62	2.0959	0 49 53.4	11.101	5	13 11 52.64	2.0621	9 10 46.1	9.483
6	11 34 35.32	2.0941	1 0 59.0	11.085	6	13 13 56.37	2.0623	9 20 13.5	9.431
7	11 36 40.91	2.0923	1 12 3.6	11.068	7	13 16 0.12	2.0627	9 29 37.8	9.379
8	11 38 46.40	2.0907	1 23 7.2	11.052	8	13 18 3.89	2.0630	9 38 59.0	9.327
9	11 40 51.79	2.0890	1 34 9.8	11.034	9	13 20 7.68	2.0633	9 48 17.0	9.273
10	11 42 57.08	2.0873	1 45 11.3	11.015	10	13 22 11.49	2.0637	9 57 31.8	9.220
11	11 45 2.27	2.0858	1 56 11.6	10.995	11	13 24 15.33	2.0642	10 6 43.4	9.166
12	11 47 7.38	2.0843	2 7 10.7	10.975	12	13 26 19.19	2.0646	10 15 51.7	9.110
13	11 49 12.39	2.0828	2 18 8.6	10.954	13	13 28 23.08	2.0651	10 24 56.6	9.054
14	11 51 17.31	2.0814	2 29 5.2	10.932	14	13 30 27.00	2.0657	10 33 58.2	8.998
15	11 53 22.16	2.0801	2 40 0.5	10.909	15	13 32 30.96	2.0662	10 42 56.4	8.942
16	11 55 26.92	2.0788	2 50 54.3	10.884	16	13 34 34.94	2.0667	10 51 51.2	8.883
17	11 57 31.61	2.0776	3 1 46.6	10.860	17	13 36 38.96	2.0673	11 0 42.4	8.825
18	11 59 36.23	2.0763	3 12 37.5	10.836	18	13 38 43.01	2.0679	11 9 30.2	8.767
19	12 1 40.77	2.0752	3 23 26.9	10.811	19	13 40 47.11	2.0686	11 18 14.4	8.708
20	12 3 45.25	2.0741	3 34 14.8	10.784	20	13 42 51.24	2.0692	11 26 55.1	8.648
21	12 5 49.66	2.0730	3 45 1.0	10.755	21	13 44 55.41	2.0698	11 35 32.1	8.586
22	12 7 54.01	2.0720	3 55 45.4	10.727	22	13 46 59.62	2.0705	11 44 5.4	8.525
23	12 9 58.30	2.0710	4 6 28.2	10.698	23	13 49 3.87	2.0713	11 52 35.1	8.461
24	12 12 2.53	2.0701	-4 17 9.1	-10.668	24	13 51 8.17	2.0720	-12 1 1.1	-8.401

GREENWICH MEAN TIME.

Hour.	Right Ascension.	Var. per Min.	Declination.	Var. per Min.	Hour.	Right Ascension.	Var. per Min.	Declination.	Var. per Min.
DECEMBER 6.					DECEMBER 8.				
0	h m s	s	" ' "	"	0	h m s	s	" ' "	"
1	13 51 8.17	2.0720	-12 1 1.1	-8.601	1	15 31 37.07	2.1148	-17 22 6.5	-4.793
2	13 53 12.51	2.0728	12 9 23.2	8.338	2	15 33 43.98	2.1166	17 26 51.5	4.708
3	13 55 16.90	2.0735	12 17 41.6	8.375	3	15 35 50.94	2.1183	17 31 31.4	4.622
4	13 57 21.33	2.0743	12 25 56.2	8.311	4	15 37 57.94	2.1170	17 36 6.1	4.536
5	13 59 25.81	2.0751	12 34 6.9	8.145	5	15 40 4.98	2.1177	17 40 35.7	4.449
6	14 1 30.34	2.0759	12 42 13.6	8.080	6	15 42 12.06	2.1183	17 45 0.0	4.362
7	14 3 34.92	2.0768	12 50 16.5	8.015	7	15 44 19.18	2.1190	17 49 19.1	4.274
8	14 5 39.55	2.0776	12 58 15.4	7.948	8	15 46 26.34	2.1197	17 53 32.9	4.187
9	14 7 44.23	2.0785	13 6 10.2	7.880	9	15 48 33.54	2.1203	17 57 41.5	4.099
10	14 9 48.97	2.0793	13 14 1.0	7.813	10	15 50 40.77	2.1208	18 1 44.8	4.011
11	14 11 53.75	2.0802	13 21 47.8	7.745	11	15 52 48.04	2.1214	18 5 42.8	3.923
12	14 13 58.59	2.0811	13 29 30.4	7.677	12	15 54 55.34	2.1219	18 9 35.5	3.834
13	14 16 3.48	2.0820	13 37 9.0	7.608	13	15 57 2.67	2.1224	18 13 22.9	3.745
14	14 18 8.48	2.0829	13 44 43.8	7.537	14	15 59 10.03	2.1229	18 17 4.9	3.656
15	14 20 13.43	2.0838	13 52 13.4	7.467	15	16 1 17.42	2.1233	18 20 41.6	3.566
16	14 22 18.49	2.0846	13 59 39.3	7.397	16	16 3 24.83	2.1238	18 24 12.8	3.476
17	14 24 23.60	2.0857	14 7 1.0	7.325	17	16 5 32.27	2.1243	18 27 38.7	3.387
18	14 26 28.77	2.0867	14 14 18.3	7.253	18	16 7 39.74	2.1247	18 30 59.2	3.297
19	14 28 34.00	2.0876	14 21 31.3	7.181	19	16 9 47.23	2.1249	18 34 14.3	3.207
20	14 30 39.28	2.0885	14 28 40.0	7.108	20	16 11 54.73	2.1253	18 37 24.0	3.116
21	14 32 44.62	2.0895	14 35 44.2	7.034	21	16 14 2.26	2.1256	18 40 28.2	3.025
22	14 34 50.02	2.0905	14 42 44.1	6.961	22	16 16 9.80	2.1258	18 43 27.0	2.935
23	14 36 55.48	2.0915	14 49 39.5	6.886	23	16 18 17.36	2.1261	18 46 20.4	2.843
24	14 39 1.00	2.0924	-14 56 30.4	-6.811	24	16 20 24.93	2.1263	-18 49 8.2	-2.752
DECEMBER 7.					DECEMBER 9.				
0	14 41 6.57	2.0933	-15 3 16.8	-6.735	0	16 22 32.51	2.1265	-18 51 50.6	-2.661
1	14 43 12.20	2.0943	15 9 58.6	6.659	1	16 24 40.11	2.1267	18 54 27.5	2.569
2	14 45 17.89	2.0953	15 16 35.9	6.583	2	16 26 47.71	2.1268	18 56 58.9	2.478
3	14 47 23.64	2.0963	15 23 8.6	6.507	3	16 28 55.32	2.1269	18 59 24.9	2.387
4	14 49 29.44	2.0973	15 29 36.7	6.430	4	16 31 2.93	2.1269	19 1 45.3	2.294
5	14 51 35.30	2.0983	15 36 0.1	6.351	5	16 33 10.55	2.1269	19 4 0.2	2.202
6	14 53 41.22	2.0993	15 42 18.8	6.273	6	16 35 18.16	2.1269	19 6 9.5	2.110
7	14 55 47.20	2.1003	15 48 32.9	6.195	7	16 37 25.78	2.1269	19 8 13.4	2.018
8	14 57 53.23	2.1010	15 54 42.2	6.115	8	16 39 33.39	2.1268	19 10 11.7	1.925
9	14 59 59.32	2.1019	16 0 46.7	6.035	9	16 41 41.00	2.1268	19 12 4.4	1.833
10	15 2 5.46	2.1028	16 6 46.4	5.956	10	16 43 48.61	2.1267	19 13 51.7	1.741
11	15 4 11.66	2.1038	16 12 41.4	5.876	11	16 45 56.20	2.1264	19 15 33.3	1.648
12	15 6 17.92	2.1048	16 18 31.5	5.794	12	16 48 3.78	2.1263	19 17 9.5	1.556
13	15 8 24.23	2.1056	16 24 16.7	5.713	13	16 50 11.35	2.1261	19 18 40.0	1.463
14	15 10 30.59	2.1065	16 29 57.1	5.632	14	16 52 18.91	2.1258	19 20 5.0	1.371
15	15 12 37.01	2.1074	16 35 32.5	5.549	15	16 54 26.45	2.1255	19 21 24.5	1.278
16	15 14 43.48	2.1083	16 41 3.0	5.467	16	16 56 33.97	2.1252	19 22 38.4	1.185
17	15 16 50.01	2.1092	16 46 28.5	5.384	17	16 58 41.47	2.1248	19 23 46.7	1.092
18	15 18 56.58	2.1100	16 51 49.1	5.301	18	17 0 48.95	2.1244	19 24 49.5	1.000
19	15 21 3.21	2.1109	16 57 4.6	5.217	19	17 2 56.40	2.1240	19 25 46.7	0.907
20	15 23 9.89	2.1117	17 2 15.1	5.133	20	17 5 3.83	2.1236	19 26 38.3	0.814
21	15 25 16.61	2.1124	17 7 29.6	5.049	21	17 7 11.23	2.1230	19 27 24.4	0.722
22	15 27 23.38	2.1133	17 12 21.0	4.964	22	17 9 18.59	2.1225	19 28 4.9	0.630
23	15 29 30.20	2.1141	17 17 16.8	4.879	23	17 11 25.93	2.1219	19 28 39.9	0.537
24	15 31 37.07	2.1148	-17 22 6.5	-4.793	24	17 13 33.22	2.1213	-19 29 9.4	-0.444

GREENWICH MEAN TIME.

Hour.	Right Ascension.	Var. per Min.	Declination.	Var. per Min.	Hour.	Right Ascension.	Var. per Min.	Declination.	Var. per Min.
DECEMBER 10.					DECEMBER 12.				
	h m s	s	° ' "	"		h m s	s	° ' "	"
0	17 13 33.22	2.1213	-19 29 9.4	-0.444	0	18 54 6.46	2.0682	-18 6 51.3	+3.780
1	17 15 40.49	2.1208	19 29 33.2	0.252	1	18 56 9.90	2.0683	18 3 2.1	3.260
2	17 17 47.71	2.1201	19 29 51.6	0.260	2	18 58 13.22	2.0644	17 59 8.1	3.941
3	17 19 54.90	2.1194	19 30 4.4	0.168	3	19 0 16.43	2.0626	17 55 9.2	4.021
4	17 22 2.04	2.1186	19 30 11.7	-0.075	4	19 2 19.53	2.0607	17 51 5.6	4.100
5	17 24 9.13	2.1178	19 30 13.4	+0.017	5	19 4 22.51	2.0488	17 46 57.2	4.180
6	17 26 16.18	2.1171	19 30 9.6	0.109	6	19 6 25.38	2.0468	17 42 44.0	4.258
7	17 28 23.18	2.1163	19 30 0.3	0.201	7	19 8 28.13	2.0449	17 38 26.2	4.336
8	17 30 30.13	2.1154	19 29 45.5	0.293	8	19 10 30.77	2.0430	17 34 3.7	4.414
9	17 32 37.03	2.1146	19 29 25.2	0.384	9	19 12 33.29	2.0410	17 29 36.5	4.492
10	17 34 43.88	2.1137	19 28 59.4	0.476	10	19 14 35.69	2.0390	17 25 4.6	4.569
11	17 36 50.67	2.1127	19 28 28.1	0.567	11	19 16 37.97	2.0371	17 20 28.2	4.645
12	17 38 57.40	2.1117	19 27 51.4	0.658	12	19 18 40.14	2.0352	17 15 47.2	4.722
13	17 41 4.07	2.1106	19 27 9.1	0.750	13	19 20 42.19	2.0332	17 11 1.6	4.798
14	17 43 10.67	2.1096	19 26 21.4	0.840	14	19 22 44.12	2.0312	17 6 11.5	4.873
15	17 45 17.22	2.1086	19 25 28.3	0.931	15	19 24 45.93	2.0292	17 1 16.9	4.948
16	17 47 23.70	2.1074	19 24 29.7	1.022	16	19 26 47.62	2.0272	16 56 17.8	5.022
17	17 49 30.11	2.1063	19 23 25.7	1.112	17	19 28 49.19	2.0252	16 51 14.3	5.096
18	17 51 36.45	2.1051	19 22 16.3	1.202	18	19 30 50.64	2.0232	16 46 6.3	5.170
19	17 53 42.72	2.1039	19 21 1.5	1.292	19	19 32 51.98	2.0212	16 40 53.9	5.243
20	17 55 48.92	2.1027	19 19 41.3	1.382	20	19 34 53.19	2.0192	16 35 37.2	5.315
21	17 57 55.04	2.1014	19 18 15.7	1.471	21	19 36 54.28	2.0172	16 30 18.1	5.388
22	18 0 1.09	2.1001	19 16 44.8	1.560	22	19 38 55.26	2.0152	16 24 50.7	5.459
23	18 2 7.05	2.0989	-19 15 8.5	+1.650	23	19 40 56.12	2.0132	-16 19 21.0	+5.530
DECEMBER 11.					DECEMBER 13.				
0	18 4 12.94	2.0975	-19 13 26.8	+1.738	0	19 42 56.85	2.0112	-16 13 47.1	+5.601
1	18 6 18.75	2.0961	19 11 39.9	1.827	1	19 44 57.47	2.0093	16 8 8.9	5.672
2	18 8 24.47	2.0947	19 9 47.6	1.915	2	19 46 57.97	2.0073	16 2 26.5	5.741
3	18 10 30.11	2.0933	19 7 50.1	2.003	3	19 48 58.35	2.0053	15 56 40.0	5.810
4	18 12 35.66	2.0918	19 5 47.3	2.091	4	19 50 58.61	2.0034	15 50 49.3	5.880
5	18 14 41.13	2.0903	19 3 39.2	2.178	5	19 52 58.76	2.0014	15 44 54.4	5.948
6	18 16 46.50	2.0888	19 1 25.9	2.266	6	19 54 58.78	1.9994	15 38 55.5	6.015
7	18 18 51.79	2.0873	18 59 7.3	2.353	7	19 56 58.69	1.9975	15 32 52.6	6.083
8	18 20 56.98	2.0858	18 56 43.6	2.438	8	19 58 58.48	1.9956	15 26 45.6	6.160
9	18 23 2.08	2.0842	18 54 14.7	2.525	9	20 0 58.16	1.9937	15 20 34.6	6.217
10	18 25 7.08	2.0826	18 51 40.6	2.612	10	20 2 57.72	1.9918	15 14 19.6	6.283
11	18 27 11.99	2.0809	18 49 1.3	2.698	11	20 4 57.17	1.9898	15 8 0.6	6.348
12	18 29 16.79	2.0793	18 46 16.9	2.783	12	20 6 56.50	1.9879	15 1 37.8	6.413
13	18 31 21.50	2.0778	18 43 27.4	2.868	13	20 8 55.72	1.9860	14 55 11.1	6.478
14	18 33 26.12	2.0761	18 40 32.8	2.953	14	20 10 54.82	1.9842	14 48 40.5	6.542
15	18 35 30.63	2.0743	18 37 33.1	3.037	15	20 12 53.82	1.9823	14 42 6.1	6.606
16	18 37 35.03	2.0725	18 34 28.4	3.120	16	20 14 52.70	1.9804	14 35 27.8	6.669
17	18 39 39.33	2.0708	18 31 18.7	3.204	17	20 16 51.47	1.9787	14 28 45.8	6.731
18	18 41 43.53	2.0692	18 28 3.9	3.288	18	20 18 50.14	1.9768	14 22 0.1	6.793
19	18 43 47.63	2.0673	18 24 44.2	3.370	19	20 20 48.69	1.9750	14 15 10.7	6.854
20	18 45 51.61	2.0655	18 21 19.5	3.453	20	20 22 47.14	1.9732	14 8 17.6	6.916
21	18 47 55.49	2.0637	18 17 49.8	3.536	21	20 24 45.48	1.9714	14 1 20.8	6.977
22	18 49 59.26	2.0618	18 14 15.2	3.618	22	20 26 43.71	1.9697	13 54 20.4	7.037
23	18 52 2.91	2.0600	18 10 35.7	3.699	23	20 28 41.84	1.9680	13 47 16.4	7.097
24	18 54 6.46	2.0582	-18 6 51.3	+3.780	24	20 30 39.87	1.9663	-13 40 8.8	+7.156

GREENWICH MEAN TIME.

Hour.	Right Ascension.	Var. per Min.	Declination.	Var. per Min.	Hour.	Right Ascension.	Var. per Min.	Declination.	Var. per Min.
DECEMBER 14.					DECEMBER 16.				
	h m s	s	° ' "	"		h m s	s	° ' "	"
0	20 30 39.87	1.9603	-13 40 8.8	+7.156	0	22 3 34.84	1.9182	-6 58 5.6	+9.403
1	20 32 37.79	1.9646	13 32 57.7	7.214	1	22 5 29.93	1.9181	6 48 40.4	9.437
2	20 34 35.62	1.9689	13 25 43.1	7.272	2	22 7 25.01	1.9180	6 39 13.2	9.471
3	20 36 33.34	1.9612	13 18 25.1	7.329	3	22 9 20.09	1.9181	6 29 43.9	9.505
4	20 38 30.96	1.9596	13 11 3.6	7.386	4	22 11 15.18	1.9183	6 20 12.6	9.537
5	20 40 28.49	1.9580	13 3 38.6	7.444	5	22 13 10.27	1.9183	6 10 39.4	9.569
6	20 42 25.92	1.9564	12 56 10.3	7.499	6	22 15 5.37	1.9183	6 1 4.3	9.601
7	20 44 23.26	1.9548	12 48 38.7	7.555	7	22 17 0.47	1.9185	5 51 27.3	9.633
8	20 46 20.51	1.9532	12 41 3.7	7.611	8	22 18 55.59	1.9188	5 41 48.4	9.663
9	20 48 17.66	1.9515	12 33 25.4	7.665	9	22 20 50.73	1.9192	5 32 7.7	9.693
10	20 50 14.72	1.9500	12 25 43.9	7.719	10	22 22 45.89	1.9195	5 22 25.2	9.723
11	20 52 11.70	1.9489	12 17 59.1	7.773	11	22 24 41.07	1.9198	5 12 40.9	9.753
12	20 54 8.59	1.9474	12 10 11.1	7.826	12	22 26 36.27	1.9208	5 2 54.9	9.781
13	20 56 5.39	1.9460	12 2 20.0	7.878	13	22 28 31.51	1.9208	4 53 7.2	9.808
14	20 58 2.11	1.9447	11 54 25.7	7.931	14	22 30 26.77	1.9218	4 43 17.9	9.836
15	20 59 58.75	1.9433	11 46 28.3	7.983	15	22 32 22.06	1.9219	4 33 26.9	9.863
16	21 1 55.30	1.9419	11 38 27.8	8.033	16	22 34 17.40	1.9226	4 23 34.3	9.890
17	21 3 51.78	1.9407	11 30 24.3	8.084	17	22 36 12.77	1.9233	4 13 40.1	9.916
18	21 5 48.19	1.9395	11 22 17.7	8.135	18	22 38 8.19	1.9240	4 3 44.4	9.941
19	21 7 44.52	1.9383	11 14 8.1	8.184	19	22 40 3.65	1.9248	3 53 47.2	9.966
20	21 9 40.77	1.9370	11 5 55.6	8.233	20	22 41 59.16	1.9257	3 43 48.5	9.990
21	21 11 36.96	1.9358	10 57 40.2	8.282	21	22 43 54.73	1.9266	3 33 48.4	10.013
22	21 13 33.07	1.9347	10 49 21.8	8.330	22	22 45 50.35	1.9275	3 23 46.9	10.037
23	21 15 29.12	1.9336	-10 41 0.6	+8.377	23	22 47 46.08	1.9285	-3 13 44.0	+10.059
DECEMBER 15.					DECEMBER 17.				
	h m s	s	° ' "	"		h m s	s	° ' "	"
0	21 17 25.10	1.9326	-10 32 36.6	+8.424	0	22 49 41.77	1.9296	-3 3 39.8	+10.082
1	21 19 21.03	1.9316	10 24 9.7	8.472	1	22 51 37.58	1.9307	2 53 34.2	10.103
2	21 21 16.89	1.9305	10 15 40.0	8.518	2	22 53 33.45	1.9318	2 43 27.4	10.123
3	21 23 12.69	1.9296	10 7 7.6	8.563	3	22 55 29.40	1.9331	2 33 19.4	10.144
4	21 25 8.44	1.9287	9 58 32.5	8.608	4	22 57 25.42	1.9343	2 23 10.1	10.164
5	21 27 4.13	1.9277	9 49 54.7	8.653	5	22 59 21.52	1.9357	2 12 59.7	10.183
6	21 28 59.76	1.9268	9 41 14.2	8.697	6	23 1 17.70	1.9371	2 2 48.2	10.202
7	21 30 55.35	1.9261	9 32 31.1	8.740	7	23 3 13.97	1.9386	1 52 35.5	10.220
8	21 32 50.89	1.9253	9 23 45.4	8.783	8	23 5 10.33	1.9400	1 42 21.8	10.237
9	21 34 46.38	1.9244	9 14 57.1	8.826	9	23 7 6.77	1.9415	1 32 7.1	10.253
10	21 36 41.82	1.9237	9 6 6.3	8.868	10	23 9 3.31	1.9432	1 21 51.4	10.270
11	21 38 37.22	1.9230	8 57 13.0	8.909	11	23 10 59.95	1.9448	1 11 34.7	10.286
12	21 40 32.58	1.9224	8 48 17.2	8.950	12	23 12 56.69	1.9465	1 1 17.1	10.301
13	21 42 27.91	1.9219	8 39 19.0	8.991	13	23 14 53.53	1.9483	0 50 58.6	10.315
14	21 44 23.21	1.9214	8 30 18.3	9.031	14	23 16 50.48	1.9501	0 40 39.3	10.329
15	21 46 18.48	1.9208	8 21 15.3	9.070	15	23 18 47.54	1.9520	0 30 19.1	10.343
16	21 48 13.71	1.9203	8 12 9.9	9.109	16	23 20 44.72	1.9539	0 19 58.2	10.354
17	21 50 8.92	1.9200	8 3 2.2	9.148	17	23 22 42.01	1.9558	-0 9 36.6	10.366
18	21 52 4.11	1.9196	7 53 52.2	9.186	18	23 24 39.42	1.9580	+0 0 45.7	10.378
19	21 53 59.27	1.9192	7 44 39.9	9.223	19	23 26 36.97	1.9602	0 11 8.7	10.389
20	21 55 54.41	1.9189	7 35 25.4	9.260	20	23 28 34.64	1.9623	0 21 32.4	10.399
21	21 57 49.54	1.9187	7 26 8.7	9.297	21	23 30 32.44	1.9644	0 31 56.6	10.408
22	21 59 44.65	1.9184	7 16 49.8	9.333	22	23 32 30.37	1.9667	0 42 21.3	10.416
23	22 1 39.75	1.9183	7 7 28.8	9.368	23	23 34 28.45	1.9692	0 52 46.5	10.424
24	22 3 34.84	1.9182	- 6 58 5.6	+9.403	24	23 36 26.67	1.9715	+1 3 12.2	+10.432

GREENWICH MEAN TIME.

Hour.	Right Ascension.	Var. per Min.	Declination.	Var. per Min.	Hour.	Right Ascension.	Var. per Min.	Declination.	Var. per Min.
DECEMBER 18.					DECEMBER 20.				
	h m s	s	° ' "	"		h m s	s	° ' "	"
0	23 36 26.67	1.9715	+1 3 12.2	+10.433	0	1 14 57.98	2.1557	+ 9 18 7.0	+9.863
1	23 38 25.03	1.9740	1 13 38.3	10.438	1	1 17 7.47	2.1608	9 27 57.8	9.820
2	23 40 23.55	1.9766	1 24 4.8	10.444	2	1 19 17.28	2.1662	9 37 46.5	9.793
3	23 42 22.22	1.9791	1 34 31.6	10.449	3	1 21 27.41	2.1715	9 47 35.0	9.756
4	23 44 21.04	1.9817	1 44 58.7	10.454	4	1 23 37.86	2.1768	9 57 17.2	9.718
5	23 46 20.02	1.9844	1 55 26.1	10.458	5	1 25 48.62	2.1821	10 6 59.2	9.680
6	23 48 19.17	1.9873	2 5 53.7	10.463	6	1 27 59.71	2.1876	10 16 35.8	9.639
7	23 50 18.49	1.9901	2 16 21.5	10.464	7	1 30 11.13	2.1931	10 26 15.9	9.598
8	23 52 17.98	1.9929	2 26 49.4	10.466	8	1 32 22.88	2.1986	10 35 50.6	9.557
9	23 54 17.64	1.9958	2 37 17.4	10.467	9	1 34 34.96	2.2042	10 45 22.7	9.513
10	23 56 17.48	1.9988	2 47 45.4	10.468	10	1 36 47.38	2.2098	10 54 52.1	9.468
11	23 58 17.50	2.0018	2 58 13.5	10.468	11	1 39 0.13	2.2154	11 4 18.8	9.423
12	0 0 17.70	2.0049	3 8 41.5	10.466	12	1 41 13.23	2.2211	11 13 42.8	9.376
13	0 2 18.09	2.0082	3 19 9.4	10.463	13	1 43 26.66	2.2268	11 23 3.9	9.327
14	0 4 18.68	2.0114	3 29 37.1	10.461	14	1 45 40.44	2.2326	11 32 22.0	9.278
15	0 6 19.46	2.0147	3 40 4.7	10.458	15	1 47 54.57	2.2383	11 41 37.2	9.228
16	0 8 20.44	2.0181	3 50 32.1	10.454	16	1 50 9.04	2.2442	11 50 49.3	9.176
17	0 10 21.63	2.0215	4 0 59.2	10.449	17	1 52 23.87	2.2501	11 59 58.3	9.123
18	0 12 23.02	2.0249	4 11 26.0	10.443	18	1 54 39.05	2.2560	12 9 4.0	9.068
19	0 14 24.62	2.0284	4 21 52.4	10.437	19	1 56 54.58	2.2619	12 18 6.4	9.013
20	0 16 26.43	2.0320	4 32 18.4	10.429	20	1 59 10.48	2.2679	12 27 5.5	8.957
21	0 18 28.46	2.0357	4 42 43.9	10.421	21	2 1 26.73	2.2738	12 36 1.2	8.898
22	0 20 30.71	2.0394	4 53 8.9	10.413	22	2 3 43.34	2.2798	12 44 53.3	8.838
23	0 22 33.19	2.0432	+5 3 33.4	+10.403	23	2 6 0.31	2.2859	+12 53 41.8	+8.778
DECEMBER 19.					DECEMBER 21.				
0	0 24 35.89	2.0469	+5 13 57.2	+10.392	0	2 8 17.65	2.2920	+13 2 26.7	+8.717
1	0 26 38.82	2.0508	5 24 20.4	10.381	1	2 10 35.35	2.2981	13 11 7.9	8.654
2	0 28 41.99	2.0548	5 34 42.9	10.368	2	2 12 53.42	2.3042	13 19 45.2	8.589
3	0 30 45.40	2.0588	5 45 4.6	10.355	3	2 15 11.85	2.3103	13 28 18.6	8.523
4	0 32 49.05	2.0628	5 55 25.5	10.341	4	2 17 30.66	2.3166	13 36 48.0	8.457
5	0 34 52.94	2.0669	6 5 45.5	10.326	5	2 19 49.84	2.3227	13 45 13.4	8.388
6	0 36 57.08	2.0711	6 16 4.6	10.311	6	2 22 9.38	2.3288	13 53 34.6	8.318
7	0 39 1.47	2.0753	6 26 22.8	10.294	7	2 24 29.30	2.3351	14 1 51.6	8.247
8	0 41 6.12	2.0797	6 36 39.9	10.276	8	2 26 49.59	2.3413	14 10 4.3	8.175
9	0 43 11.03	2.0840	6 46 55.9	10.258	9	2 29 10.26	2.3476	14 18 12.6	8.102
10	0 45 16.20	2.0884	6 57 10.8	10.238	10	2 31 31.30	2.3538	14 26 16.5	8.027
11	0 47 21.64	2.0928	7 7 24.5	10.218	11	2 33 52.71	2.3600	14 34 15.9	7.951
12	0 49 27.34	2.0973	7 17 36.9	10.196	12	2 36 14.50	2.3663	14 42 10.6	7.873
13	0 51 33.32	2.1019	7 27 48.0	10.174	13	2 38 36.67	2.3726	14 50 0.6	7.794
14	0 53 39.57	2.1065	7 37 57.8	10.151	14	2 40 59.21	2.3788	14 57 45.9	7.714
15	0 55 46.10	2.1113	7 48 6.1	10.126	15	2 43 22.13	2.3851	15 5 26.3	7.632
16	0 57 52.92	2.1160	7 58 12.9	10.101	16	2 45 45.42	2.3913	15 13 1.7	7.548
17	1 0 0.02	2.1208	8 8 18.2	10.075	17	2 48 9.09	2.3976	15 20 32.1	7.464
18	1 2 7.41	2.1256	8 18 21.9	10.048	18	2 50 33.13	2.4038	15 27 57.4	7.378
19	1 4 15.09	2.1304	8 28 24.0	10.020	19	2 52 57.55	2.4102	15 35 17.5	7.291
20	1 6 23.06	2.1354	8 38 24.3	9.990	20	2 55 22.35	2.4166	15 42 32.3	7.203
21	1 8 31.34	2.1404	8 48 22.8	9.960	21	2 57 47.51	2.4230	15 49 41.8	7.113
22	1 10 39.91	2.1454	8 58 19.5	9.928	22	3 0 13.05	2.4288	15 56 45.8	7.021
23	1 12 48.79	2.1506	9 8 14.2	9.896	23	3 2 38.96	2.4349	16 3 44.3	6.929
24	1 14 57.98	2.1557	+9 18 7.0	+ 9.863	24	3 5 5.24	2.4411	+16 10 37.3	+6.835



GREENWICH MEAN TIME.

Hour.	Right Ascension.	Var. per Min.	Declination.	Var. per Min.	Hour.	Right Ascension.	Var. per Min.	Declination.	Var. per Min.
DECEMBER 22.					DECEMBER 24.				
	h m s	s	° ' "	"		h m s	s	° ' "	"
0	3 5 5.24	2.4411	+16 10 37.3	+6.235	0	5 8 25.42	2.6678	+19 26 24.3	+0.909
1	3 7 31.89	2.4472	16 17 24.5	6.739	1	5 11 5.56	2.6701	19 27 14.5	0.764
2	3 9 58.90	2.4533	16 24 6.0	6.642	2	5 13 45.83	2.6728	19 27 56.0	0.618
3	3 12 26.29	2.4595	16 30 41.6	6.544	3	5 16 26.23	2.6744	19 28 28.7	0.472
4	3 14 54.04	2.4656	16 37 11.3	6.445	4	5 19 6.76	2.6764	19 28 52.6	0.325
5	3 17 22.15	2.4718	16 43 35.0	6.344	5	5 21 47.40	2.6783	19 29 7.7	0.178
6	3 19 50.62	2.4778	16 49 52.6	6.243	6	5 24 28.15	2.6799	19 29 14.0	+0.031
7	3 22 19.45	2.4838	16 56 4.1	6.139	7	5 27 8.99	2.6814	19 29 11.4	-0.117
8	3 24 48.64	2.4894	17 2 9.3	6.033	8	5 29 49.92	2.6829	19 29 0.0	0.264
9	3 27 18.18	2.4953	17 8 8.1	5.928	9	5 32 30.94	2.6848	19 28 39.7	0.413
10	3 29 48.07	2.5012	17 14 0.6	5.821	10	5 35 12.03	2.6864	19 28 10.5	0.561
11	3 32 18.32	2.5070	17 19 46.6	5.712	11	5 37 53.19	2.6885	19 27 32.4	0.708
12	3 34 48.91	2.5127	17 25 26.0	5.602	12	5 40 34.41	2.6874	19 26 45.5	0.857
13	3 37 19.84	2.5184	17 30 58.8	5.490	13	5 43 15.68	2.6888	19 25 49.6	1.006
14	3 39 51.12	2.5241	17 36 24.8	5.378	14	5 45 56.99	2.6898	19 24 44.8	1.154
15	3 42 22.73	2.5297	17 41 44.1	5.264	15	5 48 38.34	2.6898	19 23 31.1	1.303
16	3 44 54.68	2.5353	17 46 56.5	5.148	16	5 51 19.71	2.6897	19 22 8.5	1.451
17	3 47 26.96	2.5407	17 52 1.9	5.032	17	5 54 1.10	2.6899	19 20 37.0	1.599
18	3 49 59.56	2.5461	17 57 0.3	4.914	18	5 56 42.50	2.6900	19 18 56.6	1.747
19	3 52 32.49	2.5514	18 1 51.6	4.796	19	5 59 23.90	2.6900	19 17 7.4	1.895
20	3 55 5.73	2.5567	18 6 35.3	4.676	20	6 2 5.30	2.6898	19 15 9.2	2.043
21	3 57 39.29	2.5619	18 11 12.7	4.554	21	6 4 46.68	2.6895	19 13 2.2	2.190
22	4 0 13.16	2.5670	18 15 42.3	4.432	22	6 7 28.04	2.6891	19 10 46.4	2.337
23	4 2 47.33	2.5721	+18 20 4.6	+4.309	23	6 10 9.37	2.6884	+19 8 21.7	-2.484
DECEMBER 23.					DECEMBER 25.				
0	4 5 21.81	2.5771	+18 24 19.4	+4.184	0	6 12 50.66	2.6878	+19 5 48.3	-2.631
1	4 7 56.58	2.5829	18 28 26.7	4.058	1	6 15 31.90	2.6899	19 3 6.0	2.778
2	4 10 31.65	2.5888	18 32 26.4	3.931	2	6 18 13.09	2.6860	19 0 15.0	2.923
3	4 13 7.00	2.5916	18 36 18.4	3.803	3	6 20 54.22	2.6849	18 57 15.2	3.069
4	4 15 42.64	2.5963	18 40 2.8	3.675	4	6 23 35.28	2.6827	18 54 6.7	3.213
5	4 18 18.55	2.6008	18 43 39.4	3.544	5	6 26 16.26	2.6823	18 50 49.6	3.357
6	4 20 54.73	2.6053	18 47 8.1	3.413	6	6 28 57.16	2.6808	18 47 23.9	3.501
7	4 23 31.18	2.6097	18 50 28.9	3.281	7	6 31 37.96	2.6793	18 43 49.5	3.645
8	4 26 7.89	2.6139	18 53 41.8	3.148	8	6 34 18.66	2.6775	18 40 6.5	3.787
9	4 28 44.85	2.6181	18 56 46.7	3.014	9	6 36 59.26	2.6757	18 36 15.1	3.928
10	4 31 22.06	2.6222	18 59 43.5	2.879	10	6 39 39.74	2.6737	18 32 15.1	4.070
11	4 33 59.51	2.6261	19 2 32.2	2.744	11	6 42 20.10	2.6719	18 28 6.7	4.210
12	4 36 37.19	2.6300	19 5 12.8	2.607	12	6 45 0.33	2.6694	18 23 49.9	4.350
13	4 39 15.11	2.6338	19 7 45.1	2.469	13	6 47 40.43	2.6671	18 19 24.7	4.489
14	4 41 53.25	2.6375	19 10 9.1	2.331	14	6 50 20.38	2.6646	18 14 51.2	4.627
15	4 44 31.61	2.6411	19 12 24.8	2.192	15	6 53 0.18	2.6620	18 10 9.5	4.763
16	4 47 10.18	2.6445	19 14 32.1	2.052	16	6 55 39.82	2.6593	18 5 19.6	4.900
17	4 49 48.95	2.6478	19 16 31.0	1.911	17	6 58 19.30	2.6566	18 0 21.5	5.036
18	4 52 27.91	2.6510	19 18 21.4	1.770	18	7 0 58.61	2.6538	17 55 15.3	5.170
19	4 55 7.07	2.6541	19 20 3.4	1.628	19	7 3 37.75	2.6508	17 50 1.1	5.303
20	4 57 46.40	2.6570	19 21 36.8	1.485	20	7 6 16.70	2.6477	17 44 39.0	5.435
21	5 0 25.91	2.6599	19 23 1.6	1.342	21	7 8 55.47	2.6445	17 39 8.9	5.567
22	5 3 5.59	2.6627	19 24 17.8	1.198	22	7 11 34.04	2.6412	17 33 31.0	5.697
23	5 5 45.43	2.6653	19 25 25.4	1.054	23	7 14 12.41	2.6378	17 27 45.3	5.826
24	5 8 25.42	2.6678	+19 26 24.3	+0.909	24	7 16 50.57	2.6343	+17 21 51.9	-5.954

GREENWICH MEAN TIME.

Hour.	Right Ascension.	Var. per Min.	Declination.	Var. per Min.	Hour.	Right Ascension.	Var. per Min.	Declination.	Var. per Min.
DECEMBER 26.					DECEMBER 28.				
	h m s	s	° ' "	"		h m s	s	° ' "	"
0	7 16 50.57	2.6343	+17 21 51.9	-5.954	0	9 18 2.81	2.4022	+10 34 22.8	-10.449
1	7 19 28.52	2.6308	17 15 50.8	6.061	1	9 20 26.78	2.3968	10 23 54.2	10.504
2	7 22 6.26	2.6271	17 9 42.2	6.206	2	9 22 50.43	2.3916	10 13 22.3	10.559
3	7 24 43.77	2.6233	17 3 26.1	6.331	3	9 25 13.77	2.3863	10 2 47.1	10.612
4	7 27 21.06	2.6195	16 57 2.5	6.454	4	9 27 36.79	2.3812	9 52 8.8	10.663
5	7 29 58.11	2.6156	16 50 31.6	6.576	5	9 29 59.51	2.3760	9 41 27.5	10.713
6	7 32 34.93	2.6116	16 43 53.4	6.697	6	9 32 21.91	2.3708	9 30 43.3	10.761
7	7 35 11.50	2.6075	16 37 8.0	6.817	7	9 34 44.01	2.3657	9 19 56.2	10.808
8	7 37 47.83	2.6033	16 30 15.4	6.935	8	9 37 5.79	2.3605	9 9 6.3	10.854
9	7 40 23.90	2.5991	16 23 15.8	7.052	9	9 39 27.27	2.3554	8 58 13.7	10.897
10	7 42 59.72	2.5948	16 16 9.2	7.167	10	9 41 48.44	2.3503	8 47 18.6	10.939
11	7 45 35.28	2.5905	16 8 55.8	7.281	11	9 44 9.31	2.3453	8 36 21.0	10.980
12	7 48 10.58	2.5860	16 1 35.5	7.394	12	9 46 29.88	2.3403	8 25 21.0	11.019
13	7 50 45.60	2.5814	15 54 8.5	7.506	13	9 48 50.15	2.3353	8 14 18.7	11.058
14	7 53 20.35	2.5769	15 46 34.8	7.616	14	9 51 10.12	2.3303	8 3 14.1	11.094
15	7 55 54.83	2.5722	15 38 54.6	7.723	15	9 53 29.79	2.3254	7 52 7.4	11.128
16	7 58 29.03	2.5677	15 31 8.0	7.831	16	9 55 49.17	2.3206	7 40 58.7	11.162
17	8 1 2.95	2.5629	15 23 14.9	7.937	17	9 58 8.26	2.3158	7 29 48.0	11.194
18	8 3 36.58	2.5581	15 15 15.5	8.041	18	10 0 27.06	2.3109	7 18 35.4	11.225
19	8 6 9.92	2.5533	15 7 10.0	8.143	19	10 2 45.57	2.3062	7 7 21.0	11.254
20	8 8 42.97	2.5488	14 58 58.3	8.245	20	10 5 3.80	2.3015	6 56 4.9	11.282
21	8 11 15.72	2.5443	14 50 40.6	8.344	21	10 7 21.75	2.2968	6 44 47.1	11.309
22	8 13 48.18	2.5395	14 42 17.0	8.443	22	10 9 39.41	2.2921	6 33 27.8	11.333
23	8 16 20.34	2.5348	+14 33 47.5	-8.540	23	10 11 56.80	2.2875	+ 6 22 7.1	-11.357
DECEMBER 27.					DECEMBER 29.				
0	8 18 52.20	2.5285	+14 25 12.2	-8.635	0	10 14 13.91	2.2828	+ 6 10 44.9	-11.380
1	8 21 23.76	2.5234	14 16 31.3	8.728	1	10 16 30.74	2.2783	5 59 21.5	11.401
2	8 23 55.01	2.5182	14 7 44.8	8.821	2	10 18 47.31	2.2739	5 47 56.8	11.421
3	8 26 25.95	2.5131	13 58 52.8	8.911	3	10 21 3.61	2.2694	5 36 31.0	11.438
4	8 28 56.58	2.5079	13 49 55.5	9.000	4	10 23 19.64	2.2650	5 25 4.2	11.456
5	8 31 26.90	2.5028	13 40 52.8	9.087	5	10 25 35.41	2.2607	5 13 36.3	11.472
6	8 33 56.91	2.4976	13 31 45.0	9.173	6	10 27 50.92	2.2563	5 2 7.5	11.487
7	8 36 26.61	2.4923	13 22 32.1	9.258	7	10 30 6.17	2.2521	4 50 37.9	11.499
8	8 38 55.99	2.4871	13 13 14.1	9.341	8	10 32 21.17	2.2479	4 39 7.6	11.511
9	8 41 25.06	2.4818	13 3 51.2	9.422	9	10 34 35.92	2.2438	4 27 36.6	11.523
10	8 43 53.81	2.4765	12 54 23.5	9.501	10	10 36 50.42	2.2397	4 16 4.9	11.532
11	8 46 22.24	2.4712	12 44 51.1	9.578	11	10 39 4.68	2.2356	4 4 32.7	11.540
12	8 48 50.35	2.4659	12 35 14.1	9.655	12	10 41 18.69	2.2316	3 53 0.1	11.547
13	8 51 18.15	2.4606	12 25 32.5	9.730	13	10 43 32.47	2.2276	3 41 27.1	11.553
14	8 53 45.62	2.4553	12 15 46.5	9.803	14	10 45 46.00	2.2237	3 29 53.8	11.558
15	8 56 12.78	2.4499	12 5 56.1	9.875	15	10 47 59.31	2.2198	3 18 20.2	11.561
16	8 58 39.61	2.4446	11 56 1.5	9.945	16	10 50 12.38	2.2160	3 6 46.5	11.563
17	9 1 6.13	2.4393	11 46 2.7	10.014	17	10 52 25.23	2.2123	2 55 12.6	11.564
18	9 3 32.32	2.4339	11 35 59.8	10.081	18	10 54 37.85	2.2085	2 43 38.8	11.564
19	9 5 58.20	2.4287	11 25 53.0	10.145	19	10 56 50.25	2.2048	2 32 4.9	11.563
20	9 8 23.76	2.4233	11 15 42.4	10.209	20	10 59 2.43	2.2013	2 20 31.2	11.561
21	9 10 49.00	2.4180	11 5 27.9	10.272	21	11 1 14.40	2.1977	2 8 57.6	11.558
22	9 13 13.92	2.4127	10 55 9.8	10.332	22	11 3 26.15	2.1943	1 57 24.3	11.553
23	9 15 38.52	2.4074	10 44 48.1	10.392	23	11 5 37.70	2.1908	1 45 51.3	11.548
24	9 18 2.81	2.4022	+10 34 22.8	-10.440	24	11 7 49.04	2.1873	+ 1 34 18.6	-11.541

GREENWICH MEAN TIME.

Hour.	Right Ascension.	Var. per Min.	Declination.	Var. per Min.	Hour.	Right Ascension.	Var. per Min.	Declination.	Var. per Min.
DECEMBER 30.					DECEMBER 31.				
	h m s	s	° ' "	"		h m s	s	° ' "	"
0	11 7 49.04	2.1873	+1 34 18.6	-11.541	0	11 59 27.99	2.1219	-2 58 15.9	-11.063
1	11 10 0.18	2.1840	1 22 46.4	11.533	1	12 1 35.24	2.1198	3 9 20.0	11.063
2	11 12 11.12	2.1808	1 11 14.7	11.524	2	12 3 42.37	2.1178	3 20 22.2	11.021
3	11 14 21.87	2.1776	0 59 43.5	11.514	3	12 5 49.38	2.1158	3 31 22.5	10.980
4	11 16 32.42	2.1743	0 48 13.0	11.503	4	12 7 56.27	2.1139	3 42 20.9	10.957
5	11 18 42.78	2.1712	0 36 43.1	11.492	5	12 10 3.05	2.1121	3 53 17.3	10.923
6	11 20 52.98	2.1681	0 25 14.0	11.478	6	12 12 9.72	2.1103	4 4 11.7	10.889
7	11 23 2.95	2.1650	0 13 45.7	11.464	7	12 14 16.28	2.1085	4 15 4.0	10.853
8	11 25 12.76	2.1621	+0 2 18.3	11.449	8	12 16 22.74	2.1068	4 25 54.1	10.817
9	11 27 22.40	2.1593	-0 9 8.2	11.433	9	12 18 29.09	2.1051	4 36 42.0	10.780
10	11 29 31.87	2.1563	0 20 33.7	11.417	10	12 20 35.35	2.1036	4 47 27.7	10.743
11	11 31 41.16	2.1535	0 31 58.2	11.399	11	12 22 41.52	2.1020	4 58 11.2	10.706
12	11 33 50.29	2.1508	0 43 21.6	11.380	12	12 24 47.59	2.1005	5 8 52.4	10.666
13	11 35 59.25	2.1481	0 54 43.8	11.360	13	12 26 53.58	2.0990	5 19 31.1	10.626
14	11 38 8.06	2.1455	1 6 4.8	11.339	14	12 28 59.47	2.0975	5 30 7.5	10.586
15	11 40 16.71	2.1428	1 17 24.5	11.318	15	12 31 5.28	2.0962	5 40 41.4	10.545
16	11 42 25.20	2.1403	1 28 42.9	11.295	16	12 33 11.02	2.0949	5 51 12.9	10.503
17	11 44 33.54	2.1378	1 39 59.9	11.272	17	12 35 16.87	2.0936	6 1 41.8	10.460
18	11 46 41.74	2.1354	1 51 16.5	11.248	18	12 37 22.25	2.0924	6 12 8.1	10.417
19	11 48 49.79	2.1330	2 2 29.6	11.223	19	12 39 27.76	2.0913	6 22 31.8	10.373
20	11 50 57.70	2.1307	2 13 42.2	11.196	20	12 41 33.20	2.0901	6 32 52.9	10.328
21	11 53 5.47	2.1284	2 24 53.1	11.168	21	12 43 38.57	2.0889	6 43 11.2	10.283
22	11 55 13.11	2.1262	2 36 2.4	11.141	22	12 45 43.87	2.0879	6 53 26.8	10.237
23	11 57 20.61	2.1240	2 47 10.0	11.113	23	12 47 49.12	2.0869	7 3 39.6	10.190
24	11 59 27.99	2.1219	-2 58 15.9	-11.083	24	12 49 54.30	2.0859	-7 13 49.6	-10.143

PHASES OF THE MOON.

	Jan.	d h m	Apr.	d h m	June	d h m	Sept.	d h m
○ Full Moon	Jan.	5 9 4.9	Apr.	2 22 54.7	June	30 20 40.7	Sept.	27 13 56.6
☾ Last Quarter		12 12 8.6		11 1 24.2	July	8 17 5.6	Oct.	4 12 53.6
● New Moon		20 17 26.9		18 9 43.1		15 8 25.0		11 12 50.4
☽ First Quarter		28 3 38.0		25 1 27.5		22 7 20.4		19 12 29.3
○ Full Moon	Feb.	3 20 42.4	May	2 13 47.3		30 11 19.3		27 2 8.9
☾ Last Quarter		11 8 49.2		10 17 51.0	Aug.	7 0 50.7	Nov.	2 19 35.0
● New Moon		19 9 34.8		17 18 25.2		13 15 43.9		10 4 5.1
☽ First Quarter		26 11 49.5		24 9 7.2		20 22 51.8		18 8 12.8
○ Full Moon	Mar.	4 9 12.6	June	1 5 18.2		29 1 2.8	Dec.	25 13 42.3
☾ Last Quarter		12 5 57.4		9 6 58.5	Sept.	5 7 4.9		2 4 29.0
● New Moon		19 22 55.8		16 1 41.3		12 0 51.7		9 22 3.9
☽ First Quarter		26 18 45.1		22 18 49.5		19 16 55.2		18 2 40.4
○ Full Moon	Apr.	2 22 54.7	July	30 20 40.7		27 13 56.6		25 0 38.5
☾ Last Quarter		11 1 24.2		8 17 5.6	Oct.	4 12 53.6		31 16 34.7

APOGEE.

PERIGEE.

	d h		d h		d h		d h
January	16 4.8	July	27 2.4	January	4 2.6	July	14 12.4
February	13 0.2	August	23 16.6	February	1 6.2	August	11 17.8
March	11 21.1	September	20 10.7	February	28 1.7	September	8 10.2
April	8 16.5	October	18 6.7	March	24 0.1	October	3 21.9
May	6 8.0	November	15 2.3	April	20 13.0	October	30 2.6
June	2 16.5	December	12 17.5	May	18 18.0	November	27 2.0
June	29 19.0			June	16 3.2	December	25 12.4

## GREENWICH MEAN TIME.

G. M. T.	Longitude.	Latitude.	Semi-diameter.	Horizontal Parallax.	Var. per Hour.	Age.	Transit, Meridian of Greenwich.				Var. per Hour.
							Jan.	1	U	h m	
Jan. 1.0	39 12 38.8	+1 18 45.6	16 18.5	59 45.40	+1.732	10.0	Jan.	1	U	8 4.6	2.40
1.5	46 25 44.7	0 40 23.2	16 24.0	60 5.23	1.567	10.5		1	L	20 33.8	2.47
2.0	53 43 38.4	+0 0 57.8	16 28.7	60 22.82	1.354	11.0		2	U	9 3.9	2.54
2.5	61 5 52.0	-0 38 49.8	16 32.8	60 37.54	1.092	11.5		2	L	21 34.7	2.60
3.0	68 31 47.3	1 18 15.2	16 35.8	60 48.85	0.787	12.0		3	U	10 6.1	2.62
3.5	76 0 36.9	-1 56 32.4	16 37.9	60 56.28	+0.445	12.5		3	L	22 37.6	2.63
4.0	83 31 23.8	2 32 55.4	16 38.7	60 59.43	+0.078	13.0		4	U	11 9.2	2.62
4.5	91 3 3.8	3 6 40.0	16 38.4	60 58.10	-0.301	13.5		4	L	23 40.4	2.58
5.0	98 34 27.4	3 37 5.7	16 36.7	60 52.20	0.681	14.0		5	U	12 11.0	2.52
5.5	106 4 22.9	4 3 37.9	16 33.9	60 41.82	1.046	14.5				.....	...
6.0	113 31 39.0	-4 25 49.0	16 29.9	60 27.21	-1.381	15.0		6	L	0 40.9	2.46
6.5	120 55 8.3	4 43 19.5	16 24.9	60 8.83	1.677	15.5		6	U	13 9.9	2.38
7.0	128 13 49.7	4 55 58.1	16 19.0	59 47.15	1.927	16.0		7	L	1 37.9	2.30
7.5	135 26 51.3	5 3 41.8	16 12.4	59 22.81	2.121	16.5		7	U	14 5.0	2.22
8.0	142 33 32.1	5 6 34.7	16 5.2	58 56.47	2.259	17.0		8	L	2 31.2	2.14
8.5	149 33 22.4	-5 4 47.3	15 57.7	58 28.81	-2.341	17.5		8	U	14 56.5	2.07
9.0	156 26 4.9	4 58 35.0	15 50.0	58 0.51	2.367	18.0		9	L	3 21.0	2.01
9.5	163 11 33.5	4 48 16.9	15 42.2	57 32.20	2.344	18.5		9	U	15 44.9	1.97
10.0	169 49 52.8	4 34 14.2	15 34.7	57 4.43	2.277	19.0		10	L	4 8.3	1.93
10.5	176 21 16.9	4 16 49.6	15 27.4	56 37.71	2.171	19.5		10	U	16 31.3	1.90
11.0	182 46 7.9	-3 56 26.4	15 20.5	56 12.45	-2.034	20.0		11	L	4 54.0	1.88
11.5	189 4 54.2	3 33 27.3	15 14.1	55 49.00	1.871	20.5		11	U	17 16.5	1.87
12.0	195 18 9.4	3 8 14.7	15 8.3	55 27.63	1.689	21.0		12	L	5 38.9	1.87
12.5	201 26 30.6	2 41 10.1	15 3.1	55 8.53	1.492	21.5		12	U	18 1.3	1.87
13.0	207 30 37.4	2 12 34.1	14 58.5	54 51.87	1.285	22.0		13	L	6 23.8	1.88
13.5	213 31 10.8	-1 42 46.2	14 54.7	54 37.70	-1.075	22.5		13	U	18 46.5	1.89
14.0	219 28 52.2	1 12 5.3	14 51.5	54 26.07	0.864	23.0		14	L	7 9.3	1.91
14.5	225 24 22.8	0 40 49.6	14 49.0	54 16.96	0.655	23.5		14	U	19 32.4	1.93
15.0	231 18 22.5	-0 9 16.8	14 47.2	54 10.34	0.451	24.0		15	L	7 55.7	1.95
15.5	237 11 30.0	+0 22 15.6	14 46.1	54 6.11	0.255	24.5		15	U	20 19.3	1.97
16.0	243 4 21.8	+0 53 30.2	14 45.6	54 4.18	-0.069	25.0		16	L	8 43.1	1.99
16.5	248 57 31.6	1 24 9.8	14 45.6	54 4.40	+0.105	25.5		16	U	21 7.1	2.01
17.0	254 51 30.8	1 53 56.8	14 46.2	54 6.65	0.266	26.0		17	L	9 31.3	2.02
17.5	260 46 47.4	2 22 33.7	14 47.3	54 10.73	0.412	26.5		17	U	21 55.6	2.03
18.0	266 43 46.2	2 49 42.6	14 48.9	54 16.49	0.545	27.0		18	L	10 19.9	2.03
18.5	272 42 48.3	+3 15 5.9	14 50.9	54 23.76	+0.663	27.5		18	U	22 44.2	2.02
19.0	278 44 11.3	3 38 25.9	14 53.2	54 32.34	0.766	28.0		19	L	11 8.4	2.01
19.5	284 48 9.4	3 59 25.2	14 55.9	54 42.10	0.856	28.5		19	U	23 32.5	2.00
20.0	290 54 53.2	4 17 47.2	14 58.8	54 52.84	0.932	29.0		20	L	11 56.4	1.99
20.5	297 4 30.0	4 33 15.9	15 2.0	55 4.43	0.997	29.5				.....	...
21.0	303 17 4.4	+4 45 36.7	15 5.3	55 16.73	+1.059	0.3		21	U	0 20.2	1.97
21.5	309 32 38.2	4 54 36.6	15 8.8	55 29.59	1.094	0.8		21	L	12 43.7	1.95
22.0	315 51 11.2	5 0 4.5	15 12.5	55 42.95	1.131	1.3		22	U	1 7.1	1.95
22.5	322 12 41.8	5 1 51.6	15 16.2	55 56.72	1.163	1.8		22	L	13 30.4	1.93
23.0	328 37 7.4	4 59 51.5	15 20.1	56 10.85	1.191	2.3		23	U	1 53.5	1.92
23.5	335 4 25.6	+4 54 0.7	15 24.0	56 25.30	+1.216	2.8		23	L	14 16.6	1.92
24.0	341 34 34.0	+4 44 18.8	15 28.0	56 40.03	+1.238	3.3		24	U	2 39.7	1.93

GREENWICH MEAN TIME.

G. M. T.	Longitude.	Latitude.	Semi-diameter.	Horizontal Parallax.	Var. per Hour.	Age.	Transit, Meridian of Greenwich.			Var. per Hour.
								h	m	
Jan. 24.0	341 34 34.0	+4 44 18.8	15 23.0	56 40.03	+1.238	3.3	Jan. 24	U	2 39.7	1.98
24.5	348 7 31.2	4 30 48.3	15 32.1	56 55.01	1.200	3.8	24	L	15 3.0	1.94
25.0	354 43 17.3	4 13 35.1	15 36.3	57 10.27	1.282	4.3	25	U	8 26.4	1.96
25.5	1 21 54.1	3 52 48.0	15 40.5	57 25.77	1.300	4.8	25	L	15 50.2	2.00
26.0	8 3 25.0	3 28 39.4	15 44.8	57 41.46	1.314	5.3	26	U	4 14.4	2.04
26.5	14 47 54.8	+3 1 25.0	15 49.1	57 57.29	+1.323	5.8	26	L	16 39.2	2.09
27.0	21 35 29.8	2 31 23.0	15 53.4	58 13.18	1.324	6.3	27	U	5 4.5	2.14
27.5	28 28 16.5	1 58 55.6	15 57.7	58 29.00	1.311	6.8	27	L	17 30.5	2.20
28.0	35 20 21.6	1 24 27.8	16 2.0	58 44.58	1.283	7.3	28	U	5 57.3	2.26
28.5	42 17 50.4	0 45 27.6	16 6.1	58 59.72	1.237	7.8	28	L	18 24.8	2.33
29.0	49 18 46.2	+0 11 28.0	16 10.0	59 14.17	+1.167	8.3	29	U	6 53.2	2.39
29.5	56 23 8.2	-0 26 8.4	16 13.7	59 27.61	1.099	8.8	29	L	19 22.2	2.44
30.0	63 30 51.6	1 3 24.9	16 17.0	59 39.70	0.941	9.3	30	U	7 51.8	2.49
30.5	70 41 45.1	1 40 0.8	16 19.8	59 50.07	0.782	9.8	30	L	20 21.9	2.52
31.0	77 55 30.6	2 15 12.8	16 22.1	59 58.86	0.594	10.3	31	U	8 52.2	2.58
31.5	85 11 42.5	-2 48 22.8	16 23.7	60 4.22	+0.377	10.8	31	L	21 22.6	2.58
Feb. 1.0	92 29 47.2	3 18 53.3	16 24.5	60 7.30	+0.133	11.3	Feb. 1	U	9 52.9	2.51
1.5	99 49 3.8	3 46 10.1	16 24.5	60 7.84	-0.129	11.8	1	L	22 22.7	2.46
2.0	107 8 44.3	4 9 42.6	16 23.7	60 4.16	0.404	12.3	2	U	10 52.0	2.42
2.5	114 27 56.1	4 29 5.2	16 21.9	59 57.63	0.683	12.8	2	L	23 20.7	2.36
3.0	121 45 42.6	-4 43 58.6	16 19.2	59 47.79	-0.955	13.3	3	U	11 48.6	2.30
3.5	129 1 7.2	4 54 10.3	16 15.6	59 34.77	1.212	13.8			.....	.....
4.0	136 13 14.6	4 59 34.9	16 11.3	59 18.80	1.448	14.3	4	L	0 15.8	2.23
4.5	143 21 13.2	5 0 14.2	16 6.2	59 0.21	1.648	14.8	4	U	12 42.2	2.17
5.0	150 24 18.4	4 56 16.3	16 0.6	58 39.41	1.812	15.3	5	L	1 7.8	2.11
5.5	157 21 53.1	-4 47 55.0	15 54.4	58 16.90	-1.933	15.8	5	U	13 32.8	2.06
6.0	164 13 29.7	4 35 28.7	15 48.0	57 53.18	2.012	16.3	6	L	1 57.3	2.02
6.5	170 58 50.4	4 19 19.2	15 41.3	57 28.79	2.046	16.8	6	U	14 21.3	1.98
7.0	177 37 47.2	3 59 50.6	15 34.6	57 4.24	2.038	17.3	7	L	2 44.9	1.95
7.5	184 10 22.0	3 37 27.9	15 28.0	56 40.04	1.990	17.8	7	U	15 8.2	1.93
8.0	190 36 45.0	-3 12 36.7	15 21.6	56 16.63	-1.904	18.3	8	L	3 31.3	1.92
8.5	196 57 14.8	2 45 42.2	15 15.6	55 54.46	1.788	18.8	8	U	15 54.3	1.91
9.0	203 12 16.1	2 17 8.4	15 10.0	55 33.84	1.648	19.3	9	L	4 17.2	1.91
9.5	209 22 19.6	1 47 18.4	15 4.9	55 15.13	1.473	19.8	9	U	16 40.2	1.92
10.0	215 28 0.0	1 16 33.9	15 0.4	54 58.55	1.287	20.3	10	L	5 3.2	1.93
10.5	221 29 55.7	-0 45 15.2	14 56.5	54 44.30	-1.086	20.8	10	U	17 26.4	1.94
11.0	227 28 47.1	-0 13 41.3	14 53.3	54 32.53	0.874	21.3	11	L	5 49.7	1.96
11.5	233 25 16.0	+0 17 48.7	14 50.8	54 23.35	0.656	21.8	11	U	18 13.2	1.97
12.0	239 20 4.9	0 48 58.5	14 49.0	54 16.79	0.437	22.3	12	L	6 36.9	1.98
12.5	245 13 56.4	1 19 31.2	14 47.9	54 12.66	0.218	22.8	12	U	19 0.8	2.00
13.0	251 7 31.7	+1 49 10.5	14 47.6	54 11.54	-0.006	23.3	13	L	7 24.8	2.01
13.5	257 1 31.4	2 17 40.4	14 47.9	54 12.75	+0.204	23.8	13	U	19 48.9	2.01
14.0	262 56 34.0	2 44 44.7	14 48.8	54 16.40	0.403	24.3	14	L	8 13.0	2.02
14.5	268 53 15.1	3 10 7.4	14 50.5	54 22.86	0.588	24.8	14	U	20 37.3	2.02
15.0	274 52 7.5	3 33 32.4	14 52.7	54 30.45	0.758	25.3	15	L	9 1.5	2.01
15.5	280 53 40.7	+3 54 43.4	14 55.4	54 40.49	+0.913	25.8	15	U	21 25.6	2.01
16.0	286 58 20.0	+4 13 24.2	14 58.7	54 52.28	+1.047	26.3	16	L	9 49.7	2.01

## GREENWICH MEAN TIME.

G. M. T.	Longitude.	Latitude.	Semi-diameter.	Horizontal Parallax.	Var. per Hour.	Age.	Transit, Meridian of Greenwich.			Var. per Hour.
								h m	m	
Feb. 16.0	286 58 20.0	+4 13 24.2	14 58.7	54 52.28	+1.047	26.3	Feb. 16	L	9 49.7	2.01
16.5	293 6 26.5	4 29 18.8	15 2.3	55 5.54	1.161	26.8	16	U	22 13.7	1.99
17.0	299 18 16.3	4 42 11.9	15 6.2	55 20.05	1.253	27.3	17	L	10 37.5	1.98
17.5	305 34 0.9	4 51 48.9	15 10.4	55 35.53	1.323	27.8	17	U	23 1.3	1.97
18.0	311 53 46.6	4 57 56.9	15 14.9	55 51.71	1.370	28.3	18	L	11 24.9	1.97
18.5	318 17 34.7	+5 0 24.4	15 19.4	56 8.33	+1.393	28.8	18	U	23 48.5	1.97
19.0	324 45 21.9	4 59 2.6	15 24.0	56 25.10	1.397	29.3	19	L	12 12.1	1.97
19.5	331 17 0.4	4 53 45.5	15 28.5	56 41.79	1.380	0.1				
20.0	337 52 19.0	4 44 30.7	15 33.0	56 58.15	1.348	0.6	20	U	0 35.7	1.97
20.5	344 31 3.3	4 31 19.3	15 37.3	57 14.00	1.292	1.1	20	L	12 59.4	1.98
21.0	351 12 57.2	+4 14 16.6	15 41.4	57 29.12	+1.228	1.6	21	U	1 23.3	2.00
21.5	357 57 43.2	3 53 32.1	15 45.3	57 43.45	1.157	2.1	21	L	13 47.4	2.02
22.0	4 45 4.1	3 29 19.6	15 49.0	57 56.85	1.076	2.6	22	U	2 11.8	2.05
22.5	11 34 43.2	3 1 56.8	15 52.4	58 9.25	0.990	3.1	22	L	14 36.7	2.09
23.0	18 26 25.4	2 31 45.5	15 55.4	58 20.61	0.905	3.6	23	U	3 2.0	2.13
23.5	25 19 57.9	+1 59 10.6	15 58.3	58 30.97	+0.821	4.1	23	L	15 27.9	2.18
24.0	32 15 10.0	1 24 40.1	16 0.8	58 40.32	0.737	4.6	24	U	3 54.4	2.23
24.5	39 11 53.5	0 48 44.5	16 3.1	58 48.65	0.653	5.1	24	L	16 21.4	2.28
25.0	46 10 2.4	+0 11 55.9	16 5.1	58 55.99	0.571	5.6	25	U	4 49.1	2.33
25.5	53 9 32.3	-0 25 11.8	16 6.8	59 2.35	0.490	6.1	25	L	17 17.3	2.38
26.0	60 10 19.5	-1 2 4.3	16 8.3	59 7.73	+0.406	6.6	26	U	5 46.1	2.41
26.5	67 12 20.7	1 38 6.9	16 9.5	59 12.07	0.319	7.1	26	L	18 15.2	2.43
27.0	74 15 31.3	2 12 45.3	16 10.4	59 15.36	0.226	7.6	27	U	6 44.5	2.45
27.5	81 19 45.3	2 45 26.0	16 10.9	59 17.47	0.125	8.1	27	L	19 14.0	2.45
28.0	88 24 53.6	3 15 37.1	16 11.2	59 18.32	+0.015	8.6	28	U	7 43.3	2.43
28.5	95 30 43.5	-3 42 48.8	16 11.0	59 17.79	-0.105	9.1	28	L	20 12.4	2.41
29.0	102 36 58.1	4 6 34.4	16 10.5	59 15.75	0.238	9.6	29	U	8 41.1	2.38
29.5	109 43 16.6	4 26 30.5	16 9.5	59 12.05	0.379	10.1	29	L	21 9.4	2.33
Mar. 1.0	116 49 12.9	4 42 18.0	16 8.0	59 6.63	0.527	10.6	Mar. 1	U	9 37.0	2.27
1.5	123 54 17.8	4 53 42.6	16 6.0	58 59.38	0.684	11.1	1	L	22 4.0	2.23
2.0	130 57 58.6	-5 0 35.3	16 3.5	58 50.22	-0.841	11.6	2	U	10 30.5	2.18
2.5	137 59 40.8	5 2 52.5	16 0.5	58 39.21	0.996	12.1	2	L	22 56.3	2.12
3.0	144 58 49.3	5 0 36.2	15 57.0	58 26.34	1.144	12.6	3	U	11 21.5	2.08
3.5	151 54 49.3	4 53 54.0	15 53.0	58 11.79	1.279	13.1	3	L	23 46.3	2.01
4.0	158 47 8.9	4 42 58.2	15 48.7	57 55.71	1.398	13.6	4	U	12 10.6	2.01
4.5	165 35 19.7	-4 28 5.6	15 43.9	57 38.31	-1.498	14.1				
5.0	172 18 58.3	4 9 36.7	15 38.9	57 19.87	1.570	14.6	5	L	0 34.6	1.99
5.5	178 57 47.0	3 47 54.6	15 33.7	57 0.73	1.616	15.1	5	U	12 58.3	1.97
6.0	185 31 34.4	3 23 24.2	15 28.3	56 41.20	1.633	15.6	6	L	1 21.8	1.95
6.5	192 0 16.2	2 56 31.6	15 23.0	56 21.66	1.619	16.1	6	U	13 45.2	1.94
7.0	198 23 54.5	-2 27 42.7	15 17.8	56 2.45	-1.577	16.6	7	L	2 8.5	1.94
7.5	204 42 38.4	1 57 23.6	15 12.7	55 43.98	1.504	17.1	7	U	14 31.8	1.95
8.0	210 56 42.4	1 25 59.1	15 8.0	55 26.46	1.408	17.6	8	L	2 55.2	1.95
8.5	217 6 27.0	0 53 52.8	15 3.6	55 10.31	1.282	18.1	8	U	15 18.6	1.95
9.0	223 12 17.6	-0 21 27.2	14 59.6	54 55.79	1.134	18.6	9	L	3 42.1	1.96
9.5	229 14 43.3	+0 10 57.0	14 56.2	54 43.17	-0.968	19.1	9	U	16 5.7	1.97
10.0	235 14 17.3	+0 43 0.4	14 53.3	54 32.63	-0.785	19.6	10	L	4 29.5	1.98

GREENWICH MEAN TIME.

G. M. T.	Longitude.	Latitude.	Semi-diameter.	Horizontal Parallax.	Var. per Hour.	Age.	Transit, Meridian of Greenwich.			Var. per Hour.
								h	m	
Mar. 10.0	235 14 17.3	+0 43 0.4	14 53.3	54 32.68	-0.788	19.6	Mar. 10	L	4 29.5	1.98
10.5	241 11 35.1	1 14 24.7	14 51.1	54 24.39	0.587	20.1	10	U	16 53.3	1.99
11.0	247 7 14.7	1 44 53.0	14 49.5	54 18.58	0.389	20.6	11	L	5 17.3	2.00
11.5	253 1 55.5	2 14 9.2	14 48.6	54 15.29	-0.168	21.1	11	U	17 41.3	2.00
12.0	258 56 17.4	2 41 57.8	14 48.4	54 14.62	+0.059	21.6	12	L	6 5.3	2.01
12.5	264 51 1.3	+3 8 3.9	14 48.9	54 16.57	+0.378	22.1	12	U	18 29.4	2.01
13.0	270 46 47.2	3 32 12.9	14 50.2	54 21.17	0.491	22.6	13	L	6 58.4	2.00
13.5	276 44 14.5	3 54 10.2	14 52.1	54 28.38	0.708	23.1	13	U	19 17.4	2.00
14.0	282 44 1.0	4 13 41.3	14 54.8	54 37.99	0.908	23.6	14	L	7 41.3	1.99
14.5	288 46 42.0	4 30 32.0	14 58.0	54 50.01	1.095	24.1	14	U	20 5.1	1.98
15.0	294 52 50.5	+4 44 27.9	15 1.9	55 4.21	+1.369	24.6	15	L	8 28.8	1.98
15.5	301 2 55.6	4 55 14.9	15 6.3	55 20.38	1.423	25.1	15	U	20 52.5	1.97
16.0	307 17 22.4	5 2 39.6	15 11.2	55 38.26	1.554	25.6	16	L	9 16.1	1.97
16.5	313 36 30.9	5 6 29.5	15 16.5	55 57.56	1.656	26.1	16	U	21 39.7	1.97
17.0	320 0 35.9	5 6 33.3	15 22.0	56 17.90	1.738	26.6	17	L	10 3.3	1.97
17.5	326 29 45.9	+5 2 41.8	15 27.8	56 39.03	+1.778	27.1	17	U	22 27.0	1.98
18.0	333 4 3.5	4 54 48.7	15 33.6	57 0.43	1.784	27.6	18	L	10 50.8	2.00
18.5	339 43 24.3	4 42 50.5	15 39.4	57 21.72	1.758	28.1	18	U	23 14.9	2.02
19.0	346 27 37.8	4 26 48.2	15 45.0	57 42.48	1.696	28.6	19	L	11 39.2	2.04
19.5	353 16 37.2	4 6 47.2	15 50.5	58 2.30	1.608	29.1	19		.....	...
20.0	0 9 39.9	+3 42 57.7	15 55.5	58 20.83	+1.479	0.0	20	U	0 3.9	2.08
20.5	7 6 21.7	3 15 35.7	16 0.1	58 37.68	1.328	0.5	20	L	12 29.1	2.12
21.0	14 6 29.9	2 45 2.0	16 4.2	58 52.58	1.158	1.0	21	U	0 54.7	2.16
21.5	21 9 23.1	2 11 42.9	16 7.6	59 5.29	0.965	1.5	21	L	13 20.9	2.21
22.0	28 14 27.9	1 36 8.8	16 10.4	59 15.70	0.767	2.0	22	U	1 47.7	2.26
22.5	35 21 11.3	+0 58 54.1	16 12.6	59 23.69	+0.565	2.5	22	L	14 15.2	2.31
23.0	42 29 1.7	+0 20 35.6	16 14.2	59 29.28	0.368	3.0	23	U	2 48.2	2.35
23.5	49 37 29.6	-0 18 7.9	16 15.0	59 32.55	+0.178	3.5	23	L	15 11.7	2.40
24.0	56 46 8.2	0 56 37.2	16 15.3	59 38.59	-0.001	4.0	24	U	3 40.8	2.44
24.5	63 54 34.4	1 34 13.6	16 15.1	59 32.59	-0.164	4.5	24	L	16 10.1	2.45
25.0	71 2 27.6	-2 10 19.7	16 14.3	59 29.73	-0.309	5.0	25	U	4 39.6	2.46
25.5	78 9 39.9	2 44 20.7	16 13.1	59 25.25	0.435	5.5	25	L	17 9.2	2.46
26.0	85 15 29.8	3 15 44.3	16 11.4	59 19.34	0.548	6.0	26	U	5 38.6	2.43
26.5	92 20 12.0	3 44 2.3	16 9.5	59 12.17	0.644	6.5	26	L	18 7.6	2.41
27.0	99 23 26.4	4 8 49.7	16 7.2	59 3.94	0.725	7.0	27	U	6 36.3	2.37
27.5	106 25 3.4	-4 29 48.1	16 4.8	58 54.81	-0.795	7.5	27	L	19 4.4	2.31
28.0	113 24 53.1	4 46 35.1	16 2.1	58 44.88	0.858	8.0	28	U	7 31.8	2.26
28.5	120 22 46.0	4 59 5.0	15 59.2	58 34.23	0.915	8.5	28	L	19 58.6	2.21
29.0	127 18 31.9	5 7 8.3	15 56.1	58 22.93	0.968	9.0	29	U	8 24.8	2.16
29.5	134 11 50.7	5 10 42.1	15 52.8	58 11.02	1.016	9.5	29	L	20 50.4	2.11
30.0	141 2 58.2	-5 9 47.8	15 49.4	57 58.55	-1.063	10.0	30	U	9 15.4	2.06
30.5	147 51 15.0	5 4 30.8	15 45.9	57 45.52	1.109	10.5	30	L	21 39.9	2.02
31.0	154 36 37.9	4 55 0.7	15 42.2	57 31.95	1.151	11.0	31	U	10 4.0	1.99
31.5	161 18 54.6	4 41 30.9	15 38.4	57 17.91	1.190	11.5	31	L	22 27.8	1.97
Apr. 1.0	167 57 53.7	4 24 17.7	15 34.4	57 3.41	1.228	12.0	Apr. 1	U	10 51.3	1.96
1.5	174 33 24.7	-4 3 40.7	15 30.3	56 48.53	-1.263	12.5	1	L	23 14.6	1.94
2.0	181 5 13.9	-3 40 1.4	15 26.2	56 33.39	-1.271	13.0	2	U	11 37.9	1.94

GREENWICH MEAN TIME.

G. M. T.	Longitude.	Latitude.	Semi-diameter.	Horizontal Parallax.	Var. per Hour.	Age.	Transit, Meridian of Greenwich.			Var. per Hour.
	" " "	" " "	" "	" "	" "	d		h m	m	
Apr. 1.0	167 57 53.7	-4 24 17.7	15 34.4	57 3.41	-1.226	12.0	Apr. 1	U	10 51.3	1.95
1.5	174 33 24.7	4 3 40.7	15 30.3	56 48.53	1.252	12.5	1	L	23 14.6	1.94
2.0	181 5 18.9	3 40 1.4	15 26.2	56 33.39	1.271	13.0	2	U	11 37.9	1.94
2.5	187 33 29.8	3 13 43.5	15 22.0	56 18.08	1.273	13.5			.....	...
3.0	193 57 54.0	2 45 11.7	15 17.9	56 2.77	1.278	14.0	3	L	0 1.1	1.93
3.5	200 18 30.7	-2 14 51.2	15 13.7	55 47.62	-1.250	14.5	3	U	12 24.3	1.94
4.0	206 35 23.0	1 43 7.6	15 9.7	55 32.33	1.211	15.0	4	L	0 47.6	1.95
4.5	212 48 36.9	1 10 25.9	15 5.8	55 18.62	1.156	15.5	4	U	13 11.0	1.96
5.0	218 58 22.8	0 37 10.6	15 2.2	55 5.16	1.083	16.0	5	L	1 34.6	1.97
5.5	225 4 53.9	-0 3 45.0	14 58.8	54 52.71	0.988	16.5	5	U	13 58.2	1.98
6.0	231 8 27.7	+0 29 28.9	14 55.7	54 41.51	-0.878	17.0	6	L	2 22.1	1.99
6.5	237 9 24.7	1 2 10.3	14 53.1	54 31.71	0.749	17.5	6	U	14 46.0	2.00
7.0	243 8 8.3	1 33 59.8	14 50.9	54 23.60	0.601	18.0	7	L	3 10.0	2.00
7.5	249 5 5.1	2 4 39.4	14 49.1	54 17.35	0.439	18.5	7	U	15 34.0	2.01
8.0	255 0 44.4	2 33 52.5	14 48.0	54 13.13	0.262	19.0	8	L	3 58.1	2.01
8.5	260 55 37.5	+3 1 23.3	14 47.4	54 11.11	-0.074	19.5	8	U	16 22.1	2.00
9.0	266 50 17.7	3 26 57.1	14 47.5	54 11.40	+0.124	20.0	9	L	4 46.1	1.99
9.5	272 45 19.9	3 50 19.9	14 48.3	54 14.13	0.332	20.5	9	U	17 9.9	1.98
10.0	278 41 20.0	4 11 18.6	14 49.7	54 19.39	0.544	21.0	10	L	5 33.7	1.97
10.5	284 38 55.0	4 29 40.1	14 51.8	54 27.19	0.758	21.5	10	U	17 57.2	1.96
11.0	290 38 41.5	+4 45 11.9	14 54.7	54 37.57	+0.971	22.0	11	L	6 20.7	1.95
11.5	296 41 15.9	4 57 41.8	14 58.2	54 50.47	1.179	22.5	11	U	18 44.0	1.94
12.0	302 47 14.1	5 6 57.9	15 2.3	55 5.32	1.378	23.0	12	L	7 7.3	1.94
12.5	308 57 9.6	5 12 48.7	15 7.2	55 23.48	1.564	23.5	12	U	19 30.5	1.93
13.0	315 11 34.0	5 15 3.3	15 12.6	55 43.29	1.733	24.0	13	L	7 53.6	1.93
13.5	321 30 55.5	+5 13 31.9	15 18.5	56 4.98	+1.879	24.5	13	U	20 16.9	1.94
14.0	327 55 33.3	5 8 6.0	15 24.8	56 28.23	1.996	25.0	14	L	8 40.2	1.95
14.5	334 26 1.6	4 58 39.0	15 31.5	56 52.80	2.084	25.5	14	U	21 3.8	1.96
15.0	341 2 18.8	4 45 7.4	15 38.4	57 18.15	2.138	26.0	15	L	9 27.7	2.01
15.5	347 44 38.7	4 27 30.5	15 45.4	57 43.83	2.139	26.5	15	U	21 52.0	2.04
16.0	354 32 54.8	+4 5 52.1	15 52.4	58 9.31	+2.100	27.0	16	L	10 16.7	2.08
16.5	1 27 4.6	3 40 21.1	15 59.1	58 34.05	2.015	27.5	16	U	22 42.0	2.14
17.0	8 26 49.8	3 11 11.5	16 5.5	58 57.48	1.882	28.0	17	L	11 8.0	2.20
17.5	15 31 46.3	2 38 43.6	16 11.4	59 19.03	1.701	28.5	17	U	23 34.7	2.26
18.0	22 41 22.3	2 3 23.8	16 16.6	59 38.15	1.480	29.0	18	L	12 2.2	2.32
18.5	29 54 59.5	+1 25 44.5	16 21.0	59 54.42	+1.224	0.1			.....	...
19.0	37 11 54.0	0 46 23.0	16 24.5	60 7.42	0.939	0.6	19	U	0 30.4	2.33
19.5	44 31 18.2	+0 6 0.7	16 27.1	60 16.89	0.637	1.1	19	L	12 59.3	2.44
20.0	51 52 21.5	-0 34 37.7	16 28.7	60 22.87	0.227	1.6	20	U	1 28.9	2.49
20.5	59 14 13.2	1 14 46.7	16 29.3	60 24.76	+0.023	2.1	20	L	13 59.0	2.53
21.0	66 36 3.1	-1 53 41.4	16 28.9	60 23.24	-0.372	2.6	21	U	2 29.4	2.54
21.5	73 57 3.7	2 30 38.9	16 27.5	60 18.33	0.542	3.1	21	L	15 0.0	2.54
22.0	81 16 31.0	3 4 59.9	16 25.3	60 10.34	0.784	3.6	22	U	3 30.4	2.53
22.5	88 33 46.4	3 36 9.8	16 22.4	59 59.64	0.993	4.1	22	L	16 0.6	2.50
23.0	95 48 16.2	4 3 39.6	16 18.9	59 46.64	1.166	4.6	23	U	4 30.3	2.45
23.5	102 59 32.7	-4 27 6.2	16 14.8	59 31.80	-1.303	5.1	23	L	16 59.3	2.39
24.0	110 7 14.2	-4 46 12.6	16 10.4	59 15.51	-1.405	5.6	24	U	5 27.6	2.33



GREENWICH MEAN TIME.

G. M. T.	Longitude.	Latitude.	Semi-diameter.	Horizontal Parallax.	Var. per Hour.	Age.	Transit, Meridian of Greenwich.			Var. per Hour.	
								h m	m		
Apr.	24.0	110 7 14.2	-4 46 12.6	16 10.4	59 15.51	-1.405	5.6	Apr. 24	U	5 27.6	2.33
	24.5	117 11 4.2	5 0 47.3	16 5.7	58 58.20	1.475	6.1	24	L	17 55.1	2.25
	25.0	124 10 51.8	5 10 44.7	16 0.8	58 40.23	1.515	6.6	25	U	6 21.7	2.19
	25.5	131 6 30.3	5 16 4.0	15 55.8	58 21.93	1.553	7.1	25	L	18 47.7	2.13
	26.0	137 57 57.3	5 16 48.8	15 50.8	58 3.55	1.529	7.6	26	U	7 12.9	2.07
	26.5	144 45 13.1	-5 13 6.7	15 45.8	57 45.31	-1.509	8.1	26	L	19 37.5	2.02
	27.0	151 28 20.9	5 5 8.5	15 40.9	57 27.39	1.477	8.6	27	U	8 1.5	1.99
	27.5	158 7 25.9	4 53 8.2	15 36.2	57 9.90	1.437	9.1	27	L	20 25.2	1.96
	28.0	164 42 34.5	4 37 21.9	15 31.6	56 52.93	1.391	9.6	28	U	8 48.5	1.93
	28.5	171 13 54.4	4 18 8.1	15 27.1	56 36.53	1.342	10.1	28	L	21 11.5	1.91
29.0	177 41 33.6	-3 55 46.6	15 22.8	56 20.73	-1.291	10.6	29	U	9 34.4	1.91	
29.5	184 5 41.0	3 30 39.0	15 18.6	56 5.56	1.233	11.1	29	L	21 57.3	1.90	
30.0	190 26 25.3	3 3 7.5	15 14.7	55 51.02	1.184	11.6	30	U	10 20.1	1.91	
30.5	196 43 55.7	2 33 35.4	15 10.9	55 37.16	1.128	12.1	30	L	22 43.1	1.92	
May	1.0	202 58 21.8	2 2 26.4	15 7.3	55 23.96	1.070	12.6	May 1	U	11 6.2	1.93
	1.5	209 9 53.2	-1 30 4.4	15 3.9	55 11.49	-1.009	13.1	1	L	23 29.4	1.94
	2.0	215 18 40.4	0 56 53.0	15 0.7	54 59.77	0.943	13.6	2	U	11 52.8	1.96
	2.5	221 24 54.1	-0 23 15.6	14 57.7	54 48.88	0.871	14.1			.....	...
	3.0	227 28 46.5	+0 10 25.0	14 55.0	54 38.89	0.792	14.6	3	L	0 16.5	1.93
	3.5	233 30 30.5	0 43 47.0	14 52.6	54 29.91	0.704	15.1	3	U	12 40.2	1.99
	4.0	239 30 20.3	+1 16 29.2	14 50.4	54 22.03	-0.606	15.6	4	L	1 4.2	2.00
	4.5	245 28 31.4	1 48 12.0	14 48.6	54 15.40	0.498	16.1	4	U	13 23.2	2.00
	5.0	251 25 21.1	2 18 36.6	14 47.2	54 10.13	0.378	16.6	5	L	1 52.3	2.01
	5.5	257 21 8.5	2 47 25.8	14 46.1	54 6.37	0.247	17.1	5	U	14 16.4	2.01
	6.0	263 16 13.7	3 14 23.2	14 45.6	54 4.26	-0.103	17.6	6	L	2 40.4	2.00
	6.5	269 10 59.8	+3 39 14.0	14 45.5	54 3.94	+0.052	18.1	6	U	15 4.3	1.99
	7.0	275 5 50.9	4 1 44.1	14 45.9	54 5.55	0.219	18.6	7	L	3 28.1	1.93
	7.5	281 1 13.2	4 21 40.8	14 46.9	54 9.24	0.390	19.1	7	U	15 51.7	1.96
	8.0	286 57 34.5	4 38 52.3	14 48.5	54 15.09	0.581	19.6	8	L	4 15.1	1.94
	8.5	292 55 24.3	4 53 7.2	14 50.7	54 23.22	0.775	20.1	8	U	16 38.2	1.92
	9.0	298 55 13.4	+5 4 15.2	14 53.6	54 33.70	+0.973	20.6	9	L	5 1.2	1.91
9.5	304 57 33.6	5 12 6.6	14 57.1	54 46.58	1.173	21.1	9	U	17 24.1	1.90	
10.0	311 2 57.3	5 16 32.5	15 1.3	55 1.84	1.371	21.6	10	L	5 46.8	1.89	
10.5	317 11 57.3	5 17 24.6	15 6.1	55 19.47	1.566	22.1	10	U	18 9.5	1.89	
11.0	323 25 5.6	5 14 35.6	15 11.5	55 39.33	1.750	22.6	11	L	6 32.1	1.89	
11.5	329 42 53.9	+5 7 59.2	15 17.5	56 1.41	+1.920	23.1	11	U	18 54.9	1.91	
12.0	336 5 51.2	4 57 31.1	15 24.0	56 25.39	2.072	23.6	12	L	7 17.9	1.93	
12.5	342 34 24.5	4 43 8.3	15 31.0	56 51.04	2.196	24.1	12	U	19 41.2	1.96	
13.0	349 8 56.9	4 24 50.9	15 38.4	57 18.01	2.292	24.6	13	L	8 4.9	2.00	
13.5	355 49 46.7	4 2 41.9	15 46.0	57 45.90	2.347	25.1	13	U	20 29.2	2.05	
14.0	2 37 6.3	+3 36 48.4	15 53.7	58 14.17	+2.353	25.6	14	L	8 54.0	2.11	
14.5	9 31 1.1	3 7 22.3	16 1.4	58 42.30	2.321	26.1	14	U	21 19.6	2.17	
15.0	16 31 28.3	2 34 40.6	16 8.8	59 9.65	2.227	26.6	15	L	9 46.1	2.24	
15.5	23 38 16.0	1 59 6.5	16 15.9	59 35.53	2.077	27.1	15	U	22 13.4	2.31	
16.0	30 51 2.8	1 21 9.3	16 22.3	59 59.28	1.870	27.6	16	L	10 41.6	2.39	
16.5	38 9 17.4	+0 41 24.4	16 28.0	60 20.19	+1.608	28.1	16	U	23 10.8	2.47	
17.0	45 32 18.7	+0 0 32.7	16 32.8	60 37.70	+1.302	28.6	17	L	11 40.8	2.53	

GREENWICH MEAN TIME.

G. M. T.	Longitude.	Latitude.	Semi-diameter.	Horizontal Parallax.	Var. per Hour.	Age.	Transit, Meridian of Greenwich.			Var. per Hour.
	" ' "	" ' "	" "	" "	" "	d		h m	m	
May 17.0	45 32 18.7	+0 0 32.7	16 32.8	60 37.70	+1.302	23.6	May 17	L	11 40.8	2.53
17.5	52 59 16.5	-0 40 40.6	16 36.5	60 51.27	0.954	29.1			.....	...
18.0	60 29 13.1	1 21 27.1	16 39.0	61 0.49	0.580	0.2	18	U	0 11.5	2.58
18.5	68 1 4.7	2 0 57.9	16 40.3	61 5.13	+0.192	0.7	18	L	12 42.7	2.62
19.0	75 33 44.1	2 38 24.6	16 40.3	61 5.11	-0.195	1.2	19	U	1 14.2	2.68
19.5	83 6 2.7	-3 13 2.7	16 39.0	61 0.51	-0.567	1.7	19	L	13 45.7	2.62
20.0	90 36 53.5	3 44 12.3	16 36.6	60 51.62	0.911	2.2	20	U	2 16.9	2.58
20.5	98 5 13.5	4 11 20.4	16 33.1	60 38.80	1.218	2.7	20	L	14 47.6	2.53
21.0	105 30 5.7	4 34 1.4	16 28.7	60 22.56	1.478	3.2	21	U	3 17.6	2.46
21.5	112 50 41.0	4 51 57.7	16 23.5	60 3.51	1.691	3.7	21	L	15 46.7	2.39
22.0	120 6 19.8	-5 4 59.4	16 17.7	59 42.18	-1.852	4.2	22	U	4 15.0	2.32
22.5	127 16 31.7	5 13 4.1	16 11.4	59 19.26	1.962	4.7	22	L	16 42.3	2.24
23.0	134 20 56.1	5 16 15.4	16 4.9	58 55.28	2.026	5.2	23	U	5 8.7	2.16
23.5	141 19 21.9	5 14 42.5	15 58.2	58 30.80	2.047	5.7	23	L	17 34.2	2.09
24.0	148 11 46.3	5 8 38.8	15 51.5	58 6.30	2.031	6.2	24	U	5 59.0	2.04
24.5	154 58 13.4	-4 58 21.0	15 45.0	57 42.18	-1.985	6.7	24	L	18 23.2	2.00
25.0	161 38 54.0	4 44 8.1	15 38.6	57 18.75	1.915	7.2	25	U	6 46.9	1.96
25.5	168 14 3.2	4 26 20.7	15 32.5	56 56.29	1.825	7.7	25	L	19 10.2	1.93
26.0	174 44 0.2	4 5 20.7	15 26.7	56 35.01	1.722	8.2	26	U	7 33.2	1.90
26.5	181 9 6.6	3 41 30.5	15 21.2	56 15.00	1.611	8.7	26	L	19 55.9	1.89
27.0	187 29 45.5	-3 15 12.6	15 16.1	55 56.37	-1.493	9.2	27	U	8 18.6	1.89
27.5	193 46 20.9	2 46 49.9	15 11.4	55 39.18	1.373	9.7	27	L	20 41.3	1.89
28.0	199 59 17.2	2 16 45.0	15 7.1	55 23.42	1.253	10.2	28	U	9 4.1	1.90
28.5	206 8 57.8	1 45 20.4	15 3.2	55 9.10	1.135	10.7	28	L	21 27.0	1.92
29.0	212 15 45.5	1 12 58.4	14 59.7	54 56.18	1.018	11.2	29	U	9 50.1	1.93
29.5	218 20 2.6	-0 40 0.9	14 56.6	54 44.64	-0.907	11.7	29	L	22 13.3	1.95
30.0	224 22 9.0	-0 6 49.2	14 53.8	54 34.40	0.798	12.2	30	U	10 36.8	1.97
30.5	230 22 24.4	+0 26 15.3	14 51.4	54 25.48	0.690	12.7	30	L	23 0.5	1.98
31.0	236 21 6.8	0 58 52.5	14 49.3	54 17.82	0.586	13.2	31	U	11 24.3	1.99
31.5	242 18 33.3	1 30 42.2	14 47.5	54 11.42	0.481	13.7	31	L	23 48.3	2.01
June 1.0	248 14 59.9	+2 1 25.7	14 46.1	54 6.27	-0.376	14.2	June 1	U	12 12.4	2.01
1.5	254 10 42.2	2 30 44.6	14 45.1	54 2.41	0.268	14.7			.....	...
2.0	260 5 55.2	2 58 21.6	14 44.4	53 59.84	0.159	15.2	2	L	0 36.4	2.00
2.5	266 0 54.0	3 24 0.7	14 44.0	53 58.61	-0.045	15.7	2	U	13 0.4	2.00
3.0	271 55 53.8	3 47 26.8	14 44.1	53 58.79	+0.076	16.2	3	L	1 24.3	1.99
3.5	277 51 10.4	+4 8 26.0	14 44.5	54 0.45	+0.202	16.7	3	U	13 48.1	1.97
4.0	283 47 0.0	4 26 45.5	14 45.4	54 3.67	0.336	17.2	4	L	2 11.6	1.95
4.5	289 43 40.4	4 42 14.2	14 46.7	54 8.55	0.479	17.7	4	U	14 34.9	1.93
5.0	295 41 30.2	4 54 41.4	14 48.6	54 15.19	0.628	18.2	5	L	2 58.0	1.91
5.5	301 40 49.8	5 3 58.4	14 50.9	54 23.64	0.784	18.7	5	U	15 20.8	1.89
6.0	307 42 0.8	+5 9 57.0	14 53.7	54 34.03	+0.948	19.2	6	L	3 43.4	1.88
6.5	313 45 26.7	5 12 30.7	14 57.1	54 46.42	1.117	19.7	6	U	16 5.9	1.87
7.0	319 51 32.5	5 11 34.0	15 1.0	55 0.86	1.290	20.2	7	L	4 28.2	1.86
7.5	326 0 44.5	5 7 2.4	15 5.5	55 17.38	1.462	20.7	7	U	16 50.5	1.86
8.0	332 13 30.2	4 58 53.0	15 10.6	55 35.95	1.634	21.2	8	L	5 12.8	1.87
8.5	338 30 17.6	+4 47 4.6	15 16.2	55 56.56	+1.799	21.7	8	U	17 35.8	1.88
9.0	344 51 35.1	+4 31 37.4	15 22.8	56 19.07	+1.952	22.2	9	L	5 58.0	1.91

GREENWICH MEAN TIME.

G. M. T.	Longitude.	Latitude.	Semi-diameter.	Horizontal Parallax.	Var. per Hour.	Age.	Transit, Meridian of Greenwich.			Var. per Hour.
	° ' "	° ' "	' "	' "	"	d		h m	m	
June 9.0	344 51 35.1	+4 31 37.4	15 22.3	56 19.07	+1.982	22.2	June 9	L	5 58.0	1.91
9.5	351 17 51.0	4 12 33.7	15 28.9	56 43.35	2.091	22.7	9	U	18 21.1	1.95
10.0	357 49 31.7	3 49 58.7	15 36.0	57 9.17	2.208	23.2	10	L	6 44.7	1.99
10.5	4 27 1.7	3 24 0.2	15 43.3	57 36.23	2.297	23.7	10	U	19 8.8	2.03
11.0	11 10 42.4	2 54 49.6	15 51.0	58 4.15	2.349	24.2	11	L	7 33.6	2.10
11.5	18 0 49.9	+2 22 42.7	15 58.7	58 32.44	+2.360	24.7	11	U	19 59.3	2.18
12.0	24 57 34.8	1 47 59.7	16 6.3	59 0.60	2.324	25.2	12	L	8 25.9	2.25
12.5	32 0 59.4	1 11 8.2	16 13.8	59 27.99	2.283	25.7	12	U	20 53.4	2.34
13.0	39 10 57.6	+0 32 32.9	16 20.9	59 53.95	2.083	26.2	13	L	9 22.0	2.42
13.5	46 27 12.8	-0 7 4.0	16 27.4	60 17.74	1.874	26.7	13	U	21 51.5	2.50
14.0	53 49 16.7	-0 47 3.3	16 33.1	60 33.70	+1.969	27.2	14	L	10 21.9	2.57
14.5	61 16 30.0	1 26 40.2	16 37.8	60 56.14	1.290	27.7	14	U	22 53.1	2.62
15.0	68 48 1.7	2 5 7.1	16 41.5	61 9.47	0.924	28.2	15	L	11 24.7	2.64
15.5	76 22 49.8	2 41 35.8	16 43.8	61 18.20	0.528	28.7	15	U	23 56.5	2.65
16.0	83 59 44.2	3 15 19.8	16 44.9	61 22.06	+0.112	29.2	16	L	12 28.3	2.64
16.5	91 37 28.5	-3 45 36.0	16 44.6	61 29.88	-0.308	0.4			.....	...
17.0	99 14 42.4	4 11 47.3	16 42.9	61 14.72	0.716	0.9	17	U	0 59.8	2.60
17.5	106 50 7.0	4 33 24.2	16 39.9	61 3.81	1.096	1.4	17	L	13 30.6	2.54
18.0	114 22 26.4	4 50 5.7	16 35.8	60 48.58	1.487	1.9	18	U	2 0.7	2.47
18.5	121 50 32.1	5 1 39.6	16 30.6	60 29.52	1.729	2.4	18	L	14 29.9	2.39
19.0	129 13 25.0	-5 8 2.8	16 24.5	60 7.31	-1.963	2.9	19	U	2 58.1	2.31
19.5	136 30 17.4	5 9 20.3	16 17.8	59 42.63	2.141	3.4	19	L	15 25.4	2.23
20.0	143 40 34.3	5 5 43.9	16 10.6	59 16.15	2.260	3.9	20	U	3 51.7	2.16
20.5	150 43 53.2	4 57 39.7	16 3.1	58 48.61	2.323	4.4	20	L	16 17.3	2.10
21.0	157 40 3.4	4 45 1.9	15 55.5	58 20.60	2.386	4.9	21	U	4 42.1	2.05
21.5	164 29 5.5	-4 28 41.5	15 47.8	57 52.73	-2.304	5.4	21	L	17 6.4	2.00
22.0	171 11 9.4	4 8 54.8	15 40.4	57 25.46	2.285	5.9	22	U	5 30.1	1.96
22.5	177 46 32.8	3 46 7.8	15 33.3	56 59.21	2.135	6.4	22	L	17 53.5	1.94
23.0	184 15 39.6	3 20 46.4	15 26.5	56 34.31	2.011	6.9	23	U	6 16.6	1.92
23.5	190 88 58.5	2 53 15.9	15 20.1	56 11.02	1.863	7.4	23	L	18 39.6	1.91
24.0	196 57 1.0	-2 24 0.8	15 14.3	55 49.52	-1.713	7.9	24	U	7 2.4	1.90
24.5	203 10 21.1	1 53 24.6	15 8.9	55 29.93	1.551	8.4	24	L	19 25.3	1.91
25.0	209 19 32.8	1 21 49.8	15 4.1	55 12.31	1.384	8.9	25	U	7 48.3	1.92
25.5	215 25 10.6	0 49 37.9	14 59.9	54 56.71	1.217	9.4	25	L	20 11.4	1.93
26.0	221 27 48.0	-0 17 9.5	14 56.2	54 43.08	1.054	9.9	26	U	8 34.6	1.95
26.5	227 27 57.1	+0 15 15.3	14 53.0	54 31.40	-0.894	10.4	26	L	20 58.1	1.96
27.0	233 26 8.3	0 47 17.3	14 50.3	54 21.61	0.739	10.9	27	U	9 21.7	1.98
27.5	239 22 49.9	1 18 38.0	14 48.1	54 13.64	0.591	11.4	27	L	21 45.5	1.99
28.0	245 18 27.7	1 48 59.5	14 46.4	54 7.40	0.451	11.9	28	U	10 9.4	2.00
28.5	251 13 25.3	2 18 4.3	14 45.2	54 2.80	0.317	12.4	28	L	22 33.4	2.00
29.0	257 8 4.0	+2 45 35.6	14 44.4	53 59.77	-0.189	12.9	29	U	10 57.4	2.00
29.5	263 2 42.7	3 11 17.3	14 43.9	53 53.24	-0.068	13.4	29	L	23 21.3	1.99
30.0	268 57 38.2	3 34 54.1	14 43.9	53 53.12	+0.048	13.9	30	U	11 45.2	1.99
30.5	274 53 5.7	3 56 11.6	14 44.3	53 59.38	0.161	14.4			.....	...
July 1.0	280 49 18.8	4 14 56.3	14 45.0	54 1.97	0.271	14.9	July 1	L	0 9.0	1.97
1.5	286 46 29.8	+4 30 56.0	14 46.0	54 5.88	+0.380	15.4	1	U	12 32.5	1.95
2.0	292 44 50.1	+4 43 59.6	14 47.4	54 11.09	+0.488	15.9	2	L	0 55.8	1.93

GREENWICH MEAN TIME.

G. M. T.	Longitude.	Latitude.	Semi-diameter.	Horizontal Parallax.	Var. per Hour.	Age.	Transit, Meridian of Greenwich.				Var. per Hour.
							July	h	m	m	
July 1.0	280 49 18.8	+4 14 56.3	14 45.0	54 1.97	+0.271	14.9	July 1	L	0 9.0	1.97	
1.5	286 46 29.8	4 30 56.0	14 46.0	54 5.88	0.280	15.4	1	U	12 32.5	1.95	
2.0	292 44 50.1	4 43 59.6	14 47.4	54 11.09	0.488	15.9	2	L	0 55.8	1.93	
2.5	298 44 31.0	4 53 57.5	14 49.2	54 17.61	0.599	16.4	2	U	18 18.9	1.92	
3.0	304 45 43.7	5 0 41.4	14 51.4	54 25.43	0.711	16.9	3	L	1 41/8	1.90	
3.5	310 48 39.6	+5 4 4.7	14 53.9	54 34.69	+0.826	17.4	3	U	14 4.4	1.87	
4.0	316 53 31.3	5 4 2.6	14 56.8	54 45.32	0.945	17.9	4	L	2 26.8	1.86	
4.5	323 0 32.4	5 0 31.7	15 0.0	54 57.39	1.068	18.4	4	U	14 49.1	1.85	
5.0	329 9 57.9	4 53 30.5	15 3.8	55 10.97	1.195	18.9	5	L	8 11.3	1.85	
5.5	335 22 4.9	4 42 59.4	15 7.9	55 26.07	1.323	19.4	5	U	15 33.5	1.85	
6.0	341 37 11.6	+4 29 0.3	15 12.4	55 42.72	+1.451	19.9	6	L	3 55.8	1.87	
6.5	347 55 37.9	4 11 37.7	15 17.4	56 0.89	1.580	20.4	6	U	16 18.3	1.88	
7.0	354 17 46.0	3 50 57.7	15 22.7	56 20.63	1.705	20.9	7	L	4 41.0	1.91	
7.5	0 43 58.3	3 27 8.9	15 28.5	56 41.77	1.819	21.4	7	U	17 4.1	1.95	
8.0	7 14 38.1	3 0 22.4	15 34.6	57 4.24	1.923	21.9	8	L	5 27.8	1.99	
8.5	13 50 8.9	+2 30 52.1	15 41.1	57 27.85	+2.010	22.4	8	U	17 52.0	2.05	
9.0	20 30 52.6	1 58 56.0	15 47.7	57 52.38	2.074	22.9	9	L	6 17.0	2.12	
9.5	27 17 9.2	1 24 51.6	15 54.6	58 17.50	2.107	23.4	9	U	18 42.8	2.19	
10.0	34 9 15.3	0 49 6.2	16 1.5	58 42.81	2.105	23.9	10	L	7 9.5	2.26	
10.5	41 7 22.2	+0 12 6.6	16 8.3	59 7.86	2.064	24.4	10	U	19 37.1	2.34	
11.0	48 11 34.7	-0 25 34.9	16 14.9	59 32.15	+1.976	24.9	11	L	8 5.7	2.42	
11.5	55 21 49.5	1 3 22.5	16 21.2	59 55.07	1.836	25.4	11	U	20 35.2	2.49	
12.0	62 37 53.2	1 40 37.0	16 28.9	60 16.00	1.644	25.9	12	L	9 5.4	2.55	
12.5	69 59 21.6	2 16 36.5	16 31.9	60 34.31	1.400	26.4	12	U	21 36.3	2.59	
13.0	77 25 38.4	2 50 37.9	16 36.0	60 49.40	1.106	26.9	13	L	10 7.5	2.62	
13.5	84 55 55.6	-3 21 58.5	16 39.1	61 0.69	+0.770	27.4	13	U	22 39.0	2.62	
14.0	92 29 14.1	3 49 57.4	16 41.0	61 7.76	0.402	27.9	14	L	11 10.3	2.59	
14.5	100 4 25.0	4 13 57.9	16 41.7	61 10.25	+0.013	28.4	14	U	23 41.2	2.56	
15.0	107 40 12.6	4 33 29.4	16 41.1	61 8.04	-0.384	28.9	15	L	12 11.6	2.50	
15.5	115 15 17.0	4 48 8.4	16 39.2	61 1.07	0.773	0.1	15	U	.....	...	
16.0	122 48 18.0	-4 57 40.5	16 36.0	60 49.58	-1.139	0.6	16	U	0 41.2	2.43	
16.5	130 17 59.2	5 1 59.9	16 31.8	60 33.86	1.472	1.1	16	L	13 10.0	2.37	
17.0	137 43 11.0	5 1 9.9	16 26.5	60 14.43	1.758	1.6	17	U	1 38.0	2.30	
17.5	145 2 53.0	4 55 21.6	16 20.3	59 51.87	1.993	2.1	17	L	14 5.2	2.23	
18.0	152 16 17.6	4 44 53.0	16 13.5	59 26.81	2.172	2.6	18	U	2 31.5	2.16	
18.5	159 22 49.2	-4 30 7.3	16 6.2	58 59.96	-2.294	3.1	18	L	14 57.1	2.11	
19.0	166 22 6.1	4 11 31.2	15 58.5	58 31.98	2.358	3.6	19	U	3 22.1	2.06	
19.5	173 13 58.9	3 49 33.9	15 50.8	58 3.57	2.369	4.1	19	L	15 46.6	2.02	
20.0	179 58 30.1	3 24 45.1	15 43.1	57 35.30	2.336	4.6	20	U	4 10.7	1.99	
20.5	186 35 52.0	2 57 34.3	15 35.6	57 7.67	2.261	5.1	20	L	16 34.4	1.97	
21.0	193 6 25.7	-2 28 30.3	15 28.3	56 41.18	-2.150	5.6	21	U	4 58.0	1.95	
21.5	199 30 38.8	1 58 0.2	15 21.5	56 16.17	2.012	6.1	21	L	17 21.3	1.94	
22.0	205 49 3.7	1 26 29.7	15 15.2	55 52.97	1.832	6.6	22	U	5 44.7	1.94	
22.5	212 2 16.8	0 54 22.3	15 9.4	55 31.78	1.677	7.1	22	L	18 8.0	1.94	
23.0	218 10 56.3	-0 22 0.4	15 4.2	55 12.77	1.490	7.6	23	U	6 31.4	1.95	
23.5	224 15 41.8	+0 10 15.8	14 59.7	54 56.05	-1.297	8.1	23	L	18 54.9	1.96	
24.0	230 17 12.7	+0 42 6.9	14 55.8	54 41.65	-1.102	8.6	24	U	7 18.5	1.97	

GREENWICH MEAN TIME.

G. M. T.	Longitude.			Latitude.			Semi-diameter.	Horizontal Parallax.	Var. per Hour.	Age.	Transit, Meridian of Greenwich.			Var. per Hour.
	'	"	'''	'	"	'''					d	h	m	
July	24.0	230	17	12.7	+0 42	6.9	14 55.8	54 41.65	-1.102	8.6	July 24	U	7 18.5	1.97
	24.5	236	16	7.7	1 13	15.1	14 52.5	54 29.60	0.906	9.1	24	L	19 42.2	1.98
	25.0	242	13	4.3	1 43	23.3	14 49.8	54 19.88	0.716	9.6	25	U	8 6.0	1.99
	25.5	248	8	38.1	2 12	15.4	14 47.8	54 12.40	0.531	10.1	25	L	20 29.9	1.99
	26.0	254	3	22.3	2 39	35.8	14 46.3	54 7.10	0.354	10.6	26	U	8 53.8	2.00
	26.5	259	57	47.4	+3 5	9.5	14 45.5	54 3.87	-0.186	11.1	26	L	21 17.8	2.00
	27.0	265	52	21.1	3 28	42.1	14 45.1	54 2.60	-0.028	11.6	27	U	9 41.7	1.99
	27.5	271	47	28.4	3 49	59.9	14 45.3	54 3.15	+0.119	12.1	27	L	22 5.6	1.98
	28.0	277	43	30.7	4 8	49.5	14 45.9	54 5.41	0.255	12.6	28	U	10 29.3	1.97
	28.5	283	40	46.7	4 24	58.6	14 46.9	54 9.23	0.379	13.1	28	L	22 52.9	1.95
	29.0	289	39	32.0	+4 38	15.6	14 48.4	54 14.48	+0.495	13.6	29	U	11 16.2	1.94
	29.5	295	39	59.9	4 48	30.3	14 50.2	54 21.08	0.602	14.1	29	L	23 39.4	1.92
	30.0	301	42	20.7	4 55	33.5	14 52.3	54 28.88	0.697	14.6	30	U	12 2.3	1.90
	30.5	307	46	42.7	4 59	17.7	14 54.7	54 37.78	0.786	15.1			.....	...
	31.0	313	53	13.0	4 59	37.0	14 57.4	54 47.72	0.868	15.6	31	L	0 25.1	1.89
31.5	320	1	56.9	+4 56	27.8	15 0.4	54 58.60	+0.946	16.1	31	U	12 47.7	1.88	
Aug.	1.0	326	12	59.5	4 49	48.2	15 3.6	55 10.40	1.019	16.6	Aug. 1	L	1 10.2	1.87
	1.5	332	26	25.4	4 39	38.8	15 7.0	55 23.05	1.090	17.1	1	U	13 32.6	1.87
	2.0	338	42	19.9	4 26	2.6	15 10.7	55 36.56	1.159	17.6	2	L	1 55.0	1.87
	2.5	345	0	48.9	4 9	5.0	15 14.6	55 50.85	1.225	18.1	2	U	14 17.5	1.88
	3.0	351	21	59.5	+3 48	53.9	15 18.7	56 5.95	+1.292	18.6	3	L	2 40.1	1.89
	3.5	357	46	0.9	3 25	39.7	15 23.1	56 21.85	1.358	19.1	3	U	15 3.0	1.92
	4.0	4	13	3.5	2 59	35.3	15 27.6	56 38.52	1.421	19.6	4	L	3 26.2	1.95
	4.5	10	43	19.6	2 30	56.5	15 32.4	56 55.93	1.481	20.1	4	U	15 49.8	1.99
	5.0	17	17	2.9	2 0	1.1	15 37.3	57 14.04	1.535	20.6	5	L	4 14.0	2.04
	5.5	23	54	28.4	+1 27	9.8	15 42.4	57 32.73	+1.589	21.1	5	U	16 38.8	2.09
	6.0	30	35	51.5	0 52	45.9	15 47.6	57 51.92	1.614	21.6	6	L	5 4.3	2.15
	6.5	37	21	27.3	+0 17	15.1	15 52.9	58 11.41	1.632	22.1	6	U	17 30.5	2.22
	7.0	44	11	29.5	-0 18	54.3	15 58.3	58 31.01	1.639	22.6	7	L	5 57.5	2.28
	7.5	51	6	9.5	0 55	11.4	16 3.6	58 50.43	1.603	23.1	7	U	18 25.3	2.35
	8.0	58	5	34.6	-1 31	3.3	16 8.7	59 9.37	+1.548	23.6	8	L	6 53.9	2.41
8.5	65	9	46.9	2 5	55.1	16 13.6	59 27.44	1.457	24.1	8	U	19 23.1	2.46	
9.0	72	18	41.4	2 39	10.6	16 18.2	59 44.19	1.330	24.6	9	L	7 52.9	2.50	
9.5	79	32	5.5	3 10	12.9	16 22.3	59 59.21	1.166	25.1	9	U	20 23.1	2.53	
10.0	86	49	36.8	3 38	25.8	16 25.8	60 12.02	0.962	25.6	10	L	8 53.5	2.54	
10.5	94	10	49.5	-4 3	14.5	16 28.6	60 22.15	+0.721	26.1	10	U	21 23.9	2.52	
11.0	101	34	43.7	4 24	7.4	16 30.5	60 29.21	0.489	26.6	11	L	9 54.0	2.50	
11.5	109	0	46.4	4 40	37.3	16 31.5	60 32.84	+0.151	27.1	11	U	22 23.8	2.47	
12.0	116	27	52.5	4 52	22.8	16 31.5	60 32.76	-0.165	27.6	12	L	10 53.1	2.41	
12.5	123	54	57.1	4 59	9.7	16 30.4	60 28.84	0.489	28.1	12	U	23 21.6	2.35	
13.0	131	20	52.4	-5 0	51.4	16 28.2	60 21.03	-0.810	28.6	13	L	11 49.6	2.30	
13.5	138	44	30.6	4 57	29.5	16 25.1	60 9.47	1.114	29.1			.....	...	
14.0	146	4	46.3	4 49	13.1	16 21.0	59 54.38	1.395	0.3	14	U	0 16.9	2.25	
14.5	153	20	40.7	4 36	19.0	16 16.0	59 36.12	1.640	0.8	14	L	12 43.6	2.19	
15.0	160	31	22.5	4 19	9.4	16 10.3	59 15.18	1.844	1.3	15	U	1 9.6	2.14	
15.5	167	36	11.1	-3 58	11.4	16 4.0	58 52.04	-2.003	1.8	15	L	13 35.1	2.10	
16.0	174	34	36.3	-3 33	55.3	15 57.3	58 27.31	-2.111	2.3	16	U	2 0.1	2.07	

GREENWICH MEAN TIME.

G. M. T.	Longitude.	Latitude.	Semi-diameter.	Horizontal Parallax.	Var. per Hour.	Age.	Transit, Meridian of Greenwich.			Var. per Hour.
								h m	m	
Aug. 16.0	174 34 36.3	-3 33 55.3	15 57.3	58 27.31	-2.111	2.3	Aug. 16	U	2 0.1	2.07
16.5	181 26 19.8	3 6 52.8	15 50.3	58 1.56	2.172	2.8	16	L	14 24.8	2.05
17.0	188 11 14.2	2 37 36.4	15 43.1	57 35.38	2.184	3.3	17	U	2 49.2	2.02
17.5	194 49 22.3	2 6 37.4	15 36.0	57 9.31	2.153	3.8	17	L	15 13.8	2.00
18.0	201 20 56.1	1 34 26.1	15 29.1	56 43.86	2.063	4.3	18	U	3 37.3	2.00
18.5	207 46 15.9	-1 1 30.7	15 22.4	56 19.47	-1.976	4.8	18	L	16 1.2	1.99
19.0	214 5 47.9	-0 28 17.2	15 16.2	55 56.56	1.840	5.3	19	U	4 25.1	1.99
19.5	220 20 3.6	+0 4 50.6	15 10.4	55 35.40	1.661	5.8	19	L	16 48.9	1.99
20.0	226 29 38.4	0 37 31.3	15 5.2	55 16.29	1.502	6.3	20	U	5 12.8	1.99
20.5	232 35 10.2	1 9 25.3	15 0.6	54 59.40	1.310	6.8	20	L	17 36.7	2.00
21.0	238 37 18.4	+1 40 14.8	14 56.7	54 44.90	-1.107	7.3	21	U	6 0.7	2.00
21.5	244 36 49.3	2 9 43.5	14 53.4	54 32.86	0.897	7.8	21	L	18 24.7	2.00
22.0	250 34 4.8	2 37 36.7	14 50.8	54 23.37	0.686	8.3	22	U	6 48.7	2.00
22.5	256 30 2.3	3 8 39.9	14 48.9	54 16.39	0.477	8.8	22	L	19 12.7	2.00
23.0	262 25 13.8	3 27 40.1	14 47.7	54 11.91	0.271	9.3	23	U	7 36.6	1.99
23.5	268 20 15.3	+3 49 24.6	14 47.1	54 9.85	-0.073	9.8	23	L	20 0.5	1.99
24.0	274 15 40.4	4 8 41.5	14 47.2	54 10.13	+0.117	10.3	24	U	8 24.3	1.98
24.5	280 12 0.8	4 25 19.1	14 47.9	54 12.62	0.296	10.8	24	L	20 47.9	1.96
25.0	286 9 49.1	4 39 6.4	14 49.1	54 17.19	0.462	11.3	25	U	9 11.4	1.95
25.5	292 9 13.5	4 49 53.2	14 50.9	54 23.66	0.613	11.8	25	L	21 34.7	1.94
26.0	298 10 52.8	+4 57 29.9	14 53.1	54 31.85	+0.749	12.3	26	U	9 57.9	1.93
26.5	304 14 58.9	5 1 48.4	14 55.7	54 41.57	0.868	12.8	26	L	22 20.9	1.91
27.0	310 21 45.7	5 2 41.4	14 58.8	54 52.63	0.972	13.3	27	U	10 43.8	1.90
27.5	316 31 23.9	5 0 3.8	15 2.1	55 4.84	1.059	13.8	27	L	23 6.6	1.89
28.0	322 44 0.9	4 53 52.0	15 5.7	55 17.97	1.127	14.3	28	U	11 29.3	1.89
28.5	328 59 40.8	+4 44 5.1	15 9.4	55 31.82	+1.180	14.8	28	L	23 52.1	1.90
29.0	335 18 25.1	4 30 44.8	15 13.4	55 46.24	1.219	15.3	29	U	12 14.9	1.90
29.5	341 40 13.3	4 13 55.3	15 17.4	56 1.02	1.243	15.8			.....	...
30.0	348 5 3.0	3 53 44.1	15 21.5	56 16.02	1.255	16.3	30	L	0 37.8	1.92
30.5	354 32 50.8	3 30 22.3	15 25.6	56 31.10	1.256	16.8	30	U	13 0.9	1.93
31.0	1 3 32.9	+3 4 3.4	15 29.7	56 46.14	+1.250	17.3	31	L	1 24.2	1.96
31.5	7 37 5.8	2 35 4.8	15 33.8	57 1.06	1.235	17.8	31	U	13 47.9	2.00
Sept. 1.0	14 13 26.3	2 8 46.5	15 37.8	57 15.76	1.215	18.3	Sept. 1	L	2 12.1	2.03
1.5	20 52 32.3	1 30 31.6	15 41.7	57 30.21	1.192	18.8	1	U	14 36.7	2.07
2.0	27 34 22.9	0 55 45.6	15 45.6	57 44.36	1.166	19.3	2	L	3 1.9	2.12
2.5	34 18 58.7	+0 19 56.3	15 49.3	57 58.17	+1.135	19.8	2	U	15 27.7	2.18
3.0	41 6 21.1	-0 16 26.7	15 53.0	58 11.58	1.101	20.3	3	L	3 54.2	2.23
3.5	47 56 32.5	0 52 52.1	15 56.5	58 24.57	1.063	20.8	3	U	16 21.2	2.28
4.0	54 49 35.3	1 28 47.8	15 59.9	58 37.07	1.018	21.3	4	L	4 48.9	2.33
4.5	61 45 31.6	2 8 40.7	16 3.2	58 48.97	0.965	21.8	4	U	17 17.2	2.38
5.0	68 44 21.9	-2 36 57.8	16 6.2	59 0.18	+0.900	22.3	5	L	5 46.0	2.41
5.5	75 46 4.5	3 8 6.3	16 9.0	59 10.52	0.823	22.8	5	U	18 15.1	2.43
6.0	82 50 34.2	3 36 34.3	16 11.6	59 19.87	0.731	23.3	6	L	6 44.4	2.45
6.5	89 57 41.5	4 1 51.5	16 13.8	59 27.99	0.619	23.8	6	U	19 13.8	2.45
7.0	97 7 11.7	4 23 30.1	16 15.6	59 34.64	0.486	24.3	7	L	7 43.1	2.43
7.5	104 18 44.6	-4 41 5.3	16 17.0	59 39.58	+0.335	24.8	7	U	20 12.1	2.41
8.0	111 31 53.5	-4 54 16.5	16 17.8	59 42.60	+0.163	25.3	8	L	8 40.8	2.38

GREENWICH MEAN TIME.

G. M. T.		Longitude.	Latitude.	Semi-diameter.	Horizontal Parallax.	Var. per Hour.	Age.	Transit, Meridian of Greenwich.			Var. per Hour.
		" "	" "	" "	" "	" "	d		L	h m	m
Sept.	8.0	111 31 53.5	-4 54 16.5	16 17.8	59 42.00	+0.163	25.3	Sept. 8	L	8 40.8	2.38
	8.5	118 46 6.2	5 2 47.8	16 18.0	59 43.43	-0.026	25.8		8	U 21 9.1	2.33
	9.0	126 0 44.5	5 6 29.1	16 17.6	59 41.91	0.321	26.3		9	L 9 36.8	2.29
	9.5	133 15 6.1	5 5 16.0	16 16.5	59 37.85	0.447	26.8		9	U 22 4.0	2.25
	10.0	140 28 25.4	4 59 11.2	16 14.7	59 31.17	0.606	27.3		10	L 10 30.8	2.21
	10.5	147 39 55.6	-4 48 23.2	16 12.1	59 21.86	-0.896	27.8		10	U 22 57.0	2.16
	11.0	154 48 49.8	4 38 7.4	16 8.9	59 9.95	1.066	28.3		11	L 11 22.7	2.13
	11.5	161 54 24.3	4 13 44.0	16 5.0	58 55.61	1.391	28.8		11	U 23 48.1	2.10
	12.0	168 55 58.5	3 50 38.6	16 0.5	58 39.04	1.666	29.3		12	L 12 13.2	2.06
	12.5	175 52 58.0	3 24 19.9	15 55.4	58 20.54	1.811	0.5			.....	...
	13.0	182 44 54.9	-2 55 19.3	15 50.0	58 0.51	-1.723	1.0		13	U 0 38.0	2.06
	13.5	189 31 29.2	2 24 9.0	15 44.2	57 39.31	1.304	1.5		13	L 13 2.6	2.05
	14.0	196 12 28.6	1 51 22.0	15 38.2	57 17.37	1.347	2.0		14	U 1 27.1	2.03
	14.5	202 47 48.4	1 17 29.7	15 32.1	56 55.14	1.351	2.5		14	L 13 51.4	2.02
	15.0	209 17 31.8	0 49 2.9	15 26.1	56 33.08	1.320	3.0		15	U 2 15.7	2.02
	15.5	215 41 49.2	-0 8 29.3	15 20.3	56 11.58	-1.757	3.5		15	L 14 40.0	2.02
	16.0	222 0 57.0	+0 25 44.9	15 14.7	55 51.04	1.662	4.0		16	U 3 4.3	2.02
	16.5	228 15 17.3	0 59 16.3	15 9.4	55 31.81	1.533	4.5		16	L 15 28.6	2.02
	17.0	234 25 16.5	1 31 44.1	15 4.6	55 14.23	1.389	5.0		17	U 3 52.9	2.02
	17.5	240 31 25.3	2 2 49.5	15 0.4	54 58.56	1.220	5.5		17	L 16 17.2	2.03
	18.0	246 34 17.0	+2 32 15.9	14 56.7	54 45.02	-1.085	6.0		18	U 4 41.5	2.02
	18.5	252 34 27.2	2 59 48.4	14 53.6	54 33.78	0.335	6.5		18	L 17 5.6	2.01
	19.0	258 32 33.1	3 25 13.7	14 51.2	54 25.01	0.626	7.0		19	U 5 29.7	2.01
	19.5	264 29 12.3	3 48 19.6	14 49.5	54 18.77	0.411	7.5		19	L 17 53.7	2.00
	20.0	270 25 3.3	4 8 54.9	14 48.5	54 15.15	-0.193	8.0		20	U 6 17.6	1.98
	20.5	276 20 43.7	+4 26 49.4	14 48.3	54 14.13	+0.023	8.5		20	L 18 41.2	1.97
	21.0	282 16 50.5	4 41 53.2	14 48.7	54 15.70	0.233	9.0		21	U 7 4.8	1.96
	21.5	288 13 59.3	4 53 57.1	14 49.8	54 19.32	0.445	9.5		21	L 19 28.1	1.94
	22.0	294 12 43.8	5 2 52.4	14 51.6	54 26.35	0.642	10.0		22	U 7 51.3	1.92
	22.5	300 13 35.4	5 8 31.3	14 54.0	54 35.18	0.323	10.5		22	L 20 14.3	1.91
	23.0	306 17 2.9	+5 10 46.3	14 57.0	54 46.16	+0.993	11.0		23	U 8 37.2	1.90
	23.5	312 23 31.6	5 9 31.3	15 0.5	54 59.05	1.143	11.5		23	L 21 0.0	1.90
	24.0	318 33 23.4	5 4 41.3	15 4.5	55 13.63	1.278	12.0		24	U 9 22.8	1.90
	24.5	324 46 56.3	4 56 13.0	15 8.8	55 29.64	1.386	12.5		24	L 21 45.6	1.90
	25.0	331 4 24.0	4 44 5.3	15 13.5	55 46.80	1.470	13.0		25	U 10 8.4	1.91
	25.5	337 25 55.8	+4 29 19.5	15 18.4	56 4.81	+1.526	13.5		25	L 22 31.4	1.93
	26.0	343 51 36.8	4 9 0.0	15 23.5	56 23.32	1.555	14.0		26	U 10 54.7	1.95
	26.5	350 21 27.5	3 46 14.5	15 28.6	56 42.02	1.557	14.5		26	L 23 18.2	1.97
	27.0	356 55 24.2	3 20 14.5	15 33.6	57 0.59	1.532	15.0		27	U 11 42.1	2.01
	27.5	3 33 19.5	2 51 15.5	15 38.6	57 18.70	1.483	15.5			.....	...
	28.0	10 15 2.4	+2 19 36.9	15 43.3	57 36.09	+1.411	16.0		28	L 0 6.4	2.04
	28.5	17 0 19.5	1 45 42.2	15 47.8	57 52.48	1.317	16.5		28	U 12 31.2	2.09
	29.0	23 48 54.5	1 9 58.5	15 51.9	58 7.64	1.207	17.0		29	L 0 56.6	2.14
	29.5	30 40 30.3	+0 32 56.3	15 55.7	58 21.41	1.066	17.5		29	U 13 22.6	2.19
	30.0	37 34 48.6	-0 4 51.5	15 59.0	58 33.67	0.957	18.0		30	L 1 49.2	2.24
	30.5	44 31 30.5	-0 42 49.7	16 1.9	58 44.35	+0.322	18.5		30	U 14 16.4	2.30
Oct.	1.0	51 30 17.6	-1 20 22.3	16 4.4	58 53.40	+0.633	19.0	Oct. 1	L	2 44.3	2.34

GREENWICH MEAN TIME.

G. M. T.		Longitude.	Latitude.	Semi-diameter.	Horizontal Parallax.	Var. per Hour.	Age.	Transit, Meridian of Greenwich.			Var. per Hour.
		" " "	" " "	" "	" "	" "	d	Oct.		h m	m
Oct. 1.0	51 30 17.6	-1 20 22.3	16 4.4	58 53.40	+0.588	19.0	Oct. 1	L	2 44.3	2.34	
1.5	58 30 52.5	1 56 52.9	16 6.4	59 0.86	0.555	19.5	1	U	15 12.6	2.38	
2.0	65 32 57.9	2 31 45.9	16 8.0	59 6.74	0.487	20.0	2	L	3 41.4	2.41	
2.5	72 36 17.8	3 4 26.7	16 9.2	59 11.14	0.396	20.5	2	U	16 10.4	2.43	
3.0	79 40 36.8	3 34 23.4	16 10.0	59 14.12	0.192	21.0	3	L	4 39.6	2.44	
3.5	86 45 40.2	-4 1 6.3	16 10.5	59 15.77	+0.084	21.5	3	U	17 8.8	2.43	
4.0	93 51 13.2	4 24 9.5	16 10.6	59 16.16	-0.019	22.0	4	L	5 37.8	2.41	
4.5	100 57 1.6	4 43 10.7	16 10.4	59 15.34	0.117	22.5	4	U	18 6.6	2.38	
5.0	108 2 50.0	4 57 52.0	16 9.8	59 13.37	0.212	23.0	5	L	6 34.9	2.34	
5.5	115 8 22.5	5 8 0.0	16 9.0	59 10.25	0.307	23.5	5	U	19 2.8	2.30	
6.0	122 13 22.0	-5 13 25.8	16 7.8	59 6.00	-0.403	24.0	6	L	7 30.1	2.26	
6.5	129 17 30.3	5 14 5.8	16 6.3	59 0.56	0.503	24.5	6	U	19 57.0	2.22	
7.0	136 20 27.9	5 10 1.2	16 4.5	58 53.93	0.604	25.0	7	L	8 23.3	2.17	
7.5	143 21 53.6	5 1 18.4	16 2.4	58 46.06	0.709	25.5	7	U	20 49.1	2.13	
8.0	150 21 26.1	4 48 8.4	15 59.9	58 36.91	0.817	26.0	8	L	9 14.5	2.10	
8.5	157 18 43.2	-4 30 46.9	15 57.0	58 26.46	-0.924	26.5	8	U	21 39.6	2.07	
9.0	164 13 22.8	4 9 33.9	15 53.8	58 14.74	1.029	27.0	9	L	10 4.8	2.05	
9.5	171 5 3.8	3 44 52.9	15 50.3	58 1.77	1.132	27.5	9	U	22 28.9	2.04	
10.0	177 53 28.1	3 17 10.5	15 46.4	57 47.59	1.228	28.0	10	L	10 53.8	2.03	
10.5	184 88 12.0	2 46 55.5	15 42.3	57 32.34	1.311	28.5	10	U	23 17.6	2.02	
11.0	191 19 6.3	-2 14 38.4	15 37.9	57 16.17	-1.382	29.0	11	L	11 41.9	2.02	
11.5	197 55 57.1	1 40 49.9	15 33.3	56 59.25	1.485	0.0			.....	...	
12.0	204 28 36.2	1 6 1.1	15 28.5	56 41.82	1.467	0.5	12	U	0 6.2	2.02	
12.5	210 56 59.6	-0 30 42.0	15 23.7	56 24.13	1.477	1.0	12	L	12 30.5	2.03	
13.0	217 21 7.1	+0 4 38.6	15 18.9	56 6.46	1.463	1.5	13	U	0 54.9	2.04	
13.5	223 41 3.4	+0 39 34.0	15 14.2	55 49.12	-1.424	2.0	13	L	13 19.4	2.04	
14.0	229 56 56.9	1 13 39.1	15 9.6	55 32.37	1.362	2.5	14	U	1 43.9	2.04	
14.5	236 9 0.3	1 46 31.7	15 5.3	55 16.53	1.274	3.0	14	L	14 8.4	2.04	
15.0	242 17 30.3	2 17 51.7	15 1.3	55 1.88	1.164	3.5	15	U	2 32.9	2.04	
15.5	248 22 47.2	2 47 21.2	14 57.7	54 48.69	1.032	4.0	15	L	14 57.4	2.04	
16.0	254 25 14.4	+3 14 44.7	14 54.5	54 37.20	-0.880	4.5	16	U	3 21.8	2.03	
16.5	260 25 18.5	3 39 48.4	14 52.0	54 27.65	0.709	5.0	16	L	15 46.0	2.01	
17.0	266 23 28.5	4 2 20.4	14 49.9	54 20.24	0.525	5.5	17	U	4 10.1	2.00	
17.5	272 20 15.5	4 22 10.3	14 48.5	54 15.11	0.327	6.0	17	L	16 33.9	1.97	
18.0	278 16 12.5	4 39 8.8	14 47.8	54 12.44	-0.119	6.5	18	U	4 57.5	1.96	
18.5	284 11 53.9	+4 53 7.7	14 47.8	54 12.28	+0.094	7.0	18	L	17 20.9	1.94	
19.0	290 7 55.0	5 3 59.6	14 48.4	54 14.73	0.314	7.5	19	U	5 44.1	1.92	
19.5	296 4 51.3	5 11 37.7	14 49.8	54 19.82	0.585	8.0	19	L	18 7.0	1.90	
20.0	302 3 18.8	5 15 56.1	14 51.9	54 27.55	0.782	8.5	20	U	6 29.7	1.89	
20.5	308 3 52.4	5 16 49.3	14 54.7	54 37.84	0.963	9.0	20	L	18 52.3	1.88	
21.0	314 7 6.5	+5 14 12.8	14 58.2	54 50.63	+1.166	9.5	21	U	7 14.8	1.87	
21.5	320 13 34.0	5 8 2.6	15 2.3	55 5.76	1.354	10.0	21	L	19 37.3	1.87	
22.0	326 23 45.1	4 58 16.4	15 7.0	55 23.06	1.524	10.5	22	U	7 59.8	1.88	
22.5	332 38 7.8	4 44 53.1	15 12.3	55 42.26	1.672	11.0	22	L	20 22.4	1.89	
23.0	338 57 6.3	4 27 53.6	15 18.0	56 3.10	1.796	11.5	23	U	8 45.3	1.91	
23.5	345 21 1.0	+4 7 21.5	15 24.0	56 25.24	+1.889	12.0	23	L	21 8.4	1.94	
24.0	351 50 7.2	+3 43 23.1	15 30.3	56 48.30	+1.947	12.5	24	U	9 31.9	1.96	



GREENWICH MEAN TIME.

G. M. T.	Longitude.			Latitude.			Semi-diameter.	Horizontal Parallax.	Var. per Hour.	Age.	Transit, Meridian of Greenwich.				Var. per Hour.
	°	'	"	+	'	"					d	h	m	m	
Oct. 24.0	351	50	7.2	+3	43	23.1	15 30.3	56 48.30	+1.947	12.5	Oct. 24	U	9	31.9	1.98
24.5	358	24	35.0	3	18	8.6	15 36.7	57 11.83	1.968	13.0	24	L	21	55.9	2.02
25.0	5	4	28.6	2	45	52.2	15 43.1	57 35.38	1.980	13.5	25	U	10	20.4	2.07
25.5	11	49	45.9	2	12	52.2	15 49.4	57 58.46	1.890	14.0	25	L	22	45.6	2.13
26.0	18	40	18.3	1	37	32.1	15 55.4	58 20.58	1.790	14.5	26	U	11	11.5	2.19
26.5	25	35	50.2	+1	0	19.9	16 1.1	58 41.26	+1.651	15.0	26	L	23	38.1	2.25
27.0	32	36	0.5	+0	21	48.1	16 6.2	59 0.07	1.477	15.5	27	U	12	5.5	2.31
27.5	39	40	21.0	-0	17	26.9	16 10.7	59 16.59	1.271	16.0					
28.0	46	48	19.4	0	59	45.8	16 14.5	59 30.49	1.042	16.5	28	L	0	33.6	2.37
28.5	53	59	18.3	1	35	27.1	16 17.5	59 41.54	0.797	17.0	28	U	18	2.4	2.43
29.0	61	12	37.6	-2	12	49.1	16 19.7	59 49.60	+0.546	17.5	29	L	1	31.8	2.47
29.5	68	27	35.1	2	48	10.8	16 21.1	59 54.64	0.293	18.0	29	U	14	1.6	2.49
30.0	75	43	28.3	3	20	53.5	16 21.6	59 56.66	+0.048	18.5	30	L	2	31.6	2.50
30.5	82	59	35.0	3	50	22.0	16 21.4	59 55.86	-0.179	19.0	30	U	15	1.6	2.50
31.0	90	15	15.5	4	16	5.8	16 20.5	59 52.43	0.389	19.5	31	L	8	31.5	2.48
31.5	97	29	52.8	-4	37	39.7	16 18.9	59 46.62	-0.574	20.0	31	U	16	1.1	2.45
Nov. 1.0	104	42	53.8	4	54	44.5	16 16.7	59 38.77	0.781	20.5	Nov. 1	L	4	30.2	2.40
1.5	111	53	49.9	5	7	6.8	16 14.1	59 29.19	0.892	21.0	1	U	16	58.7	2.35
2.0	119	2	16.7	5	14	39.3	16 11.1	59 18.18	0.968	21.5	2	L	5	26.5	2.39
2.5	126	7	54.8	5	17	20.4	16 7.8	59 6.04	1.052	22.0	2	U	17	53.6	2.23
3.0	133	10	28.8	-5	15	13.6	16 4.3	58 53.02	-1.114	22.5	3	L	6	20.1	2.18
3.5	140	9	48.1	5	8	27.1	16 0.5	58 39.36	1.159	23.0	3	U	18	46.0	2.13
4.0	147	5	44.7	4	67	13.4	15 56.7	58 25.25	1.190	23.5	4	L	7	11.3	2.09
4.5	153	58	14.2	4	41	48.7	15 52.8	58 10.84	1.211	24.0	4	U	19	36.1	2.05
5.0	160	47	14.3	4	22	32.1	15 48.8	57 56.23	1.232	24.5	5	L	8	0.5	2.02
5.5	167	32	44.7	-3	59	45.3	15 44.8	57 41.52	-1.231	25.0	5	U	20	24.7	2.00
6.0	174	14	46.6	3	33	52.3	15 40.8	57 26.71	1.235	25.5	6	L	8	48.6	1.99
6.5	180	53	21.6	3	5	18.8	15 36.7	57 11.89	1.235	26.0	6	U	21	12.5	1.99
7.0	187	28	32.4	2	34	31.4	15 32.7	56 57.07	1.234	26.5	7	L	9	36.3	1.98
7.5	194	0	22.0	2	1	58.0	15 28.6	56 42.29	1.231	27.0	7	U	22	0.1	1.99
8.0	200	28	53.1	-1	28	6.6	15 24.6	56 27.54	-1.236	27.5	8	L	10	24.0	2.00
8.5	206	54	9.4	0	53	25.0	15 20.6	56 12.90	1.214	28.0	8	U	22	48.0	2.01
9.0	213	16	14.3	-0	18	21.0	15 16.7	55 58.43	1.197	28.5	9	L	11	12.2	2.02
9.5	219	35	12.4	+0	16	38.8	15 12.8	55 44.19	1.174	29.0	9	U	23	36.4	2.02
10.0	225	51	8.3	0	51	8.9	15 9.0	55 30.30	1.140	29.5	10	L	12	0.8	2.04
10.5	232	4	7.8	+1	24	45.1	15 5.4	55 16.87	-1.095	0.3					
11.0	238	14	18.3	1	57	5.3	15 1.9	55 4.06	1.028	0.8	11	U	0	25.3	2.04
11.5	244	21	48.1	2	27	49.0	14 58.6	54 52.01	0.967	1.3	11	L	12	49.8	2.04
12.0	250	26	47.7	2	56	37.8	14 55.6	54 40.91	0.881	1.8	12	U	1	14.3	2.04
12.5	256	29	29.3	3	23	15.4	14 52.8	54 30.93	0.779	2.3	12	L	13	38.8	2.04
13.0	262	30	7.3	+3	47	27.6	14 50.5	54 22.28	-0.661	2.8	13	U	2	3.1	2.02
13.5	268	28	58.3	4	9	2.0	14 48.5	54 15.13	0.537	3.3	13	L	14	27.2	2.00
14.0	274	26	21.6	4	27	48.1	14 47.1	54 9.70	0.378	3.8	14	U	2	51.1	1.98
14.5	280	22	38.4	4	43	37.0	14 46.1	54 6.12	0.215	4.3	14	L	15	14.7	1.95
15.0	286	18	12.6	4	56	21.4	14 45.7	54 4.60	-0.037	4.8	15	U	3	38.0	1.93
15.5	292	13	30.3	+5	5	55.2	14 45.9	54 5.27	+0.151	5.3	15	L	16	1.0	1.90
16.0	298	9	0.0	+5	12	13.4	14 46.7	54 8.27	+0.330	5.8	16	U	4	23.7	1.88

GREENWICH MEAN TIME.

G. M. T.	Longitude.	Latitude.	Semi-diameter.	Horizontal Parallax.	Var. per Hour.	Age.	Transit, Meridian of Greenwich.			Var. per Hour.
	" "	" "	" "	" "	" "	d	Nov. 16	U	h m	m
Nov. 16.0	298 9 0.0	+5 12 13.4	14 46.7	54 8.27	+0.350	5.8	Nov. 16	U	4 23.7	1.88
16.5	304 5 11.9	5 15 12.0	14 48.2	54 13.71	0.558	6.3	16	L	16 46.2	1.87
17.0	310 2 37.9	5 14 45.1	14 50.3	54 21.68	0.770	6.8	17	U	5 8.5	1.85
17.5	316 1 51.9	5 10 59.2	14 53.2	54 32.21	0.985	7.3	17	L	17 30.6	1.84
18.0	322 3 28.2	5 3 44.0	14 56.8	54 45.32	1.199	7.8	18	U	5 52.6	1.84
18.5	328 8 2.1	+4 53 2.0	15 1.0	55 0.96	+1.407	8.3	18	L	18 14.7	1.84
19.0	334 16 8.7	4 38 53.9	15 5.9	55 19.05	1.608	8.8	19	U	6 36.8	1.85
19.5	340 28 22.6	4 21 21.7	15 11.5	55 39.49	1.794	9.3	19	L	18 59.1	1.87
20.0	346 45 17.5	4 0 29.4	15 17.7	56 2.03	1.960	9.8	20	U	7 21.7	1.90
20.5	353 7 24.2	3 36 22.7	15 24.3	56 26.44	2.103	10.3	20	L	19 44.7	1.94
21.0	359 35 11.0	+3 9 10.5	15 31.4	56 52.38	+2.214	10.8	21	U	8 8.2	1.98
21.5	6 9 2.0	2 39 4.9	15 38.8	57 19.43	2.289	11.3	21	L	20 32.3	2.04
22.0	12 49 15.3	2 6 21.5	15 46.3	57 47.14	2.321	11.8	22	U	8 57.2	2.10
22.5	19 36 3.1	1 31 20.7	15 53.9	58 14.95	2.305	12.3	22	L	21 22.8	2.17
23.0	26 29 29.5	0 54 27.4	16 1.3	58 42.26	2.233	12.8	23	U	9 49.3	2.25
23.5	33 29 29.8	+0 18 11.5	16 8.5	59 8.45	+2.117	13.3	23	L	22 16.8	2.33
24.0	40 35 49.6	-0 22 52.3	16 15.1	59 32.84	1.940	13.8	24	U	10 45.1	2.40
24.5	47 48 4.3	1 2 4.7	16 21.1	59 54.80	1.712	14.3	24	L	23 14.4	2.47
25.0	55 5 38.6	1 40 43.4	16 26.3	60 13.75	1.437	14.8	25	U	11 44.4	2.53
25.5	62 27 47.6	2 18 3.5	16 30.5	60 29.14	1.121	15.3			.....	.....
26.0	69 53 37.3	-2 53 19.9	16 33.6	60 40.56	+0.780	15.8	26	L	0 15.0	2.57
26.5	77 22 6.5	3 25 49.0	16 35.5	60 47.79	0.421	16.3	26	U	12 46.0	2.59
27.0	84 52 8.8	3 54 50.4	16 36.3	60 50.65	+0.057	16.8	27	L	1 17.1	2.59
27.5	92 22 35.4	4 19 49.0	16 35.9	60 49.21	-0.295	17.3	27	U	13 49.1	2.57
28.0	99 52 17.7	4 40 16.4	16 34.4	60 43.66	0.626	17.8	28	L	2 18.8	2.54
28.5	107 20 10.6	-4 55 51.8	16 31.9	60 34.32	-0.923	18.3	28	U	14 49.0	2.49
29.0	114 45 14.5	5 6 22.7	16 28.4	60 21.60	1.186	18.8	29	L	3 18.4	2.42
29.5	122 6 37.5	5 11 44.5	16 24.2	60 6.03	1.401	19.3	29	U	15 47.0	2.36
30.0	129 23 37.0	5 12 0.2	16 19.3	59 48.16	1.570	19.8	30	L	4 14.9	2.28
30.5	136 35 40.1	5 7 19.2	16 13.9	59 28.52	1.695	20.3	30	U	16 41.8	2.22
Dec. 1.0	143 42 24.4	-4 57 56.6	16 8.3	59 7.66	-1.776	20.8	Dec. 1	L	5 8.1	2.16
1.5	150 43 36.6	4 44 11.8	16 2.4	58 46.05	1.819	21.3	1	U	17 33.6	2.10
2.0	157 39 12.5	4 26 27.4	15 56.4	58 24.15	1.827	21.8	2	L	5 58.6	2.06
2.5	164 29 15.1	4 5 8.2	15 50.5	58 2.31	1.807	22.3	2	U	18 23.0	2.02
3.0	171 13 53.6	3 40 40.5	15 44.6	57 40.88	1.764	22.8	3	L	6 47.1	1.99
3.5	177 53 22.3	-3 13 31.1	15 38.9	57 20.04	-1.704	23.3	3	U	19 10.9	1.97
4.0	184 27 58.9	2 44 7.2	15 33.5	57 0.04	1.630	23.8	4	L	7 34.5	1.96
4.5	190 58 3.0	2 12 55.8	15 28.3	56 40.95	1.551	24.3	4	U	19 53.0	1.96
5.0	197 23 55.9	1 40 23.4	15 23.3	56 22.85	1.461	24.8	5	L	8 21.5	1.96
5.5	203 45 58.9	1 6 56.0	15 18.7	56 5.82	1.375	25.3	5	U	20 45.1	1.97
6.0	210 4 32.9	-0 32 59.0	15 14.4	55 49.84	-1.287	25.8	6	L	9 8.7	1.98
6.5	216 19 58.0	+0 1 3.3	15 10.3	55 34.92	1.200	26.3	6	U	21 32.6	1.99
7.0	222 32 32.7	0 34 47.3	15 6.5	55 21.03	1.115	26.8	7	L	9 56.5	2.00
7.5	228 42 34.1	1 7 50.6	15 3.0	55 8.15	1.032	27.3	7	U	22 20.6	2.02
8.0	234 50 17.3	1 39 51.7	14 59.7	54 56.27	0.948	27.8	8	L	10 44.9	2.03
8.5	240 55 56.5	+2 10 30.6	14 56.8	54 45.39	-0.867	28.3	8	U	23 9.2	2.03
9.0	246 59 43.9	+2 39 28.5	14 54.1	54 35.46	-0.786	28.8	9	L	11 33.5	2.03

GREENWICH MEAN TIME.

G. M. T.	Longitude.	Latitude.	Semi-diameter.	Horizontal Parallax.	Var. per Hour.	Age.	Transit, Meridian of Greenwich.			Var. per Hour.
								h	m	
Dec. 9.0	246 59 43.9	+2 39 28.5	14 54.1	54 35.46	-0.786	28.8	Dec. 9	L	11 35.5	2.03
9.5	258 1 50.8	3 6 28.2	14 51.6	54 26.55	0.700	29.8	9	U	23 57.8	2.08
10.0	269 2 27.7	3 31 14.0	14 49.5	54 18.67	0.612	0.1	10	L	12 22.1	2.01
10.5	265 1 44.8	3 53 32.2	14 47.7	54 11.89	0.518	0.6			.....	....
11.0	270 59 02.3	4 13 10.3	14 46.1	54 6.27	0.417	1.1	11	U	0 46.1	2.00
11.5	276 57 0.7	+4 29 58.0	14 44.9	54 1.91	-0.308	1.6	11	L	13 10.0	1.98
12.0	282 53 21.7	4 43 46.6	14 44.1	53 58.91	0.201	2.1	12	U	1 33.5	1.95
12.5	288 49 8.2	4 54 29.2	14 43.7	53 57.37	-0.083	2.6	12	L	13 56.8	1.93
13.0	294 44 34.7	5 2 0.3	14 43.7	53 57.44	+0.076	3.1	13	U	2 19.8	1.90
13.5	300 39 57.6	5 6 16.2	14 44.2	53 59.24	0.226	3.6	13	L	14 42.4	1.87
14.0	306 35 35.9	+5 7 14.4	14 45.2	54 2.91	+0.386	4.1	14	U	3 4.8	1.85
14.5	312 31 50.5	5 4 53.9	14 46.7	54 8.55	0.568	4.6	14	L	15 26.9	1.83
15.0	318 29 5.3	4 59 14.8	14 48.9	54 16.33	0.730	5.1	15	U	3 48.8	1.82
15.5	324 27 46.5	4 50 18.4	14 51.6	54 26.30	0.925	5.6	15	L	16 10.6	1.81
16.0	330 25 22.8	4 38 7.2	14 54.9	54 38.56	1.118	6.1	16	U	4 32.2	1.80
16.5	336 31 25.1	+4 22 44.8	14 58.9	54 53.15	+1.315	6.6	16	L	16 53.9	1.82
17.0	342 37 26.3	4 4 16.7	15 3.5	55 10.12	1.512	7.1	17	U	5 15.8	1.84
17.5	348 47 1.1	3 42 46.5	15 8.8	55 29.41	1.703	7.6	17	L	17 37.8	1.85
18.0	355 0 44.4	3 18 24.8	15 14.7	55 50.97	1.897	8.1	18	U	6 0.2	1.88
18.5	1 19 12.1	2 51 20.2	15 21.1	56 14.65	2.097	8.6	18	L	18 23.0	1.92
19.0	7 42 59.3	+2 21 44.8	15 28.1	56 40.27	+2.308	9.1	19	U	6 46.3	1.97
19.5	14 12 39.1	1 49 53.4	15 35.5	57 7.54	2.521	9.6	19	L	19 16.3	2.04
20.0	20 48 41.8	1 16 4.0	15 43.3	57 36.09	2.722	10.1	20	U	7 35.2	2.11
20.5	27 31 33.5	0 40 38.2	15 51.3	58 5.50	2.972	10.6	20	L	20 0.9	2.18
21.0	34 21 33.6	+0 4 1.5	15 59.4	58 35.23	3.275	11.1	21	U	8 27.5	2.26
21.5	41 18 54.1	-0 33 15.7	16 7.4	59 4.67	+3.421	11.6	21	L	20 55.2	2.35
22.0	48 23 37.2	1 10 39.4	16 15.2	59 33.11	3.200	12.1	22	U	9 23.8	2.43
22.5	55 35 33.1	1 47 31.0	16 22.5	59 59.85	2.136	12.6	22	L	21 53.4	2.50
23.0	62 54 19.8	2 23 9.2	16 29.1	60 24.12	1.890	13.1	23	U	10 23.8	2.57
23.5	70 19 21.3	2 56 50.2	16 34.8	60 45.19	1.603	13.6	23	L	22 54.9	2.61
24.0	77 49 48.0	-3 27 50.1	16 39.5	61 2.39	+1.254	14.1	24	U	11 26.4	2.63
24.5	85 24 26.9	3 55 26.1	16 43.0	61 15.13	0.965	14.6	24	L	23 58.0	2.63
25.0	93 2 34.2	4 18 59.3	16 45.1	61 23.03	0.647	15.1	25	U	12 29.5	2.61
25.5	100 42 17.2	4 37 58.2	16 45.9	61 25.81	+0.015	15.6			.....	....
26.0	108 22 18.7	4 51 56.2	16 45.2	61 23.40	-0.413	16.1	26	L	1 0.6	2.57
26.5	116 1 11.0	-5 0 37.6	16 43.2	61 15.98	-0.820	16.6	26	U	13 31.2	2.52
27.0	123 37 29.1	5 3 56.1	16 39.9	61 3.86	1.393	17.1	27	L	2 1.0	2.45
27.5	131 9 55.9	5 1 54.6	16 35.5	60 47.54	1.519	17.6	27	U	14 29.9	2.38
28.0	138 37 24.6	4 54 44.8	16 30.0	60 27.62	1.792	18.1	28	L	2 58.1	2.31
28.5	145 59 1.5	4 42 45.6	16 23.8	60 4.77	2.006	18.6	28	U	15 25.3	2.24
29.0	153 14 6.4	-4 26 21.9	16 17.0	59 39.71	-2.100	19.1	29	L	3 51.8	2.18
29.5	160 22 13.3	4 6 2.3	16 9.8	59 13.15	2.237	19.6	29	U	16 17.6	2.12
30.0	167 23 9.7	3 42 17.9	16 2.3	58 45.76	2.390	20.1	30	L	4 42.3	2.06
30.5	174 16 54.9	3 15 40.9	15 54.8	58 18.14	2.566	20.6	30	U	17 7.5	2.04
31.0	181 3 28.8	2 46 43.1	15 47.3	57 50.83	2.760	21.1	31	L	5 31.8	2.01
31.5	187 43 39.2	-2 15 55.6	15 40.1	57 24.27	-2.172	21.6	31	U	17 56.8	2.00
32.0	194 17 20.5	-1 43 48.1	15 33.2	56 58.82	-2.006	22.1	32	L	6 19.7	1.99

GREENWICH MEAN TIME.

Date.	Apparent Right Ascension.			Var. per Hour.	Apparent Declination.			Var. per Hour.	Logarithm of Distance from Earth.	Var. per Hour.	Semi-diameter.	Hor. Parallax.	Transit Meridian of Greenwich.
	h	m	s	s	°	'	"	"	Noon.	Noon.	Noon.	Noon.	h m
Jan. 1	17	18	25.64	+14.735	-22	25	4.0	- 35.09	0.084 0579	+2224.6	2.75	7.25	22 40.9
2	17	24	22.03	14.961	22	38	40.9	32.96	0.089 2561	2106.1	2.72	7.16	22 43.0
3	17	30	23.62	15.166	22	51	25.0	30.68	0.094 1808	1996.6	2.69	7.08	22 45.2
4	17	36	30.01	15.363	23	8	12.8	28.29	0.098 8435	1886.3	2.66	7.01	22 47.4
5	17	42	40.86	15.540	23	14	2.0	25.77	0.103 2551	1787.3	2.64	6.94	22 49.7
6	17	48	55.84	+15.706	-23	23	48.9	- 23.14	0.107 4257	+1686.9	2.61	6.87	22 52.1
7	17	55	14.67	15.861	23	32	31.9	20.44	0.111 3650	1584.4	2.58	6.81	22 54.5
8	18	1	37.08	16.004	23	40	9.2	17.64	0.115 0817	1503.4	2.56	6.75	22 57.0
9	18	8	2.82	16.139	23	46	38.0	14.75	0.118 5838	1415.5	2.54	6.70	22 59.5
10	18	14	31.68	16.264	23	51	56.8	11.80	0.121 8786	1330.3	2.52	6.65	23 2.1
11	18	21	3.45	+16.383	-23	56	3.9	- 8.78	0.124 9735	+1248.7	2.50	6.60	23 4.8
12	18	27	37.93	16.496	23	58	57.8	5.70	0.127 8741	1166.9	2.49	6.56	23 7.4
13	18	34	14.94	16.592	24	0	36.9	- 2.55	0.130 5862	1091.6	2.48	6.52	23 10.2
14	18	40	54.30	16.687	24	0	59.9	+ 0.65	0.133 1152	1016.2	2.46	6.48	23 12.9
15	18	47	35.85	16.774	24	0	5.5	3.90	0.135 4652	942.5	2.45	6.44	23 15.7
16	18	54	19.45	+16.857	-23	57	52.6	+ 7.19	0.137 6406	+ 870.3	2.43	6.41	23 18.5
17	19	1	4.94	16.933	23	54	20.1	10.63	0.139 6445	796.3	2.42	6.38	23 21.4
18	19	7	52.19	17.004	23	49	26.8	13.91	0.141 4802	730.3	2.41	6.35	23 24.3
19	19	14	41.07	17.069	23	43	11.9	17.33	0.143 1501	681.3	2.40	6.33	23 27.2
20	19	21	31.45	17.128	23	35	34.4	20.80	0.144 6562	598.6	2.39	6.31	23 30.1
21	19	28	23.20	+17.183	-23	28	33.3	+ 24.29	0.145 9996	+ 536.0	2.39	6.29	23 33.0
22	19	35	16.22	17.234	23	16	8.1	27.82	0.147 1815	486.9	2.38	6.27	23 36.0
23	19	42	10.40	17.280	23	4	17.7	31.38	0.148 2023	391.3	2.37	6.25	23 39.0
24	19	49	5.63	17.322	22	51	1.6	34.97	0.149 0618	324.5	2.37	6.24	23 42.0
25	19	56	1.81	17.360	22	36	19.0	38.58	0.149 7595	266.3	2.36	6.23	23 45.0
26	20	2	58.85	+17.393	-22	20	9.3	+ 42.23	0.150 2939	+ 188.4	2.36	6.23	23 48.0
27	20	9	56.65	17.423	22	2	31.9	45.89	0.150 6632	119.3	2.36	6.22	23 51.1
28	20	16	55.13	17.450	21	43	26.3	49.58	0.150 8652	+ 48.9	2.36	6.22	23 54.1
29	20	23	54.20	17.472	21	22	52.0	53.28	0.150 8968	- 22.9	2.36	6.22	23 57.2
30	20	30	53.78	17.493	21	0	48.6	57.00	0.150 7539	96.3	2.36	6.22	...
31	20	37	53.81	+17.510	-20	37	15.6	+ 60.75	0.150 4329	- 171.3	2.36	6.22	0 0.2
Feb. 1	20	44	54.21	17.522	20	12	12.6	64.50	0.149 9274	249.7	2.36	6.23	0 3.3
2	20	51	54.85	17.531	19	45	39.7	68.25	0.149 2323	380.3	2.37	6.24	0 6.4
3	20	58	55.70	17.539	19	17	36.6	72.01	0.148 3397	414.0	2.37	6.25	0 9.4
4	21	5	56.68	17.543	18	48	3.1	75.78	0.147 2422	501.3	2.38	6.27	0 12.5
5	21	12	57.70	+17.542	-18	16	59.4	+ 79.53	0.145 9307	- 592.4	2.39	6.29	0 15.6
6	21	19	58.65	17.537	17	44	25.6	83.28	0.144 3950	688.1	2.40	6.32	0 18.7
7	21	26	59.44	17.528	17	10	22.2	87.00	0.142 6240	788.6	2.41	6.34	0 21.8
8	21	33	59.94	17.513	16	34	49.8	90.70	0.140 6052	894.7	2.42	6.37	0 24.8
9	21	41	0.00	17.492	15	57	49.2	94.35	0.138 3249	1006.6	2.43	6.40	0 27.9
10	21	47	59.48	+17.464	-15	19	21.5	+ 97.95	0.135 7682	-1126.1	2.45	6.44	0 31.0
11	21	54	58.18	17.426	14	39	28.2	101.48	0.132 9186	1280.3	2.46	6.48	0 34.0
12	22	1	55.86	17.379	13	58	11.2	104.93	0.129 7588	1384.1	2.47	6.53	0 37.0
13	22	8	52.26	17.319	13	15	32.7	108.26	0.126 2681	1525.8	2.49	6.58	0 40.0
14	22	15	47.05	17.244	12	31	35.9	111.45	0.122 4275	1676.3	2.52	6.64	0 43.0
15	22	22	39.85	+17.153	-11	46	24.2	+114.49	0.118 2149	-1886.0	2.54	6.70	0 45.9
16	22	29	30.22	+17.040	-11	0	1.9	+117.33	0.113 6071	-2005.5	2.57	6.77	0 48.8

GREENWICH MEAN TIME.

Date.	Apparent Right Ascension.			Var. per Hour.	Apparent Declination.			Var. per Hour.	Logarithm of Distance from Earth.	Var. per Hour.	Semi-diameter.	Hor. Parallax.	Transit, Meridian of Greenwich.
	Hours.	Minutes.	Seconds.		Hours.	Minutes.	Seconds.						
Feb. 16	22	29	30.22	+17.940	-11	0	1.9	+117.23	0.113 6071	-2035.5	2.57	6.77	0 49.8
17	22	26	17.60	16.304	10	12	34.2	119.23	0.108 5904	2125.1	2.60	6.85	0 51.7
18	22	43	1.37	16.789	9	24	7.4	123.25	0.103 1103	2075.1	2.64	6.94	0 54.5
19	22	40	40.80	16.543	8	34	48.8	126.24	0.097 1716	2075.4	2.68	7.04	0 57.2
20	22	56	15.02	16.304	7	44	47.0	125.84	0.090 7406	2035.5	2.72	7.14	0 59.8
21	23	2	43.05	+16.024	-6	54	11.9	+127.00	0.083 7933	-2035.0	2.76	7.26	1 2.4
22	23	9	3.76	15.608	6	3	14.8	127.00	0.076 3008	2025.9	2.80	7.38	1 4.8
23	23	15	15.89	15.308	5	12	8.6	127.78	0.068 2704	2007.7	2.86	7.52	1 7.0
24	23	21	18.02	14.830	4	21	7.8	127.30	0.059 6610	2070.5	2.91	7.67	1 9.1
25	23	27	8.60	14.244	3	30	28.3	125.97	0.050 4723	2000.0	2.97	7.83	1 11.0
26	23	32	45.95	+13.736	-2	40	27.3	+126.26	0.040 7015	-4192.0	3.04	8.01	1 12.7
27	23	38	8.28	13.091	1	51	23.5	123.30	0.030 3586	4490.3	3.11	8.21	1 14.1
28	23	43	13.69	12.347	1	3	36.5	117.23	0.019 4422	4461.0	3.20	8.42	1 15.2
29	23	48	0.23	11.521	-0	17	26.7	115.00	0.007 9905	4670.7	3.28	8.64	1 16.0
Mar. 1	23	52	26.07	10.635	+0	26	44.9	107.73	9.996 0326	5023.1	3.37	8.88	1 16.5
2	23	56	29.16	+9.680	+1	8	37.2	+101.20	9.983 6131	-5235.5	3.47	9.14	1 16.6
3	0	0	7.69	8.870	1	47	49.8	94.40	9.970 7881	5419.2	3.57	9.41	1 16.3
4	0	3	19.97	7.442	2	24	2.0	86.45	9.957 6251	5544.7	3.68	9.70	1 15.5
5	0	6	4.45	6.265	2	56	54.5	77.77	9.944 2014	5665.6	3.80	10.01	1 14.3
6	0	8	19.82	5.018	3	26	9.3	68.24	9.930 6054	5667.6	3.92	10.32	1 12.6
7	0	10	5.05	+3.745	+3	51	29.7	+55.25	9.916 9349	-5697.1	4.04	10.65	1 10.4
8	0	11	19.44	2.451	4	12	40.8	47.00	9.903 2962	5660.6	4.17	10.99	1 7.6
9	0	12	2.68	+1.123	4	29	30.1	36.45	9.889 8028	5675.6	4.31	11.34	1 4.4
10	0	12	14.86	-0.123	4	41	47.7	24.26	9.876 5742	5420.6	4.44	11.69	1 0.6
11	0	11	56.57	1.264	4	49	26.5	13.24	9.863 7346	5251.3	4.57	12.04	0 56.4
12	0	11	8.88	-2.579	+4	52	22.9	+1.46	9.851 4100	-5016.5	4.71	12.39	0 51.7
13	0	9	53.39	3.697	4	50	37.5	-10.21	9.839 7256	4718.0	4.83	12.73	0 46.5
14	0	8	12.24	4.714	4	44	15.3	21.58	9.828 3033	4675.9	4.95	13.05	0 40.8
15	0	6	8.09	5.511	4	33	26.0	32.43	9.818 7583	3967.6	5.07	13.36	0 34.8
16	0	3	44.05	6.308	4	18	24.5	42.55	9.809 6952	3558.3	5.18	13.64	0 28.5
17	0	1	3.68	-6.970	+3	59	30.5	-61.77	9.801 7037	-3085.7	5.28	13.89	0 21.9
18	23	58	10.83	7.406	3	37	8.6	59.25	9.794 8572	2666.1	5.35	14.11	0 15.1
19	23	55	9.56	7.670	3	11	47.8	66.66	9.789 2080	2009.4	5.43	14.30	0 8.2
20	23	52	4.04	7.751	2	44	0.3	72.05	9.784 7364	1584.7	5.48	14.44	0 23 <sup>0</sup> 54.2
21	23	48	58.26	7.663	2	14	20.7	76.00	9.781 6003	1071.5	5.52	14.55	23 47.3
22	23	45	56.44	-7.450	+1	43	24.5	-79.44	9.779 6349	-666.3	5.55	14.62	23 40.4
23	23	43	1.90	7.072	1	11	47.2	79.43	9.778 8548	-85.1	5.56	14.64	23 33.8
24	23	40	18.00	6.587	0	40	3.0	79.04	9.779 2059	+372.9	5.55	14.63	23 27.4
25	23	37	47.56	5.964	+0	8	43.6	77.33	9.780 6197	799.6	5.53	14.58	23 21.2
26	23	35	32.91	5.264	-0	21	42.3	74.00	9.783 0157	1191.3	5.50	14.50	23 15.3
27	23	33	35.92	+4.430	-0	50	49.6	-70.26	9.786 3066	+1545.0	5.47	14.39	23 9.8
28	23	31	57.98	3.670	1	18	17.1	66.32	9.790 4006	1860.1	5.41	14.26	23 4.5
29	23	30	40.03	2.823	1	43	47.6	61.13	9.795 2046	2127.0	5.35	14.10	22 59.6
30	23	29	42.63	1.900	2	7	7.5	55.46	9.800 6236	2676.9	5.29	13.93	22 55.1
31	23	29	6.00	1.094	2	28	6.7	49.43	9.806 5855	2331.5	5.22	13.74	22 50.9
Apr. 1	23	23	50.07	-0.200	-2	46	38.1	-48.16	9.812 9938	+2733.5	5.14	13.54	22 47.0
2	23	23	54.54	+0.605	-3	2	37.4	-36.77	9.819 7786	+2395.7	5.06	13.33	22 43.4

GREENWICH MEAN TIME.

Date.	Apparent Right Ascension.			Var. per Hour.	Apparent Declination.			Var. per Hour.	Logarithm of Distance from Earth.	Var. per Hour.	Semi-diameter.	Hor. Parallax.	Transit, Meridian of Greenwich.
	Noon.			Noon.	Noon.			Noon.	Noon.	Noon.	Noon.	Noon.	h m s
Apr. 1	23	28	50.07	- 0.236	- 2	46	38.1	- 43.16	9.812 9938	+3233.5	5.14	13.54	22 47.0
2	23	28	54.54	+ 0.605	3	2	37.4	26.77	9.819 7786	2995.7	5.06	13.33	22 43.4
3	23	29	18.93	1.423	3	16	2.4	39.32	9.826 8714	3010.3	4.97	13.11	22 40.2
4	23	30	2.61	2.212	3	26	52.7	23.68	9.834 2112	3102.0	4.89	12.89	22 37.3
5	23	31	4.84	2.969	3	35	9.2	17.51	9.841 7498	3171.9	4.81	12.67	22 34.7
6	23	32	24.85	+ 3.893	- 3	40	54.2	- 11.26	9.849 4217	+3226.5	4.73	12.45	22 32.3
7	23	34	1.81	4.232	3	44	10.8	- 5.15	9.857 2096	3290.0	4.64	12.23	22 30.3
8	23	35	54.88	5.034	3	45	2.5	+ 0.80	9.865 0541	3290.9	4.55	12.01	22 28.5
9	23	38	3.22	5.664	3	43	33.5	6.58	9.872 9426	3291.1	4.48	11.79	22 26.9
10	23	40	26.02	6.249	3	39	47.9	12.13	9.880 8433	3291.4	4.39	11.58	22 25.5
11	23	43	2.49	+ 6.794	- 3	33	50.2	+ 17.59	9.888 7346	+3283.5	4.32	11.37	22 24.4
12	23	45	51.87	7.244	3	25	45.0	22.81	9.896 5986	3286.7	4.24	11.17	22 23.5
13	23	48	53.45	7.811	3	15	36.6	27.85	9.904 4197	3268.3	4.17	10.97	22 22.7
14	23	52	6.58	8.379	3	3	29.5	32.71	9.912 1864	3223.2	4.09	10.77	22 22.2
15	23	55	30.64	8.732	2	49	27.9	37.39	9.919 8877	3194.1	4.02	10.58	22 21.8
16	23	59	5.02	+ 9.141	- 2	33	36.3	+ 41.89	9.927 5158	+3182.3	3.95	10.40	22 21.6
17	0	2	49.24	9.541	2	15	58.5	46.23	9.935 0642	3127.3	3.88	10.22	22 21.5
18	0	6	42.82	9.921	1	56	38.4	50.42	9.942 5276	3091.5	3.82	10.05	22 21.6
19	0	10	45.32	10.295	1	35	39.8	54.45	9.949 9019	3053.6	3.75	9.88	22 21.8
20	0	14	56.37	10.634	1	13	6.2	58.33	9.957 1839	3014.6	3.68	9.71	22 22.2
21	0	19	15.63	+10.989	- 0	49	1.2	+ 62.07	9.964 3714	+2974.3	3.62	9.55	22 22.7
22	0	23	42.81	11.294	- 0	23	28.0	65.68	9.971 4624	2934.2	3.57	9.40	22 23.3
23	0	28	17.67	11.610	+ 0	3	30.2	69.15	9.978 4551	2893.0	3.51	9.25	22 24.1
24	0	33	0.01	11.917	0	31	50.2	72.50	9.985 3485	2851.3	3.46	9.10	22 25.0
25	0	37	49.65	12.219	1	1	29.3	75.73	9.992 1410	2809.1	3.40	8.96	22 26.0
26	0	42	46.48	+12.516	+ 1	32	24.4	+ 78.84	9.998 8316	+2766.3	3.35	8.82	22 27.1
27	0	47	50.40	12.810	2	4	32.7	81.83	0.005 4187	2722.9	3.30	8.69	22 28.4
28	0	53	1.36	13.103	2	37	51.4	84.71	0.011 9009	2678.3	3.25	8.56	22 29.7
29	0	58	19.35	13.396	3	12	17.9	87.48	0.018 2764	2633.3	3.21	8.44	22 31.1
30	1	3	44.37	13.690	3	47	49.3	90.13	0.024 5425	2587.7	3.16	8.32	22 32.7
May 1	1	9	16.47	+13.986	+ 4	24	23.0	+ 92.66	0.030 6965	+2540.4	3.11	8.20	22 34.4
2	1	14	55.73	14.286	5	1	56.1	95.08	0.036 7351	2491.5	3.07	8.09	22 36.3
3	1	20	42.25	14.591	5	40	25.6	97.37	0.042 6541	2440.7	3.03	7.98	22 38.2
4	1	26	36.16	14.902	6	19	48.7	99.54	0.048 4489	2387.9	2.99	7.87	22 40.3
5	1	32	37.63	15.221	7	0	2.4	101.68	0.054 1139	2332.4	2.95	7.77	22 42.5
6	1	38	46.83	+15.548	+ 7	41	3.2	+103.47	0.059 6422	+2274.0	2.91	7.67	22 44.8
7	1	45	3.98	15.883	8	22	47.7	105.22	0.065 0266	2212.3	2.87	7.58	22 47.4
8	1	51	29.29	16.228	9	5	12.4	106.81	0.070 2584	2146.3	2.84	7.48	22 49.9
9	1	58	2.99	16.583	9	48	13.1	108.23	0.075 3278	2076.9	2.81	7.40	22 52.7
10	2	4	45.38	16.950	10	31	45.6	109.45	0.080 2235	2002.0	2.78	7.32	22 55.6
11	2	11	36.67	+17.327	+11	15	45.0	+110.47	0.084 9331	+1921.7	2.75	7.24	22 58.7
12	2	18	37.14	17.715	12	0	6.3	111.27	0.089 4429	1835.3	2.72	7.16	23 1.9
13	2	25	47.04	18.112	12	44	43.7	111.81	0.093 7373	1742.2	2.70	7.09	23 5.3
14	2	33	6.59	18.519	13	29	30.8	112.08	0.097 7994	1641.7	2.67	7.02	23 8.8
15	2	40	36.02	18.934	14	14	20.8	112.04	0.101 6109	1533.2	2.64	6.96	23 12.6
16	2	48	15.48	+19.355	+14	59	5.9	+111.66	0.105 1580	+1416.3	2.62	6.91	23 16.4
17	2	56	5.08	+19.779	+15	43	37.8	+110.93	0.108 4018	+1290.4	2.60	6.86	23 20.5

GREENWICH MEAN TIME.

Date.	Apparent Right Ascension.			Var. per Hour.	Apparent Declination.			Var. per Hour.	Logarithm of Distance from Earth.	Var. per Hour.	Semi-diameter.	Hor. Parallax.	Transit, Meridian of Greenwich.
	Hours.	Minutes.	Seconds.		Hours.	Minutes.	Seconds.						
May 17	2	56	5.06	+19.779	+15	43	37.8	+139.93	0.106 4618	+3290.4	2.60	6.86	23 20.5
18	3	4	4.85	20.302	16	27	47.4	109.80	0.111 3364	1245.2	2.58	6.81	23 24.7
19	3	12	14.75	20.622	17	11	24.6	106.23	0.118 9302	1040.5	2.57	6.77	23 29.1
20	3	20	34.62	21.022	17	54	19.0	106.22	0.116 1812	886.3	2.56	6.74	23 33.7
21	3	29	4.17	21.426	18	36	19.1	106.71	0.118 0419	692.8	2.54	6.71	23 38.4
22	3	37	42.99	+21.826	+19	17	13.0	+106.70	0.119 4963	+ 580.4	2.53	6.68	23 43.3
23	3	46	30.50	22.161	19	56	48.5	97.18	0.120 5333	340.0	2.53	6.67	23 48.3
24	3	55	25.99	22.466	20	34	53.3	86.14	0.121 1259	+ 182.7	2.52	6.66	23 53.4
25	4	4	28.56	22.741	21	11	15.0	86.59	0.121 2619	- 40.2	2.52	6.66	23 58.6
26	4	13	37.19	22.970	21	45	41.8	86.87	0.120 9300	267.0	2.52	6.66	...
27	4	22	59.69	+23.147	+22	18	2.5	+ 78.08	0.120 1225	- 406.0	2.53	6.67	0 3.9
28	4	32	7.79	23.266	22	48	6.5	72.20	0.118 8369	635.2	2.54	6.69	0 9.3
29	4	41	27.11	23.522	23	15	45.3	66.98	0.117 0749	262.7	2.55	6.72	0 14.7
30	4	50	47.23	23.526	23	49	51.3	60.48	0.114 8429	1026.5	2.56	6.76	0 20.1
31	5	0	6.69	23.577	24	3	18.7	52.78	0.112 1517	1215.1	2.58	6.80	0 25.5
June 1	5	9	24.06	+23.561	+24	23	3.4	+ 65.94	0.109 0160	-1969.7	2.60	6.85	0 30.8
2	5	18	37.96	23.969	24	40	3.2	59.04	0.106 4541	1670.2	2.62	6.90	0 36.2
3	5	27	47.69	23.233	24	54	17.5	52.15	0.101 4960	1784.9	2.65	6.97	0 41.4
4	5	36	50.19	22.483	25	5	47.2	35.34	0.097 1342	1899.9	2.68	7.04	0 46.5
5	5	45	46.15	22.169	25	14	34.7	23.65	0.092 4224	2085.0	2.70	7.11	0 51.5
6	5	54	33.96	+21.840	+25	20	43.6	+ 12.13	0.087 3740	-2170.2	2.74	7.20	0 56.4
7	6	3	12.77	21.417	25	24	18.7	+ 5.83	0.082 0135	2265.4	2.77	7.29	1 1.1
8	6	11	41.74	20.995	25	25	25.3	- 9.28	0.076 3696	2411.2	2.80	7.38	1 5.6
9	6	20	0.30	20.547	25	24	9.7	6.08	0.079 4469	2517.9	2.84	7.48	1 10.0
10	6	28	7.81	20.076	25	20	38.4	12.63	0.064 2345	2616.0	2.88	7.59	1 14.2
11	6	36	3.81	+19.668	+25	14	58.5	- 19.74	0.057 8966	-2706.1	2.92	7.70	1 18.2
12	6	43	47.92	19.066	25	7	17.2	21.06	0.051 3012	2799.0	2.97	7.82	1 22.0
13	6	51	19.80	18.379	24	57	41.8	26.26	0.044 5151	2965.0	3.02	7.94	1 25.6
14	6	58	39.19	18.044	24	46	19.6	29.55	0.037 5543	2984.8	3.06	8.07	1 28.9
15	7	5	45.86	17.510	24	33	18.1	34.53	0.030 4327	2999.0	3.11	8.20	1 32.1
16	7	12	39.64	+16.970	+24	18	44.4	- 26.22	0.023 1632	-3066.1	3.17	8.34	1 35.0
17	7	19	20.36	16.423	24	2	45.8	41.61	0.015 7578	3112.5	3.23	8.49	1 37.8
18	7	25	47.88	15.870	23	45	29.3	44.71	0.008 2269	3162.5	3.28	8.64	1 40.3
19	7	32	2.10	15.313	23	27	1.9	47.53	0.000 5806	3206.7	3.34	8.79	1 42.6
20	7	38	2.89	14.752	23	7	30.4	50.06	9.992 8281	3251.2	3.40	8.95	1 44.6
21	7	43	50.15	+14.186	+22	47	1.4	- 22.21	9.984 9778	-3290.2	3.46	9.11	1 46.4
22	7	49	23.76	13.614	22	25	41.6	54.29	9.977 0379	3325.8	3.52	9.28	1 48.0
23	7	54	43.60	13.028	22	3	37.4	58.01	9.969 0163	3363.3	3.59	9.45	1 49.4
24	7	59	49.55	12.467	21	40	55.0	61.48	9.960 9205	3397.7	3.65	9.63	1 50.6
25	8	4	41.47	11.898	21	17	40.8	65.67	9.952 7581	3423.8	3.72	9.81	1 51.5
26	8	9	19.18	+11.373	+20	54	1.1	- 59.80	9.944 5367	-3456.7	3.80	10.00	1 52.1
27	8	13	42.53	10.671	20	30	1.8	69.29	9.936 2648	3486.2	3.87	10.19	1 52.6
28	8	17	51.31	10.060	20	5	49.1	69.73	9.927 9499	3472.0	3.95	10.39	1 52.7
29	8	21	45.29	9.428	19	41	29.3	69.99	9.919 8020	3498.8	4.02	10.59	1 52.7
30	8	25	24.23	8.809	19	17	8.4	69.61	9.911 2310	3491.8	4.10	10.80	1 52.4
July 1	8	28	47.87	+ 8.123	+18	52	52.4	- 60.47	9.902 8476	-3494.0	4.18	11.01	1 51.8
2	8	31	55.92	+ 7.506	+18	28	48.2	- 59.85	9.894 4644	-3493.1	4.26	11.22	1 51.0

GREENWICH MEAN TIME.

Date.	Apparent Right Ascension.			Var. per Hour.	Apparent Declination.			Var. per Hour.	Logarithm of Distance from Earth.	Var. per Hour.	Semi-diameter.	Hor. Parallax.	Transit Meridian of Greenwich.
	Noon.			Noon.	Noon.			Noon.	Noon.	Noon.	Noon.	Noon.	h m
	h	m	s	s	°	'	"	"			"	"	h m
July 1	8	28	47.87	+ 8.162	+18	52	52.4	-60.47	9.902 8476	-944.0	4.18	11.01	1 51.8
2	8	31	55.92	7.506	18	28	48.2	59.85	9.894 4644	9491.1	4.26	11.22	1 51.0
3	8	34	48.06	6.887	18	5	1.6	58.99	9.886 0953	9482.2	4.34	11.44	1 49.9
4	8	37	23.97	6.153	17	41	39.0	57.85	9.877 7556	9466.3	4.42	11.66	1 48.5
5	8	39	43.30	5.455	17	18	47.0	56.44	9.869 4694	9442.6	4.51	11.89	1 46.9
6	8	41	45.71	+ 4.742	+16	56	32.1	-54.76	9.861 2382	-9410.0	4.59	12.11	1 45.0
7	8	43	30.82	4.015	16	35	1.2	52.78	9.853 1031	9367.5	4.68	12.34	1 42.7
8	8	44	58.31	3.273	16	14	20.8	50.53	9.845 0829	9313.0	4.77	12.57	1 40.2
9	8	46	7.83	2.518	15	54	38.0	47.99	9.837 2066	9247.5	4.86	12.80	1 37.4
10	8	46	59.10	1.752	15	35	59.6	45.17	9.829 5061	9167.2	4.94	13.03	1 34.3
11	8	47	31.84	+ 0.975	+15	18	32.4	-42.06	9.822 0167	-9071.2	5.03	13.26	1 30.9
12	8	47	45.88	+ 0.193	15	2	23.4	39.65	9.814 7731	9057.9	5.11	13.48	1 27.2
13	8	47	41.10	- 0.592	14	47	39.3	34.98	9.807 8337	9026.3	5.20	13.70	1 23.2
14	8	47	17.51	1.374	14	34	26.5	31.04	9.801 2305	9073.2	5.28	13.91	1 18.8
15	8	46	35.24	2.147	14	22	51.4	26.85	9.795 0197	9008.6	5.35	14.11	1 14.2
16	8	45	34.60	- 2.904	+14	12	59.4	-22.44	9.789 2558	-8950.5	5.43	14.30	1 9.2
17	8	44	16.06	3.686	14	4	55.8	17.83	9.783 9966	9076.0	5.49	14.47	1 4.0
18	8	42	40.37	4.333	13	58	44.7	13.06	9.779 8017	1890.0	5.55	14.63	0 58.5
19	8	40	48.48	4.983	13	54	29.8	8.17	9.775 2331	1556.3	5.61	14.77	0 52.7
20	8	38	41.63	5.577	13	52	13.0	- 3.22	9.771 8518	1257.2	5.65	14.88	0 46.6
21	8	36	21.34	- 6.101	+13	51	55.3	+ 1.75	9.769 2181	- 933.5	5.68	14.97	0 40.4
22	8	33	49.44	6.542	13	53	36.3	6.65	9.767 3894	586.9	5.70	15.03	0 33.9
23	8	31	8.06	6.980	13	57	13.8	11.45	9.766 4175	- 219.3	5.72	15.07	0 27.3
24	8	28	19.57	7.132	14	2	44.3	16.05	9.766 3484	+ 164.7	5.72	15.07	0 20.6
25	8	25	26.62	7.260	14	10	2.4	20.41	9.767 2189	522.7	5.70	15.04	0 13.8
26	8	22	32.04	- 7.267	+14	19	1.5	+24.45	9.769 0566	+ 909.3	5.68	14.98	0 7.0
27	8	19	38.83	7.146	14	29	33.3	28.13	9.771 8773	1381.1	5.65	14.88	0 0 0.2 23 53.5
28	8	16	50.05	6.897	14	41	28.4	31.38	9.775 6849	1791.3	5.60	14.75	23 46.9
29	8	14	8.81	6.519	14	54	36.1	34.18	9.780 4704	2195.2	5.54	14.59	23 40.4
30	8	11	38.15	6.016	15	8	45.0	36.48	9.786 2127	2687.3	5.47	14.40	23 34.2
31	8	9	21.00	- 5.204	+15	23	43.1	+38.27	9.792 8790	+2964.3	5.38	14.18	23 28.3
Aug. 1	8	7	20.13	4.661	15	39	17.8	39.53	9.800 4252	3320.5	5.29	13.93	23 22.7
2	8	5	38.08	3.823	15	55	16.4	40.26	9.808 7982	3632.7	5.19	13.67	23 17.4
3	8	4	17.13	2.905	16	11	26.2	40.46	9.817 9366	3957.9	5.08	13.38	23 12.5
4	8	3	19.27	1.905	16	27	34.4	40.14	9.827 7727	4233.3	4.96	13.08	23 8.0
5	8	2	46.22	- 0.840	+16	43	28.8	+39.20	9.838 2342	+4478.9	4.85	12.77	23 3.9
6	8	2	39.36	+ 0.276	16	58	56.5	37.94	9.849 2462	4692.4	4.73	12.45	23 0.3
7	8	2	59.80	1.432	17	13	45.8	36.08	9.860 7318	4573.5	4.60	12.13	22 57.2
8	8	3	48.35	2.618	17	27	44.4	33.73	9.872 6132	5022.4	4.48	11.80	22 54.5
9	8	5	5.57	3.820	17	40	40.9	30.89	9.884 8138	5189.5	4.35	11.47	22 52.3
10	8	6	51.74	+ 5.028	+17	52	23.5	+27.58	9.897 2575	+5225.1	4.23	11.15	22 50.6
11	8	9	6.91	6.225	18	2	41.0	25.80	9.909 8700	5280.3	4.11	10.83	22 49.4
12	8	11	50.92	7.420	18	11	22.1	19.55	9.922 5794	5396.0	3.99	10.52	22 48.6
13	8	15	3.36	8.603	18	18	16.1	14.87	9.935 8167	5808.0	3.87	10.21	22 48.3
14	8	18	43.64	9.748	18	23	12.3	9.74	9.948 0114	5872.2	3.77	9.92	22 48.5
15	8	22	50.95	+10.855	+18	26	0.2	+ 4.20	9.960 6011	+5214.9	3.66	9.64	22 49.1
16	8	27	24.30	+11.436	+18	26	30.7	- 1.78	9.973 0226	+5123.2	3.55	9.36	22 50.1



GREENWICH MEAN TIME.

Date.	Apparent Right Ascension.			Var. per Hour.	Apparent Declination.			Var. per Hour.	Logarithm of Distance from Earth.	Var. per Hour.	Semi-diameter.	Hor. Parallax.	Transit, Meridian of Greenwich.
	Hours.	Minutes.	Seconds.		Hours.	Minutes.	Seconds.						
Aug. 16	8	27	24.30	+11.946	+18	26	30.7	- 1.73	9.973 0226	+5183.3	3.55	9.36	22 50.1
17	8	32	22.49	12.928	18	24	34.7	3.00	9.985 2165	6089.4	3.46	9.10	22 51.5
18	8	37	44.13	13.890	18	29	4.3	14.58	9.997 1264	4995.0	3.36	8.86	22 53.2
19	8	43	27.65	14.746	18	12	53.0	21.40	0.006 7003	4745.6	3.27	8.63	22 55.3
20	8	49	31.32	15.547	18	2	55.4	26.42	0.019 8899	4579.0	3.19	8.41	22 57.8
21	8	55	59.26	+16.308	+17	50	8.0	- 26.55	0.030 6518	+4390.5	3.11	8.20	23 0.5
22	9	2	31.47	16.992	17	34	29.0	42.70	0.040 9486	4189.3	3.04	8.01	23 3.4
23	9	9	28.66	17.446	17	15	58.8	49.30	0.056 7484	3979.1	2.97	7.83	23 6.5
24	9	16	28.29	17.906	16	54	39.5	56.78	0.060 0266	3754.4	2.90	7.66	23 9.8
25	9	23	42.64	18.375	16	30	35.2	63.55	0.068 7648	3539.7	2.85	7.51	23 13.2
26	9	31	4.82	+18.559	+16	8	51.6	- 70.08	0.076 9520	+3325.7	2.80	7.37	23 16.8
27	9	38	32.53	18.793	15	34	36.5	76.17	0.084 5835	3094.1	2.75	7.24	23 20.4
28	9	46	4.80	18.990	15	2	58.7	81.91	0.091 6611	2894.5	2.71	7.12	23 24.0
29	9	53	39.02	19.390	14	29	8.2	87.33	0.098 1922	2699.0	2.67	7.02	23 27.7
30	10	1	13.94	19.650	13	58	15.4	92.09	0.104 1891	2509.5	2.63	6.92	23 31.3
31	10	8	48.21	+19.898	+13	15	31.5	- 98.49	0.109 6682	+2377.6	2.60	6.84	23 34.9
Sept. 1	10	16	20.68	19.901	12	36	7.5	103.43	0.114 6465	1974.2	2.56	6.76	23 38.5
2	10	23	50.38	19.908	11	55	14.5	108.91	0.119 1618	1790.1	2.53	6.69	23 42.0
3	10	31	16.52	19.906	11	13	3.2	108.95	0.123 2009	1595.8	2.51	6.63	23 45.4
4	10	38	38.48	19.930	10	29	44.2	109.58	0.126 8198	1421.5	2.49	6.57	23 48.8
5	10	45	55.77	+19.118	+ 9	45	26.8	-111.81	0.130 0620	+1266.9	2.48	6.52	23 52.0
6	10	53	8.05	17.904	9	0	20.3	113.66	0.132 8608	1102.0	2.46	6.48	23 55.2
7	11	0	15.10	17.682	8	14	33.0	115.22	0.135 3290	966.3	2.45	6.44	23 58.3
8	11	7	16.77	17.457	7	28	12.5	116.43	0.137 4584	819.5	2.43	6.41	...
9	11	14	13.01	17.390	6	41	26.6	117.36	0.139 2692	699.8	2.42	6.38	0 1.3
10	11	21	3.84	+17.006	+ 5	54	21.0	-118.06	0.140 7806	+ 569.9	2.41	6.36	0 4.2
11	11	27	49.31	16.785	5	7	1.7	118.50	0.142 0104	456.1	2.41	6.34	0 7.0
12	11	34	29.54	16.560	4	19	34.4	118.74	0.142 9749	345.7	2.40	6.33	0 9.8
13	11	41	4.65	16.800	3	32	3.5	118.80	0.143 6890	247.3	2.40	6.33	0 12.4
14	11	47	34.82	16.186	2	44	33.5	118.68	0.144 1664	151.3	2.40	6.32	0 15.0
15	11	54	0.22	+16.902	+ 1	57	8.2	-118.41	0.144 4192	+ 60.2	2.39	6.31	0 17.5
16	12	0	21.06	16.776	1	9	51.1	118.00	0.144 4587	- 26.6	2.39	6.31	0 19.9
17	12	6	37.53	16.596	+ 0	22	45.5	117.45	0.144 2946	109.6	2.39	6.31	0 22.2
18	12	12	49.83	16.429	- 0	24	5.7	116.80	0.143 9855	189.0	2.40	6.32	0 24.5
19	12	18	58.20	16.309	1	10	39.8	116.02	0.143 3895	265.5	2.40	6.33	0 26.7
20	12	25	2.81	+15.118	- 1	56	54.6	-115.18	0.142 6629	- 339.5	2.41	6.34	0 28.8
21	12	31	3.89	14.974	2	42	47.8	114.34	0.141 7619	411.1	2.41	6.35	0 30.9
22	12	37	1.61	14.833	3	28	17.5	113.23	0.140 6910	481.0	2.41	6.36	0 32.9
23	12	42	56.20	14.711	4	13	21.5	113.11	0.139 4546	549.2	2.42	6.38	0 34.9
24	12	48	47.81	14.591	4	57	58.3	110.95	0.138 0557	616.3	2.43	6.40	0 36.8
25	12	54	36.68	+14.478	- 5	42	6.3	-109.71	0.136 4972	- 682.3	2.44	6.43	0 38.7
26	13	0	22.82	14.373	6	25	43.9	108.41	0.134 7811	747.7	2.45	6.45	0 40.5
27	13	6	6.53	14.273	7	8	49.6	107.06	0.132 9086	812.7	2.46	6.48	0 42.3
28	13	11	47.92	14.178	7	51	22.1	106.63	0.130 8805	877.5	2.47	6.51	0 44.1
29	13	17	27.12	14.099	8	33	19.6	104.16	0.128 6968	942.3	2.49	6.54	0 45.7
30	13	23	4.23	+14.006	- 9	14	41.3	-102.64	0.126 3571	-1007.5	2.50	6.58	0 47.4
Oct. 1	13	28	39.38	+13.925	- 9	55	25.7	-101.05	0.123 8603	-1073.3	2.51	6.62	0 49.1

GREENWICH MEAN TIME.

Date.	Apparent Right Ascension.			Var. per Hour.	Apparent Declination.			Var. per Hour.	Logarithm of Distance from Earth.	Var. per Hour.	Semi-diameter.	Hor. Parallax.	Transit, Meridian of Greenwich.	
	h	m	s	s	°	'	"	"	h	m	"	"	h	m
Oct. 1	13	28	39.38	+13.925	- 9	55	25.7	-101.05	0.129 8608	-1073.2	2.51	6.62	0	49.1
2	13	34	12.64	13.848	10	35	31.4	99.42	0.121 2053	1189.6	2.52	6.66	0	50.7
3	13	39	44.11	13.775	11	14	57.3	97.73	0.118 3892	1207.2	2.54	6.70	0	52.2
4	13	45	13.83	13.708	11	53	41.9	95.98	0.115 4100	1275.8	2.56	6.75	0	53.8
5	13	50	41.84	13.632	12	31	43.9	94.18	0.112 2645	1345.3	2.58	6.79	0	55.3
6	13	56	8.17	+13.562	-13	9	2.1	-92.32	0.108 9480	-1417.5	2.60	6.85	0	56.8
7	14	1	32.82	13.492	13	45	34.9	90.40	0.105 4593	1400.9	2.62	6.90	0	58.3
8	14	6	55.76	13.419	14	21	21.0	88.43	0.101 7912	1506.3	2.64	6.96	0	59.7
9	14	12	16.93	13.345	14	56	18.8	86.38	0.097 9393	1644.0	2.67	7.02	1	1.1
10	14	17	36.28	13.265	15	30	26.8	84.28	0.098 8983	1724.0	2.70	7.09	1	2.5
11	14	22	53.67	+13.182	-16	3	43.4	-82.10	0.089 6619	-1806.3	2.72	7.16	1	3.9
12	14	28	8.97	13.092	16	36	6.8	79.34	0.085 2238	1892.1	2.75	7.23	1	5.2
13	14	33	22.00	12.998	17	7	35.3	77.52	0.080 5775	1980.4	2.78	7.31	1	6.5
14	14	38	32.55	12.894	17	38	7.1	75.11	0.075 7154	2071.9	2.81	7.39	1	7.7
15	14	43	40.35	12.783	18	7	39.9	72.82	0.070 6296	2166.7	2.84	7.48	1	8.9
16	14	48	45.07	+12.628	-18	36	11.9	-70.02	0.065 3124	-2264.9	2.87	7.57	1	10.0
17	14	53	46.36	12.476	19	3	40.6	67.35	0.059 7550	2366.8	2.91	7.67	1	11.1
18	14	58	43.78	12.305	19	30	3.8	64.56	0.053 9487	2473.3	2.95	7.77	1	12.1
19	15	3	36.82	12.111	19	55	18.7	61.96	0.047 8348	2581.6	2.99	7.88	1	13.0
20	15	8	24.91	11.892	20	19	22.7	58.65	0.041 5567	2694.9	3.04	8.00	1	13.9
21	15	13	7.38	+11.642	-20	42	12.7	-55.50	0.034 0463	-2811.9	3.08	8.12	1	14.7
22	15	17	43.45	11.389	21	3	45.4	52.21	0.028 0538	2932.6	3.13	8.25	1	15.3
23	15	22	12.29	11.087	21	23	57.6	48.78	0.020 8672	3066.8	3.19	8.39	1	15.8
24	15	26	32.86	10.870	21	42	45.2	45.16	0.013 3789	3184.1	3.24	8.53	1	16.2
25	15	30	44.06	10.264	22	0	4.0	41.37	0.005 5818	3313.9	3.30	8.69	1	16.5
26	15	34	44.60	+ 9.781	-22	15	49.5	-37.28	9.997 4709	-3445.5	3.36	8.85	1	16.5
27	15	38	33.06	9.246	22	29	56.6	33.17	9.989 0428	3577.9	3.43	9.02	1	16.4
28	15	42	7.84	8.640	22	42	19.7	28.71	9.980 2974	3709.7	3.49	9.20	1	16.0
29	15	45	27.13	7.965	22	52	52.7	23.99	9.971 2384	3838.9	3.57	9.40	1	15.4
30	15	48	28.97	7.183	23	1	28.6	18.94	9.961 8748	3963.0	3.65	9.61	1	14.4
31	15	51	11.17	+ 6.317	-23	7	59.2	-18.56	9.952 2224	-4079.0	3.73	9.82	1	13.2
Nov. 1	15	53	31.35	5.348	23	12	16.4	7.81	9.942 3055	4182.7	3.82	10.05	1	11.6
2	15	55	26.98	4.270	23	14	10.7	- 1.64	9.932 1592	4269.1	3.91	10.29	1	9.5
3	15	58	55.37	3.077	23	13	31.4	+ 5.00	9.921 8324	4332.1	4.00	10.54	1	7.0
4	15	57	53.75	1.769	23	10	7.0	12.13	9.911 3398	4384.2	4.10	10.79	1	4.0
5	15	58	19.37	+ 0.348	-23	3	45.3	+ 19.78	9.900 9163	-4456.3	4.19	11.06	1	0.5
6	15	58	9.62	- 1.176	22	54	13.6	27.96	9.890 5197	4498.2	4.30	11.32	0	56.4
7	15	57	22.23	2.786	22	41	19.2	26.66	9.880 3331	4479.3	4.40	11.59	0	51.7
8	15	55	55.46	4.461	22	24	50.5	45.80	9.870 5175	3987.1	4.50	11.86	0	46.3
9	15	53	48.44	6.123	22	4	38.5	55.23	9.861 2627	3710.3	4.59	12.11	0	40.2
10	15	51	1.40	- 7.775	-21	40	38.5	+ 64.76	9.852 7832	-3339.5	4.69	12.35	0	33.5
11	15	47	36.08	9.311	21	12	51.9	74.05	9.845 3188	2867.9	4.77	12.57	0	26.2
12	15	43	35.91	10.667	20	41	29.6	82.66	9.839 0987	2294.7	4.84	12.75	0	18.2
13	15	39	6.17	11.762	20	6	53.6	90.09	9.834 3757	1626.0	4.90	12.89	0	9.9
14	15	34	14.02	12.623	19	29	39.2	95.78	9.831 3586	876.4	4.92	12.98	0	1.1
15	15	29	8.19	-12.893	-18	50	34.7	+ 99.18	9.830 2156	- 68.8	4.93	13.01	23	43.1
16	15	23	58.54	-12.839	-18	10	40.3	+ 99.89	9.831 0509	+ 766.7	4.92	12.98	23	34.1

GREENWICH MEAN TIME.

Date.	Apparent Right Ascension.			Var. per Hour.	Apparent Declination.			Var. per Hour.	Logarithm of Distance from Earth.	Var. per Hour.	Semi-diameter.	Hor. Parallax.	Transit, Meridian of Greenwich.	
	Noon.			Noon.	Noon.			Noon.		Noon.				Noon.
	h	m	s	s	°	'	"	"		"			h	m
Nov. 16	15	23	58.54	-12.339	-18	10	40.3	+99.89	9.831 0509	+ 766.7	4.92	12.98	23	34.1
17	15	18	55.37	12.355	17	31	3.7	97.66	9.833 8909	1596.0	4.90	12.90	23	25.4
18	15	14	8.70	11.471	16	52	56.0	92.51	9.838 6789	2394.6	4.84	12.76	23	17.2
19	15	9	47.56	10.240	16	17	24.7	84.68	9.845 2801	3102.3	4.77	12.57	23	9.5
20	15	5	59.36	8.735	15	45	29.1	74.63	9.853 4947	3726.0	4.68	12.33	23	2.4
21	15	2	49.77	- 7.040	-15	17	55.7	+62.94	9.863 0783	+4241.5	4.57	12.06	22	56.0
22	15	0	22.33	5.285	14	55	16.0	50.26	9.873 7625	4643.1	4.47	11.77	22	50.3
23	14	58	38.77	3.394	14	37	47.1	37.15	9.885 2760	4933.4	4.35	11.46	22	45.3
24	14	57	39.23	- 1.576	14	25	31.9	24.18	9.897 3606	5120.9	4.23	11.15	22	41.1
25	14	57	22.56	+ 0.172	14	18	22.4	11.73	9.909 7837	5217.7	4.11	10.83	22	37.5
26	14	57	46.68	+ 1.519	-14	16	1.9	+ 0.13	9.922 3437	+5237.3	4.00	10.52	22	34.6
27	14	58	48.89	3.344	14	18	7.8	-10.44	9.934 8727	5194.2	3.88	10.22	22	32.2
28	15	0	26.17	4.741	14	24	14.1	19.90	9.947 2362	5101.5	3.78	9.94	22	30.4
29	15	2	35.39	6.006	14	33	53.5	28.19	9.959 3300	4971.3	3.66	9.66	22	29.1
30	15	5	13.41	7.142	14	46	38.3	35.35	9.971 0765	4813.8	3.57	9.41	22	28.2
Dec. 1	15	8	17.24	+ 8.158	-15	2	1.9	-41.43	9.982 4210	+4637.5	3.48	9.16	22	27.7
2	15	11	44.12	9.064	15	19	39.1	46.50	9.993 3268	4449.2	3.40	8.94	22	27.5
3	15	15	31.49	9.968	15	39	6.8	50.65	0.003 7722	4254.7	3.31	8.72	22	27.6
4	15	19	37.05	10.582	16	0	3.8	53.97	0.013 7474	4057.8	3.24	8.52	22	28.0
5	15	23	58.77	11.215	16	22	11.4	56.54	0.023 2504	3861.8	3.17	8.34	22	28.7
6	15	28	34.82	+11.778	-16	45	12.3	-58.44	0.032 2868	+3699.2	3.10	8.17	22	29.5
7	15	33	23.61	12.279	17	8	51.7	59.75	0.040 8663	3481.3	3.04	8.01	22	30.6
8	15	38	23.76	12.725	17	32	56.2	60.55	0.049 0018	3299.4	2.98	7.86	22	31.8
9	15	43	34.05	13.125	17	57	14.2	60.88	0.056 7086	3124.2	2.93	7.72	22	33.2
10	15	48	53.44	13.484	18	21	35.2	60.81	0.064 0035	2956.0	2.88	7.59	22	34.7
11	15	54	21.00	+13.808	-18	45	50.2	-60.29	0.070 9032	+2795.0	2.84	7.47	22	36.3
12	15	59	55.96	14.101	19	9	51.2	59.65	0.077 4251	2641.2	2.80	7.36	22	38.1
13	16	5	37.62	14.367	19	33	31.1	58.63	0.083 5864	2494.4	2.76	7.26	22	39.9
14	16	11	25.39	14.610	19	56	43.7	57.38	0.089 4037	2354.4	2.72	7.16	22	41.9
15	16	17	18.76	14.834	20	19	23.5	55.90	0.094 8928	2221.0	2.69	7.07	22	43.9
16	16	23	17.29	+15.040	-20	41	25.5	-54.23	0.100 0693	+2093.7	2.66	6.99	22	46.0
17	16	29	20.57	15.281	21	2	45.3	52.39	0.104 9473	1972.3	2.62	6.91	22	48.2
18	16	35	28.28	15.499	21	23	19.1	50.40	0.109 5407	1856.5	2.59	6.84	22	50.4
19	16	41	40.11	15.575	21	43	3.2	48.26	0.113 8624	1745.7	2.57	6.77	22	52.8
20	16	47	55.80	15.731	22	1	54.5	46.00	0.117 9240	1639.8	2.54	6.71	22	55.1
21	16	54	15.12	+15.873	-22	19	50.2	-43.62	0.121 7367	+1538.2	2.52	6.65	22	57.6
22	17	0	37.86	16.017	22	36	47.4	41.13	0.125 3107	1440.8	2.50	6.59	23	0.1
23	17	7	3.85	16.148	22	52	43.8	38.55	0.128 6557	1347.3	2.48	6.54	23	2.6
24	17	13	32.89	16.272	23	7	37.2	35.88	0.131 7806	1257.2	2.47	6.50	23	5.2
25	17	20	4.85	16.390	23	21	25.4	33.13	0.134 6927	1170.2	2.45	6.45	23	7.8
26	17	26	39.59	+16.504	-23	34	6.5	-30.29	0.137 3996	+1066.0	2.43	6.41	23	10.5
27	17	33	16.93	16.611	23	45	38.7	27.38	0.139 9075	1004.4	2.42	6.38	23	13.3
28	17	39	56.89	16.714	23	56	0.3	24.40	0.142 2226	925.2	2.41	6.34	23	16.0
29	17	46	39.20	16.811	24	5	9.6	21.36	0.144 3502	848.0	2.39	6.31	23	18.8
30	17	53	23.80	16.904	24	13	5.1	18.26	0.146 2946	772.8	2.38	6.28	23	21.7
31	18	0	10.57	+16.993	-24	19	45.3	-15.09	0.148 6598	+ 698.7	2.38	6.26	23	24.5
32	18	6	59.41	....	-24	25	8.9	....	0.149 6493	....	2.37	6.23	23	27.5

## FOR GREENWICH MEAN NOON.

Date.	Heliocentric Longitude, Mean Equinox of Date.			Var. per Day.	Reduction to Orbit.	Heliocentric Latitude.			Var. per Day.	Logarithm of Radius Vector.	Var. per Day.						
	°	'	"	°	'	"	°	'	"	'	"						
Jan. 1	211	37	41.5	3	9	46.9	-	6	44.9	+1	54	37.3	-22	24.7	9.637 6838	+40667	
2	214	45	41.9	3	6	17.2		5	30.4		1	32	15.2	22	18.9	9.641 6365	38194
3	217	50	21.9	3	3	5.8		4	13.4		1	10	0.4	22	10.2	9.645 3205	35497
4	220	51	59.3	3	0	11.9		2	54.8		0	47	55.5	21	59.3	9.648 7358	32808
5	223	50	51.4	2	57	35.0		1	35.4		0	26	2.5	21	46.3	9.651 8823	30123
6	226	47	14.6	2	55	14.0		-	0	16.1	+0	4	23.5	-21	31.5	9.654 7608	+27449
7	229	41	24.6	2	53	8.6		+	1	2.4	-0	16	59.9	21	15.1	9.657 3723	24782
8	232	33	36.8	2	51	18.1			2	19.3		0	38	20	57.3	9.659 7175	22123
9	235	24	5.5	2	49	41.8			3	84.1		0	58	20	38.1	9.661 7973	19475
10	238	13	5.0	2	48	19.5			4	46.2		1	19	20	17.9	9.663 6129	16837
11	241	0	48.9	2	47	10.6		+	5	54.9	-1	39	29.4	-19	56.5	9.665 1651	+14210
12	243	47	30.5	2	46	14.8			6	59.9		1	59	19	34.0	9.666 4551	11589
13	246	33	22.8	2	45	31.8			8	0.6		2	18	19	10.5	9.667 4832	8976
14	249	18	38.4	2	45	1.5			8	56.6		2	37	18	46.0	9.668 2504	6368
15	252	3	30.0	2	44	43.7			9	47.4		2	56	18	20.4	9.668 7569	3765
16	254	48	9.9	2	44	38.1		+10	82.8		-3	14	15.7	-17	53.7	9.669 0034	+ 1164
17	257	32	50.3	2	44	44.6			11	12.3		3	31	17	25.9	9.668 9897	- 1436
18	260	17	43.3	2	43	3.5			11	45.7		3	49	16	56.8	9.668 7162	4036
19	263	3	1.4	2	43	34.6			12	12.6		4	5	16	26.4	9.668 1824	6639
20	265	48	56.6	2	43	17.9			12	82.8		4	21	15	54.6	9.667 3883	9247
21	268	35	41.4	2	47	13.7		+12	46.0		-4	37	37.3	-15	21.2	9.666 3328	-11862
22	271	23	28.2	2	48	22.0			12	52.0		4	52	14	46.1	9.665 0157	14481
23	274	12	29.8	2	49	43.4			12	50.6		5	7	14	9.1	9.663 4362	17110
24	277	2	59.3	2	51	17.8			12	41.6		5	20	18	30.0	9.661 5933	19750
25	279	55	9.8	2	53	5.5			12	25.0		5	34	12	48.7	9.659 4859	22399
26	282	49	15.0	2	55	7.2		+12	0.7		-5	46	35.2	-12	4.8	9.657 1131	-25059
27	285	45	28.9	2	57	23.1			11	28.5		5	58	11	18.2	9.654 4739	27726
28	288	44	6.1	2	59	53.8			10	48.6		6	9	10	28.4	9.651 5675	30404
29	291	45	21.6	3	2	39.8			10	1.0		6	19	9	35.2	9.648 3929	33089
30	294	49	30.9	3	5	41.5			9	5.8		6	28	8	38.4	9.644 9497	35776
31	297	56	50.1	3	8	59.7		+	8	3.3		-6	36	-7	37.4	9.641 2378	-38463
Feb. 1	301	7	36.1	3	12	35.1			6	53.8		6	43	6	31.9	9.637 2573	41146
2	304	22	6.3	3	16	28.3			5	87.8		6	49	5	21.6	9.633 0090	43817
3	307	40	38.8	3	20	39.9			4	15.8		6	54	4	5.8	9.628 4946	46468
4	311	3	32.5	3	25	10.7			2	48.5		6	57	2	44.1	9.623 7165	49087
5	314	31	6.9	3	30	1.5		+	1	16.8		-6	59	-1	16.2	9.618 6788	-51660
6	318	3	42.8	3	35	12.8		-	0	18.2		7	0	+0	18.5	9.613 3866	54175
7	321	41	39.6	3	40	45.4			1	55.3		6	59	2	0.5	9.607 8465	56610
8	325	25	20.3	3	46	39.7			3	33.1		6	56	3	50.2	9.602 0681	58939
9	329	15	6.5	3	52	56.4			5	9.8		6	51	5	48.0	9.596 0631	61137
10	333	11	20.6	3	59	35.5		-	6	43.5		-6	44	+7	54.3	9.589 8462	-63172
11	337	14	25.0	4	6	37.1			8	12.0		6	35	10	9.3	9.583 4355	65004
12	341	24	42.3	4	14	1.1			9	33.0		6	24	12	32.8	9.576 8536	66589
13	345	42	34.4	4	21	46.6			10	43.8		6	10	15	4.9	9.570 1276	67878
14	350	8	22.3	4	29	52.6			11	41.8		5	53	17	44.9	9.563 2899	68814
15	354	42	26.0	4	38	17.7		-12	24.0		-5	34	45.9	+20	31.8	9.556 3787	-69335
16	359	25	3.2	4	46	59.1		-12	47.9		-5	12	48.1	+23	24.6	9.549 4391	-69372

FOR GREENWICH MEAN NOON.

Date.	Heliocentric Longitude, Mean Equinox of Date.	Var. per Day.	Reduction to Orbit.	Heliocentric Latitude.	Var. per Day.	Logarithm of Radius Vector.	Var. per Day.
Feb. 16	359 25 3.2	4 46 59.1	-12 47.9	-5 12 48.1	+28 24.6	9.549 4391	-66372
17	4 16 28.7	4 55 53.3	12 50.8	4 47 55.5	26 21.1	9.542 5228	68857
18	9 16 53.8	5 4 57.3	12 30.7	4 20 5.6	26 18.7	9.535 6887	67714
19	14 26 25.6	5 14 5.3	11 46.0	3 49 18.9	23 14.1	9.529 0084	65870
20	19 45 4.7	5 23 11.6	10 36.1	3 15 39.4	26 3.6	9.522 5402	63263
21	25 12 45.7	5 32 8.0	- 9 1.3	-2 39 15.4	+37 42.3	9.516 3783	-59534
22	30 49 14.7	5 40 46.3	7 3.4	2 0 20.5	49 4.4	9.510 6023	55540
23	36 34 9.1	5 48 57.2	4 45.7	1 19 13.8	42 4.9	9.505 2996	50366
24	42 26 56.5	5 56 30.5	- 2 12.9	-0 36 20.0	43 37.6	9.500 5580	44325
25	48 26 53.9	6 3 15.4	+ 0 28.8	+0 7 50.3	44 36.9	9.496 4620	37462
26	54 33 7.7	6 9 1.5	+ 3 11.9	+0 52 41.1	+44 58.0	9.493 0905	-29852
27	60 44 34.0	6 12 38.8	5 48.4	1 37 32.4	44 37.3	9.490 5124	21617
28	66 59 59.3	6 16 58.3	8 9.9	2 21 41.1	43 32.7	9.488 7826	12917
29	73 18 2.3	6 18 53.1	10 8.6	3 4 23.3	41 44.5	9.487 9386	- 3928
Mar. 1	79 37 15.7	6 19 18.7	11 38.0	3 44 56.2	39 14.7	9.487 9999	+ 5150
2	85 56 9.3	6 18 13.2	+12 33.5	+4 22 40.2	+36 7.5	9.488 9647	+14112
3	92 13 12.0	6 15 37.6	12 52.3	4 57 0.6	32 26.6	9.490 8118	22761
4	98 26 55.9	6 11 36.4	12 34.5	5 27 29.4	26 25.7	9.493 5005	30918
5	104 35 58.3	6 6 16.0	11 42.1	5 53 46.5	24 6.4	9.496 9739	38432
6	110 39 4.4	5 59 45.4	10 19.2	6 15 39.4	19 38.7	9.501 1617	45190
7	116 35 9.3	5 52 15.2	+ 8 31.3	+6 33 3.5	+15 10.0	9.505 9842	+51116
8	122 23 19.0	5 43 57.0	6 24.8	6 46 1.2	10 46.3	9.511 3558	56170
9	128 2 51.2	5 35 2.2	4 6.4	6 54 40.9	6 34.8	9.517 1889	60346
10	133 33 15.0	5 26 42.1	+ 1 42.6	6 59 15.9	+ 2 38.1	9.523 3964	63663
11	138 54 10.4	5 16 7.0	- 0 40.7	7 0 3.0	- 1 0.8	9.529 8942	66162
12	144 5 27.2	5 6 26.4	- 2 58.5	+6 57 20.9	- 4 19.9	9.536 6037	+67907
13	149 7 4.0	4 56 45.2	5 6.5	6 51 30.1	7 18.4	9.543 4526	68963
14	153 59 6.7	4 47 19.1	7 1.6	6 42 50.8	9 56.8	9.550 3756	69399
15	158 41 47.1	4 38 4.5	6 41.6	6 31 43.2	12 15.3	9.557 3142	69289
16	163 15 21.8	4 29 8.3	10 5.0	6 18 26.5	14 15.1	9.564 2178	68710
17	167 40 10.9	4 20 23.8	-11 11.4	+6 3 18.7	-15 57.7	9.571 0426	+67723
18	171 56 37.3	4 12 23.0	12 0.6	5 46 36.4	17 24.5	9.577 7509	66391
19	176 5 5.2	4 4 37.1	12 33.1	5 28 34.5	18 37.0	9.584 3112	64770
20	180 6 0.1	3 57 17.0	12 49.6	5 9 26.6	19 26.7	9.590 6969	62908
21	183 59 47.9	3 50 23.9	12 51.3	4 49 24.8	20 25.2	9.596 8863	60849
22	187 46 54.5	3 43 54.5	-12 39.2	+4 28 39.5	-21 3.3	9.602 8615	+56632
23	191 27 45.3	3 37 51.4	12 14.7	4 7 20.1	21 33.6	9.608 6084	56287
24	195 2 45.5	3 32 13.0	11 39.2	3 45 34.8	21 55.3	9.614 1155	53840
25	198 32 19.3	3 26 56.4	10 54.1	3 23 30.6	22 11.5	9.619 3739	51317
26	201 56 50.0	3 22 6.7	10 0.6	3 1 13.7	22 21.5	9.624 3770	48735
27	205 16 40.1	3 17 37.1	- 9 0.0	+2 38 49.3	-22 26.6	9.629 1195	+46111
28	208 32 11.2	3 13 26.5	7 53.7	2 16 22.0	22 37.4	9.633 5982	43458
29	211 43 43.9	3 9 40.2	6 42.7	1 53 55.7	22 24.6	9.637 8105	40783
30	214 51 37.9	3 6 16.9	5 28.1	1 31 33.8	22 18.7	9.641 7549	38101
31	217 56 11.9	3 3 6.1	4 11.0	1 9 19.3	22 9.9	9.645 4306	35412
Apr. 1	220 57 43.9	3 0 6.8	- 2 52.4	+0 47 14.7	-21 59.0	9.648 8374	+32724
2	223 56 31.1	2 57 20.4	- 1 33.0	+0 25 22.1	-21 45.9	9.651 9756	+30041

## FOR GREENWICH MEAN NOON.

Date.	Heliocentric Longitude, Mean Equinox of Date.	Var. per Day.	Reduction to Orbit.	Heliocentric Latitude.	Var. per Day.	Logarithm of Radius Vector.	Var. per Day.	
Apr.	1	220 57 43.9	3 0 6.8	- 2 52.4	+0 47 14.7	-21 39.0	9.648 8374	+32724
	2	223 56 31.1	2 57 30.4	1 33.0	0 25 22.1	21 45.9	9.651 9756	30041
	3	226 52 50.0	2 55 9.9	- 0 13.7	+0 3 43.5	21 31.0	9.654 8459	27366
	4	229 46 56.1	2 53 4.9	+ 1 4.8	-0 17 39.4	21 14.5	9.657 4491	24008
	5	232 39 4.8	2 51 14.9	2 21.7	0 38 45.1	20 56.6	9.659 7859	22041
	6	235 29 30.6	2 49 39.0	+ 3 36.4	-0 59 32.3	-20 37.6	9.661 8576	+19393
	7	238 18 27.5	2 48 17.1	4 48.4	1 19 59.8	20 17.2	9.663 6649	16756
	8	241 6 9.3	2 47 8.7	5 57.0	1 40 6.4	19 55.8	9.665 2091	14128
	9	243 52 49.2	2 46 13.2	7 1.8	1 59 51.0	19 33.3	9.666 4908	11507
	10	246 38 40.1	2 45 20.8	8 2.4	2 19 12.6	19 9.8	9.667 5108	8895
	11	249 23 54.9	2 45 0.8	+ 8 58.2	-2 38 10.2	-18 45.2	9.668 2699	+ 6287
	12	252 8 45.9	2 44 43.3	9 48.9	2 56 42.6	18 19.5	9.668 7684	3684
	13	254 53 25.6	2 44 38.1	10 34.1	3 14 48.9	17 52.9	9.669 0067	+ 1083
	14	257 38 6.2	2 44 45.1	11 13.4	3 32 27.9	17 24.9	9.668 9851	- 1516
	15	260 22 59.9	2 45 4.3	11 46.6	3 49 38.4	16 55.9	9.668 7034	4116
	16	263 8 18.9	2 45 35.7	+12 13.3	-4 6 19.2	-16 25.4	9.668 1617	- 6720
	17	265 54 15.4	2 46 19.4	12 33.3	4 22 28.8	15 53.6	9.667 3593	9328
	18	268 41 1.9	2 47 15.7	12 46.3	4 38 5.8	15 20.2	9.666 2959	11942
	19	271 28 50.9	2 48 24.4	12 52.0	4 53 8.5	14 44.9	9.664 9706	14564
	20	274 17 55.0	2 49 46.1	12 50.4	5 7 35.1	14 8.0	9.663 3828	17193
	21	277 8 27.4	2 51 20.9	+12 41.2	-5 21 23.7	-13 28.8	9.661 5316	-19832
	22	280 0 41.2	2 53 9.1	12 24.4	5 34 32.0	12 47.4	9.659 4160	22482
	23	282 54 50.2	2 55 11.2	11 59.8	5 46 57.6	12 3.4	9.657 0349	25141
	24	285 51 8.4	2 57 27.6	11 27.4	5 58 37.9	11 16.7	9.654 3875	27809
	25	288 49 50.3	2 59 58.8	10 47.2	6 9 29.9	10 26.8	9.651 4727	30487
	26	291 51 11.0	3 2 45.2	+ 9 59.4	-6 19 30.4	- 9 33.6	9.648 2898	-33172
	27	294 55 25.9	3 5 47.4	9 4.0	6 28 35.8	8 86.5	9.644 8382	35860
	28	298 2 51.3	3 9 6.2	8 1.2	6 36 42.1	7 35.4	9.641 1176	38548
	29	301 13 44.1	3 12 42.2	6 51.6	6 43 45.1	6 29.8	9.637 1288	41228
	30	304 28 21.5	3 16 35.7	5 35.4	6 49 40.1	5 19.3	9.632 8723	43900
May	1	307 47 1.8	3 20 48.0	+ 4 13.2	-6 54 21.9	- 4 3.3	9.628 3496	-46549
	2	311 10 3.9	3 25 19.5	2 45.7	6 57 44.8	2 41.5	9.623 5635	49168
	3	314 37 47.4	3 30 10.8	+ 1 13.9	6 59 42.8	- 1 13.4	9.618 5175	51741
	4	318 10 32.5	3 35 22.8	- 0 21.2	7 0 9.4	+ 0 21.5	9.613 2174	54253
	5	321 48 40.2	3 40 56.1	1 58.4	6 58 57.4	2 3.8	9.607 6697	56684
	6	325 32 32.0	3 46 51.3	- 3 36.1	-6 55 59.3	+ 3 53.8	9.601 8841	-59009
	7	329 22 30.0	3 53 8.4	5 12.8	6 51 7.2	5 51.8	9.595 8722	61203
	8	333 18 56.4	3 59 48.3	6 46.3	6 44 12.8	7 58.4	9.589 6490	63233
	9	337 22 14.1	4 6 50.7	8 14.7	6 35 7.5	10 13.6	9.583 2325	65058
	10	341 32 45.1	4 14 15.2	9 35.4	6 23 42.7	12 37.4	9.576 6457	66635
	11	345 50 51.7	4 22 1.5	-10 45.8	-6 9 49.8	+15 9.7	9.569 9154	-67913
	12	350 16 54.9	4 30 8.2	11 43.3	5 53 20.6	17 49.9	9.563 0749	68836
	13	354 51 14.4	4 38 33.7	12 25.0	5 34 7.6	20 37.2	9.556 1621	69344
	14	359 34 7.8	4 47 15.7	12 48.3	5 12 4.4	23 30.0	9.549 2223	69364
	15	4 25 50.1	4 56 10.7	12 50.6	4 47 6.4	26 26.5	9.542 3077	68830
	16	9 26 32.3	5 5 14.9	-12 29.7	-4 19 11.0	+29 24.2	9.535 4772	-67668
	17	14 36 21.2	5 14 23.0	-11 44.2	-3 48 18.8	+32 19.6	9.528 7975	-65802

FOR GREENWICH MEAN NOON.

Date.	Heliocentric Longitude, Mean Equinox of Data.	Var. per Day.	Reduction to Orbit.	Heliocentric Latitude.	Var. per Day.	Logarithm of Radius Vector.	Var. per Day.	
May	17	14 36 21.2	5 14 23.0	-11 44.2	-3 48 18.8	+32 19.4	9.528 7975	-63692
	18	19 55 17.4	5 23 26.6	10 33.5	3 14 34.0	35 8.7	9.522 3424	63168
	19	25 23 15.1	5 32 24.6	8 58.0	2 38 5.1	37 46.3	9.516 1913	59712
	20	31 0 0.4	5 41 2.1	6 59.4	1 59 5.8	40 8.6	9.510 4289	55300
	21	36 45 10.1	5 49 12.0	4 41.1	1 17 55.3	42 8.2	9.505 1425	50192
	22	42 38 11.7	5 56 43.9	- 2 8.0	-0 34 58.6	+43 40.0	9.500 4195	-44124
	23	48 38 21.7	6 3 27.2	+ 0 33.9	+0 9 13.5	44 23.2	9.496 3452	37231
	24	54 44 46.8	6 9 11.3	3 16.9	0 54 5.0	44 58.1	9.492 9978	29002
	25	60 56 21.2	6 13 46.2	5 53.0	1 38 55.6	44 36.0	9.490 4454	21353
	26	67 11 52.7	6 17 3.2	8 13.9	2 23 2.3	43 30.0	9.488 7427	12630
	27	73 29 59.2	6 18 55.2	+10 11.9	+3 5 41.1	+41 40.5	9.487 9269	- 3646
	28	79 49 13.4	6 19 18.1	11 40.3	3 46 9.4	39 9.4	9.488 0164	+ 5432
	29	86 8 4.9	6 18 9.6	12 34.6	4 23 47.5	36 1.0	9.489 0063	14398
30	92 25 2.7	6 15 31.3	12 52.3	4 58 1.0	32 21.4	9.490 8334	23025	
31	98 38 39.0	6 11 27.5	12 33.4	5 28 22.3	28 17.8	9.493 5976	31162	
June	1	104 47 31.3	6 6 4.7	+11 40.0	+5 54 31.3	+28 53.2	9.497 0943	+33655
	2	110 50 25.1	5 59 32.2	10 16.2	6 16 15.9	19 30.3	9.501 3083	45300
	3	116 46 15.9	5 52 0.5	8 27.6	6 33 31.6	15 1.6	9.506 1443	51288
	4	122 34 10.0	5 43 40.7	6 20.7	6 46 21.1	10 38.9	9.511 5317	56314
	5	128 13 25.4	5 34 45.0	4 2.0	6 54 53.1	6 27.2	9.517 3777	60461
	6	133 43 31.7	5 25 24.2	+ 1 38.1	+6 59 20.7	+ 2 30.9	9.523 5953	+63752
	7	139 4 9.1	5 15 48.9	- 0 45.1	7 0 1.0	- 1 7.2	9.530 1009	66229
	8	144 15 7.8	5 6 8.2	3 2.6	6 57 12.8	4 25.7	9.536 8159	67951
	9	149 16 26.5	4 56 30.2	5 10.2	6 51 16.4	7 23.7	9.543 6682	69686
	10	154 8 11.4	4 47 1.8	7 4.9	6 42 32.2	10 1.2	9.550 5925	69403
	11	158 50 34.5	4 37 47.4	- 8 44.4	+6 31 20.4	-12 19.2	9.557 5307	+69278
	12	163 23 52.4	4 28 51.9	10 7.4	6 18 0.0	14 18.6	9.564 4325	69896
	13	167 48 25.5	4 20 18.1	11 13.2	6 2 49.0	16 0.6	9.571 2543	67667
	14	172 4 36.5	4 12 8.0	12 1.9	5 46 4.0	17 26.9	9.577 9584	66344
	15	176 12 49.8	4 4 22.9	12 33.8	5 27 59.9	18 39.0	9.584 5135	64714
	16	180 13 31.0	3 57 3.8	-12 49.9	+5 8 50.2	-19 33.4	9.590 8933	+62846
	17	184 7 5.9	3 50 10.3	12 51.1	4 48 46.8	20 26.5	9.597 0762	60731
	18	187 54 0.3	3 43 42.3	12 38.6	4 28 0.4	21 4.3	9.603 0444	58500
	19	191 34 39.9	3 37 40.5	12 13.8	4 6 40.1	21 34.4	9.608 7840	56212
	20	195 9 29.5	3 32 2.8	11 38.0	3 44 54.1	21 56.3	9.614 2383	53703
	21	198 38 53.5	3 26 49.0	-10 52.6	+3 22 49.5	-23 11.9	9.619 5339	+51237
	22	202 3 15.1	3 21 58.0	9 58.8	3 0 32.2	23 21.3	9.624 5233	49663
	23	205 22 56.8	3 17 39.0	8 58.1	2 38 7.6	23 26.6	9.629 2632	48028
	24	208 38 20.2	3 13 21.1	7 51.6	2 15 40.3	23 27.4	9.633 7335	46374
	25	211 49 45.8	3 9 33.4	6 40.4	1 53 14.1	23 24.4	9.637 9373	40700
	26	214 57 33.3	3 6 4.6	- 5 25.8	+1 39 52.5	-23 13.4	9.641 8731	+33017
	27	218 2 1.3	3 2 54.5	4 8.6	1 8 38.2	23 9.7	9.645 5405	35329
	28	221 3 28.1	3 0 1.3	2 49.9	0 46 33.9	21 58.8	9.648 9389	32641
	29	224 2 10.4	2 57 25.7	1 30.5	0 24 41.8	21 45.4	9.652 0683	29956
	30	226 58 24.9	2 55 5.9	- 0 11.2	+0 3 8.7	21 30.5	9.654 9307	27232
July	1	229 52 27.3	2 53 1.3	+ 1 7.2	-0 18 18.7	-21 14.0	9.657 5255	+24616
	2	232 44 32.5	2 51 11.7	+ 2 24.0	-0 39 23.9	-20 56.1	9.659 8541	+21968

FOR GREENWICH MEAN NOON.

Date.	Heliocentric Longitude, Mean Equinox of Date.	Var. per Day.	Reduction to Orbit.	Heliocentric Latitude.	Var. per Day.	Logarithm of Radius Vector.	Var. per Day.	
	° ' "	° ' "	' "	° ' "	' "			
July	1	229 52 27.3	2 53 1.3	+ 1 7.2	-0 18 18.7	-21 14.0	9.657 5255	+24616
	2	232 44 32.5	2 51 11.7	2 24.0	0 39 23.9	20 56.1	9.659 8541	21958
	3	235 34 55.4	2 49 36.4	3 38.7	1 0 10.5	20 37.0	9.661 9174	19310
	4	238 23 49.8	2 48 14.7	4 50.5	1 20 37.4	20 16.3	9.663 7165	16674
	5	241 11 29.4	2 47 0.7	5 59.0	1 40 43.3	19 55.1	9.665 2525	14046
	6	243 58 7.6	2 46 11.3	+ 7 3.8	-2 0 27.2	-19 32.6	9.666 5260	+11426
	7	246 43 57.3	2 45 29.7	8 4.2	2 19 48.1	19 9.0	9.667 5379	8812
	8	249 29 11.2	2 45 0.3	8 59.8	2 38 44.9	18 44.4	9.668 2887	6206
	9	252 14 1.8	2 44 43.0	9 50.4	2 57 16.6	18 18.3	9.668 7792	3604
	10	254 58 41.3	2 44 38.2	10 35.4	3 15 22.1	17 53.0	9.669 0095	+ 1002
	11	257 43 22.2	2 44 45.6	+11 14.5	-3 33 0.2	-17 24.0	9.668 9797	- 1697
	12	260 28 16.5	2 45 5.2	11 47.5	3 50 9.8	16 54.9	9.668 6901	4197
	13	263 13 36.6	2 45 37.0	12 14.0	4 6 49.6	16 24.5	9.668 1402	6801
	14	265 59 34.5	2 46 21.0	12 33.8	4 22 58.3	15 53.6	9.667 3298	9409
	15	268 46 22.8	2 47 17.7	12 46.6	4 38 34.3	15 19.1	9.666 2582	12023
	16	271 34 14.0	2 48 26.3	+12 52.1	-4 53 35.9	-14 43.3	9.664 9249	-14645
	17	274 23 20.7	2 49 48.9	12 50.2	5 8 1.4	14 6.8	9.663 3289	17276
	18	277 13 56.1	2 51 24.0	12 40.8	5 21 48.7	13 27.5	9.661 4695	19914
	19	280 6 13.3	2 53 12.7	12 23.8	5 34 55.7	12 46.1	9.659 3457	22563
	20	283 0 26.2	2 55 15.3	11 58.9	5 47 20.0	12 2.0	9.656 9565	25222
	21	285 56 48.6	2 57 32.1	+11 26.3	-5 58 58.8	-11 15.2	9.654 3009	-27892
	22	288 55 35.3	3 0 3.7	10 45.9	6 9 49.3	10 25.2	9.651 3777	30570
	23	291 57 1.1	3 2 50.3	9 57.8	6 19 48.1	9 31.3	9.648 1866	33255
	24	295 1 21.8	3 5 53.4	9 2.1	6 28 51.7	8 34.7	9.644 7267	35941
	25	298 8 53.4	3 9 12.6	7 59.2	6 36 56.2	7 33.5	9.640 9983	38629
	26	301 19 52.8	3 12 49.2	+ 6 49.3	-6 43 57.2	-6 27.7	9.637 0011	-41312
	27	304 34 37.6	3 16 43.4	5 32.9	6 49 50.0	5 17.0	9.632 7363	43982
	28	307 58 25.7	3 20 56.1	4 10.5	6 54 29.4	4 0.9	9.628 2055	46629
	29	311 16 36.3	3 25 28.3	2 43.0	6 57 49.8	3 36.9	9.623 4115	49246
	30	314 44 28.8	3 30 20.1	+ 1 11.0	6 59 45.1	- 1 10.6	9.618 3578	51818
	31	318 17 23.5	3 35 32.9	- 0 24.2	-7 0 8.7	+ 0 24.3	9.613 0500	-54327
Aug.	1	321 55 41.6	3 41 6.8	2 1.4	6 58 53.5	2 7.1	9.607 4952	56754
	2	325 39 44.8	3 47 2.5	3 39.1	6 55 52.0	3 57.3	9.601 7026	59078
	3	329 29 54.0	3 53 20.5	5 15.7	6 50 56.2	5 55.6	9.595 6841	61267
	4	333 26 32.8	4 0 0.9	6 49.2	6 43 57.9	8 2.4	9.589 4548	63289
	5	337 30 3.4	4 7 3.9	- 8 17.3	-6 34 48.5	+10 17.9	9.583 0331	-65107
	6	341 40 48.1	4 14 29.2	9 37.7	6 23 19.2	12 42.1	9.576 4417	66676
	7	345 59 9.0	4 22 16.1	10 47.3	6 9 21.6	15 14.3	9.569 7079	67944
	8	350 25 27.1	4 30 23.4	11 44.9	5 52 47.5	17 55.0	9.562 8647	68856
	9	355 0 2.1	4 38 49.3	12 26.1	5 33 29.3	20 42.4	9.555 9506	69351
	10	359 43 11.5	4 47 31.3	-12 48.7	-5 11 20.8	+23 35.4	9.549 0109	-69354
	11	4 85 10.0	4 56 37.1	12 50.3	4 46 17.3	26 32.0	9.542 0984	68800
	12	9 36 8.8	5 5 31.5	12 28.7	4 18 16.4	29 29.6	9.535 2718	67617
	13	14 46 14.3	5 14 39.6	11 42.4	3 47 18.8	32 24.9	9.528 5984	65729
	14	20 5 27.1	5 23 45.0	10 30.9	3 18 28.8	35 13.7	9.522 1516	63073
	15	25 33 41.0	5 32 40.3	- 8 54.3	-2 36 55.1	+37 51.4	9.516 0114	-69589
	16	31 10 41.8	5 41 17.3	- 6 55.4	-1.57 51.5	+40 12.6	9.510 2626	-55242



FOR GREENWICH MEAN NOON.

Data.	Heliocentric Longitude, Mean Equinox of Date.	Var. per Day.	Reduction to Orbit.	Heliocentric Latitude.	Var. per Day.	Logarithm of Radius Vector.	Var. per Day.
Aug. 16	31 10 41.8	5 41 17.3	- 6 55.4	-1 57 51.5	+40 12.6	9.510 2626	-55242
17	36 56 6.3	5 40 26.1	4 36.6	1 16 37.3	42 11.5	9.504 9923	50017
18	42 49 21.3	5 56 56.7	- 2 3.1	-0 33 37.9	43 42.3	9.500 2882	43923
19	48 49 43.4	6 3 38.4	+ 0 38.9	+0 10 36.0	44 30.4	9.496 2352	37007
20	54 56 18.1	6 9 20.4	3 21.9	0 55 28.0	44 57.9	9.492 9114	29357
21	61 8 1.0	6 13 53.0	+ 5 57.6	+1 40 17.8	+44 34.5	9.490 3844	-21092
22	67 23 38.1	6 17 7.5	8 17.9	2 24 22.4	43 27.4	9.488 7084	12968
23	73 41 47.6	6 18 56.9	10 15.0	3 6 57.9	41 36.4	9.487 9201	- 3367
24	80 1 2.1	6 19 17.0	11 42.5	3 47 21.4	30 4.1	9.486 0375	+ 5710
25	86 19 51.1	6 18 5.8	12 35.7	4 24 53.7	35 54.7	9.489 0577	14657
26	92 36 43.7	6 15 24.8	+12 52.3	+4 59 0.4	+32 14.3	9.490 9580	+23280
27	98 50 12.2	6 11 18.4	12 32.2	5 29 14.3	28 10.1	9.493 6968	31399
28	104 58 54.3	6 5 53.4	11 37.8	5 55 15.3	23 50.0	9.497 2161	36870
29	111 1 35.8	5 59 18.9	10 13.2	6 16 51.6	19 22.0	9.501 4458	45579
30	116 57 12.4	5 51 45.5	8 24.0	6 33 59.1	14 53.5	9.506 3040	51452
Sept. 31	122 44 51.0	5 43 24.7	+ 6 16.6	+6 46 40.6	+10 30.9	9.511 7065	+56451
1	128 23 49.9	5 34 28.1	3 57.6	6 55 4.8	6 19.8	9.517 5649	60572
2	133 53 38.9	5 25 6.7	+ 1 33.7	6 59 25.3	+ 2 24.0	9.523 7923	63837
3	139 13 58.6	5 15 31.1	- 0 49.4	6 59 58.9	- 1 13.7	9.530 3051	66288
4	144 24 39.5	5 5 50.5	3 6.7	6 57 4.6	4 31.5	9.537 0249	67989
5	149 25 40.5	4 56 12.7	- 5 14.0	+6 51 2.8	- 7 28.8	9.543 8800	+69004
6	154 17 8.0	4 46 44.4	7 8.2	6 42 13.8	10 5.8	9.550 8052	69403
7	158 59 14.1	4 37 30.7	8 47.2	6 30 57.7	12 23.1	9.557 7427	69264
8	163 32 15.7	4 28 35.8	10 9.6	6 17 33.7	14 21.9	9.564 6425	68658
9	167 56 83.1	4 20 2.8	11 14.9	6 2 19.6	16 3.5	9.571 4609	67647
10	172 12 29.2	4 11 53.5	-12 3.1	+5 45 32.0	-17 29.3	9.578 1606	+66296
11	176 20 23.4	4 4 9.2	12 34.6	5 27 25.7	18 41.1	9.584 7106	64660
12	180 20 56.2	3 56 50.7	12 50.2	5 8 14.1	19 40.1	9.591 0846	62784
13	184 14 18.5	3 49 58.2	12 50.9	4 48 9.3	20 27.3	9.597 2610	60716
14	188 1 1.3	3 43 31.5	12 38.0	4 27 21.7	21 5.8	9.603 2226	58490
15	191 41 29.9	3 37 29.9	-12 12.9	+4 6 0.5	-21 35.3	9.606 9547	+56135
16	195 16 9.3	3 31 52.9	11 36.7	3 44 13.8	21 57.0	9.614 4464	59685
17	198 45 23.7	3 26 39.8	10 51.0	3 22 8.6	22 12.3	9.619 6891	51158
18	202 9 36.6	3 21 49.6	9 57.0	2 59 51.1	22 21.9	9.624 6761	45874
19	205 29 10.2	3 17 21.2	8 56.1	2 37 26.4	23 26.3	9.629 4024	43947
20	208 44 26.1	3 13 14.0	- 7 49.4	+2 14 59.0	-23 27.4	9.633 8645	+43292
21	211 55 44.9	3 9 26.8	6 38.2	1 52 32.9	23 24.3	9.638 0602	40619
22	215 3 26.1	3 5 56.7	5 23.4	1 30 11.4	23 18.2	9.641 9879	37035
23	218 7 48.5	3 2 49.0	4 6.2	1 7 57.4	23 9.4	9.645 6470	35247
24	221 9 10.0	2 59 56.8	2 47.5	0 45 53.4	21 58.2	9.649 0373	32559
25	224 7 47.7	2 57 21.3	- 1 28.1	+0 24 1.7	-21 45.0	9.652 1590	+29676
26	227 3 58.0	2 55 1.9	- 0 8.8	+0 2 24.0	21 30.1	9.655 0123	27201
27	229 57 56.6	2 52 57.3	+ 1 9.6	-0 18 57.9	21 13.5	9.657 5995	24533
28	232 49 58.6	2 51 8.7	2 26.4	0 40 2.5	20 55.6	9.659 9199	21879
29	235 40 18.7	2 49 33.7	3 40.9	1 0 48.6	20 36.4	9.661 9755	19232
30	238 29 10.7	2 48 12.5	+ 4 52.7	-1 21 14.8	-20 15.9	9.663 7666	+16594
Oct. 1	241 16 48.3	2 47 4.9	+ 6 1.1	-1 41 20.1	-19 54.4	9.665 2946	+13967

FOR GREENWICH MEAN NOON.

Date.	Heliocentric Longitude, Mean Equinox of Date.	Var. per Day.	Reduction to Orbit.	Heliocentric Latitude.	Var. per Day.	Logarithm of Radius Vector.	Var. per Day.	
Oct.	1	241 16 48.3	2 47 4.9	+ 6 1.1	-1 41 20.1	-19 54.4	9.665 2946	+13067
	2	244 3 24.9	2 46 10.4	7 5.7	2 1 3.3	19 31.9	9.666 5002	11347
	3	246 49 13.4	2 45 28.7	8 6.0	2 20 23.5	19 8.3	9.667 5642	8734
	4	249 34 26.4	2 44 59.4	9 1.5	2 39 19.5	18 43.3	9.668 3073	6129
	5	252 19 16.4	2 44 42.8	9 51.8	2 57 50.4	18 18.0	9.668 7901	3526
	6	255 3 55.9	2 44 38.3	+10 36.7	-3 15 55.1	-17 51.2	9.669 0126	+ 926
	7	257 48 37.0	2 44 46.0	11 15.7	3 33 32.4	17 23.2	9.668 9752	- 1674
	8	260 33 31.9	2 45 5.9	11 48.4	3 50 41.1	16 54.1	9.668 6778	4275
	9	263 18 52.9	2 45 38.1	12 14.7	4 7 20.0	16 23.5	9.668 1202	6878
	10	266 4 52.2	2 46 22.6	12 34.3	4 23 27.6	15 51.6	9.667 3021	9486
	11	268 51 42.2	2 47 19.5	+12 46.8	-4 39 2.6	-15 18.1	9.666 2228	-12102
	12	271 39 35.4	2 48 29.0	12 52.2	4 54 3.1	14 42.7	9.664 8816	14723
	13	274 28 44.6	2 49 51.5	12 50.1	5 8 27.4	14 5.6	9.663 2780	17352
	14	277 19 22.8	2 51 27.1	12 40.4	5 22 13.6	13 26.4	9.661 4108	19992
	15	280 11 43.3	2 53 16.2	12 23.1	5 35 19.3	12 44.7	9.659 2792	22642
	16	283 5 59.8	2 55 19.1	+11 58.0	-5 47 42.2	-12 0.6	9.656 8821	-25301
	17	286 2 26.3	2 57 36.3	11 25.1	5 59 19.6	11 13.7	9.654 2187	27970
	18	289 1 17.4	3 0 8.4	10 44.5	6 10 8.5	10 23.6	9.651 2877	30649
	19	292 2 48.2	3 2 55.8	9 56.2	6 20 5.7	9 30.1	9.648 0887	33331
	20	295 7 14.2	3 5 59.0	9 0.3	6 29 7.5	8 32.9	9.644 6213	36020
	21	298 14 51.8	3 9 18.8	+ 7 57.2	-6 37 10.1	- 7 31.6	9.640 8847	-38709
	22	301 25 57.6	3 12 55.7	6 47.0	6 44 9.1	6 25.6	9.636 8798	41390
	23	304 40 49.2	3 16 50.5	5 30.5	6 49 59.7	5 14.7	9.632 6071	44080
	24	307 59 44.8	3 21 3.9	4 7.9	6 54 36.7	3 58.4	9.628 0886	46707
	25	311 23 3.4	3 26 36.5	2 40.2	6 57 54.6	2 36.3	9.623 2667	49323
	26	314 51 4.5	3 30 29.0	+ 1 8.2	-6 59 47.2	- 1 7.8	9.618 2056	-51892
	27	318 24 8.4	3 35 42.3	- 0 27.1	7 0 7.9	+ 0 37.6	9.612 8904	54399
	28	322 2 36.2	3 41 16.9	2 4.4	6 58 49.6	2 10.3	9.607 3285	56824
	29	325 46 49.5	3 47 13.3	3 42.1	6 55 44.7	4 0.7	9.601 5291	59144
	30	329 37 10.2	3 53 31.9	5 18.6	6 50 45.4	5 59.3	9.595 5042	61328
	31	333 34 0.8	4 0 13.0	- 6 51.9	-6 43 43.2	+ 8 6.4	9.589 2690	-63247
Nov.	1	337 37 43.8	4 7 16.7	8 19.9	6 34 29.7	10 22.1	9.582 8418	65158
	2	341 48 41.6	4 14 42.6	9 40.0	6 22 56.1	12 46.5	9.576 2458	66717
	3	346 7 16.2	4 22 30.1	10 49.8	6 8 53.9	15 19.3	9.569 5083	67978
	4	350 33 48.6	4 30 38.0	11 46.4	5 52 14.9	17 59.9	9.562 6623	68877
	5	355 8 38.4	4 39 4.5	-12 27.0	-5 32 51.7	+20 47.6	9.555 7469	-69356
	6	359 52 3.1	4 47 47.4	12 49.1	5 10 37.9	23 40.7	9.548 8073	69345
	7	4 44 17.4	4 56 48.1	12 50.0	4 45 29.1	26 37.3	9.541 8960	68777
	8	9 45 32.2	5 5 47.6	12 27.6	4 17 23.0	29 35.0	9.535 0731	67571
	9	14 55 53.8	5 14 55.7	11 40.6	3 46 20.1	32 30.1	9.528 4052	65663
	10	20 15 22.6	5 24 0.9	-10 28.4	-3 12 25.1	+35 13.6	9.521 9662	-62963
	11	25 43 52.2	5 32 56.1	8 51.4	2 35 46.7	37 56.0	9.515 8362	59476
	12	31 21 8.3	5 41 32.3	6 51.5	1 56 38.8	40 16.5	9.510 0999	55104
	13	37 6 47.2	5 49 40.0	4 32.2	1 15 21.2	42 14.6	9.504 8448	49650
	14	43 0 15.5	5 57 9.3	- 1 58.3	-0 32 19.0	43 44.5	9.500 1588	43729
	15	49 0 49.4	6 3 49.3	+ 0 43.8	+0 11 56.5	+44 40.4	9.496 1262	-36793
	16	55 7 34.2	6 9 29.5	+ 3 26.7	+0 56 49.0	+44 57.3	9.492 8247	-29194

FOR GREENWICH MEAN NOON.

Date.	Heliocentric Longitude, Mean Equinox of Date.			Var. per Day.	Reduction to Orbit.	Heliocentric Latitude.			Var. per Day.	Logarithm of Radius Vector.	Var. per Day.				
	°	'	"	°	'	"	°	'	"	'	"				
Nov. 16	55	7	34.2	6	9	29.5	+ 3	26.7	+0	56	49.0	+44	57.8	9.492 8247	-20124
17	61	19	25.2	6	14	0.0	6	2.1	1	41	38.1	44	33.2	9.490 3219	20641
18	67	35	8.1	6	17	12.0	8	21.8	2	25	40.7	43	24.6	9.488 6716	12106
19	73	53	20.9	6	18	58.9	10	18.1	3	8	12.8	41	32.5	9.487 9099	- 3101
20	80	12	36.1	6	19	16.3	11	44.6	3	48	31.8	38	58.9	9.488 0538	+ 5974
21	86	31	23.0	6	18	2.4	+12	36.8	+4	25	58.3	+35	48.5	9.489 1003	+14917
22	92	48	10.9	6	15	18.8	12	52.2	4	59	58.5	32	7.3	9.491 0260	23525
23	99	1	32.2	6	11	10.1	12	31.1	5	30	5.0	28	2.4	9.493 7885	31628
24	105	10	4.8	6	5	42.8	11	35.7	5	55	58.2	23	42.0	9.497 3299	39079
25	111	12	34.7	5	59	6.4	10	10.2	6	17	26.5	19	13.9	9.501 5787	45763
26	117	7	58.1	5	51	31.6	+ 8	20.4	+6	34	25.9	+14	45.5	9.506 4547	+51613
27	122	55	22.1	5	43	9.5	6	12.5	6	46	59.5	10	23.2	9.511 8720	56586
28	128	34	5.2	5	34	11.9	3	53.3	6	55	16.2	6	12.4	9.517 7425	60680
29	134	3	37.8	5	24	50.0	+ 1	29.3	6	59	29.5	+ 2	17.2	9.523 9795	63921
30	139	23	40.6	5	15	14.1	- 0	53.7	6	59	56.6	- 1	19.9	9.530 4996	66351
Dec. 1	144	34	4.4	5	5	33.4	- 3	10.7	+6	56	56.3	- 4	37.2	9.537 2246	+69029
2	149	34	48.4	4	55	55.8	5	17.6	6	50	49.1	7	33.8	9.544 0826	69023
3	154	25	59.2	4	46	27.9	7	11.4	6	41	55.4	10	10.3	9.551 0089	69406
4	159	7	49.1	4	37	14.7	8	49.9	6	30	35.1	12	27.0	9.557 9460	69254
5	163	40	34.9	4	28	20.4	10	11.8	6	17	7.5	14	25.2	9.564 8441	69635
6	168	4	37.2	4	19	48.0	-11	16.6	+6	1	50.3	-16	6.4	9.571 6596	+67614
7	172	20	18.9	4	11	39.4	12	4.3	5	45	0.0	17	31.8	9.578 3556	66253
8	176	28	4.4	4	3	55.8	12	35.3	5	26	51.5	18	43.0	9.584 9007	64607
9	180	28	19.4	3	56	38.2	12	50.4	5	7	38.2	19	41.7	9.591 2691	62727
10	184	21	29.5	3	49	46.5	12	50.7	4	47	31.8	20	29.3	9.597 4396	60654
11	188	8	0.8	3	43	20.4	-12	37.4	+4	26	43.0	-21	6.9	9.603 3948	+58423
12	191	48	18.8	3	37	19.7	12	11.9	4	5	20.9	21	36.0	9.609 1199	56064
13	195	22	48.3	3	31	43.4	11	35.5	3	43	33.5	21	57.6	9.614 6043	53611
14	198	51	53.5	3	26	31.0	10	49.5	3	21	27.9	22	12.7	9.619 8397	51084
15	202	15	57.8	3	21	41.3	9	55.3	2	59	10.0	22	22.2	9.624 8192	48498
16	205	35	23.4	3	17	13.6	- 8	54.2	+2	36	45.1	-22	26.8	9.629 5378	+45868
17	208	50	32.1	3	13	7.0	7	47.3	2	14	17.7	22	27.4	9.633 9920	43214
18	212	1	44.1	3	9	20.3	6	35.9	1	51	51.6	22	24.2	9.638 1799	40640
19	215	9	19.1	3	5	52.9	5	21.1	1	29	30.3	22	18.0	9.642 0996	37856
20	218	13	35.9	3	2	43.7	4	3.8	1	7	16.5	22	9.1	9.645 7509	35168
21	221	14	52.3	2	59	52.0	- 2	45.0	+0	45	12.9	-21	57.8	9.649 1332	+32479
22	224	13	25.4	2	57	17.0	1	25.6	0	23	21.5	21	44.6	9.652 2470	29797
23	227	9	31.6	2	54	58.0	- 0	6.4	+0	1	44.3	21	29.6	9.655 0929	27123
24	230	3	28.5	2	52	54.4	+ 1	12.0	-0	19	37.1	21	13.0	9.657 6718	24456
25	232	55	25.3	2	51	5.6	2	28.7	0	40	41.2	20	55.0	9.659 9844	21799
26	235	45	42.5	2	49	31.1	+ 3	43.2	-1	1	26.7	-20	35.8	9.662 0320	+19152
27	238	34	32.1	2	48	10.3	4	54.8	1	21	52.3	20	15.3	9.663 8152	16515
28	241	22	7.7	2	47	3.1	6	3.2	1	41	56.9	19	53.8	9.665 3354	13889
29	244	8	42.7	2	46	9.0	7	7.6	2	1	39.5	19	31.2	9.666 5932	11269
30	246	54	29.9	2	45	27.6	8	7.7	2	20	58.9	19	7.5	9.667 5895	8657
31	249	39	42.1	2	44	58.9	+ 9	3.1	-2	39	54.2	-18	42.9	9.668 3248	+ 6050
32	252	24	31.7	...	...	...	+ 9	53.3	-2	58	24.3	...	...	9.668 7998	....

GREENWICH MEAN TIME.

Date.	Apparent Right Ascension.	Var. per Hour.	Apparent Declination.	Var. per Hour.	Logarithm of Distance of from Earth.	Var. per Hour.	Semi- diameter.	Hor. Paral- lax.	Transit, Meridian of Green- wich.
	Mean.	Mean.	Mean.	Mean.	Mean.	Mean.	Mean.	Mean.	
	h m s	s	° ' "	"			"	"	h m
Jan. 1	15 39 39.82	+11.882	-16 57 13.7	-43.01	9.986 2797	+1325.6	8.68	9.08	21 1.0
2	15 44 24.94	11.908	17 14 15.5	42.13	9.989 4455	1312.5	8.62	9.02	21 1.8
3	15 49 11.39	11.963	17 30 55.8	41.22	9.992 5800	1290.6	8.56	8.95	21 2.7
4	15 53 59.17	12.019	17 47 13.7	40.27	9.995 6837	1268.8	8.50	8.89	21 3.5
5	15 58 48.28	12.074	18 3 8.5	39.29	9.998 7570	1247.2	8.44	8.83	21 4.4
6	16 3 38.70	+12.128	-18 18 39.4	-38.28	0.001 8002	+1261.7	8.37	8.76	21 5.3
7	16 8 30.43	12.182	18 33 45.6	37.24	0.004 8134	1249.3	8.32	8.70	21 6.3
8	16 13 23.43	12.235	18 48 26.4	36.16	0.007 7970	1237.0	8.26	8.64	21 7.3
9	16 18 17.71	12.288	19 2 41.0	35.05	0.010 7511	1224.8	8.20	8.58	21 8.2
10	16 23 13.23	12.339	19 16 28.7	33.92	0.013 6759	1212.6	8.15	8.53	21 9.2
11	16 28 9.98	+12.390	-19 29 48.8	-32.75	0.016 5717	+1200.6	8.10	8.47	21 10.3
12	16 33 7.92	12.439	19 42 40.4	31.55	0.019 4388	1188.7	8.04	8.41	21 11.3
13	16 38 7.04	12.487	19 55 3.0	30.33	0.022 2773	1176.8	7.99	8.36	21 12.4
14	16 43 7.29	12.534	20 6 55.9	29.08	0.025 0876	1165.1	7.94	8.31	21 13.4
15	16 48 8.64	12.579	20 18 18.4	27.80	0.027 8699	1153.5	7.89	8.25	21 14.5
16	16 53 11.06	+12.623	-20 29 9.9	-26.49	0.030 6246	+1142.1	7.84	8.20	21 15.6
17	16 58 14.52	12.665	20 39 29.7	25.16	0.033 3520	1130.8	7.79	8.15	21 16.7
18	17 3 18.97	12.705	20 49 17.3	23.80	0.036 0524	1119.6	7.74	8.10	21 17.9
19	17 8 24.37	12.744	20 58 32.1	22.42	0.038 7262	1108.6	7.69	8.05	21 19.1
20	17 13 30.69	12.782	21 7 13.6	21.03	0.041 3736	1097.6	7.65	8.00	21 20.2
21	17 18 37.88	+12.817	-21 15 21.2	-19.61	0.043 9949	+1086.8	7.60	7.95	21 21.4
22	17 23 45.99	12.850	21 22 54.5	18.17	0.046 5905	1076.2	7.55	7.90	21 22.7
23	17 28 54.68	12.882	21 29 53.0	16.71	0.049 1609	1065.8	7.51	7.86	21 23.9
24	17 34 4.20	12.911	21 36 16.2	15.23	0.051 7063	1055.5	7.47	7.81	21 25.1
25	17 39 14.40	12.939	21 42 3.7	13.73	0.054 2273	1045.3	7.43	7.77	21 26.3
26	17 44 25.24	+12.964	-21 47 15.1	-12.22	0.056 7241	+1035.4	7.38	7.72	21 27.6
27	17 49 36.67	12.988	21 51 50.1	10.69	0.059 1972	1025.5	7.34	7.68	21 28.8
28	17 54 48.63	13.009	21 55 48.3	9.15	0.061 6468	1015.9	7.29	7.63	21 30.1
29	18 0 1.08	13.028	21 59 9.4	7.60	0.064 0735	1006.4	7.26	7.59	21 31.4
30	18 5 13.97	13.046	22 1 53.2	6.04	0.066 4774	997.0	7.22	7.55	21 32.7
31	18 10 27.25	+13.061	-22 3 59.3	-4.47	0.068 8590	+987.7	7.18	7.51	21 33.9
Feb. 1	18 15 40.87	13.074	22 5 27.5	2.89	0.071 2185	978.6	7.14	7.47	21 35.2
2	18 20 54.78	13.085	22 6 17.7	-1.30	0.073 5562	969.5	7.10	7.43	21 36.5
3	18 26 8.93	13.094	22 6 29.6	+0.30	0.075 8723	960.6	7.06	7.39	21 37.8
4	18 31 23.26	13.100	22 6 3.1	1.91	0.078 1670	951.7	7.03	7.35	21 39.1
5	18 36 37.73	+13.105	-22 4 58.1	+3.51	0.080 4404	+942.8	6.99	7.31	21 40.4
6	18 41 52.29	13.107	22 3 14.6	5.12	0.082 6927	934.1	6.95	7.27	21 41.7
7	18 47 6.87	13.107	22 0 52.4	6.73	0.084 9240	925.4	6.92	7.24	21 43.0
8	18 52 21.43	13.106	21 57 51.7	8.34	0.087 1344	916.7	6.88	7.20	21 44.3
9	18 57 35.92	13.101	21 54 12.3	9.94	0.089 3240	908.0	6.84	7.16	21 45.6
10	19 2 50.27	+13.095	-21 49 54.4	+11.55	0.091 4930	+899.4	6.81	7.13	21 46.9
11	19 8 4.44	13.086	21 44 58.0	13.15	0.093 6414	890.9	6.78	7.09	21 48.2
12	19 13 18.37	13.075	21 39 23.3	14.74	0.095 7694	882.5	6.75	7.06	21 49.5
13	19 18 32.00	13.061	21 33 10.3	16.33	0.097 8772	874.1	6.71	7.02	21 50.8
14	19 23 45.29	13.046	21 26 19.3	17.91	0.099 9649	865.7	6.68	6.99	21 52.0
15	19 28 58.18	+13.028	-21 18 50.5	+19.48	0.102 0327	+857.5	6.65	6.96	21 53.3
16	19 34 10.64	+13.009	-21 10 44.1	+21.05	0.104 0808	+849.3	6.62	6.92	21 54.6

GREENWICH MEAN TIME.

Date.	Apparant Right Ascension.	Var. per Hour.	Apparant Declination.	Var. per Hour.	Logarithm of Distance from Earth.	Var. per Hour.	Semi- diam- eter.	Hor. Paral- lax.	Transit, Meridian of Green- wich.
	Noon.	Noon.	Noon.	Noon.	Noon.	Noon.	Noon.	Noon.	
	h m s	s	° ' "	"			"	"	h m
Feb. 16	19 34 10.64	+12.000	-21 10 44.1	+21.05	0.104 0608	+840.3	6.62	6.92	21 54.6
17	19 39 22.60	12.087	21 2 0.3	23.60	0.106 1098	841.1	6.59	6.89	21 55.8
18	19 44 34.02	12.094	20 52 39.5	24.14	0.108 1184	833.1	6.56	6.86	21 57.1
19	19 49 44.87	12.089	20 42 41.9	26.66	0.110 1064	825.3	6.53	6.83	21 58.3
20	19 54 55.08	12.012	20 32 7.9	27.17	0.112 0793	817.3	6.50	6.80	21 59.5
21	20 0 4.63	+12.383	-20 20 57.9	+28.06	0.114 0315	+809.5	6.47	6.77	22 0.7
22	20 5 13.47	12.353	20 9 12.2	30.14	0.115 9651	801.3	6.44	6.74	22 1.9
23	20 10 21.56	12.331	19 56 51.3	31.00	0.117 8804	794.3	6.41	6.71	22 3.1
24	20 15 23.88	12.738	19 43 55.6	28.04	0.119 7776	786.3	6.39	6.68	22 4.2
25	20 20 35.39	12.754	19 30 25.5	34.46	0.121 6570	779.4	6.36	6.65	22 5.4
26	20 25 41.06	+12.719	-19 16 21.5	+35.87	0.123 5189	+772.2	6.33	6.62	22 6.5
27	20 30 45.88	12.682	19 1 44.1	37.25	0.125 3636	765.1	6.30	6.59	22 7.7
28	20 35 49.81	12.645	18 46 33.8	38.61	0.127 1912	758.0	6.28	6.57	22 8.8
29	20 40 52.84	12.607	18 30 51.0	39.95	0.129 0019	751.0	6.25	6.54	22 9.9
Mar. 1	20 45 54.95	12.569	18 14 36.3	41.27	0.130 7961	744.1	6.22	6.51	22 10.9
2	20 50 56.13	+12.529	-17 57 50.2	+42.57	0.132 5788	+737.3	6.19	6.48	22 12.0
3	20 55 56.36	12.490	17 40 33.3	43.84	0.134 3351	730.5	6.17	6.46	22 13.1
4	21 0 55.64	12.450	17 22 46.1	45.09	0.136 0801	723.7	6.15	6.43	22 14.1
5	21 5 58.96	12.410	17 4 29.2	46.31	0.137 8090	717.0	6.13	6.41	22 15.1
6	21 10 51.31	12.369	16 45 43.2	47.51	0.139 5217	710.3	6.10	6.38	22 16.1
7	21 15 47.68	+12.328	-16 26 28.7	+48.69	0.141 2184	+703.6	6.08	6.36	22 17.1
8	21 20 43.07	12.288	16 6 46.3	49.84	0.142 8990	696.9	6.05	6.33	22 18.1
9	21 25 37.49	12.247	15 46 36.7	50.96	0.144 5637	690.3	6.03	6.31	22 19.0
10	21 30 30.93	12.206	15 26 0.4	52.05	0.146 2123	683.6	6.00	6.28	22 19.9
11	21 35 23.40	12.166	15 4 58.3	53.12	0.147 8451	677.0	5.98	6.26	22 20.8
12	21 40 14.88	+12.125	-14 43 30.8	+54.16	0.149 4619	+670.4	5.96	6.24	22 21.8
13	21 45 5.40	12.085	14 21 38.7	55.18	0.151 0629	663.8	5.94	6.21	22 22.7
14	21 49 54.96	12.045	13 59 22.5	56.16	0.152 6481	657.2	5.92	6.19	22 23.5
15	21 54 43.56	12.006	13 36 43.1	57.11	0.154 2175	650.6	5.90	6.17	22 24.4
16	21 59 31.21	11.966	13 13 41.2	58.04	0.155 7711	644.1	5.88	6.15	22 25.2
17	22 4 17.94	+11.928	-12 50 17.3	+58.94	0.157 3091	+637.6	5.85	6.12	22 26.0
18	22 9 3.74	11.889	12 26 32.2	59.81	0.158 8315	631.1	5.83	6.10	22 26.8
19	22 13 48.63	11.852	12 2 26.7	60.65	0.160 3383	624.6	5.81	6.08	22 27.6
20	22 18 32.63	11.815	11 38 1.3	61.46	0.161 8297	618.2	5.79	6.06	22 28.4
21	22 23 15.76	11.779	11 13 16.8	62.24	0.163 3057	611.9	5.77	6.04	22 29.2
22	22 27 58.03	+11.744	-10 48 13.9	+63.99	0.164 7665	+605.5	5.75	6.02	22 29.9
23	22 32 39.46	11.709	10 22 53.3	63.73	0.166 2123	599.3	5.74	6.00	22 30.7
24	22 37 20.07	11.675	9 57 15.7	64.41	0.167 6431	593.1	5.72	5.98	22 31.4
25	22 41 59.89	11.643	9 31 21.8	65.08	0.169 0591	586.9	5.70	5.96	22 32.1
26	22 46 38.95	11.612	9 5 12.3	65.71	0.170 4605	580.9	5.68	5.94	22 32.8
27	22 51 17.26	+11.581	- 8 38 47.9	+66.32	0.171 8474	+574.9	5.66	5.92	22 33.5
28	22 55 54.87	11.553	8 12 9.3	66.90	0.173 2199	568.9	5.64	5.90	22 34.1
29	23 0 31.80	11.526	7 45 17.1	67.45	0.174 5788	563.1	5.63	5.89	22 34.8
30	23 5 8.08	11.499	7 18 12.1	67.97	0.175 9226	557.2	5.61	5.87	22 35.5
31	23 9 43.75	11.474	6 50 54.9	68.46	0.177 2529	551.4	5.59	5.85	22 36.1
Apr. 1	23 14 18.83	+11.450	- 6 23 26.2	+68.93	0.178 5698	+545.6	5.57	5.83	22 36.7
2	23 18 53.37	+11.428	- 5 55 46.7	+69.36	0.179 8718	+539.3	5.56	5.82	22 37.4

GREENWICH MEAN TIME.

Date.	Apparent Right Ascension.	Var. per Hour.	Apparent Declination.	Var. per Hour.	Logarithm of Distance from Earth.	Var. per Hour.	Semi-diameter.	Hor. Parallax.	Transit, Meridian of Greenwich.
	Noon.	Noon.	Noon.	Noon.	Noon.	Noon.	Noon.	Noon.	h m
Apr.	h m s	s	° ' "	"			"	"	h m
	23 14 18.83	+11.450	- 6 23 26.2	+68.93	0.178 5693	+545.6	5.57	5.83	22 36.7
	23 18 53.37	11.438	5 55 46.7	60.36	0.179 8718	539.3	5.56	5.82	22 37.4
	23 23 27.40	11.408	5 27 57.0	60.77	0.181 1604	534.0	5.54	5.80	22 38.0
	23 28 0.96	11.389	4 59 57.9	70.15	0.182 4351	528.2	5.53	5.78	22 38.6
	23 32 34.08	11.371	4 31 50.0	70.50	0.183 6959	522.4	5.51	5.76	22 39.2
	23 37 6.80	+11.355	- 4 3 34.1	+70.82	0.184 9427	+516.6	5.50	5.75	22 39.8
	23 41 39.16	11.341	3 35 10.7	71.12	0.186 1756	510.3	5.48	5.73	22 40.4
	23 46 11.19	11.328	3 6 40.7	71.38	0.187 3946	505.0	5.47	5.72	22 41.0
	23 50 42.93	11.317	2 38 4.7	71.62	0.188 5996	499.2	5.45	5.70	22 41.6
	23 55 14.42	11.307	2 9 23.3	71.82	0.189 7906	493.3	5.43	5.68	22 42.1
	23 59 45.69	+11.299	- 1 40 37.4	+72.00	0.190 9675	+487.5	5.42	5.67	22 42.7
	0 4 16.79	11.293	1 11 47.5	72.15	0.192 1304	481.6	5.40	5.65	22 43.3
	0 8 47.75	11.283	0 42 54.5	72.27	0.193 2790	475.6	5.39	5.64	22 43.9
	0 13 18.61	11.284	- 0 13 58.9	72.36	0.194 4135	469.7	5.37	5.62	22 44.4
	0 17 49.40	11.282	+ 0 14 58.6	72.42	0.195 5337	463.8	5.36	5.61	22 45.0
	0 22 20.16	+11.282	+ 0 43 57.1	+72.45	0.196 6397	+457.9	5.34	5.59	22 45.6
	0 26 50.93	11.283	1 12 56.1	72.46	0.197 7314	451.9	5.33	5.58	22 46.1
	0 31 21.74	11.285	1 41 54.8	72.43	0.198 8088	446.0	5.32	5.57	22 46.7
	0 35 52.64	11.289	2 10 52.5	72.37	0.199 8720	440.0	5.31	5.55	22 47.3
	0 40 23.65	11.295	2 39 48.4	72.29	0.200 9210	434.1	5.30	5.54	22 47.9
	0 44 54.82	+11.303	+ 3 8 42.0	+72.17	0.201 9559	+428.3	5.29	5.53	22 48.4
	0 49 26.18	11.311	3 37 32.5	72.03	0.202 9767	422.4	5.27	5.51	22 49.0
	0 53 57.77	11.321	4 6 19.2	71.86	0.203 9836	416.6	5.26	5.50	22 49.6
	0 58 29.62	11.333	4 35 1.4	71.66	0.204 9766	410.8	5.25	5.49	22 50.2
	1 3 1.77	11.347	5 3 38.5	71.43	0.205 9557	405.1	5.24	5.48	22 50.8
	1 7 34.27	+11.362	+ 5 32 9.7	+71.17	0.206 9211	+399.4	5.22	5.46	22 51.4
	1 12 7.15	11.379	6 0 34.3	70.88	0.207 8728	393.7	5.21	5.45	22 52.0
	1 16 40.46	11.397	6 28 51.7	70.57	0.208 8110	388.1	5.20	5.44	22 52.6
	1 21 14.22	11.417	6 57 1.2	70.22	0.209 7355	382.4	5.19	5.43	22 53.3
1 25 43.48	11.439	7 25 2.0	69.85	0.210 6466	376.8	5.18	5.42	22 53.9	
May	1 80 23.28	+11.462	+ 7 52 53.6	+69.45	0.211 5441	+371.1	5.17	5.41	22 54.6
	1 34 58.66	11.486	8 20 35.1	69.01	0.212 4281	365.5	5.15	5.39	22 55.2
	1 39 34.64	11.512	8 48 5.8	68.55	0.213 2986	359.9	5.14	5.38	22 55.9
	1 44 11.27	11.540	9 15 25.2	68.06	0.214 1555	354.2	5.13	5.37	22 56.6
	1 48 48.59	11.570	9 42 32.4	67.54	0.214 9988	348.5	5.12	5.36	22 57.3
	1 53 26.68	+11.601	+10 9 26.7	+66.99	0.215 8284	+342.8	5.11	5.35	22 58.0
	1 58 5.48	11.633	10 36 7.5	66.41	0.216 6442	337.0	5.11	5.34	22 58.7
	2 2 45.01	11.666	11 2 34.0	65.80	0.217 4462	331.3	5.10	5.33	22 59.4
	2 7 25.40	11.700	11 28 45.6	65.16	0.218 2343	325.5	5.09	5.32	23 0.1
	2 12 6.64	11.736	11 54 41.4	64.49	0.219 0084	319.6	5.08	5.31	23 0.9
	2 16 48.76	+11.774	+12 20 20.8	+63.79	0.219 7685	+313.8	5.07	5.30	23 1.7
	2 21 31.78	11.812	12 45 43.0	63.06	0.220 5145	307.9	5.06	5.29	23 2.5
	2 26 15.78	11.851	13 10 47.4	62.30	0.221 2463	302.0	5.06	5.29	23 3.3
	2 31 0.63	11.891	13 35 33.0	61.50	0.221 9639	296.0	5.05	5.28	23 4.1
	2 35 46.50	11.932	13 59 59.3	60.68	0.222 6671	290.0	5.04	5.27	23 4.9
2 40 33.37	+11.974	+14 24 5.5	+59.83	0.223 3559	+284.0	5.03	5.26	23 5.8	
2 45 21.25	+12.016	+14 47 50.9	+58.95	0.224 0303	+278.0	5.02	5.25	23 6.7	

GREENWICH MEAN TIME.

Date.	Apparent Right Ascension.	Var. per Hour.	Apparent Declination.	Var. per Hour.	Logarithm of Distance from Earth.	Var. per Hour.	Semi- diam- eter.	Hor. Paral- lax.	Transit, Meridian of Green- wich.
	Noon.	Noon.	Noon.	Noon.	Noon.	Noon.	Noon.	Noon.	
	h m s	s	° ' "	"			"	"	h m
May 17	2 45 21.25	+12.016	+14 47 50.9	+58.95	0.224 0903	+278.0	5.02	5.25	23 6.7
18	2 50 10.15	12.030	15 11 14.8	58.93	0.224 6902	271.9	5.02	5.25	23 7.6
19	2 55 0.10	12.103	15 34 16.3	57.99	0.225 3356	265.9	5.01	5.24	23 8.5
20	2 59 51.10	12.147	15 56 54.8	56.12	0.225 9065	259.9	5.00	5.23	23 9.4
21	3 4 43.17	12.192	16 19 9.6	55.11	0.226 5829	253.8	4.99	5.22	23 10.3
22	3 9 36.32	+12.237	+16 40 59.8	+54.07	0.227 1849	+247.8	4.99	5.22	23 11.3
23	3 14 30.56	12.283	17 2 24.9	53.01	0.227 7726	241.9	4.98	5.21	23 12.3
24	3 19 25.89	12.329	17 23 24.1	51.92	0.228 3460	235.9	4.97	5.20	23 13.3
25	3 24 22.33	12.375	17 43 56.6	50.70	0.228 9051	230.0	4.96	5.19	23 14.3
26	3 29 19.87	12.421	18 4 1.9	49.44	0.229 4501	224.1	4.96	5.19	23 15.3
27	3 34 18.53	+12.467	+18 23 39.2	+48.46	0.229 9810	+218.3	4.95	5.18	23 16.4
28	3 39 18.30	12.513	18 42 47.9	47.25	0.230 4979	212.4	4.95	5.18	23 17.5
29	3 44 19.18	12.560	19 1 27.2	46.01	0.231 0007	206.6	4.94	5.17	23 18.5
30	3 49 21.18	12.606	19 19 36.4	44.75	0.231 4895	200.7	4.93	5.16	23 19.6
31	3 54 24.28	12.652	19 37 15.0	43.46	0.231 9641	194.8	4.93	5.16	23 20.8
June 1	3 59 28.49	+12.698	+19 54 22.2	+42.14	0.232 4246	+188.9	4.92	5.15	23 21.9
2	4 4 33.78	12.743	20 10 57.4	40.79	0.232 8710	183.1	4.92	5.15	23 23.1
3	4 9 40.16	12.788	20 27 0.0	39.42	0.233 3033	177.3	4.91	5.14	23 24.3
4	4 14 47.59	12.833	20 42 29.3	38.02	0.233 7213	171.3	4.91	5.14	23 25.5
5	4 19 56.08	12.875	20 57 24.8	36.60	0.234 1251	165.3	4.90	5.13	23 26.7
6	4 25 5.59	+12.917	+21 11 45.7	+35.15	0.234 5147	+159.3	4.90	5.13	23 27.9
7	4 30 16.11	12.960	21 25 31.7	33.67	0.234 8898	153.3	4.89	5.12	23 29.2
8	4 35 27.61	12.999	21 38 41.9	32.18	0.235 2506	147.3	4.89	5.12	23 30.4
9	4 40 40.07	13.039	21 51 16.0	30.66	0.235 5969	141.3	4.89	5.12	23 31.7
10	4 45 53.46	13.077	22 3 13.3	29.12	0.235 9286	135.2	4.89	5.11	23 33.0
11	4 51 7.74	+13.113	+22 14 33.5	+27.56	0.236 2456	+129.0	4.89	5.11	23 34.3
12	4 56 22.37	13.148	22 25 15.9	25.97	0.236 5478	122.8	4.88	5.10	23 35.6
13	5 1 38.82	13.181	22 35 20.1	24.37	0.236 8352	116.6	4.88	5.10	23 37.0
14	5 6 55.55	13.213	22 44 45.6	22.75	0.237 1076	110.4	4.88	5.10	23 38.4
15	5 12 13.01	13.243	22 53 32.0	21.11	0.237 3651	104.2	4.87	5.09	23 39.7
16	5 17 31.16	+13.270	+23 1 38.9	+19.46	0.237 6075	+ 97.9	4.87	5.09	23 41.1
17	5 22 49.94	13.295	23 9 5.9	17.79	0.237 8348	91.6	4.87	5.09	23 42.4
18	5 28 9.31	13.319	23 15 52.8	16.11	0.238 0471	85.3	4.87	5.09	23 43.8
19	5 33 29.22	13.340	23 21 59.0	14.41	0.238 2444	79.1	4.86	5.08	23 45.2
20	5 38 49.60	13.358	23 27 24.4	12.70	0.238 4267	72.8	4.86	5.08	23 46.6
21	5 44 10.41	+13.375	+23 32 8.7	+10.99	0.238 5941	+ 66.7	4.86	5.08	23 48.1
22	5 49 31.60	13.390	23 36 11.6	9.26	0.238 7467	60.5	4.86	5.08	23 49.5
23	5 54 53.10	13.402	23 39 32.9	7.52	0.238 8845	54.3	4.86	5.08	23 50.9
24	6 0 14.87	13.413	23 42 12.3	5.77	0.239 0076	48.2	4.85	5.07	23 52.3
25	6 5 36.85	13.419	23 44 9.9	4.02	0.239 1160	42.1	4.85	5.07	23 53.7
26	6 10 58.97	+13.424	+23 45 25.3	+ 2.26	0.239 2098	+ 36.0	4.85	5.07	23 55.2
27	6 16 21.19	13.427	23 45 58.6	+ 0.51	0.239 2889	30.0	4.85	5.07	23 56.6
28	6 21 43.45	13.427	23 45 49.7	- 1.25	0.239 3536	23.9	4.85	5.07	23 58.0
29	6 27 5.69	13.425	23 44 58.5	3.01	0.239 4038	17.9	4.85	5.07	23 59.5
30	6 32 27.86	13.421	23 43 25.1	4.77	0.239 4396	11.9	4.85	5.07	.....
July 1	6 37 49.90	+13.414	+23 41 9.4	- 6.53	0.239 4609	+ 5.9	4.85	5.07	0 0.9
2	6 43 11.74	+13.406	+23 38 11.4	- 8.29	0.239 4677	- 0.2	4.85	5.07	0 2.3

## GREENWICH MEAN TIME.

Date.	Apparent Right Ascension.	Var. per Hour.	Apparent Declination.	Var. per Hour.	Logarithm of Distance from Earth.	Var. per Hour.	Semi- diam- eter.	Hor. Paral- ax.	Transit, Meridian of Green- wich.
	Noon.	Noon.	Noon.	Noon.	Noon.	Noon.	Noon.	Noon.	
	h m s	s	° ' "	"			"	"	h m
July 1	6 37 49.90	+13.414	+23 41 9.4	-6.53	0.239 4609	+ 5.9	4.85	5.07	0 0.9
2	6 43 11.74	13.406	23 38 11.4	8.29	0.239 4677	- 0.2	4.85	5.07	0 2.3
3	6 48 33.35	13.395	23 34 31.3	10.05	0.239 4599	6.2	4.85	5.07	0 3.7
4	6 53 54.66	13.381	23 30 9.2	11.79	0.239 4377	12.3	4.85	5.07	0 5.2
5	6 59 15.62	13.365	23 25 5.3	13.53	0.239 4008	18.4	4.85	5.07	0 6.6
6	7 4 36.18	+13.347	+23 19 19.6	-15.27	0.239 8494	-24.5	4.85	5.07	0 8.0
7	7 9 56.28	13.327	23 12 52.4	16.99	0.239 2894	30.5	4.85	5.07	0 9.4
8	7 15 15.87	13.305	23 5 44.0	18.71	0.239 2028	36.6	4.85	5.07	0 10.7
9	7 20 34.91	13.281	22 57 54.6	20.41	0.239 1075	42.8	4.85	5.07	0 12.1
10	7 25 53.33	13.254	22 49 24.5	22.10	0.238 9974	49.0	4.86	5.08	0 13.5
11	7 31 11.11	+13.226	+22 40 14.0	-23.77	0.238 8725	-55.1	4.86	5.08	0 14.8
12	7 36 28.18	13.196	22 30 23.5	25.43	0.238 7327	61.4	4.86	5.08	0 16.2
13	7 41 44.50	13.164	22 19 53.3	27.08	0.238 5778	67.7	4.86	5.08	0 17.5
14	7 47 0.03	13.130	22 8 43.9	28.70	0.238 4079	74.0	4.86	5.08	0 18.8
15	7 52 14.73	13.095	21 56 55.6	30.32	0.238 2228	80.3	4.86	5.08	0 20.1
16	7 57 28.56	+13.057	+21 44 28.9	-31.90	0.238 0227	-86.5	4.87	5.09	0 21.4
17	8 2 41.47	13.018	21 31 24.4	33.47	0.237 8075	92.8	4.87	5.09	0 22.7
18	8 7 53.43	12.978	21 17 42.4	35.02	0.237 5773	99.0	4.87	5.09	0 23.9
19	8 13 4.41	12.937	21 3 23.6	36.55	0.237 3321	105.3	4.87	5.09	0 25.2
20	8 18 14.38	12.894	20 48 28.3	38.05	0.237 0719	111.5	4.88	5.10	0 26.4
21	8 23 23.31	+12.850	+20 32 57.3	-39.53	0.236 7970	-117.6	4.88	5.10	0 27.6
22	8 28 31.17	12.805	20 16 51.0	40.99	0.236 5073	123.8	4.88	5.10	0 28.8
23	8 33 37.94	12.759	20 0 10.0	42.42	0.236 2090	129.8	4.89	5.11	0 30.0
24	8 38 43.61	12.713	19 42 55.0	43.83	0.235 8841	135.9	4.89	5.11	0 31.1
25	8 43 48.16	12.666	19 25 6.5	45.22	0.235 5507	141.9	4.89	5.12	0 32.3
26	8 48 51.58	+12.619	+19 6 45.1	-46.57	0.235 2028	-148.0	4.89	5.12	0 33.4
27	8 53 53.85	12.571	18 47 51.5	47.90	0.234 8405	153.9	4.89	5.12	0 34.5
28	8 58 54.98	12.523	18 28 26.2	49.20	0.234 4640	159.9	4.90	5.13	0 35.6
29	9 3 54.94	12.474	18 8 30.1	50.47	0.234 0731	165.8	4.90	5.13	0 36.6
30	9 8 53.74	12.426	17 48 3.7	51.72	0.233 6680	171.8	4.91	5.14	0 37.6
31	9 13 51.38	+12.378	+17 27 7.6	-52.94	0.233 2487	-177.7	4.91	5.14	0 38.7
Aug. 1	9 18 47.87	12.330	17 5 42.6	54.14	0.232 8153	183.5	4.92	5.15	0 39.7
2	9 23 43.20	12.282	16 43 49.3	55.30	0.232 3678	189.4	4.92	5.15	0 40.6
3	9 28 37.39	12.234	16 21 28.4	56.44	0.231 9062	195.3	4.93	5.16	0 41.6
4	9 33 30.44	12.187	15 58 40.6	57.54	0.231 4305	201.1	4.93	5.16	0 42.6
5	9 38 22.37	+12.140	+15 35 26.6	-58.62	0.230 9408	-207.0	4.94	5.17	0 43.5
6	9 43 13.18	12.094	15 11 47.1	59.67	0.230 4368	212.9	4.95	5.18	0 44.4
7	9 48 2.89	12.049	14 47 42.9	60.68	0.229 9187	218.8	4.95	5.18	0 45.3
8	9 52 51.52	12.004	14 23 14.6	61.67	0.229 3864	224.8	4.96	5.19	0 46.1
9	9 57 39.08	11.960	13 58 22.9	62.63	0.228 8398	230.8	4.96	5.19	0 47.0
10	10 2 25.59	+11.917	+13 33 8.6	-63.55	0.228 2788	-236.7	4.97	5.20	0 47.8
11	10 7 11.08	11.874	13 7 32.5	64.45	0.227 7035	242.7	4.98	5.21	0 48.6
12	10 11 55.55	11.832	12 41 35.2	65.32	0.227 1137	248.7	4.99	5.22	0 49.4
13	10 16 39.04	11.792	12 15 17.6	66.15	0.226 5095	254.8	4.99	5.22	0 50.2
14	10 21 21.56	11.752	11 48 40.3	66.95	0.225 8906	260.8	5.00	5.23	0 51.0
15	10 26 3.13	+11.713	+11 21 44.1	-67.72	0.225 2576	-266.9	5.01	5.24	0 51.7
16	10 30 43.79	+11.675	+10 54 29.8	-68.47	0.224 6099	-272.9	5.02	5.25	0 52.5



GREENWICH MEAN TIME.

Date.	Apparent Right Ascension.	Var. per Hour.	Apparent Declination.	Var. per Hour.	Logarithm of Distance from Earth.	Var. per Hour.	Semi-diameter.	Hor. Parallax.	Transit, Meridian of Greenwich.
	Noon.	Noon.	Noon.	Noon.	Noon.	Noon.	Noon.	Noon.	Noon.
	h m s	s	° ' "	"			"	"	h m
Aug. 16	10 30 43.79	+11.675	+10 54 29.8	-66.47	0.224 6099	-373.9	5.02	5.25	0 52.5
17	10 35 23.55	11.639	10 26 58.0	66.18	0.223 9478	373.9	5.02	5.25	0 53.2
18	10 40 2.45	11.603	9 59 9.6	66.85	0.223 2714	384.3	5.03	5.26	0 53.9
19	10 44 40.51	11.569	9 31 5.2	70.50	0.222 5807	390.3	5.04	5.27	0 54.6
20	10 49 17.77	11.536	9 2 45.6	71.12	0.221 8758	396.6	5.05	5.28	0 55.3
21	10 53 54.26	+11.505	+ 8 34 11.5	-71.71	0.221 1569	-392.3	5.06	5.29	0 55.9
22	10 58 30.00	11.475	8 5 23.6	72.27	0.220 4239	398.3	5.07	5.30	0 56.6
23	11 3 5.05	11.446	7 36 22.8	73.79	0.219 6770	314.1	5.08	5.31	0 57.2
24	11 7 39.43	11.419	7 7 9.7	73.29	0.218 9163	319.3	5.08	5.31	0 57.8
25	11 12 13.18	11.393	6 37 45.0	73.76	0.218 1418	325.6	5.09	5.32	0 58.5
26	11 16 46.33	+11.369	+ 6 8 9.4	-74.20	0.217 3536	-381.3	5.10	5.33	0 59.1
27	11 21 18.92	11.347	5 38 23.8	74.60	0.216 5519	336.9	5.11	5.34	0 59.7
28	11 25 51.00	11.327	5 8 28.7	74.98	0.215 7366	342.6	5.11	5.35	1 0.3
29	11 30 22.61	11.308	4 38 24.9	75.33	0.214 9077	348.2	5.12	5.36	1 0.8
30	11 34 53.78	11.290	4 8 13.1	75.65	0.214 0655	353.7	5.13	5.37	1 1.4
31	11 39 24.56	+11.275	+ 3 37 54.0	-75.94	0.213 2099	-359.3	5.14	5.38	1 2.0
Sept. 1	11 43 54.99	11.262	3 7 28.3	76.20	0.212 3409	364.9	5.16	5.40	1 2.6
2	11 48 25.13	11.250	2 36 56.8	76.42	0.211 4585	370.5	5.17	5.41	1 3.1
3	11 52 55.00	11.240	2 6 20.2	76.62	0.210 5627	376.0	5.18	5.42	1 3.7
4	11 57 24.65	11.232	1 35 39.1	76.79	0.209 6535	381.6	5.19	5.43	1 4.2
5	12 1 54.13	+11.225	+ 1 4 54.3	-76.93	0.208 7309	-387.2	5.20	5.44	1 4.8
6	12 6 23.48	11.221	0 34 6.5	77.05	0.207 7949	392.3	5.21	5.45	1 5.3
7	12 10 52.75	11.218	+ 0 3 16.3	77.13	0.206 8453	393.5	5.22	5.46	1 5.9
8	12 15 21.97	11.217	- 0 27 35.4	77.18	0.205 8820	404.2	5.24	5.48	1 6.4
9	12 19 51.19	11.218	0 58 27.9	77.19	0.204 9051	409.9	5.25	5.49	1 7.0
10	12 24 20.46	+11.221	- 1 29 20.5	-77.18	0.203 9143	-415.7	5.26	5.50	1 7.5
11	12 28 49.80	11.225	2 0 12.5	77.14	0.202 9098	421.4	5.27	5.51	1 8.1
12	12 33 19.27	11.231	2 31 3.1	77.07	0.201 8914	427.2	5.29	5.53	1 8.6
13	12 37 48.90	11.239	3 1 51.6	76.97	0.200 8590	433.1	5.30	5.54	1 9.2
14	12 42 18.74	11.248	3 32 37.4	76.84	0.199 8127	438.9	5.31	5.55	1 9.7
15	12 46 48.82	+11.260	- 4 3 19.5	-76.67	0.198 7525	-444.7	5.32	5.57	1 10.3
16	12 51 19.19	11.272	4 33 57.3	76.48	0.197 6784	450.4	5.33	5.58	1 10.8
17	12 55 49.88	11.286	5 4 30.1	76.25	0.196 5905	456.2	5.35	5.60	1 11.4
18	13 0 20.94	11.302	5 34 57.0	75.99	0.195 4887	461.9	5.36	5.61	1 12.0
19	13 4 52.40	11.320	6 5 17.4	75.70	0.194 3732	467.6	5.37	5.62	1 12.6
20	13 9 24.31	+11.339	- 6 35 30.5	-75.38	0.193 2440	-473.4	5.39	5.64	1 13.2
21	13 13 56.70	11.360	7 5 35.5	75.03	0.192 1011	479.1	5.40	5.65	1 13.8
22	13 18 29.62	11.383	7 35 31.7	74.65	0.190 9446	484.7	5.42	5.67	1 14.4
23	13 23 3.11	11.408	8 5 18.4	74.24	0.189 7745	490.4	5.43	5.68	1 15.0
24	13 27 37.20	11.434	8 34 54.8	73.79	0.188 5909	496.0	5.45	5.70	1 15.6
25	13 32 11.93	+11.461	- 9 4 20.2	-73.32	0.187 3938	-501.6	5.47	5.72	1 16.2
26	13 36 47.34	11.490	9 33 33.9	72.82	0.186 1833	507.1	5.48	5.73	1 16.9
27	13 41 23.48	11.521	10 2 35.1	72.28	0.184 9596	512.7	5.50	5.75	1 17.5
28	13 46 0.37	11.553	10 31 23.0	71.71	0.183 7225	518.2	5.51	5.76	1 18.2
29	13 50 38.06	11.587	10 59 56.9	71.11	0.182 4722	523.7	5.53	5.78	1 18.9
30	13 55 16.58	+11.623	-11 28 16.0	-70.48	0.181 2085	-529.3	5.54	5.80	1 19.6
Oct. 1	13 59 55.98	+11.660	-11 56 19.6	-69.82	0.179 9316	-534.8	5.55	5.81	1 20.3

## GREENWICH MEAN TIME.

Date.	Apparent Right Ascension.			Var. per Hour.	Apparent Declination.			Var. per Hour.	Logarithm of Distance from Earth.	Var. per Hour.	Semi-diameter.	Hor. Parallax.	Transit, Meridian of Greenwich.
	Noon.				Noon.								
	h	m	s	s	°	'	"	"	Noon.	Noon.	Noon.	Noon.	h m
Oct. 1	13	59	55.98	+11.660	-11	56	19.6	-69.82	0.179 9316	-534.8	5.55	5.81	1 20.3
2	14	4	36.28	11.698	12	24	6.9	69.12	0.178 6413	540.4	5.57	5.83	1 21.1
3	14	9	17.52	11.739	12	51	37.1	68.39	0.177 3377	546.0	5.59	5.85	1 21.8
4	14	13	59.74	11.780	13	18	49.5	67.63	0.176 0205	551.6	5.61	5.87	1 22.6
5	14	18	42.96	11.822	13	45	43.3	66.84	0.174 6898	557.3	5.63	5.89	1 23.3
6	14	23	27.21	+11.866	-14	12	17.7	-66.02	0.173 3454	-563.1	5.64	5.90	1 24.1
7	14	28	12.52	11.910	14	38	32.0	65.16	0.171 9871	568.8	5.66	5.92	1 25.0
8	14	32	58.92	11.956	15	4	25.3	64.27	0.170 6149	574.7	5.68	5.94	1 25.8
9	14	37	46.43	12.003	15	29	56.8	63.35	0.169 2287	580.5	5.70	5.96	1 26.6
10	14	42	35.06	12.050	15	55	5.8	62.40	0.167 8283	586.5	5.72	5.98	1 27.5
11	14	47	24.84	+12.098	-16	19	51.5	-61.41	0.166 4136	-592.5	5.74	6.00	1 28.4
12	14	52	15.78	12.147	16	44	13.1	60.38	0.164 9845	598.5	5.76	6.02	1 29.3
13	14	57	7.89	12.196	17	8	9.7	59.33	0.163 5409	604.5	5.77	6.04	1 30.2
14	15	2	1.19	12.246	17	31	40.7	58.25	0.162 0827	610.6	5.79	6.06	1 31.2
15	15	6	55.69	12.296	17	54	45.2	57.13	0.160 6098	616.7	5.81	6.08	1 32.1
16	15	11	51.38	+12.346	-18	17	22.5	-56.97	0.159 1223	-622.8	5.83	6.10	1 33.1
17	15	16	48.28	12.396	18	39	31.7	54.79	0.157 6201	629.0	5.85	6.12	1 34.1
18	15	21	46.39	12.446	19	1	12.2	53.58	0.156 1031	635.2	5.87	6.14	1 35.2
19	15	26	45.71	12.497	19	22	23.1	52.33	0.154 5714	641.3	5.89	6.16	1 36.2
20	15	31	46.23	12.547	19	43	3.7	51.05	0.153 0250	647.4	5.92	6.19	1 37.3
21	15	36	47.96	+12.597	-20	3	13.2	-49.74	0.151 4638	-653.6	5.94	6.21	1 38.4
22	15	41	50.89	12.647	20	22	50.9	48.40	0.149 8878	659.8	5.96	6.23	1 39.5
23	15	46	55.00	12.696	20	41	56.1	47.03	0.148 2969	666.0	5.98	6.25	1 40.6
24	15	52	0.29	12.745	21	0	28.0	45.63	0.146 6912	672.1	6.00	6.28	1 41.8
25	15	57	6.75	12.793	21	18	25.9	44.19	0.145 0708	678.3	6.02	6.30	1 42.9
26	16	2	14.35	+12.840	-21	35	49.1	-42.74	0.143 4355	-684.4	6.04	6.32	1 44.1
27	16	7	23.08	12.887	21	52	37.0	41.25	0.141 7855	690.6	6.07	6.35	1 45.3
28	16	12	32.91	12.933	22	8	48.9	39.74	0.140 1207	696.8	6.09	6.37	1 46.5
29	16	17	43.84	12.978	22	24	24.2	38.20	0.138 4409	703.0	6.12	6.40	1 47.8
30	16	22	55.83	13.021	22	39	22.1	36.63	0.136 7463	709.2	6.14	6.42	1 49.0
31	16	28	8.85	+13.064	-22	53	42.1	-35.04	0.135 0367	-715.5	6.17	6.45	1 50.3
Nov. 1	16	33	22.88	13.106	23	7	23.6	33.42	0.133 3118	721.9	6.19	6.47	1 51.6
2	16	38	37.87	13.144	23	20	26.0	31.78	0.131 5717	728.3	6.21	6.50	1 52.9
3	16	43	53.79	13.182	23	32	48.7	30.11	0.129 8161	734.7	6.24	6.53	1 54.2
4	16	49	10.61	13.219	23	44	31.3	28.43	0.128 0449	741.3	6.26	6.55	1 55.6
5	16	54	28.27	+13.253	-23	55	33.1	-26.72	0.126 2578	-747.9	6.29	6.58	1 56.9
6	16	59	46.74	13.286	24	5	53.7	24.99	0.124 4547	754.7	6.32	6.61	1 58.3
7	17	5	5.96	13.316	24	15	32.6	23.25	0.122 6352	761.6	6.34	6.63	1 59.7
8	17	10	25.88	13.344	24	24	29.4	21.48	0.120 7991	768.5	6.37	6.66	2 1.1
9	17	15	46.43	13.369	24	32	43.7	19.70	0.118 9463	775.5	6.40	6.69	2 2.5
10	17	21	7.56	+13.392	-24	40	15.0	-17.91	0.117 0766	-782.6	6.42	6.72	2 3.9
11	17	26	29.21	13.412	24	47	3.1	16.10	0.115 1898	789.8	6.45	6.75	2 5.3
12	17	31	51.31	13.429	24	53	7.7	14.28	0.113 2857	797.0	6.48	6.78	2 6.7
13	17	37	13.80	13.444	24	58	28.4	12.45	0.111 3641	804.3	6.51	6.81	2 8.2
14	17	42	36.60	13.456	25	3	5.0	10.60	0.109 4249	811.7	6.54	6.84	2 9.6
15	17	47	59.66	+13.465	-25	6	57.3	-8.75	0.107 4679	-819.1	6.57	6.87	2 11.1
16	17	53	22.90	+13.471	-25	10	5.1	-6.89	0.105 4930	-826.6	6.60	6.90	2 12.5

GREENWICH MEAN TIME.

Date.	Apparent Right Ascension.	Var. per Hour.	Apparent Declination.	Var. per Hour.	Logarithm of Distance from Earth.	Var. per Hour.	Semi- diam- eter.	Hor. Paral- lax.	Transit, Meridian of Green- wich.
	Noon.	Noon.	Noon.	Noon.	Noon.	Noon.	Noon.	Noon.	h m
Nov. 16	17 53 22.90	+13.471	-25 10 5.1	- 6.80	0.105 4930	- 836.6	6.60	6.90	2 12.5
17	17 58 46.24	13.474	25 12 28.2	5.03	0.103 5001	834.2	6.63	6.93	2 14.0
18	18 4 9.63	13.474	25 14 6.5	3.16	0.101 4890	841.8	6.66	6.97	2 15.4
19	18 9 32.97	13.471	25 15 0.0	- 1.29	0.099 4596	849.4	6.69	7.00	2 16.9
20	18 14 56.20	13.465	25 15 8.6	+ 0.58	0.097 4118	857.1	6.72	7.03	2 18.3
21	18 20 19.25	+13.456	-25 14 32.4	+ 2.44	0.095 3454	- 864.9	6.75	7.06	2 19.7
22	18 25 42.05	13.443	25 13 11.3	4.31	0.093 2605	872.6	6.79	7.10	2 21.2
23	18 31 4.51	13.428	25 11 5.4	6.18	0.091 1570	880.4	6.82	7.13	2 22.6
24	18 36 26.58	13.410	25 8 14.8	8.04	0.089 0346	888.2	6.85	7.17	2 24.0
25	18 41 48.18	13.389	25 4 39.6	9.90	0.086 8935	896.1	6.88	7.20	2 25.4
26	18 47 9.23	+13.365	-25 0 19.9	+11.74	0.084 7334	- 904.0	6.92	7.24	2 26.9
27	18 52 29.69	13.338	24 55 16.1	13.58	0.082 5542	912.0	6.96	7.28	2 28.3
28	18 57 49.49	13.310	24 49 28.3	15.41	0.080 3559	920.0	6.99	7.31	2 29.6
29	19 3 8.55	13.278	24 42 56.7	17.22	0.078 1382	928.1	7.03	7.35	2 31.0
30	19 8 26.83	13.244	24 35 41.7	19.02	0.075 9010	936.3	7.06	7.39	2 32.4
Dec. 1	19 13 44.26	+13.208	-24 27 43.6	+20.81	0.073 6439	- 944.6	7.10	7.43	2 33.7
2	19 19 0.79	13.169	24 19 2.7	22.59	0.071 3668	953.0	7.14	7.47	2 35.1
3	19 24 16.35	13.127	24 9 39.5	24.34	0.069 0692	961.6	7.18	7.51	2 36.4
4	19 29 30.89	13.084	23 59 34.4	26.08	0.066 7510	970.3	7.22	7.55	2 37.7
5	19 34 44.36	13.038	23 48 47.8	27.80	0.064 4117	979.1	7.26	7.59	2 39.0
6	19 39 56.71	+12.990	-23 37 20.2	+29.50	0.062 0510	- 988.1	7.29	7.63	2 40.2
7	19 45 7.88	12.940	23 25 12.1	31.18	0.059 6685	997.3	7.33	7.67	2 41.5
8	19 50 17.82	12.888	23 12 24.0	32.83	0.057 2639	1006.6	7.37	7.71	2 42.7
9	19 55 26.49	12.834	22 58 56.6	34.46	0.054 8368	1016.0	7.42	7.76	2 43.9
10	20 0 33.84	12.778	22 44 50.3	36.06	0.052 3870	1025.5	7.46	7.80	2 45.1
11	20 5 39.84	+12.721	-22 30 5.8	+37.64	0.049 9141	-1035.2	7.50	7.84	2 46.2
12	20 10 44.43	12.661	22 14 43.8	39.19	0.047 4177	1045.1	7.54	7.89	2 47.4
13	20 15 47.53	12.601	21 58 44.8	40.72	0.044 8976	1055.0	7.59	7.94	2 48.5
14	20 20 49.26	12.539	21 42 9.6	42.21	0.042 3534	1065.1	7.63	7.98	2 49.5
15	20 25 49.42	12.475	21 24 58.8	43.68	0.039 7849	1075.4	7.68	8.03	2 50.6
16	20 30 48.04	+12.410	-21 7 13.1	+45.12	0.037 1916	-1085.7	7.72	8.08	2 51.6
17	20 35 45.09	12.344	20 48 53.2	46.53	0.034 5735	1096.1	7.77	8.13	2 52.6
18	20 40 40.55	12.277	20 29 59.9	47.90	0.031 9301	1106.7	7.81	8.17	2 53.6
19	20 45 34.39	12.210	20 10 34.0	49.25	0.029 2612	1117.4	7.87	8.23	2 54.6
20	20 50 26.60	12.141	19 50 36.1	50.57	0.026 5666	1128.1	7.92	8.28	2 55.5
21	20 55 17.15	+12.071	-19 30 7.0	+51.85	0.023 8461	-1139.0	7.96	8.33	2 56.4
22	21 0 6.03	12.002	19 9 7.6	53.10	0.021 0993	1150.0	8.01	8.38	2 57.3
23	21 4 53.23	11.932	18 47 38.5	54.32	0.018 3261	1161.0	8.06	8.43	2 58.1
24	21 9 38.74	11.861	18 25 40.5	55.51	0.015 5264	1172.1	8.12	8.49	2 58.9
25	21 14 22.56	11.790	18 3 14.4	56.66	0.012 6998	1183.3	8.17	8.55	2 59.7
26	21 19 4.63	+11.720	-17 40 21.0	+57.78	0.009 8463	-1194.6	8.22	8.60	3 0.5
27	21 23 45.11	11.649	17 17 1.0	58.88	0.006 9654	1206.1	8.28	8.66	3 1.2
28	21 28 23.85	11.579	16 53 15.1	59.94	0.004 0569	1217.7	8.34	8.72	3 1.9
29	21 33 0.99	11.509	16 29 4.3	60.96	0.001 1204	1229.4	8.39	8.78	3 2.6
30	21 37 36.27	11.439	16 4 29.3	61.95	9.998 1555	1241.3	8.45	8.84	3 3.2
31	21 42 9.97	+11.369	-15 39 30.8	+62.91	9.995 1618	-1253.4	8.51	8.90	3 3.8
32	21 46 42.01	.....	-15 14 9.7	.....	9.992 1388	.....	8.57	8.96	3 4.4

## FOR GREENWICH MEAN NOON.

Date.	Heliocentric Longitude, Mean Equinox of Date.	Var. per Day.	Reduction to Orbit.	Heliocentric Latitude.	Var. per Day.	Logarithm of Radius Vector.	Var. per Day.	
	° ' "	° ' "	' "	° ' "	' "			
Jan.	0	165 26 45.9	1 37 22.9	+0 3.2	+3 23 37.0	+0 3.1	9.856 9039	+474
	2	168 41 29.1	1 37 20.2	-0 17.2	3 23 23.6	-0 16.4	9.857 0026	512
	4	171 56 6.5	1 37 17.2	0 37.4	3 22 31.2	0 35.9	9.857 1086	548
	6	175 10 37.6	1 37 13.9	0 57.2	3 21 0.1	0 55.2	9.857 2217	582
	8	178 25 1.7	1 37 10.2	1 16.2	3 18 50.4	1 14.3	9.857 3413	614
	10	181 39 18.2	1 37 6.3	-1 34.2	+3 16 2.9	-1 33.3	9.857 4672	+644
	12	184 53 26.6	1 37 2.1	1 51.0	3 12 38.0	1 51.7	9.857 5989	672
	14	188 7 26.3	1 36 57.6	2 6.4	3 8 36.5	2 9.8	9.857 7360	696
	16	191 21 17.0	1 36 53.0	2 20.2	3 3 59.2	2 27.4	9.857 8780	722
	18	194 34 58.2	1 36 48.2	2 32.2	2 58 47.1	2 44.5	9.858 0246	748
Feb.	20	197 48 29.5	1 36 43.1	-2 42.2	+2 53 1.4	-3 1.1	9.858 1751	+782
	22	201 1 50.6	1 36 37.9	2 50.2	2 46 43.0	3 17.1	9.858 3292	778
	24	204 15 1.2	1 36 32.7	2 56.0	2 39 53.4	3 32.4	9.858 4863	792
	26	207 28 1.2	1 36 27.3	2 59.7	2 32 33.9	3 47.0	9.858 6460	804
	28	210 40 50.8	1 36 21.8	3 1.0	2 24 45.9	4 0.8	9.858 8077	818
	30	213 53 28.5	1 36 16.4	-3 0.1	+2 16 31.1	-4 13.9	9.858 9709	+819
	1	217 5 55.8	1 36 10.9	2 56.9	2 7 50.9	4 26.1	9.859 1351	823
	3	220 18 12.1	1 36 5.4	2 51.5	1 58 47.2	4 37.4	9.859 2999	824
	5	223 30 17.5	1 36 0.0	2 44.0	1 49 21.7	4 47.9	9.859 4645	822
	7	226 42 12.0	1 35 54.7	2 34.4	1 39 36.1	4 57.5	9.859 6287	819
Mar.	9	229 53 56.1	1 35 49.4	-2 23.0	+1 29 32.4	-5 6.1	9.859 7918	+812
	11	233 5 29.7	1 35 44.3	2 9.7	1 19 12.5	5 13.7	9.859 9533	803
	13	236 16 53.8	1 35 39.3	1 54.9	1 8 38.3	5 20.3	9.860 1128	792
	15	239 28 7.0	1 35 34.5	1 38.7	0 57 51.8	5 26.0	9.860 2698	778
	17	242 39 11.8	1 35 29.9	1 21.2	0 46 55.0	5 30.6	9.860 4237	761
	19	245 50 6.6	1 35 25.5	-1 2.7	+0 35 50.1	-5 34.2	9.860 5741	+742
	21	249 0 53.4	1 35 21.3	0 43.5	0 24 38.9	5 36.8	9.860 7205	721
	23	252 11 31.9	1 35 17.4	0 23.8	0 13 23.7	5 38.3	9.860 8625	698
	25	255 22 2.9	1 35 13.7	-0 3.8	+0 2 6.4	5 38.8	9.860 9997	673
	27	258 32 26.7	1 35 10.2	+0 16.3	-0 9 10.9	5 38.3	9.861 1317	646
Apr.	29	261 42 43.9	1 35 7.0	+0 36.1	-0 20 26.0	-5 36.7	9.861 2580	+617
	1	264 52 55.0	1 35 4.1	0 55.5	0 31 37.0	5 34.1	9.861 3783	596
	3	268 3 0.7	1 35 1.6	1 14.2	0 42 41.9	5 30.6	9.861 4923	553
	5	271 13 1.6	1 34 59.4	1 32.0	0 53 38.6	5 26.0	9.861 5995	519
	7	274 22 58.0	1 34 57.3	1 48.6	1 4 25.1	5 20.4	9.861 6997	488
	9	277 32 50.7	1 34 55.5	+2 3.9	-1 14 59.6	-5 13.9	9.861 7925	+445
	11	280 42 40.8	1 34 54.1	2 17.7	1 25 20.1	5 6.4	9.861 8778	407
	13	283 52 27.8	1 34 53.0	2 29.9	1 35 24.8	4 58.1	9.861 9551	367
	15	287 2 12.3	1 34 52.1	2 40.1	1 45 11.9	4 48.8	9.862 0244	326
	17	290 11 55.8	1 34 51.5	2 48.4	1 54 39.6	4 38.7	9.862 0854	284
Apr.	19	293 21 38.4	1 34 51.2	+2 54.7	-2 3 46.2	-4 27.8	9.862 1379	+241
	21	296 31 20.6	1 34 51.1	2 58.9	2 12 30.1	4 16.0	9.862 1818	196
	23	299 41 2.9	1 34 51.3	3 0.9	2 20 49.7	4 3.5	9.862 2169	154
	25	302 50 45.8	1 34 51.7	3 0.6	2 28 43.5	3 50.2	9.862 2432	109
	27	306 0 29.7	1 34 52.3	2 58.2	2 36 10.2	3 36.3	9.862 2605	64
	29	309 10 15.2	1 34 53.2	+2 53.6	-2 43 8.3	-3 21.7	9.862 2689	+19
	1	312 20 2.5	1 34 54.2	+2 46.9	-2 49 36.7	-3 6.5	9.862 2682	-26

FOR GREENWICH MEAN NOON.

Date.	Heliocentric Longitude, Mean Equinox of Date.			Var. per Day.	Reduction to Orbit.	Heliocentric Latitude.			Var. per Day.	Logarithm of Radius Vector.	Var. per Day.		
	°	'	"	°	'	"	°	'	"	'	"		
Apr.	1	312	20	2.5	1 34	54.2	+2	49	36.7	-3	6.5	9.862 2682	-26
	3	315	29	52.2	1 34	55.5	2	38.2	2 55	34.1	2 30.8	9.862 2585	71
	5	318	39	44.6	1 34	56.9	2	27.5	3 0	59.5	2 34.5	9.862 2399	116
	7	321	49	39.9	1 34	58.5	2	15.0	3 5	51.8	2 17.7	9.862 2123	160
	9	324	59	38.6	1 35	0.2	2	0.9	3 10	10.2	2 0.6	9.862 1759	204
	11	328	9	40.9	1 35	2.1	+1	45.3	-3 13	53.9	-1 43.1	9.862 1307	-247
	13	331	19	47.1	1 35	4.1	1	28.5	3 17	2.2	1 25.2	9.862 0770	290
	15	334	29	57.4	1 35	6.2	1	10.5	3 19	34.4	1 7.0	9.862 0148	332
	17	337	40	12.0	1 35	8.4	0	51.6	3 21	30.1	0 48.7	9.861 9443	373
	19	340	50	31.2	1 35	10.8	0	32.2	3 22	48.9	0 30.1	9.861 8658	412
	21	344	0	55.2	1 35	13.2	+0	12.3	-3 23	30.4	-0 11.5	9.861 7795	-450
	23	347	11	24.0	1 35	15.6	-0	7.7	3 23	34.7	+0 7.2	9.861 6857	488
	25	350	21	57.9	1 35	18.2	0	27.7	3 23	1.5	0 26.0	9.861 5845	524
27	353	32	36.9	1 35	20.8	0	47.3	3 21	50.9	0 44.6	9.861 4763	558	
29	356	43	21.3	1 35	23.5	1	6.4	3 20	3.1	1 3.1	9.861 3615	590	
May	1	359	54	11.0	1 35	26.2	-1	24.6	-3 17	38.4	+1 21.5	9.861 2404	-621
	3	3	5	6.2	1 35	29.0	1	41.8	3 14	37.1	1 30.7	9.861 1133	650
	5	6	16	7.1	1 35	31.8	1	57.8	3 10	59.7	1 57.6	9.860 9806	677
	7	9	27	13.6	1 35	34.7	2	12.3	3 6	46.9	2 15.2	9.860 8428	701
	9	12	38	25.9	1 35	37.6	2	25.2	3 1	59.3	2 32.4	9.860 7002	724
	11	15	49	44.0	1 35	40.5	-2	36.3	-2 56	37.8	+2 49.0	9.860 5583	-745
	13	19	1	8.1	1 35	43.5	2	45.5	2 50	43.4	3 5.3	9.860 4024	763
	15	22	12	38.2	1 35	46.6	2	52.6	2 44	16.9	3 21.1	9.860 2482	779
	17	25	24	14.5	1 35	49.7	2	57.6	2 37	19.6	3 36.2	9.860 0910	792
	19	28	35	56.9	1 35	52.7	3	0.4	2 29	52.7	3 50.6	9.859 9314	804
	21	31	47	45.5	1 35	55.9	-3	1.0	-2 21	57.5	+4 4.4	9.859 7697	-812
	23	34	59	40.5	1 35	59.1	2	59.3	2 13	35.5	4 17.5	9.859 6066	818
	25	38	11	42.0	1 36	2.4	2	55.3	2 4	48.1	4 29.3	9.859 4425	822
27	41	23	50.0	1 36	5.7	2	49.2	1 55	37.0	4 41.1	9.859 2780	823	
29	44	36	4.7	1 36	9.0	2	41.0	1 46	3.8	4 51.8	9.859 1135	821	
31	47	48	26.0	1 36	12.3	-2	30.7	-1 36	10.2	+5 1.6	9.858 9496	-817	
June	2	51	0	54.1	1 36	15.8	2	18.6	1 25	58.1	5 10.4	9.858 7868	811
	4	54	13	39.2	1 36	19.2	2	4.3	1 15	29.4	5 18.2	9.858 6255	801
	6	57	26	11.1	1 36	22.7	1	49.2	1 4	46.0	5 25.0	9.858 4664	790
	8	60	39	0.1	1 36	26.2	1	32.3	0 53	50.0	5 30.8	9.858 3098	775
	10	63	51	56.2	1 36	29.8	-1	14.3	-0 42	43.3	+5 35.7	9.858 1564	-758
	12	67	4	39.5	1 36	33.4	0	55.3	0 31	28.0	5 39.4	9.858 0066	739
	14	70	18	10.0	1 36	37.0	0	35.6	0 20	6.4	5 42.1	9.857 8609	718
	16	73	31	27.6	1 36	40.6	-0	15.4	-0 8	40.4	5 48.7	9.857 7197	694
	18	76	44	52.5	1 36	44.2	+0	5.0	+0 2	47.6	5 44.2	9.857 5885	668
	20	79	58	24.6	1 36	47.9	+0	25.3	+0 14	15.5	+5 43.6	9.857 4528	-639
	22	83	12	3.9	1 36	51.4	0	45.3	0 25	41.1	5 41.9	9.857 3280	609
	24	86	25	50.2	1 36	54.9	1	4.7	0 37	2.2	5 39.1	9.857 2094	577
	26	89	39	43.5	1 36	58.4	1	23.4	0 48	16.6	5 35.2	9.857 0975	542
28	92	53	43.8	1 37	1.8	1	40.9	0 59	22.1	5 30.1	9.856 9926	506	
30	96	7	50.7	1 37	5.1	+1	57.2	+1 10	16.5	+5 24.1	9.856 8952	-468	
July	2	99	22	4.1	1 37	8.3	+2	12.1	+1 20	57.8	+5 17.1	9.856 8054	-429

## FOR GREENWICH MEAN NOON.

Date.		Heliocentric Longitude, Mean Equinox of Date.	Var. per Day.	Reduction to Orbit.	Heliocentric Latitude.	Var. per Day.	Logarithm of Radius Vector.	Var. per Day.
		° ' "	° ' "	' "	° ' "	' "		
July	2	99 22 4.1	1 37 8.3	+2 12.1	+1 20 57.8	+5 17.1	9.856 8064	-429
	4	102 36 23.9	1 37 11.4	2 25.2	1 31 23.9	5 8.9	9.856 7236	388
	6	105 50 49.7	1 37 14.4	2 36.5	1 41 32.6	4 59.7	9.856 6501	346
	8	109 5 21.2	1 37 17.1	2 45.8	1 51 22.1	4 49.4	9.856 5851	303
	10	112 19 58.0	1 37 19.6	2 52.9	2 0 50.3	4 38.5	9.856 5288	259
	12	115 34 39.9	1 37 22.1	+2 57.9	+2 9 55.4	+4 26.5	9.856 4815	-214
	14	118 49 26.4	1 37 24.3	3 0.5	2 18 35.7	4 13.6	9.856 4432	168
	16	122 4 17.0	1 37 26.3	3 0.9	2 26 49.4	3 59.9	9.856 4142	122
	18	125 19 11.3	1 37 27.9	2 58.9	2 34 34.9	3 45.4	9.856 3944	76
	20	128 34 8.6	1 37 29.4	2 54.6	2 41 50.6	3 30.3	9.856 3840	-28
	22	131 49 8.6	1 37 30.5	+2 48.1	+2 48 35.2	+3 14.3	9.856 3880	+19
	24	135 4 10.4	1 37 31.3	2 39.5	2 54 47.2	2 57.7	9.856 3914	66
	26	138 19 13.7	1 37 31.9	2 28.7	3 0 25.6	2 40.6	9.856 4092	113
	28	141 34 17.6	1 37 32.0	2 16.1	3 5 29.1	2 22.9	9.856 4364	159
30	144 49 21.5	1 37 31.9	2 1.7	3 9 56.9	2 4.8	9.856 4727	204	
Aug.	1	148 4 24.9	1 37 31.3	+1 45.8	+3 13 48.0	+1 46.3	9.856 5181	+280
	3	151 19 26.8	1 37 30.5	1 28.5	3 17 1.7	1 27.4	9.856 5725	294
	5	154 34 26.8	1 37 29.4	1 10.0	3 19 37.4	1 8.3	9.856 6357	338
	7	157 49 24.0	1 37 27.8	0 50.7	3 21 34.6	0 48.9	9.856 7075	390
	9	161 4 17.8	1 37 25.9	0 30.7	3 22 53.0	0 29.5	9.856 7876	421
	11	164 19 7.5	1 37 23.7	+0 10.4	+3 23 32.4	+0 9.9	9.856 8757	+461
	13	167 33 52.3	1 37 21.1	-0 10.1	3 23 32.7	-0 9.6	9.856 9717	499
	15	170 48 31.6	1 37 18.2	0 30.4	3 22 53.9	0 29.1	9.857 0751	535
	17	174 3 4.8	1 37 15.0	0 50.4	3 21 36.3	0 48.5	9.857 1856	570
	19	177 17 31.2	1 37 11.4	1 9.7	3 19 40.0	1 7.7	9.857 3029	603
	21	180 31 50.2	1 37 7.6	-1 28.1	+3 17 5.7	-1 26.6	9.857 4265	+634
	23	183 46 1.3	1 37 3.5	1 45.3	3 13 53.7	1 45.3	9.857 5562	662
	25	187 0 4.0	1 36 59.2	2 1.2	3 10 4.9	2 3.5	9.857 6913	699
	27	190 13 57.8	1 36 54.6	2 15.6	3 5 40.1	2 21.3	9.857 8316	714
29	193 27 42.1	1 36 49.3	2 28.2	3 0 40.0	2 38.6	9.857 9766	736	
Sept.	31	196 41 16.8	1 36 44.3	-2 38.9	+2 55 5.9	-2 55.4	9.858 1257	+755
	2	199 54 41.3	1 36 39.7	2 47.7	2 48 58.8	3 11.6	9.858 2785	773
	4	203 7 55.5	1 36 34.5	2 54.3	2 42 20.0	3 27.1	9.858 4346	788
	6	206 20 59.1	1 36 29.1	2 58.7	2 35 10.8	3 42.0	9.858 5934	800
	8	209 33 51.9	1 36 23.7	3 0.8	2 27 32.6	3 56.1	9.858 7543	809
	10	212 46 33.7	1 36 18.2	-3 0.7	+2 19 26.9	-4 9.4	9.858 9170	+817
	12	215 59 4.7	1 36 12.7	2 58.3	2 10 55.5	4 21.9	9.859 0899	821
	14	219 11 24.6	1 36 7.2	2 53.7	2 1 59.8	4 33.6	9.859 2454	823
	16	222 23 33.7	1 36 1.8	2 46.9	1 52 41.7	4 44.4	9.859 4191	823
	18	225 35 31.9	1 35 56.5	2 38.0	1 43 2.9	4 54.3	9.859 5744	820
	20	228 47 19.5	1 35 51.2	-2 27.2	+1 33 5.3	-5 3.2	9.859 7379	+814
	22	231 58 56.6	1 35 46.0	2 14.5	1 22 50.9	5 11.1	9.859 8999	806
	24	235 10 23.5	1 35 41.0	2 0.2	1 12 21.4	5 18.1	9.860 0601	795
	26	238 21 40.5	1 35 36.2	1 44.4	1 1 39.0	5 24.1	9.860 2179	782
28	241 32 48.0	1 35 31.5	1 27.4	0 50 45.6	5 29.1	9.860 3728	767	
30	244 43 46.3	1 35 27.0	-1 9.3	+0 39 43.3	-5 33.0	9.860 5244	+749	
Oct.	2	247 54 35.8	1 35 22.7	-0 50.3	+0 28 34.1	-5 36.0	9.860 6721	+729

FOR GREENWICH MEAN NOON.

Date.	Heliocentric Longitude, Mean Equinox of Date.	Var. per Day.	Reduction to Orbit.	Heliocentric Latitude.	Var. per Day.	Logarithm of Radius Vector.	Var. per Day.
Oct.	2 247 54 35.8	1 35 22.7	-0 50.3	+0 28 34.1	-5 36.0	9.860 6721	+729
	4 251 5 17.1	1 35 18.6	0 30.7	0 17 20.1	5 37.9	9.860 8157	706
	6 254 15 50.5	1 35 14.8	-0 10.7	+0 6 3.3	5 38.7	9.860 9545	682
	8 257 26 16.6	1 35 11.3	+0 9.3	-0 5 14.2	5 38.6	9.861 0882	655
	10 260 36 35.9	1 35 8.1	0 29.2	0 16 30.3	5 37.4	9.861 2164	627
	12 263 46 49.1	1 35 5.1	+0 48.8	-0 27 43.0	-5 35.3	9.861 3387	+596
	14 266 56 56.5	1 35 2.4	1 7.8	0 38 50.3	5 31.9	9.861 4548	564
	16 270 6 58.9	1 35 0.0	1 25.9	0 49 50.0	5 27.7	9.861 5642	530
	18 273 16 56.7	1 34 57.9	1 42.9	1 0 40.4	5 22.5	9.861 6667	494
	20 276 26 50.7	1 34 56.1	1 58.7	1 11 19.3	5 16.3	9.861 7619	457
Nov.	22 279 36 41.2	1 34 54.5	+2 13.1	-1 21 44.9	-5 9.3	9.861 8496	+419
	24 282 46 29.0	1 34 53.3	2 25.8	1 31 55.3	5 1.1	9.861 9296	380
	26 285 56 14.6	1 34 52.4	2 36.7	1 41 48.7	4 52.2	9.862 0015	339
	28 289 5 58.6	1 34 51.7	2 45.8	1 51 23.4	4 42.3	9.862 0652	298
	30 292 15 41.4	1 34 51.2	2 52.8	2 0 37.5	4 31.7	9.862 1205	255
	1 295 25 23.7	1 34 51.1	+2 57.7	-2 9 29.5	-4 20.2	9.862 1672	+212
	3 298 35 5.9	1 34 51.2	3 0.4	2 17 57.8	4 8.0	9.862 2051	168
	5 301 44 48.6	1 34 51.5	3 1.0	2 26 0.9	3 54.9	9.862 2343	124
	7 304 54 32.1	1 34 52.1	2 59.3	2 33 37.2	3 41.3	9.862 2545	78
	9 308 4 17.0	1 34 52.9	2 55.5	2 40 45.5	3 26.9	9.862 2657	+ 84
Dec.	11 311 14 3.8	1 34 53.9	+2 49.5	-2 47 24.4	-3 11.9	9.862 2680	- 11
	13 314 23 52.6	1 34 55.0	2 41.4	2 53 32.8	2 56.3	9.862 2612	57
	15 317 33 44.1	1 34 56.4	2 31.4	2 59 9.4	2 40.2	9.862 2454	101
	17 320 43 38.4	1 34 57.9	2 19.6	3 4 13.4	2 23.7	9.862 2207	146
	19 323 53 36.0	1 34 59.7	2 6.0	3 8 43.8	2 6.6	9.862 1871	190
	21 327 3 37.2	1 35 1.5	+1 50.9	-3 12 39.7	-1 49.2	9.862 1448	-233
	23 330 13 42.1	1 35 3.5	1 34.5	3 16 0.4	1 31.4	9.862 0938	276
	25 333 23 51.1	1 35 5.5	1 16.8	3 18 45.3	1 13.4	9.862 0343	318
	27 336 34 4.3	1 35 7.7	0 58.3	3 20 53.8	0 55.1	9.861 9665	360
	29 339 44 22.1	1 35 10.0	0 89.0	3 22 25.5	0 36.6	9.861 8905	400
Dec.	1 342 54 44.5	1 35 12.4	+0 19.2	-3 23 20.1	-0 18.0	9.861 8067	-438
	3 346 5 11.8	1 35 14.9	-0 0.8	3 23 37.4	+0 0.7	9.861 7152	476
	5 349 15 44.1	1 35 17.4	0 20.8	3 23 17.3	0 19.4	9.861 6164	512
	7 352 26 21.5	1 35 20.0	0 40.5	3 22 19.8	0 38.1	9.861 5104	547
	9 355 37 4.2	1 35 22.7	0 59.8	3 20 45.0	0 56.7	9.861 3977	580
	11 358 47 52.3	1 35 25.4	-1 18.3	-3 18 33.1	+1 15.1	9.861 2785	-611
	13 1 58 45.8	1 35 28.2	1 35.9	3 15 44.6	1 33.4	9.861 1533	640
	15 5 9 45.0	1 35 31.0	1 52.3	3 12 19.7	1 51.4	9.861 0224	668
	17 8 20 49.7	1 35 33.8	2 7.4	3 8 19.2	2 9.1	9.860 8861	694
	19 11 32 0.8	1 35 36.7	2 20.9	3 3 43.7	2 26.4	9.860 7450	717
Dec.	21 14 43 16.6	1 35 39.6	-2 32.6	-2 58 34.0	+2 43.3	9.860 5994	-738
	23 17 54 38.9	1 35 42.6	2 42.5	2 52 50.9	2 59.7	9.860 4498	757
	25 21 6 7.2	1 35 45.6	2 50.3	2 46 35.5	3 15.6	9.860 2966	774
	27 24 17 41.5	1 35 48.7	2 56.1	2 39 48.8	3 31.0	9.860 1404	788
	29 27 29 22.0	1 35 51.8	2 59.7	2 32 32.1	3 45.7	9.859 9814	800
	31 30 41 8.8	1 35 55.0	-3 1.0	-2 24 46.6	+3 59.7	9.859 8204	-810
	33 33 53 1.9	1 35 58.1	-3 0.1	-2 16 33.8	+4 13.0	9.859 6577	-817

GREENWICH MEAN TIME.

Date.	Apparent Right Ascension.			Var. per Hour.	Apparent Declination.			Var. per Hour.	Logarithm of Distance from Earth.	Var. per Hour.	Semi-diameter.	Hor. Parallax.	Transit, Meridian of Greenwich.	
	h	m	s	s	°	'	"	"	Noon.	Noon.	Noon.	Noon.	h m	
Jan.	1	13	4	44.63	+4.541	- 4	47	12.7	-26.93	0.166 6954	-1235.9	3.19	5.99	18 23.7
	2	13	6	33.35	4.518	4	57	56.4	26.71	0.163 7168	1246.3	3.21	6.04	18 21.6
	3	13	8	21.51	4.495	5	8	34.7	26.48	0.160 7130	1256.8	3.23	6.08	18 19.4
	4	13	10	9.12	4.472	5	19	7.5	26.25	0.157 6839	1267.4	3.26	6.12	18 17.3
	5	13	11	56.16	4.448	5	29	34.9	26.03	0.154 6293	1278.1	3.28	6.16	18 15.1
	6	13	13	42.62	+4.424	- 5	39	56.7	-25.79	0.151 5490	-1288.9	3.30	6.21	18 12.9
	7	13	15	28.49	4.399	5	50	12.7	25.54	0.148 4427	1299.7	3.33	6.25	18 10.8
	8	13	17	13.75	4.373	6	0	22.8	25.30	0.145 3103	1310.6	3.35	6.30	18 8.6
	9	13	18	58.39	4.347	6	10	27.0	25.05	0.142 1515	1321.7	3.37	6.34	18 6.4
	10	13	20	42.39	4.320	6	20	25.2	24.80	0.138 9661	1332.8	3.40	6.39	18 4.2
	11	13	22	25.74	+4.292	- 6	30	17.3	-24.54	0.135 7540	-1343.9	3.43	6.44	18 1.9
	12	13	24	8.40	4.263	6	40	3.1	24.28	0.132 5151	1355.2	3.45	6.48	17 59.7
	13	13	25	50.37	4.234	6	49	42.7	24.02	0.129 2492	1366.4	3.47	6.53	17 57.4
	14	13	27	31.63	4.204	6	59	15.9	23.75	0.125 9564	1377.6	3.50	6.58	17 55.2
	15	13	29	12.15	4.173	7	8	42.5	23.47	0.122 6365	1388.9	3.53	6.63	17 52.9
	16	13	30	51.91	+4.141	- 7	18	2.4	-23.19	0.119 2897	-1400.1	3.56	6.69	17 50.6
	17	13	32	30.90	4.108	7	27	15.7	22.91	0.115 9159	1411.4	3.59	6.74	17 48.3
	18	13	34	9.09	4.074	7	36	22.1	22.63	0.112 5152	1422.6	3.61	6.79	17 46.0
	19	13	35	46.45	4.039	7	45	21.7	22.34	0.109 0876	1433.8	3.64	6.85	17 43.7
	20	13	37	22.97	4.004	7	54	14.2	22.04	0.105 6330	1445.0	3.67	6.90	17 41.4
	21	13	38	58.63	+3.967	- 8	2	59.7	-21.75	0.102 1516	-1456.2	3.70	6.95	17 39.0
	22	13	40	33.39	3.930	8	11	38.0	21.45	0.098 6434	1467.3	3.73	7.01	17 36.6
	23	13	42	7.25	3.892	8	20	9.1	21.14	0.095 1086	1478.3	3.76	7.07	17 34.2
	24	13	43	40.18	3.852	8	28	32.8	20.84	0.091 5474	1489.4	3.79	7.13	17 31.8
	25	13	45	12.15	3.812	8	36	49.2	20.53	0.087 9596	1500.4	3.83	7.19	17 29.4
	26	13	46	43.15	+3.771	- 8	44	58.1	-20.21	0.084 3456	-1511.3	3.86	7.25	17 27.0
	27	13	48	13.15	3.729	8	52	59.4	19.90	0.080 7055	1522.1	3.89	7.31	17 24.5
	28	13	49	42.14	3.686	9	0	53.1	19.58	0.077 0395	1532.9	3.92	7.37	17 22.1
	29	13	51	10.08	3.642	9	8	39.1	19.26	0.073 3477	1543.6	3.95	7.43	17 19.6
	30	13	52	36.96	3.598	9	16	17.4	18.94	0.069 6301	1554.4	3.99	7.50	17 17.1
	31	13	54	2.76	+3.552	- 9	23	48.0	-18.61	0.065 8868	-1565.1	4.02	7.56	17 14.6
Feb.	1	13	55	27.44	3.505	9	31	10.6	18.28	0.062 1178	1575.8	4.06	7.63	17 12.0
	2	13	56	50.99	3.457	9	38	25.4	17.95	0.058 3231	1586.5	4.09	7.69	17 9.5
	3	13	58	13.37	3.408	9	45	32.1	17.61	0.054 5028	1597.2	4.13	7.76	17 6.9
	4	13	59	34.55	3.357	9	52	30.7	17.27	0.050 6568	1607.8	4.17	7.83	17 4.3
	5	14	0	54.50	+3.305	- 9	59	21.0	-16.92	0.046 7854	-1618.4	4.20	7.90	17 1.7
	6	14	2	13.20	3.252	10	6	3.0	16.58	0.042 8884	1629.1	4.24	7.97	16 59.0
	7	14	3	30.60	3.197	10	12	36.6	16.22	0.038 9660	1639.6	4.28	8.04	16 56.3
	8	14	4	46.66	3.141	10	19	1.7	15.87	0.035 0184	1650.0	4.32	8.12	16 53.6
	9	14	6	1.36	3.083	10	25	18.2	15.50	0.031 0460	1660.3	4.36	8.19	16 50.9
	10	14	7	14.65	+3.024	-10	31	25.9	-15.14	0.027 0490	-1670.5	4.40	8.27	16 48.2
	11	14	8	26.49	2.963	10	37	24.9	14.77	0.023 0277	1680.5	4.44	8.34	16 45.5
	12	14	9	36.85	2.900	10	43	14.9	14.40	0.018 9825	1690.4	4.48	8.42	16 42.7
	13	14	10	45.67	2.835	10	48	55.9	14.02	0.014 9137	1700.2	4.52	8.50	16 39.9
	14	14	11	52.92	2.769	10	54	27.8	13.64	0.010 8217	1709.7	4.56	8.58	16 37.1
	15	14	12	58.55	+2.700	-10	59	50.4	-13.25	0.006 7072	-1719.0	4.61	8.66	16 34.2
16	14	14	2.53	+2.630	-11	5	3.8	-12.86	0.002 5709	-1727.9	4.66	8.75	16 31.3	



GREENWICH MEAN TIME.

Date.	Apparent Right Ascension.			Var. per Hour.	Apparent Declination.			Var. per Hour.	Logarithm of Distance from Earth.	Var. per Hour.	Semi-diameter.	Hor. Parallax.	Transit, Meridian of Greenwich.		
	h	m	s		h	m	s						h	m	s
Feb. 16	14	14	2.53	+2.430	-11	5	3.8	-12.86	0.602 5709	-1727.9	4.66	8.75	16	31.3	
17	14	15	4.80	2.540	11	10	7.7	12.47	9.998 4136	1726.5	4.70	8.83	16	28.4	
18	14	16	5.33	2.495	11	15	2.1	12.07	9.994 2360	1744.8	4.75	8.92	16	25.4	
19	14	17	4.08	2.410	11	19	46.9	11.67	9.990 0389	1752.7	4.79	9.00	16	22.4	
20	14	18	1.00	2.323	11	24	22.0	11.26	9.985 8232	1760.3	4.84	9.09	16	19.4	
21	14	18	56.04	+2.364	-11	28	47.4	-10.85	9.981 5997	-1767.5	4.88	9.18	16	16.4	
22	14	19	49.17	2.173	11	33	3.0	10.44	9.977 3393	1774.4	4.93	9.27	16	13.3	
23	14	20	40.34	2.091	11	37	8.6	10.03	9.973 0730	1780.8	4.98	9.36	16	10.2	
24	14	21	29.52	2.007	11	41	4.2	9.61	9.968 7919	1786.7	5.03	9.46	16	7.1	
25	14	22	16.67	1.921	11	44	49.8	9.19	9.964 4971	1792.2	5.08	9.55	16	3.9	
26	14	23	1.74	+1.824	-11	48	25.2	-8.76	9.960 1895	-1797.3	5.13	9.64	16	0.7	
27	14	23	44.70	1.745	11	51	50.4	8.34	9.955 8703	1801.9	5.18	9.74	15	57.5	
28	14	24	25.51	1.665	11	55	5.3	7.91	9.951 5406	1806.1	5.23	9.84	15	54.2	
29	14	25	4.12	1.583	11	58	9.8	7.47	9.947 2015	1809.7	5.29	9.94	15	50.9	
Mar. 1	14	25	40.49	1.468	12	1	3.8	7.03	9.942 8542	1812.9	5.34	10.04	15	47.5	
2	14	26	14.57	+1.372	-12	3	47.2	-6.59	9.938 4999	-1815.6	5.39	10.14	15	44.1	
3	14	26	46.32	1.274	12	6	19.9	6.14	9.934 1399	1817.7	5.45	10.24	15	40.7	
4	14	27	15.70	1.174	12	8	41.9	5.69	9.929 7754	1819.3	5.50	10.34	15	37.2	
5	14	27	42.66	1.072	12	10	53.0	5.23	9.925 4079	1820.2	5.56	10.45	15	33.7	
6	14	28	7.14	0.968	12	12	53.1	4.77	9.921 0390	1820.4	5.61	10.55	15	30.1	
7	14	28	29.09	+0.861	-12	14	42.1	-4.31	9.916 6704	-1819.9	5.67	10.66	15	26.5	
8	14	28	48.47	0.753	12	16	19.8	3.83	9.912 3040	1818.6	5.73	10.77	15	22.9	
9	14	29	5.23	0.643	12	17	46.1	3.36	9.907 9418	1816.4	5.79	10.88	15	19.2	
10	14	29	19.31	0.530	12	19	1.0	2.88	9.903 5858	1813.4	5.85	10.99	15	15.5	
11	14	29	30.67	0.416	12	20	4.3	2.39	9.899 2382	1809.4	5.91	11.10	15	11.7	
12	14	29	39.26	+0.300	-12	20	55.9	-1.90	9.894 9015	-1804.3	5.96	11.21	15	7.9	
13	14	29	45.05	0.182	12	21	35.7	1.41	9.890 5782	1798.2	6.02	11.32	15	4.0	
14	14	29	47.99	+0.063	12	22	3.7	0.91	9.886 2708	1791.0	6.08	11.43	15	0.1	
15	14	29	48.04	-0.059	12	22	19.6	-0.41	9.881 9822	1782.6	6.14	11.55	14	56.1	
16	14	29	45.15	0.182	12	22	23.5	+0.09	9.877 7152	1773.0	6.20	11.66	14	52.1	
17	14	29	39.31	-0.305	-12	22	15.3	+0.60	9.873 4727	-1762.1	6.27	11.78	14	48.1	
18	14	29	30.48	0.430	12	21	54.9	1.10	9.869 2581	1749.8	6.33	11.89	14	44.0	
19	14	29	18.64	0.556	12	21	22.3	1.62	9.865 0748	1736.1	6.39	12.01	14	39.8	
20	14	29	3.76	0.683	12	20	37.3	2.13	9.860 9262	1720.8	6.45	12.12	14	35.6	
21	14	28	45.83	0.811	12	19	40.0	2.64	9.856 8159	1704.2	6.51	12.24	14	31.3	
22	14	28	24.85	-0.928	-12	18	30.5	+3.15	9.852 7473	-1686.0	6.57	12.35	14	27.0	
23	14	28	0.82	1.065	12	17	8.7	3.66	9.848 7241	1666.4	6.63	12.47	14	22.7	
24	14	27	33.73	1.192	12	15	34.6	4.18	9.844 7500	1645.3	6.69	12.58	14	18.3	
25	14	27	3.60	1.319	12	13	48.3	4.68	9.840 8288	1622.3	6.76	12.70	14	13.8	
26	14	26	30.44	1.444	12	11	49.9	5.19	9.836 9640	1598.0	6.82	12.81	14	9.3	
27	14	25	54.27	-1.570	-12	9	39.3	+5.69	9.833 1595	-1573.1	6.87	12.92	14	4.7	
28	14	25	15.10	1.694	12	7	16.8	6.19	9.829 4190	1544.7	6.93	13.03	14	0.1	
29	14	24	32.97	1.817	12	4	42.3	6.68	9.825 7463	1515.6	6.99	13.14	13	55.5	
30	14	23	47.91	1.939	12	1	56.0	7.17	9.822 1453	1484.9	7.05	13.25	13	50.8	
31	14	22	59.94	2.059	11	58	58.0	7.66	9.818 6199	1452.6	7.11	13.36	13	46.0	
Apr. 1	14	22	9.11	-2.177	-11	55	48.4	+8.12	9.815 1739	-1418.8	7.17	13.47	13	41.2	
2	14	21	15.47	-2.293	-11	52	27.6	+8.60	9.811 8112	-1383.2	7.22	13.57	13	36.4	

GREENWICH MEAN TIME.

Date.	Apparent Right Ascension.			Var. per Hour.	Apparent Declination.			Var. per Hour.	Logarithm of Distance from Earth.	Var. per Hour.	Semi-diameter.	Hor. Parallax.	Transit Meridian of Greenwich.
	Noon.			Noon.	Noon.			Noon.	Noon.	Noon.	Noon.	Noon.	Noon.
	h	m	s	s	°	'	"	"			"	"	h m
Apr. 1	14	22	9.11	-2.177	-11	55	49.4	+ 8.13	9.815 1739	-1418.8	7.17	13.47	13 41.2
2	14	21	15.47	2.203	11	52	27.6	8.60	9.811 8112	1383.2	7.22	13.57	13 36.4
3	14	20	19.06	2.407	11	48	55.5	9.07	9.808 5300	1345.9	7.26	13.68	13 31.5
4	14	19	19.94	2.510	11	45	12.4	9.52	9.805 3523	1308.9	7.33	13.78	13 26.6
5	14	18	18.18	2.628	11	41	18.6	9.96	9.802 2643	1266.2	7.88	13.87	13 21.6
6	14	17	13.84	-2.733	-11	37	14.4	+10.30	9.799 2759	-1223.8	7.43	13.97	13 16.6
7	14	16	7.01	2.835	11	33	0.0	10.81	9.796 3914	1179.6	7.48	14.06	13 11.5
8	14	14	57.77	2.934	11	28	35.8	11.21	9.793 6149	1133.9	7.53	14.15	13 6.4
9	14	13	46.22	3.028	11	24	2.2	11.50	9.790 9502	1086.3	7.58	14.24	13 1.3
10	14	12	32.46	3.118	11	19	19.6	11.96	9.788 4014	1037.3	7.62	14.32	12 56.1
11	14	11	16.61	-3.202	-11	14	28.5	+12.30	9.785 9724	-986.6	7.66	14.40	12 50.9
12	14	9	58.78	3.282	11	9	29.4	12.62	9.783 6699	934.4	7.70	14.48	12 45.6
13	14	8	39.11	3.356	11	4	22.7	12.93	9.781 4884	880.8	7.74	14.55	12 40.4
14	14	7	17.72	3.426	10	59	9.0	13.20	9.779 4408	826.7	7.78	14.62	12 35.1
15	14	5	54.77	3.487	10	53	49.1	13.45	9.777 5259	769.4	7.82	14.69	12 29.8
16	14	4	30.41	-3.542	-10	48	23.5	+13.67	9.775 7483	-711.8	7.85	14.75	12 24.4
17	14	3	4.81	3.590	10	42	53.1	13.86	9.774 1100	653.2	7.87	14.80	12 19.1
18	14	1	38.12	3.632	10	37	18.4	14.02	9.772 6139	593.5	7.90	14.85	12 13.7
19	14	0	10.53	3.666	10	31	40.4	14.14	9.771 2616	533.2	7.93	14.90	12 8.3
20	13	58	42.21	3.692	10	25	59.8	14.23	9.770 0549	473.3	7.95	14.94	12 2.9
21	13	57	13.85	-3.711	-10	20	17.5	+14.29	9.768 9949	-410.9	7.97	14.98	11 57.5
22	13	55	44.13	3.722	10	14	34.1	14.32	9.768 0829	349.1	7.99	15.01	11 52.1
23	13	54	14.73	3.726	10	8	50.7	14.30	9.767 3191	287.4	8.00	15.04	11 46.7
24	13	52	45.34	3.722	10	3	8.1	14.25	9.766 7035	225.6	8.01	15.06	11 41.3
25	13	51	16.13	3.710	9	57	27.1	14.16	9.766 2361	164.6	8.02	15.08	11 35.9
26	13	49	47.29	-3.692	-9	51	48.5	+14.05	9.765 9162	-102.7	8.03	15.09	11 30.5
27	13	48	18.98	3.666	9	46	13.2	13.89	9.765 7430	-41.8	8.03	15.09	11 25.1
28	13	46	51.37	3.634	9	40	42.0	13.70	9.765 7153	+ 18.6	8.03	15.09	11 19.7
29	13	45	24.62	3.595	9	35	15.8	13.48	9.765 8317	78.3	8.03	15.09	11 14.3
30	13	43	58.89	3.549	9	29	55.2	13.23	9.766 0905	137.3	8.02	15.08	11 9.0
May 1	13	42	34.33	-3.497	-9	24	41.0	+12.95	9.766 4899	+ 195.4	8.02	15.07	11 3.7
2	13	41	11.10	3.438	9	19	34.1	12.63	9.767 0277	252.6	8.01	15.05	10 58.4
3	13	39	49.33	3.375	9	14	35.2	12.28	9.767 7018	306.9	7.99	15.02	10 53.1
4	13	38	29.16	3.305	9	9	45.0	11.90	9.768 5096	364.1	7.98	15.00	10 47.8
5	13	37	10.73	3.230	9	5	4.1	11.50	9.769 4486	418.2	7.96	14.96	10 42.6
6	13	35	54.17	-3.149	-9	0	33.4	+11.06	9.770 5158	+ 471.0	7.94	14.93	10 37.4
7	13	34	39.60	3.064	8	56	13.3	10.60	9.771 7084	522.6	7.92	14.89	10 32.3
8	13	33	27.14	2.974	8	52	4.6	10.12	9.773 0232	572.8	7.89	14.84	10 27.2
9	13	32	16.90	2.879	8	48	7.8	9.61	9.774 4568	621.6	7.87	14.79	10 22.1
10	13	31	8.99	2.780	8	44	23.5	9.08	9.776 0058	666.6	7.84	14.74	10 17.1
11	13	30	3.50	-2.677	-8	40	52.3	+ 8.52	9.777 6667	+ 714.8	7.81	14.68	10 12.1
12	13	29	0.52	2.570	8	37	34.5	7.95	9.779 4356	759.1	7.78	14.62	10 7.1
13	13	28	0.15	2.460	8	34	30.8	7.36	9.781 3090	801.8	7.75	14.56	10 2.2
14	13	27	2.48	2.346	8	31	41.5	6.75	9.783 2829	842.8	7.71	14.49	9 57.3
15	13	26	7.57	2.229	8	29	7.0	6.12	9.785 3534	882.3	7.68	14.43	9 52.5
16	13	25	15.49	-2.110	-8	26	47.7	+ 5.48	9.787 5163	+ 929.1	7.64	14.35	9 47.7
17	13	24	26.31	-1.968	-8	24	43.9	+ 4.88	9.789 7686	+ 966.1	7.60	14.28	9 43.0

GREENWICH MEAN TIME.

Date.	Apparent Right Ascension.			Var. per Hour.	Apparent Declination.			Var. per Hour.	Logarithm of Distance from Earth.	Var. per Hour.	Semi-diameter.	Hor. Parallax.	Transit, Meridian of Greenwich.
	h	m	s		°	'	"						
May 17	13	24	26.31	-1.900	8	24	43.9	+4.33	9.789 7686	+006.1	7.60	14.28	9 49.0
18	13	23	40.09	1.800	8	22	56.0	4.16	9.792 1046	000.3	7.55	14.20	9 38.3
19	13	22	56.88	1.707	8	21	24.3	3.48	9.794 5205	1022.7	7.51	14.12	9 33.7
20	13	22	16.72	1.600	8	20	8.9	2.80	9.797 0121	1002.3	7.47	14.04	9 29.1
21	13	21	39.63	1.491	8	19	10.0	2.11	9.799 5749	1022.1	7.43	13.96	9 24.6
22	13	21	5.65	-1.351	8	18	27.6	+1.42	9.802 2046	+1100.1	7.38	13.88	9 20.1
23	13	20	34.79	1.231	8	18	1.9	0.72	9.804 8972	1134.4	7.34	13.79	9 15.7
24	13	20	7.06	1.099	8	17	53.0	+0.02	9.807 6483	1167.9	7.29	13.70	9 11.3
25	13	19	42.45	0.960	8	18	0.7	-0.67	9.810 4540	1179.9	7.25	13.62	9 7.0
26	13	19	20.96	0.820	8	18	25.0	1.36	9.813 3105	1200.3	7.20	13.53	9 2.7
27	13	19	2.59	-0.701	8	19	5.9	-2.05	9.816 2143	+1219.2	7.15	13.44	8 58.5
28	13	18	47.31	0.573	8	20	3.3	2.73	9.819 1616	1236.6	7.10	13.34	8 54.3
29	13	18	35.11	0.446	8	21	17.1	3.41	9.822 1491	1262.8	7.05	13.25	8 50.2
30	13	18	25.96	0.326	8	22	47.1	4.09	9.825 1738	1287.6	7.00	13.16	8 46.2
31	13	18	19.84	0.203	8	24	33.2	4.76	9.828 2324	1321.1	6.95	13.07	8 42.2
June 1	13	18	16.74	-0.067	8	26	35.3	-3.42	9.831 3221	+1362.4	6.90	12.98	8 38.2
2	13	18	16.61	+0.066	8	28	53.2	6.07	9.834 4400	1394.7	6.85	12.88	8 34.3
3	13	18	10.48	0.176	8	31	26.6	6.71	9.837 5836	1314.8	6.80	12.79	8 30.4
4	13	18	25.17	0.290	8	34	15.4	7.35	9.840 7503	1333.9	6.75	12.70	8 26.6
5	13	18	33.80	0.419	8	37	19.5	7.98	9.843 9377	1351.1	6.70	12.60	8 22.8
6	13	18	45.29	+0.538	8	40	38.5	-3.60	9.847 1436	+1369.3	6.66	12.51	8 19.1
7	13	18	59.60	0.656	8	44	12.3	9.21	9.850 3654	1385.5	6.61	12.42	8 15.4
8	13	19	16.71	0.770	8	48	0.7	9.82	9.853 6014	1361.0	6.56	12.33	8 11.8
9	13	19	36.57	0.885	8	52	3.4	10.41	9.856 8494	1336.6	6.51	12.24	8 8.2
10	13	19	59.17	0.998	8	56	20.3	11.00	9.860 1078	1309.4	6.46	12.14	8 4.7
11	13	20	24.47	+1.110	9	0	51.1	-11.57	9.863 3741	+1302.5	6.41	12.05	8 1.2
12	13	20	52.44	1.220	9	5	35.6	12.13	9.866 6470	1264.8	6.36	11.96	7 57.7
13	13	21	28.04	1.330	9	10	33.5	12.69	9.869 9248	1226.5	6.31	11.87	7 54.3
14	13	21	56.25	1.439	9	15	44.7	13.24	9.873 2055	1187.2	6.27	11.78	7 50.9
15	13	22	32.04	1.544	9	21	8.9	13.77	9.876 4875	1147.5	6.22	11.69	7 47.6
16	13	23	10.37	+1.649	9	26	45.7	-14.30	9.879 7690	+1107.0	6.18	11.61	7 44.3
17	13	23	51.21	1.753	9	32	35.1	14.82	9.883 0496	1066.8	6.13	11.52	7 41.1
18	13	24	34.52	1.855	9	38	36.7	15.32	9.886 3245	1024.0	6.08	11.43	7 37.9
19	13	25	20.26	1.956	9	44	50.2	15.81	9.889 5952	981.5	6.04	11.35	7 34.7
20	13	26	8.38	2.054	9	51	15.8	16.29	9.892 8594	938.5	5.99	11.26	7 31.6
21	13	26	58.86	+2.150	9	57	51.9	-16.76	9.896 1156	+934.9	5.95	11.18	7 28.5
22	13	27	51.65	2.247	10	4	39.5	17.21	9.899 3627	890.9	5.90	11.09	7 25.5
23	13	28	46.70	2.340	10	11	37.8	17.65	9.902 5997	846.5	5.86	11.01	7 22.5
24	13	29	43.98	2.429	10	18	46.5	18.08	9.905 8255	801.6	5.81	10.93	7 19.5
25	13	30	43.43	2.523	10	26	5.8	18.49	9.909 0392	756.2	5.77	10.85	7 16.6
26	13	31	45.02	+2.610	10	33	38.9	-18.89	9.912 2492	+710.2	5.73	10.77	7 13.7
27	13	32	48.71	2.697	10	41	12.0	19.28	9.915 4276	665.2	5.69	10.69	7 10.8
28	13	33	54.47	2.780	10	48	59.4	19.66	9.918 6010	620.2	5.64	10.61	7 8.0
29	13	35	2.26	2.860	10	56	55.8	20.03	9.921 7597	575.0	5.61	10.54	7 5.2
30	13	36	12.94	2.940	11	5	0.8	20.38	9.924 9033	530.7	5.56	10.46	7 2.4
July 1	13	37	23.78	+3.020	11	13	14.1	-20.73	9.928 0315	+485.1	5.53	10.39	6 59.7
2	13	38	37.43	+3.106	11	21	35.6	-21.06	9.931 1488	+440.4	5.48	10.31	6 57.0

GREENWICH MEAN TIME.

Date.	Apparent Right Ascension.	Var. per Hour.	Apparent Declination.	Var. per Hour.	Logarithm of Distance from Earth.	Var. per Hour.	Semi-diameter.	Hor. Parallax.	Transit Meridian of Greenwich.
	Noon.	Noon.	Noon.	Noon.	Noon.	Noon.	Noon.	Noon.	Noon.
	h m s	s	° ' "	"			"	"	h m
July 1	13 37 23.78	+3.069	-11 13 14.1	-20.73	9.928 0315	+1300.1	5.53	10.39	6 59.7
2	13 38 37.43	3.108	11 21 35.6	21.06	9.931 1438	1293.4	5.48	10.31	6 57.0
3	13 39 52.98	3.157	11 30 4.9	21.38	9.934 2399	1286.6	5.45	10.24	6 54.3
4	13 41 10.39	3.204	11 38 41.7	21.69	9.937 3196	1279.8	5.41	10.17	6 51.6
5	13 42 29.64	3.240	11 47 25.8	21.99	9.940 3826	1272.7	5.37	10.09	6 49.0
6	13 43 50.69	+3.414	-11 56 17.0	-22.28	9.943 4285	+1265.5	5.33	10.02	6 46.4
7	13 45 18.52	3.458	12 5 14.9	22.55	9.946 4572	1258.4	5.29	9.95	6 43.9
8	13 46 38.11	3.501	12 14 19.4	22.82	9.949 4685	1251.1	5.26	9.89	6 41.4
9	13 48 4.44	3.533	12 23 30.3	23.08	9.952 4622	1243.7	5.22	9.82	6 38.9
10	13 49 32.49	3.704	12 32 47.2	23.33	9.955 4382	1236.3	5.19	9.75	6 36.4
11	13 51 2.23	+3.774	-12 42 9.9	-23.56	9.958 3964	+1228.8	5.15	9.68	6 34.0
12	13 52 33.66	3.844	12 51 38.2	23.79	9.961 3364	1221.2	5.12	9.62	6 31.6
13	13 54 6.75	3.913	13 1 11.9	24.01	9.964 2580	1213.5	5.08	9.55	6 29.2
14	13 55 41.49	3.981	13 10 50.8	24.22	9.967 1609	1205.6	5.05	9.49	6 26.8
15	13 57 17.85	4.048	13 20 34.5	24.42	9.970 0450	1197.7	5.02	9.43	6 24.5
16	13 58 55.81	+4.115	-13 30 22.8	-24.61	9.972 9098	+1189.8	4.98	9.37	6 22.2
17	14 0 35.36	4.180	13 40 15.6	24.79	9.975 7551	1181.4	4.95	9.31	6 20.0
18	14 2 16.47	4.245	13 50 12.5	24.95	9.978 5806	1173.1	4.92	9.25	6 17.7
19	14 3 59.13	4.309	14 0 13.3	25.11	9.981 3861	1164.8	4.89	9.19	6 15.5
20	14 5 49.31	4.372	14 10 17.6	25.25	9.984 1714	1156.3	4.86	9.13	6 13.3
21	14 7 28.98	+4.434	-14 20 25.3	-25.39	9.986 9364	+1147.9	4.82	9.07	6 11.1
22	14 9 16.12	4.494	14 30 36.1	25.51	9.989 6812	1139.4	4.79	9.01	6 9.0
23	14 11 4.71	4.554	14 40 49.7	25.62	9.992 4057	1131.0	4.77	8.96	6 6.9
24	14 12 54.73	4.614	14 51 5.8	25.72	9.995 1100	1122.6	4.73	8.90	6 4.8
25	14 14 46.16	4.672	15 1 24.3	25.81	9.997 7941	1114.2	4.70	8.84	6 2.7
26	14 16 38.99	+4.730	-15 11 44.8	-25.90	0.000 4582	+1105.9	4.67	8.78	6 0.6
27	14 18 33.19	4.787	15 22 7.2	26.97	0.003 1025	1097.7	4.65	8.74	5 58.6
28	14 20 28.75	4.843	15 32 31.1	26.03	0.005 7271	1089.5	4.62	8.68	5 56.6
29	14 22 25.65	4.898	15 42 56.3	26.07	0.008 3322	1081.4	4.59	8.63	5 54.6
30	14 24 23.87	4.953	15 53 22.5	26.11	0.010 9179	1073.4	4.56	8.58	5 52.6
31	14 26 23.40	+5.007	-16 3 49.6	-26.14	0.013 4845	+1065.4	4.54	8.53	5 50.7
Aug. 1	14 28 24.23	5.061	16 14 17.3	26.16	0.016 0321	1057.6	4.51	8.48	5 48.8
2	14 30 26.85	5.115	16 24 45.4	26.17	0.018 5610	1049.9	4.49	8.43	5 46.9
3	14 32 29.74	5.168	16 35 13.5	26.17	0.021 0715	1042.2	4.46	8.38	5 45.0
4	14 34 34.40	5.221	16 45 41.6	26.16	0.023 5638	1034.7	4.43	8.33	5 43.1
5	14 36 40.33	+5.273	-16 56 9.3	-26.15	0.026 0381	+1027.2	4.41	8.29	5 41.3
6	14 38 47.51	5.325	17 6 36.5	26.12	0.028 4945	1019.8	4.38	8.24	5 39.5
7	14 40 55.93	5.377	17 17 2.9	26.08	0.030 9333	1012.5	4.36	8.19	5 37.7
8	14 43 5.59	5.428	17 27 28.4	26.04	0.033 3546	1005.3	4.34	8.15	5 35.9
9	14 45 16.49	5.480	17 37 52.6	26.98	0.035 7586	998.0	4.31	8.10	5 34.2
10	14 47 28.62	+5.531	-17 48 15.4	-26.92	0.038 1452	+990.8	4.29	8.06	5 32.4
11	14 49 41.96	5.581	17 58 36.5	26.84	0.040 5147	983.7	4.26	8.01	5 30.7
12	14 51 56.52	5.632	18 8 55.7	26.76	0.042 8671	976.6	4.24	7.97	5 29.0
13	14 54 12.30	5.680	18 19 12.8	26.67	0.045 2023	969.4	4.22	7.93	5 27.4
14	14 56 29.27	5.723	18 29 27.6	26.56	0.047 5203	962.3	4.20	7.89	5 25.7
15	14 58 47.44	+5.783	-18 39 39.8	-26.45	0.049 8212	+955.1	4.17	7.84	5 24.1
16	15 1 6.80	+5.831	-18 49 49.2	-26.33	0.052 1048	+948.0	4.15	7.80	5 22.5

GREENWICH MEAN TIME.

Date.	Apparent Right Ascension.	Var. per Hour.	Apparent Declination.	Var. per Hour.	Logarithm of Distance from Earth.	Var. per Hour.	Semi- diam- eter.	Hor. Paral- lax.	Transit, Meridian of Green- wich.
	Noon.	Noon.	Noon.	Noon.	Noon.	Noon.	Noon.	Noon.	
	h m s	s	" ' "	"			"	"	h m
Aug. 16	15 1 6.80	+5.531	-18 49 49.2	-25.33	0.052 1048	+645.0	4.15	7.80	5 22.5
17	15 3 27.33	5.579	18 59 55.5	25.19	0.054 3714	940.8	4.13	7.76	5 20.9
18	15 5 49.01	5.537	19 9 58.5	25.05	0.056 6209	923.8	4.11	7.72	5 19.3
19	15 8 11.83	5.575	19 19 58.0	24.90	0.058 8536	926.8	4.09	7.68	5 17.7
20	15 10 35.79	5.523	19 29 53.7	24.74	0.061 0695	919.8	4.07	7.65	5 16.2
21	15 13 0.88	+5.599	-19 39 45.3	-24.56	0.063 2639	+613.0	4.05	7.61	5 14.7
22	15 15 27.08	5.114	19 49 32.7	24.38	0.065 4520	906.2	4.03	7.57	5 13.2
23	15 17 54.37	5.160	19 59 15.5	24.18	0.067 6189	899.5	4.01	7.53	5 11.7
24	15 20 22.76	5.205	20 8 58.5	23.96	0.069 7698	892.9	3.99	7.49	5 10.2
25	15 22 52.22	5.250	20 18 26.6	23.77	0.071 9051	886.5	3.97	7.46	5 8.8
26	15 25 22.75	+5.294	-20 27 54.5	-23.55	0.074 0250	+880.1	3.95	7.42	5 7.3
27	15 27 54.35	5.338	20 37 16.9	23.32	0.076 1296	873.8	3.93	7.38	5 5.9
28	15 30 26.99	5.382	20 46 38.6	23.07	0.078 2194	867.7	3.91	7.35	5 4.5
29	15 33 0.68	5.425	20 55 44.4	22.82	0.080 2945	861.7	3.89	7.31	5 3.2
30	15 35 35.40	5.468	21 4 49.1	22.56	0.082 3554	855.7	3.87	7.28	5 1.8
31	15 38 11.14	+5.510	-21 13 47.3	-22.29	0.084 4021	+849.9	3.85	7.24	5 0.5
Sept. 1	15 40 47.90	5.553	21 22 38.9	22.01	0.086 4350	844.2	3.84	7.21	4 59.1
2	15 43 25.68	5.595	21 31 28.7	21.72	0.088 4545	838.7	3.82	7.18	4 57.8
3	15 46 4.47	5.637	21 40 1.5	21.42	0.090 4606	833.1	3.80	7.14	4 56.5
4	15 48 44.27	5.679	21 48 33.9	21.11	0.092 4536	827.8	3.78	7.11	4 55.2
5	15 51 25.07	+5.721	-21 56 54.8	-20.80	0.094 4339	+822.5	3.77	7.08	4 54.0
6	15 54 6.86	5.763	22 5 10.6	20.47	0.096 4016	817.2	3.75	7.05	4 52.7
7	15 56 49.64	5.803	22 13 17.3	20.13	0.098 3567	812.0	3.73	7.02	4 51.5
8	15 59 33.40	5.844	22 21 16.4	19.79	0.100 2994	806.9	3.72	6.99	4 50.3
9	16 2 18.14	5.884	22 29 7.1	19.44	0.102 2298	801.7	3.70	6.95	4 49.1
10	16 5 3.85	+5.925	-22 36 49.3	-19.08	0.104 1478	+796.6	3.68	6.92	4 48.0
11	16 7 50.52	5.965	22 44 22.7	18.71	0.106 0537	791.6	3.67	6.89	4 46.8
12	16 10 38.15	7.004	22 51 47.1	18.33	0.107 9474	786.5	3.65	6.86	4 45.7
13	16 13 26.72	7.043	22 59 2.3	17.94	0.109 8239	781.4	3.63	6.83	4 44.5
14	16 16 16.22	7.082	23 6 8.6	17.53	0.111 6933	776.4	3.62	6.80	4 43.4
15	16 19 6.64	+7.119	-23 13 8.9	-17.12	0.113 5457	+771.4	3.60	6.77	4 42.3
16	16 21 57.95	7.156	23 19 50.0	16.71	0.115 4011	766.5	3.59	6.75	4 41.2
17	16 24 50.15	7.193	23 26 26.0	16.29	0.117 2348	761.6	3.58	6.72	4 40.1
18	16 27 40.23	7.230	23 32 51.7	15.85	0.119 0568	756.8	3.56	6.69	4 39.1
19	16 30 37.17	7.265	23 39 6.8	15.41	0.120 8673	752.0	3.54	6.66	4 38.1
20	16 33 31.94	+7.299	-23 45 11.2	-14.96	0.122 6665	+747.4	3.53	6.63	4 37.1
21	16 36 27.54	7.334	23 51 4.7	14.50	0.124 4547	742.8	3.52	6.61	4 36.0
22	16 39 23.95	7.367	23 56 42.0	14.03	0.126 2319	738.3	3.50	6.58	4 35.0
23	16 42 21.16	7.400	24 2 18.0	13.54	0.127 9985	733.9	3.48	6.55	4 34.0
24	16 45 19.16	7.433	24 7 39.4	13.07	0.129 7546	729.5	3.47	6.53	4 33.1
25	16 48 17.92	+7.464	-24 12 45.1	-12.58	0.131 5004	+725.2	3.46	6.50	4 32.1
26	16 51 17.44	7.495	24 17 41.0	12.06	0.133 2362	721.2	3.44	6.47	4 31.2
27	16 54 17.69	7.525	24 22 24.7	11.57	0.134 9623	717.3	3.43	6.45	4 30.2
28	16 57 18.67	7.555	24 26 56.1	11.06	0.136 6788	713.3	3.42	6.42	4 29.3
29	17 0 20.85	7.585	24 31 15.1	10.53	0.138 3861	709.5	3.40	6.40	4 28.4
30	17 3 22.74	+7.614	-24 35 21.5	-10.00	0.140 0844	+705.8	3.39	6.37	4 27.5
Oct. 1	17 6 25.60	+7.642	-24 39 15.6	-9.46	0.141 7739	+702.2	3.38	6.35	4 26.6

## GREENWICH MEAN TIME.

Date.	Apparent Right Ascension.			Var. per Hour.	Apparent Declination.			Var. per Hour.	Logarithm of Distance from Earth.	Var. per Hour.	Semi-diameter.	Hor. Parallax.	Transit, Meridian of Greenwich.	
	h	m	s		°	'	"							h
Oct.	1	17	6	25.80	+7.643	-24	39	15.0	-9.46	0.141 7739	+762.3	3.38	6.35	4 26.6
	2	17	9	29.54	7.670	24	42	55.6	8.92	0.143 4548	695.6	3.36	6.32	4 25.7
	3	17	12	33.94	7.697	24	46	23.0	8.37	0.145 1273	625.2	3.35	6.30	4 24.9
	4	17	15	38.98	7.723	24	49	37.1	7.81	0.146 7016	561.7	3.34	6.28	4 24.0
	5	17	18	44.66	7.750	24	52	37.7	7.24	0.148 4477	503.3	3.33	6.25	4 23.2
	6	17	21	50.96	+7.775	-24	55	24.8	-6.68	0.150 0057	+435.0	3.31	6.23	4 22.3
	7	17	24	57.87	7.801	24	57	58.1	6.10	0.151 7857	381.7	3.30	6.20	4 21.5
	8	17	28	5.38	7.825	25	0	17.6	5.52	0.153 3678	323.4	3.29	6.18	4 20.7
	9	17	31	13.46	7.848	25	2	23.0	4.93	0.154 9920	275.1	3.28	6.16	4 19.9
	10	17	34	22.10	7.872	25	4	14.3	4.34	0.156 6083	231.8	3.26	6.13	4 19.1
	11	17	37	31.29	+7.894	-25	5	51.3	-3.74	0.158 2168	+185.6	3.25	6.11	4 18.3
	12	17	40	41.00	7.915	25	7	13.8	3.14	0.159 8175	145.4	3.24	6.09	4 17.5
	13	17	43	51.21	7.936	25	8	21.3	2.53	0.161 4105	108.1	3.23	6.07	4 16.7
	14	17	47	1.90	7.955	25	9	15.2	1.92	0.162 9957	73.9	3.22	6.05	4 16.0
	15	17	50	13.06	7.974	25	9	53.3	1.30	0.164 5733	45.7	3.20	6.02	4 15.2
	16	17	53	24.65	+7.992	-25	10	17.6	-0.98	0.166 1438	+19.6	3.19	6.00	4 14.5
	17	17	56	36.66	8.009	25	10	26.5	-0.06	0.167 7058	6.5	3.18	5.98	4 13.7
	18	17	59	49.07	8.025	25	10	20.3	+0.57	0.169 2610	64.5	3.17	5.96	4 13.0
	19	18	3	1.85	8.040	25	9	59.0	1.20	0.170 8089	143.5	3.16	5.94	4 12.3
	20	18	6	14.89	8.055	25	9	22.6	1.84	0.172 3498	246.0	3.15	5.92	4 11.5
	21	18	9	28.46	+8.068	-25	8	30.3	+2.48	0.173 8837	+387.7	3.14	5.90	4 10.8
	22	18	12	42.23	8.080	25	7	23.7	3.12	0.175 4108	534.9	3.12	5.87	4 10.1
	23	18	15	56.30	8.092	25	6	1.2	3.76	0.176 9313	682.2	3.11	5.85	4 9.4
	24	18	19	10.63	8.102	25	4	23.3	4.40	0.178 4454	829.5	3.10	5.83	4 8.7
	25	18	22	25.21	8.112	25	2	29.9	5.05	0.179 9532	977.0	3.09	5.81	4 8.0
	26	18	25	40.02	+8.121	-25	0	20.9	+5.70	0.181 4550	+1234.5	3.08	5.79	4 7.3
	27	18	28	55.03	8.129	24	57	56.3	6.34	0.182 9509	1381.1	3.07	5.77	4 6.6
	28	18	32	10.23	8.137	24	55	16.1	7.00	0.184 4411	1527.8	3.06	5.75	4 5.9
	29	18	35	25.60	8.144	24	52	20.3	7.65	0.185 9258	1673.5	3.05	5.73	4 5.3
	30	18	38	41.12	8.150	24	49	6.7	8.31	0.187 4052	1818.3	3.04	5.71	4 4.6
	31	18	41	56.78	+8.155	-24	45	41.4	+8.96	0.188 8795	+2013.3	3.03	5.70	4 3.9
Nov.	1	18	45	12.56	8.160	24	41	58.4	9.62	0.190 3488	2157.2	3.02	5.68	4 3.2
	2	18	48	28.45	8.164	24	37	59.6	10.28	0.191 8131	2300.1	3.01	5.66	4 2.5
	3	18	51	44.43	8.168	24	33	45.1	10.93	0.193 2724	2442.0	3.00	5.64	4 1.9
	4	18	55	0.49	8.170	24	29	14.0	11.59	0.194 7268	2583.0	2.99	5.62	4 1.2
	5	18	58	16.60	+8.172	-24	24	29.0	+12.24	0.196 1763	+3005.0	2.98	5.60	4 0.5
	6	19	1	32.75	8.174	24	19	27.3	12.90	0.197 6210	3146.0	2.97	5.58	3 59.8
	7	19	4	48.93	8.175	24	14	10.0	13.55	0.199 0610	3287.0	2.96	5.56	3 59.2
	8	19	8	5.12	8.174	24	8	37.0	14.20	0.200 4983	3427.0	2.95	5.55	3 58.5
	9	19	11	21.29	8.173	24	2	46.4	14.85	0.201 9268	3567.0	2.94	5.53	3 57.8
	10	19	14	37.44	+8.172	-23	56	44.2	+15.50	0.203 3524	+3707.0	2.93	5.51	3 57.2
	11	19	17	53.53	8.169	23	50	24.5	16.14	0.204 7732	3847.9	2.92	5.49	3 56.5
	12	19	21	9.56	8.166	23	43	49.5	16.78	0.206 1888	3988.8	2.91	5.47	3 55.8
	13	19	24	25.51	8.162	23	36	59.0	17.42	0.207 5996	4129.7	2.90	5.46	3 55.1
	14	19	27	41.35	8.157	23	29	53.3	18.06	0.209 0056	4270.6	2.89	5.44	3 54.4
	15	19	30	57.06	+8.152	-23	22	32.4	+18.70	0.210 4068	+4411.5	2.88	5.42	3 53.8
16	19	34	12.64	+8.146	-23	14	56.3	+19.33	0.211 8034	+4552.4	2.87	5.40	3 53.1	

GREENWICH MEAN TIME.

Date.	Apparent Right Ascension.			Var. per Hour.	Apparent Declination.			Var. per Hour.	Logarithm of Distance from Earth.	Var. per Hour.	Semi-diameter.	Hor. Parallax.	Transit, Meridian of Greenwich.
	h	m	s	"	°	'	"	"		"			
Nov. 16	19	34	12.64	+8.146	-23	14	50.3	+19.22	0.211 8084	+581.0	2.87	5.40	3 53.1
17	19	37	28.06	8.130	23	7	5.2	19.04	0.213 1965	579.1	2.87	5.39	3 52.4
18	19	40	43.31	8.131	22	58	59.2	20.56	0.214 5831	577.2	2.86	5.37	3 51.7
19	19	43	58.36	8.123	22	50	38.3	21.18	0.215 9662	575.4	2.85	5.35	3 51.0
20	19	47	13.20	8.114	22	42	2.7	21.79	0.217 3449	573.6	2.84	5.33	3 50.3
21	19	50	27.82	+8.104	-22	33	12.4	+22.40	0.218 7194	+571.8	2.83	5.32	3 49.6
22	19	53	42.30	8.094	22	24	7.6	23.00	0.220 0906	570.2	2.82	5.30	3 48.9
23	19	56	56.33	8.083	22	14	48.4	23.60	0.221 4566	568.6	2.81	5.28	3 48.2
24	20	0	10.19	8.072	22	5	14.9	24.20	0.222 8189	566.9	2.80	5.27	3 47.5
25	20	3	23.78	8.060	21	55	27.2	24.78	0.224 1777	565.4	2.79	5.25	3 46.8
26	20	6	37.07	+8.048	-21	45	25.5	+25.26	0.225 5329	+563.9	2.78	5.23	3 46.1
27	20	9	50.07	8.035	21	35	9.9	25.84	0.226 8846	562.5	2.78	5.22	3 45.3
28	20	13	2.76	8.022	21	24	40.4	26.51	0.228 2328	561.1	2.77	5.20	3 44.6
29	20	16	15.14	8.009	21	13	57.3	27.08	0.229 5778	559.7	2.76	5.19	3 43.9
30	20	19	27.20	7.996	21	3	0.6	27.64	0.230 9196	558.4	2.75	5.17	3 43.1
Dec. 1	20	22	38.93	+7.982	-20	51	50.6	+28.29	0.232 2584	+557.2	2.74	5.15	3 42.4
2	20	25	50.32	7.968	20	40	27.3	28.75	0.233 5943	556.0	2.73	5.14	3 41.6
3	20	29	1.38	7.954	20	28	50.8	29.29	0.234 9271	554.7	2.72	5.12	3 40.9
4	20	32	12.09	7.939	20	17	1.5	29.82	0.236 2568	553.4	2.72	5.11	3 40.1
5	20	35	22.45	7.924	20	4	59.3	30.26	0.237 5832	552.0	2.71	5.09	3 39.3
6	20	38	32.45	+7.909	-19	52	44.5	+30.83	0.238 9082	+550.5	2.70	5.08	3 38.6
7	20	41	42.09	7.894	19	40	17.2	31.20	0.240 2268	549.1	2.69	5.06	3 37.8
8	20	44	51.35	7.878	19	27	37.6	31.90	0.241 5420	547.7	2.69	5.05	3 37.0
9	20	48	0.24	7.862	19	14	45.9	32.40	0.242 8547	546.2	2.68	5.03	3 36.2
10	20	51	8.74	7.846	19	1	42.3	32.90	0.244 1641	544.8	2.67	5.02	3 35.4
11	20	54	16.85	+7.830	-18	48	26.9	+33.23	0.245 4699	+543.4	2.66	5.00	3 34.6
12	20	57	24.56	7.813	18	35	0.0	33.86	0.246 7728	541.9	2.65	4.99	3 33.8
13	21	0	31.86	7.796	18	21	21.7	34.33	0.248 0712	540.5	2.64	4.97	3 32.9
14	21	3	38.76	7.779	18	7	32.2	34.79	0.249 3666	539.0	2.64	4.96	3 32.1
15	21	6	45.25	7.761	17	53	31.7	35.25	0.250 6584	537.6	2.63	4.94	3 31.3
16	21	9	51.31	+7.744	-17	39	20.4	+35.69	0.251 9469	+536.1	2.62	4.93	3 30.4
17	21	12	56.96	7.726	17	24	58.6	36.18	0.253 2319	534.7	2.61	4.91	3 29.6
18	21	16	2.16	7.708	17	10	20.3	36.56	0.254 5126	533.2	2.61	4.90	3 28.7
19	21	19	6.94	7.690	16	55	43.9	36.96	0.255 7917	531.9	2.60	4.88	3 27.9
20	21	22	11.28	7.672	16	40	51.5	37.29	0.257 0666	530.5	2.59	4.87	3 27.0
21	21	25	15.19	+7.654	-16	25	42.3	+37.79	0.258 3328	+529.2	2.58	4.85	3 26.1
22	21	28	18.66	7.635	16	10	37.5	38.19	0.259 6097	527.8	2.57	4.84	3 25.2
23	21	31	21.09	7.617	15	55	10.3	38.56	0.260 8720	526.6	2.57	4.83	3 24.3
24	21	34	24.29	7.599	15	39	45.9	38.95	0.262 1344	525.4	2.56	4.81	3 23.4
25	21	37	26.44	7.580	15	24	6.6	39.22	0.263 3933	524.2	2.55	4.80	3 22.5
26	21	40	28.15	+7.562	-15	8	18.4	+39.59	0.264 6506	+523.0	2.54	4.78	3 21.6
27	21	43	29.43	7.545	14	52	21.6	40.04	0.265 9044	521.9	2.54	4.77	3 20.7
28	21	46	30.29	7.527	14	36	16.4	40.39	0.267 1556	520.7	2.53	4.76	3 19.8
29	21	49	30.73	7.509	14	20	3.0	40.73	0.268 4040	519.6	2.52	4.74	3 18.8
30	21	52	30.74	7.492	14	3	41.5	41.06	0.269 6498	518.5	2.52	4.73	3 17.9
31	21	55	30.34	+7.475	-13	47	12.2	+41.38	0.270 8926	+517.3	2.51	4.72	3 16.9
32	21	58	29.58	...	-13	30	35.2	...	0.272 1330	...	2.50	4.70	3 16.0

FOR GREENWICH MEAN NOON.

Date.	Heliocentric Longitude, Mean Equinox of Date.	Var. per Day.	Reduction to Orbit.	Heliocentric Latitude.	Var. per Day.	Logarithm of Radius Vector.	Var. per Day.
Jan. 0	160 24 24.1	26 13.7	-36.6	+1 43 18.5	-18.6	0.221 4800	-344
2	161 16 51.9	26 14.2	37.8	1 42 40.6	19.3	0.221 3561	305
4	162 9 20.8	26 14.3	39.0	1 42 1.3	20.0	0.221 2719	447
6	163 1 51.0	26 15.4	40.1	1 41 20.5	20.8	0.221 1773	490
8	163 54 22.6	26 16.2	41.2	1 40 38.3	21.5	0.221 0724	550
10	164 46 55.7	26 17.0	-42.2	+1 39 54.6	-22.2	0.220 9572	-602
12	165 39 30.6	26 17.9	43.2	1 39 9.5	22.9	0.220 8317	653
14	166 32 7.3	26 18.3	44.2	1 38 23.0	23.6	0.220 6959	705
16	167 24 46.0	26 19.9	45.1	1 37 35.0	24.2	0.220 5498	756
18	168 17 26.8	26 21.0	46.0	1 36 45.8	25.0	0.220 3936	807
20	169 10 10.0	26 22.2	-46.8	+1 35 55.0	-25.7	0.220 2271	-858
22	170 2 55.6	26 23.4	47.6	1 35 2.9	26.4	0.220 0504	909
24	170 55 43.8	26 24.8	48.3	1 34 9.4	27.1	0.219 8634	960
26	171 48 34.8	26 26.2	49.0	1 33 14.5	27.8	0.219 6664	1011
28	172 41 28.6	26 27.7	49.7	1 32 18.2	28.5	0.219 4591	1062
30	173 34 25.6	26 29.3	-50.3	+1 31 20.6	-29.2	0.219 2418	-1112
Feb. 1	174 27 25.7	26 30.9	50.9	1 30 21.6	29.8	0.219 0143	1163
3	175 20 29.2	26 32.6	51.4	1 29 21.3	30.5	0.218 7768	1213
5	176 13 36.2	26 34.4	51.8	1 28 19.6	31.2	0.218 5292	1263
7	177 6 46.9	26 36.3	52.3	1 27 16.6	31.9	0.218 2717	1313
9	178 0 1.4	26 38.2	-52.6	+1 26 12.2	-32.5	0.218 0041	-1363
11	178 53 19.7	26 40.2	52.9	1 25 6.6	33.1	0.217 7266	1412
13	179 46 42.2	26 42.3	53.2	1 23 59.6	33.8	0.217 4392	1462
15	180 40 9.0	26 44.5	53.4	1 22 51.3	34.5	0.217 1419	1511
17	181 33 40.2	26 46.7	53.6	1 21 41.7	35.1	0.216 8348	1560
19	182 27 15.9	26 49.0	-53.7	+1 20 30.8	-35.8	0.216 5178	-1609
21	183 20 56.4	26 51.4	53.8	1 19 18.6	36.4	0.216 1912	1658
23	184 14 41.7	26 53.9	53.8	1 18 5.1	37.0	0.215 8548	1706
25	185 8 32.0	26 56.4	53.7	1 16 50.4	37.7	0.215 5088	1754
27	186 2 27.5	26 59.1	53.6	1 15 34.4	38.3	0.215 1531	1802
29	186 56 28.4	27 1.8	-53.5	+1 14 17.2	-38.9	0.214 7879	-1850
Mar. 2	187 50 34.7	27 4.5	53.3	1 12 58.8	39.5	0.214 4132	1897
4	188 44 46.6	27 7.4	53.0	1 11 39.1	40.2	0.214 0290	1945
6	189 39 4.3	27 10.3	52.7	1 10 18.2	40.8	0.213 6353	1992
8	190 33 27.9	27 13.3	52.4	1 8 56.1	41.4	0.213 2324	2038
10	191 27 57.6	27 16.4	-51.9	+1 7 32.8	-41.9	0.212 8201	-2085
12	192 22 33.5	27 19.5	51.5	1 6 8.4	42.5	0.212 3986	2131
14	193 17 15.8	27 22.6	50.9	1 4 42.8	43.1	0.211 9679	2176
16	194 12 4.6	27 25.1	50.4	1 3 16.0	43.7	0.211 5281	2222
18	195 7 0.1	27 28.5	49.7	1 1 48.1	44.3	0.211 0792	2267
20	196 2 2.5	27 32.9	-49.1	+1 0 19.0	-44.8	0.210 6214	-2312
22	196 57 11.8	27 36.4	48.3	0 58 48.8	45.4	0.210 1546	2356
24	197 52 28.3	27 40.1	47.5	0 57 17.5	45.9	0.209 6791	2400
26	198 47 52.1	27 43.7	46.7	0 55 45.2	46.5	0.209 1948	2443
28	199 43 23.2	27 47.4	45.8	0 54 11.7	47.0	0.208 7018	2487
30	200 39 1.9	27 51.3	-44.9	+0 52 37.2	-47.5	0.208 2002	-2530
Apr. 1	201 34 48.4	27 55.2	-43.9	+0 51 1.7	-48.0	0.207 6901	-2572



FOR GREENWICH MEAN NOON.

Date.	Heliocentric Longitude, Mean Equinox of Date.	Var. per Day.	Reduction to Orbit.	Heliocentric Latitude.	Var. per Day.	Logarithm of Radius Vector.	Var. per Day.	
Apr.	1	201 84 48.4	27 55.2	-43.9	+0 51 1.7	-43.6	0.207 6001	-2572
	3	202 30 42.8	27 59.2	42.9	0 49 25.1	48.6	0.207 1716	2613
	5	203 26 45.2	28 3.2	41.8	0 47 47.5	49.1	0.206 6448	2655
	7	204 22 55.8	28 7.4	40.7	0 46 8.9	49.6	0.206 1096	2696
	9	205 19 14.8	28 11.6	39.5	0 44 29.2	50.1	0.205 5664	2736
	11	206 15 42.2	28 15.8	-38.3	+0 42 48.6	-50.5	0.205 0152	-2776
	13	207 12 18.2	28 20.2	37.0	0 41 7.1	51.0	0.204 4559	2816
	15	208 9 3.0	28 24.6	35.7	0 39 24.6	51.5	0.203 8888	2855
	17	209 5 56.8	28 29.1	34.4	0 37 41.2	51.9	0.203 3140	2893
	19	210 2 59.6	28 33.7	33.0	0 35 56.9	52.4	0.202 7316	2931
	21	211 0 11.6	28 38.3	-31.5	+0 34 11.7	-52.8	0.202 1416	-2968
	23	211 57 33.0	28 43.1	30.1	0 32 25.7	53.3	0.201 5443	3005
	25	212 55 3.9	28 47.8	28.8	0 30 38.8	53.6	0.200 9396	3041
	27	213 52 44.4	28 52.7	27.0	0 28 51.2	54.0	0.200 3278	3077
29	214 50 34.8	28 57.6	25.4	0 27 2.7	54.5	0.199 7090	3112	
May	1	215 48 35.0	29 2.6	-23.3	+0 25 13.4	-54.8	0.199 0832	-3146
	3	216 46 45.4	29 7.7	22.2	0 23 23.4	55.2	0.198 4507	3179
	5	217 45 5.8	29 12.8	20.5	0 21 32.6	55.6	0.197 8116	3212
	7	218 43 36.7	29 18.1	18.8	0 19 41.2	55.9	0.197 1659	3244
	9	219 42 18.1	29 23.3	17.1	0 17 49.1	56.2	0.196 5139	3276
	11	220 41 10.1	29 28.7	-15.8	+0 15 56.3	-56.6	0.196 8557	-3306
	13	221 40 12.8	29 34.1	13.5	0 14 2.9	56.9	0.195 1914	3336
	15	222 39 26.4	29 39.5	11.7	0 12 8.9	57.3	0.194 5213	3365
	17	223 38 51.0	29 45.1	9.9	0 10 14.5	57.4	0.193 8454	3398
	19	224 38 26.8	29 50.7	8.1	0 8 19.4	57.7	0.193 1640	3421
	21	225 38 13.8	29 56.4	- 6.2	+0 6 23.7	-58.0	0.192 4771	-3448
	23	226 38 12.2	30 2.1	4.3	0 4 27.6	58.3	0.191 7850	3473
	25	227 38 22.2	30 7.9	2.5	0 2 31.1	58.4	0.191 0879	3498
	27	228 38 43.8	30 13.7	- 0.6	+0 0 34.1	58.6	0.190 3859	3522
29	229 39 17.2	30 19.6	+ 1.3	-0 1 23.2	58.8	0.189 6792	3545	
31	230 40 2.4	30 25.6	+ 3.2	-0 3 21.0	-59.0	0.188 9679	-3567	
June	2	231 40 59.6	30 31.6	5.1	0 5 19.0	59.1	0.188 2524	3588
	4	232 42 9.0	30 37.7	7.0	0 7 17.4	59.3	0.187 5327	3608
	6	233 43 30.6	30 43.9	8.9	0 9 16.0	59.4	0.186 8091	3627
	8	234 45 4.5	30 50.0	10.8	0 11 14.8	59.4	0.186 0818	3645
	10	235 46 50.8	30 56.3	+12.7	-0 13 13.7	-59.5	0.185 3510	-3663
	12	236 48 49.8	31 2.6	14.6	0 15 12.9	59.6	0.184 6168	3678
	14	237 51 1.3	31 8.9	16.5	0 17 12.1	59.6	0.183 8797	3693
	16	238 53 25.6	31 15.3	18.3	0 19 11.4	59.7	0.183 1398	3707
	18	239 56 2.7	31 21.8	20.1	0 21 10.7	59.7	0.182 3970	3719
	20	240 58 52.7	31 28.3	+21.9	-0 23 10.0	-59.7	0.181 6519	-3731
	22	242 1 55.8	31 34.8	23.7	0 25 9.3	59.6	0.180 9046	3741
	24	243 5 11.9	31 41.3	25.5	0 27 8.5	59.6	0.180 1555	3750
	26	244 8 41.2	31 47.9	27.2	0 29 7.6	59.5	0.179 4047	3758
	28	245 12 23.7	31 54.6	28.9	0 31 6.4	59.4	0.178 6525	3764
30	246 16 19.6	32 1.3	+30.6	-0 33 5.0	-59.3	0.177 8991	-3769	
July	2	247 20 28.8	32 7.9	+32.2	-0 35 3.8	-59.1	0.177 1448	-3773

FOR GREENWICH MEAN NOON.

Date.	Heliocentric Longitude, Mean Equinox of Date.	Var. per Day.	Reduction to Orbit.	Heliocentric Latitude.	Var. per Day.	Logarithm of Radius Vector.	Var. per Day.
July 2	247 20 28.8	32 7.9	+82.2	-0 35 3.3	-30.1	0.177 1448	-3778
4	248 24 51.4	32 14.7	33.8	0 37 1.3	38.9	0.176 3699	3776
6	249 29 27.6	32 21.5	35.4	0 38 58.9	36.7	0.175 6346	3777
8	250 34 17.4	32 28.3	36.9	0 40 56.1	36.5	0.174 8792	3777
10	251 39 20.8	32 35.1	38.3	0 42 52.8	36.3	0.174 1239	3776
12	252 44 37.8	32 41.9	+89.7	-0 44 49.0	-36.0	0.173 3692	-3772
14	253 50 8.4	32 48.7	41.1	0 46 44.7	37.7	0.172 6151	3768
16	254 55 52.8	32 55.6	42.4	0 48 39.7	37.4	0.171 8621	3762
18	256 1 51.0	33 2.6	43.6	0 50 34.1	37.6	0.171 1104	3754
20	257 8 3.0	33 9.4	44.8	0 52 27.7	36.6	0.170 3604	3746
22	258 14 28.7	33 16.3	+45.9	-0 54 20.6	-36.3	0.169 6122	-3736
24	259 21 8.3	33 23.2	47.0	0 56 12.6	36.3	0.168 8662	3724
26	260 28 1.7	33 30.1	47.9	0 58 3.7	36.3	0.168 1228	3710
28	261 35 8.8	33 37.0	48.9	0 59 53.9	34.8	0.167 3823	3695
30	262 42 29.8	33 44.0	49.7	1 1 43.0	34.3	0.166 6449	3679
Aug. 1	263 50 4.6	33 50.8	+50.5	-1 3 31.1	-35.8	0.165 9109	-3661
3	264 57 53.1	33 57.7	51.2	1 5 18.1	35.3	0.165 1808	3640
5	266 5 55.4	34 4.6	51.8	1 7 3.9	32.6	0.164 4548	3619
7	267 14 11.8	34 11.4	52.3	1 8 48.5	32.0	0.163 7332	3596
9	268 22 41.0	34 18.3	52.8	1 10 31.9	31.4	0.163 0164	3572
11	269 31 24.3	34 25.1	+53.1	-1 12 13.9	-30.6	0.162 3047	-3546
13	270 40 21.2	34 31.9	53.4	1 13 54.4	30.0	0.161 5985	3517
15	271 49 31.6	34 38.6	53.8	1 15 33.5	30.3	0.160 8990	3487
17	272 58 55.4	34 45.3	53.7	1 17 11.1	28.4	0.160 2037	3456
19	274 8 32.5	34 51.9	53.8	1 18 47.1	27.6	0.159 5158	3423
21	275 18 23.0	34 58.5	+53.7	-1 20 21.5	-26.8	0.158 8346	-3388
23	276 28 26.6	35 5.1	53.8	1 21 54.1	25.9	0.158 1606	3351
25	277 38 43.3	35 11.6	53.8	1 23 25.0	25.0	0.157 4941	3313
27	278 49 13.0	35 18.1	53.0	1 24 54.0	24.1	0.156 8354	3274
29	279 59 55.6	35 24.5	52.6	1 26 21.2	23.1	0.156 1848	3232
31	281 10 50.9	35 30.8	+52.1	-1 27 46.4	-22.1	0.155 5428	-3189
Sept. 2	282 21 58.8	35 37.1	51.5	1 29 9.7	21.1	0.154 9096	3144
4	283 33 19.2	35 43.3	50.8	1 30 30.8	20.1	0.154 2855	3096
6	284 44 51.9	35 49.4	50.0	1 31 49.9	19.0	0.153 6710	3048
8	285 56 36.8	35 55.4	49.1	1 33 6.8	17.9	0.153 0663	2996
10	287 8 33.6	36 1.4	+48.3	-1 34 21.5	-16.8	0.152 4719	-2946
12	288 20 42.2	36 7.3	47.1	1 35 33.8	15.6	0.151 8890	2892
14	289 33 2.5	36 13.0	46.0	1 36 43.9	14.5	0.151 3150	2837
16	290 45 34.2	36 18.7	44.8	1 37 51.6	13.3	0.150 7531	2781
18	291 58 17.2	36 24.3	43.5	1 38 56.8	12.1	0.150 2027	2723
20	293 11 11.2	36 30.7	+42.1	-1 39 59.4	-10.7	0.149 6642	-2662
22	294 24 16.0	36 35.1	40.6	1 40 59.6	9.4	0.149 1379	2601
24	295 37 31.4	36 40.3	39.1	1 41 57.1	8.1	0.148 6240	2538
26	296 50 57.2	36 45.4	37.5	1 42 51.9	6.8	0.148 1230	2473
28	298 4 33.0	36 50.4	35.8	1 43 44.1	5.4	0.147 6350	2407
30	299 18 18.8	36 55.3	+34.0	-1 44 33.5	-4.0	0.147 1604	-2339
Oct. 2	300 32 14.1	37 0.0	+32.3	-1 45 20.1	-2.6	0.146 6995	-2270

FOR GREENWICH MEAN NOON.

Date.	Heliocentric Longitude, Mean Equinox of Date.			Var. per Day.	Reduction to Orbit.	Heliocentric Latitude.			Var. per Day.	Logarithm of Radius Vector.	Var. per Day.
	°	'	"	"	"	°	'	"	"		
Oct. 2	300	32	14.1	37 0.0	+32.2	-1	45	20.1	-22.6	0.146 6995	-2370
4	301	46	18.8	37 4.6	30.3	1	46	4.0	21.3	0.146 2526	2199
6	303	0	32.5	37 9.1	28.4	1	46	44.9	19.8	0.145 8200	2137
8	304	14	55.0	37 13.4	26.4	1	47	23.0	18.3	0.145 4019	2064
10	305	29	26.1	37 17.6	24.3	1	47	58.0	16.8	0.144 9935	1979
12	306	44	5.4	37 21.6	+22.2	-1	48	30.1	-15.3	0.144 6103	-1903
14	307	58	52.5	37 25.5	20.1	1	48	59.2	13.8	0.144 2373	1826
16	309	13	47.3	37 29.2	17.9	1	49	25.2	12.3	0.143 8799	1748
18	310	28	49.3	37 33.7	15.7	1	49	48.2	10.7	0.143 5383	1668
20	311	43	58.2	37 38.2	13.4	1	50	8.0	9.1	0.143 2126	1588
22	312	59	13.9	37 39.4	+11.1	-1	50	24.7	-7.6	0.142 9032	-1506
24	314	14	35.8	37 42.4	8.8	1	50	38.3	6.0	0.142 6103	1428
26	315	30	3.6	37 45.3	6.4	1	50	48.7	4.4	0.142 3340	1340
28	316	45	37.0	37 48.1	4.1	1	50	55.9	2.8	0.142 0745	1256
30	318	1	15.7	37 50.6	+ 1.7	1	50	59.8	-1.3	0.141 8320	1170
Nov. 1	319	16	59.3	37 53.0	- 0.6	-1	51	0.6	+ 0.4	0.141 6067	-1063
3	320	32	47.4	37 55.1	3.0	1	50	58.1	2.1	0.141 3987	997
5	321	48	39.7	37 57.1	5.4	1	50	52.4	3.6	0.141 2081	909
7	323	4	35.8	37 58.9	7.7	1	50	43.5	5.3	0.141 0352	821
9	324	20	35.8	38 0.5	10.1	1	50	31.3	6.9	0.140 8799	733
11	325	36	37.8	38 1.9	-12.4	-1	50	15.8	+ 8.6	0.140 7425	- 642
13	326	52	43.0	38 3.2	14.7	1	49	56.9	10.2	0.140 6230	553
15	328	8	50.6	38 4.3	17.0	1	49	35.0	11.3	0.140 5215	468
17	329	25	0.0	38 5.1	19.2	1	49	9.8	13.4	0.140 4380	373
19	330	41	11.0	38 5.3	21.4	1	48	41.4	15.0	0.140 3727	281
21	331	57	23.1	38 6.3	-23.6	-1	48	9.7	+16.6	0.140 3255	- 190
23	333	13	36.0	38 6.6	25.7	1	47	34.9	18.2	0.140 2966	99
25	334	29	49.2	38 6.7	27.8	1	46	56.9	19.8	0.140 2858	- 8
27	335	46	2.5	38 6.6	29.8	1	46	15.8	21.4	0.140 2933	+ 33
29	337	2	15.3	38 6.3	31.7	1	45	31.5	22.9	0.140 3191	174
Dec. 1	338	18	27.3	38 5.7	-33.6	-1	44	44.2	+24.5	0.140 3630	+ 265
3	339	34	38.1	38 5.1	35.5	1	43	53.7	26.0	0.140 4252	356
5	340	50	47.4	38 4.3	37.2	1	43	0.3	27.5	0.140 5054	446
7	342	6	54.7	38 3.0	38.9	1	42	3.8	29.0	0.140 6037	537
9	343	22	59.7	38 1.3	40.5	1	41	4.3	30.5	0.140 7201	637
11	344	39	1.9	38 0.4	-42.0	-1	40	2.0	+31.9	0.140 8544	+ 716
13	345	55	1.1	37 58.3	43.5	1	38	56.7	33.4	0.141 0065	806
15	347	10	56.8	37 57.0	44.8	1	37	48.5	34.3	0.141 1763	893
17	348	26	48.8	37 54.9	46.1	1	36	37.6	36.2	0.141 3637	961
19	349	42	36.4	37 53.7	47.3	1	35	23.9	37.5	0.141 5686	1038
21	350	58	19.5	37 50.4	-48.4	-1	34	7.5	+38.9	0.141 7909	+1155
23	352	13	57.7	37 47.3	49.3	1	32	48.4	40.2	0.142 0304	1240
25	353	29	39.6	37 45.1	50.2	1	31	26.8	41.5	0.142 2869	1325
27	354	44	58.0	37 42.3	51.0	1	30	2.6	42.7	0.142 5602	1406
29	356	0	19.3	37 39.1	51.7	1	28	35.9	44.0	0.142 8502	1491
31	357	15	34.3	37 35.9	-52.3	-1	27	6.8	+45.1	0.143 1567	+1573
33	358	30	42.7	37 33.5	-52.8	-1	25	35.4	+46.3	0.143 4795	+1654

## GREENWICH MEAN TIME.

Date.	Apparent Right Ascension.			Var. per Hour.	Apparent Declination.			Var. per Hour.	Logarithm of Distance from Earth.	Var. per Hour.	Polar Semi-diameter.	Hor. Parallax.	Transit, Meridian of Greenwich.
	h	m	s		°	'	"						
Jan. 1	9	18	39.41	-0.830	+16	30	57.1	+4.36	0.652 2928	-379.0	20.47	1.96	14 36.7
2	9	18	19.17	0.856	16	32	43.0	4.47	0.651 3941	309.8	20.51	1.96	14 32.4
3	9	17	58.30	0.882	16	34	31.6	4.58	0.650 5176	360.5	20.55	1.97	14 28.1
4	9	17	36.81	0.908	16	36	22.8	4.68	0.649 6637	351.0	20.59	1.97	14 23.8
5	9	17	14.70	0.934	16	38	16.4	4.78	0.648 8330	341.2	20.63	1.98	14 19.5
6	9	16	52.00	-0.958	+16	40	12.4	+4.88	0.648 0259	-331.3	20.67	1.98	14 15.2
7	9	16	28.71	0.982	16	42	10.8	4.98	0.647 2428	321.2	20.71	1.98	14 10.9
8	9	16	4.86	1.006	16	44	11.5	5.07	0.646 4842	310.9	20.74	1.99	14 6.5
9	9	15	40.44	1.029	16	46	14.3	5.16	0.645 7507	300.3	20.78	1.99	14 2.2
10	9	15	15.48	1.051	16	48	19.2	5.25	0.645 0428	289.5	20.81	1.99	13 57.8
11	9	14	49.99	-1.072	+16	50	26.1	+5.33	0.644 3609	-278.6	20.84	2.00	13 53.5
12	9	14	24.00	1.093	16	52	34.9	5.40	0.643 7055	267.5	20.88	2.00	13 49.1
13	9	13	57.51	1.114	16	54	45.5	5.48	0.643 0770	256.3	20.91	2.00	13 44.7
14	9	13	30.54	1.133	16	56	57.9	5.55	0.642 4759	244.7	20.94	2.00	13 40.4
15	9	13	3.11	1.152	16	59	11.8	5.61	0.641 9026	233.0	20.96	2.01	13 36.0
16	9	12	35.25	-1.170	+17	1	27.3	+5.67	0.641 3575	-221.2	20.99	2.01	13 31.6
17	9	12	6.96	1.187	17	3	44.1	5.73	0.640 8410	209.2	21.01	2.01	13 27.2
18	9	11	38.28	1.203	17	6	2.2	5.78	0.640 3535	197.0	21.04	2.01	13 22.8
19	9	11	9.21	1.219	17	8	21.6	5.83	0.639 8955	184.6	21.06	2.02	13 18.3
20	9	10	39.79	1.233	17	10	42.0	5.87	0.639 4673	172.2	21.08	2.02	13 13.9
21	9	10	10.03	-1.247	+17	13	3.3	+5.91	0.639 0690	-159.6	21.10	2.02	13 9.5
22	9	9	39.95	1.259	17	15	25.5	5.94	0.638 7010	147.0	21.12	2.02	13 5.1
23	9	9	9.59	1.271	17	17	48.4	5.97	0.638 3636	134.2	21.13	2.02	13 0.6
24	9	8	38.95	1.282	17	20	11.9	5.99	0.638 0569	121.3	21.15	2.02	12 56.2
25	9	8	8.07	1.291	17	22	35.9	6.01	0.637 7813	106.3	21.16	2.03	12 51.7
26	9	7	36.97	-1.300	+17	25	0.3	+6.02	0.637 5369	-95.3	21.18	2.03	12 47.3
27	9	7	5.68	1.308	17	27	25.0	6.03	0.637 3239	82.2	21.19	2.03	12 42.8
28	9	6	34.21	1.314	17	29	49.8	6.04	0.637 1423	69.1	21.19	2.03	12 38.4
29	9	6	2.59	1.320	17	32	14.7	6.04	0.636 9923	55.9	21.20	2.03	12 33.9
30	9	5	30.85	1.325	17	34	39.5	6.03	0.636 8740	42.7	21.21	2.03	12 29.5
31	9	4	59.01	-1.328	+17	37	4.1	+6.02	0.636 7874	-29.5	21.21	2.03	12 25.0
Feb. 1	9	4	27.09	1.331	17	39	28.5	6.01	0.636 7324	16.3	21.21	2.03	12 20.5
2	9	3	55.11	1.333	17	41	52.5	5.99	0.636 7091	-3.1	21.22	2.03	12 16.1
3	9	3	23.11	1.334	17	44	16.0	5.97	0.636 7174	+10.0	21.22	2.03	12 11.6
4	9	2	51.09	1.334	17	46	38.9	5.94	0.636 7573	23.2	21.21	2.03	12 7.2
5	9	2	19.08	-1.333	+17	49	1.2	+5.91	0.636 8287	+36.4	21.21	2.03	12 2.7
6	9	1	47.11	1.331	17	51	22.8	5.88	0.636 9318	49.5	21.20	2.03	11 58.2
7	9	1	15.20	1.328	17	53	43.5	5.84	0.637 0664	62.7	21.20	2.03	11 53.8
8	9	0	43.37	1.324	17	56	3.2	5.80	0.637 2326	75.8	21.19	2.03	11 49.3
9	9	0	11.64	1.319	17	58	21.9	5.76	0.637 4302	88.8	21.18	2.03	11 44.8
10	8	59	40.04	-1.314	+18	0	39.5	+5.71	0.637 6590	+101.8	21.17	2.03	11 40.4
11	8	59	8.59	1.307	18	2	55.8	5.65	0.637 9189	114.7	21.16	2.03	11 35.9
12	8	58	37.32	1.299	18	5	10.8	5.59	0.638 2097	127.6	21.14	2.02	11 31.5
13	8	58	6.24	1.290	18	7	24.3	5.53	0.638 5313	140.4	21.13	2.02	11 27.0
14	8	57	35.38	1.281	18	9	36.3	5.47	0.638 8835	153.1	21.11	2.02	11 22.6
15	8	57	4.77	-1.270	+18	11	46.7	+5.40	0.639 2660	+165.7	21.09	2.02	11 18.2
16	8	56	34.43	-1.258	+18	13	55.4	+5.33	0.639 6788	+178.2	21.07	2.02	11 13.7

GREENWICH MEAN TIME.

Date.	Apparent Right Ascension.	Var. per Hour.	Apparent Declination.	Var. per Hour.	Logarithm of Distance from Earth.	Var. per Hour.	Polar Semi-diameter.	Hor. Parallax.	Transit, Meridian of Greenwich.
	Noon.	Noon.	Noon.	Noon.	Noon.	Noon.	Noon.		
	h m s	s	° ' "	"			"	"	h m
Feb. 16	8 56 34.43	-1.288	+18 13 55.4	+5.38	0.639 6788	+178.2	21.07	2.02	11 13.7
17	8 56 4.38	1.286	18 16 2.3	5.36	0.640 1214	190.6	21.05	2.02	11 9.3
18	8 55 34.64	1.282	18 18 7.8	5.17	0.640 5986	202.3	21.03	2.01	11 4.9
19	8 55 5.24	1.280	18 20 10.4	5.09	0.641 0950	214.9	21.00	2.01	11 0.5
20	8 54 36.19	1.262	18 22 11.5	5.00	0.641 6253	226.9	20.98	2.01	10 56.1
21	8 54 7.53	-1.188	+18 24 10.5	+4.91	0.642 1842	+238.3	20.95	2.01	10 51.7
22	8 53 39.27	1.169	18 26 7.3	4.82	0.642 7713	250.4	20.92	2.00	10 47.3
23	8 53 11.43	1.161	18 28 1.9	4.73	0.643 3800	261.8	20.89	2.00	10 42.9
24	8 52 44.04	1.152	18 29 54.2	4.63	0.644 0281	273.1	20.86	2.00	10 38.5
25	8 52 17.10	1.143	18 31 44.1	4.53	0.644 6970	284.2	20.83	1.99	10 34.1
26	8 51 50.65	-1.022	+18 33 31.6	+4.43	0.645 3922	+295.1	20.80	1.99	10 29.8
27	8 51 24.69	1.071	18 35 16.6	4.32	0.646 1183	306.7	20.76	1.99	10 25.4
28	8 50 59.25	1.069	18 36 59.1	4.22	0.646 8596	316.1	20.73	1.98	10 21.0
29	8 50 34.33	1.066	18 38 39.1	4.11	0.647 6308	326.4	20.69	1.98	10 16.7
Mar. 1	8 50 9.97	1.064	18 40 16.5	4.00	0.648 4263	336.4	20.65	1.98	10 12.4
2	8 49 46.16	-0.989	+18 41 51.2	+3.89	0.649 2457	+346.3	20.61	1.97	10 8.0
3	8 49 22.93	0.986	18 43 23.3	3.78	0.650 0885	356.0	20.57	1.97	10 3.7
4	8 49 0.29	0.981	18 44 52.6	3.66	0.650 9543	365.4	20.53	1.97	9 59.4
5	8 48 38.25	0.976	18 46 19.2	3.55	0.651 8424	374.6	20.49	1.96	9 55.1
6	8 48 16.82	0.969	18 47 43.0	3.43	0.652 7523	383.6	20.45	1.96	9 50.9
7	8 47 56.02	-0.988	+18 49 4.0	+3.32	0.653 6835	+392.4	20.40	1.95	9 46.6
8	8 47 35.86	0.977	18 50 22.2	3.20	0.654 6356	400.9	20.36	1.95	9 42.3
9	8 47 16.34	0.969	18 51 37.5	3.08	0.655 6079	409.3	20.31	1.94	9 38.1
10	8 46 57.48	0.959	18 52 49.9	2.96	0.656 6001	417.4	20.27	1.94	9 33.8
11	8 46 39.30	0.948	18 53 59.4	2.83	0.657 6116	425.4	20.22	1.94	9 29.6
12	8 46 21.80	-0.918	+18 55 5.9	+2.71	0.658 6419	+433.1	20.17	1.93	9 25.4
13	8 46 4.99	0.906	18 56 9.5	2.59	0.659 6904	440.6	20.12	1.93	9 21.2
14	8 45 48.88	0.896	18 57 10.2	2.46	0.660 7566	447.3	20.07	1.92	9 17.0
15	8 45 33.49	0.886	18 58 7.8	2.34	0.661 8399	454.3	20.02	1.92	9 12.8
16	8 45 18.81	0.886	18 59 2.4	2.21	0.662 9397	461.6	19.97	1.91	9 8.6
17	8 45 4.87	-0.909	+18 59 54.0	+2.09	0.664 0556	+469.2	19.92	1.91	9 4.5
18	8 44 51.66	0.925	19 0 42.5	1.96	0.665 1870	474.5	19.87	1.90	9 0.3
19	8 44 39.19	0.904	19 1 27.9	1.83	0.666 3333	480.6	19.82	1.90	8 56.2
20	8 44 27.48	0.872	19 2 10.3	1.70	0.667 4940	486.5	19.76	1.89	8 52.1
21	8 44 16.52	0.841	19 2 49.5	1.57	0.668 6684	492.1	19.71	1.89	8 48.0
22	8 44 6.33	-0.809	+19 3 25.7	+1.44	0.669 8560	+497.4	19.66	1.88	8 43.9
23	8 43 56.90	0.777	19 3 58.3	1.31	0.671 0561	502.5	19.60	1.88	8 39.8
24	8 43 48.25	0.744	19 4 28.7	1.18	0.672 2681	507.4	19.55	1.87	8 35.7
25	8 43 40.37	0.712	19 4 55.6	1.06	0.673 4915	512.0	19.49	1.87	8 31.6
26	8 43 33.26	0.680	19 5 19.4	0.93	0.674 7257	516.4	19.44	1.86	8 27.6
27	8 43 26.93	-0.648	+19 5 40.1	+0.80	0.675 9701	+520.5	19.38	1.86	8 23.6
28	8 43 21.38	0.615	19 5 57.7	0.67	0.677 2243	524.5	19.33	1.85	8 19.6
29	8 43 16.61	0.582	19 6 12.3	0.55	0.678 4875	528.1	19.27	1.84	8 15.6
30	8 43 12.62	0.550	19 6 23.9	0.42	0.679 7594	531.6	19.21	1.84	8 11.6
31	8 43 9.40	0.518	19 6 32.4	0.30	0.681 0393	534.9	19.16	1.83	8 7.6
Apr. 1	8 43 6.96	-0.486	+19 6 37.8	+0.16	0.682 3268	+537.9	19.10	1.83	8 3.6
2	8 43 5.29	-0.453	+19 6 40.3	+0.04	0.683 6214	+540.3	19.04	1.82	7 59.7

GREENWICH MEAN TIME.

Date.	Apparent Right Ascension.			Var. per Hour.	Apparent Declination.			Var. per Hour.	Logarithm of Distance from Earth.	Var. per Hour.	Polar Semi-diameter.	Hor. Paral-lax.	Transit, Meridian of Green-wich.
	h	m	s	s	°	'	"	"	Nov.	Nov.	"	Noon.	h m
Apr. 1	8	43	6.96	-0.066	+19	0	37.8	+0.16	0.662 3268	+587.9	19.10	1.88	8 3.6
2	8	43	5.29	0.068	19	0	40.3	+0.04	0.683 6214	588.8	19.04	1.82	7 59.7
3	8	43	4.40	-0.081	19	0	39.7	-0.09	0.684 9227	588.8	18.99	1.82	7 55.7
4	8	43	4.28	+0.011	19	0	36.2	0.21	0.686 2392	588.0	18.93	1.81	7 51.8
5	8	43	4.93	0.043	19	0	29.6	0.34	0.687 5434	588.3	18.87	1.81	7 47.9
6	8	43	6.35	+0.075	+19	0	20.1	-0.46	0.688 8619	+589.4	18.81	1.80	7 44.0
7	8	43	8.54	0.107	19	0	7.6	0.58	0.690 1853	589.3	18.76	1.80	7 40.1
8	8	43	11.50	0.139	19	5	52.1	0.71	0.691 5130	589.0	18.70	1.79	7 36.2
9	8	43	15.21	0.171	19	5	33.6	0.83	0.692 8446	588.6	18.64	1.78	7 32.3
10	8	43	19.69	0.202	19	5	12.2	0.95	0.694 1797	588.9	18.59	1.78	7 28.5
11	8	43	24.92	+0.234	+19	4	47.8	-1.06	0.695 5179	+588.1	18.53	1.77	7 24.6
12	8	43	30.90	0.265	19	4	20.5	1.20	0.696 8598	588.2	18.47	1.77	7 20.8
13	8	43	37.64	0.296	19	3	50.3	1.32	0.698 2019	588.0	18.41	1.76	7 17.0
14	8	43	45.13	0.328	19	3	17.1	1.44	0.699 5489	587.7	18.36	1.76	7 13.2
15	8	43	53.36	0.359	19	2	41.1	1.56	0.700 8933	587.2	18.30	1.75	7 9.4
16	8	44	2.34	+0.389	+19	2	2.1	-1.68	0.702 2406	+586.5	18.24	1.75	7 5.6
17	8	44	12.05	0.420	19	1	20.3	1.80	0.703 5885	586.6	18.19	1.74	7 1.9
18	8	44	22.50	0.451	19	0	35.6	1.92	0.704 9365	586.6	18.13	1.74	6 58.1
19	8	44	33.68	0.481	18	59	48.1	2.04	0.706 2842	586.4	18.08	1.73	6 54.4
20	8	44	45.58	0.511	18	58	57.7	2.16	0.707 6313	586.1	18.02	1.72	6 50.6
21	8	44	58.20	+0.541	+18	58	4.5	-2.28	0.708 9773	+585.5	17.96	1.72	6 46.9
22	8	45	11.53	0.570	18	57	8.5	2.39	0.710 3218	585.8	17.91	1.71	6 43.2
23	8	45	25.57	0.599	18	56	9.7	2.51	0.711 6645	585.0	17.85	1.71	6 39.5
24	8	45	40.30	0.628	18	55	8.1	2.62	0.713 0049	585.0	17.80	1.70	6 35.8
25	8	45	55.73	0.657	18	54	3.8	2.74	0.714 3427	585.3	17.74	1.70	6 32.1
26	8	46	11.84	+0.685	+18	52	56.8	-2.85	0.715 6776	+585.5	17.69	1.69	6 28.5
27	8	46	28.62	0.713	18	51	47.0	2.96	0.717 0092	584.1	17.63	1.69	6 24.8
28	8	46	46.07	0.741	18	50	34.6	3.07	0.718 3373	583.6	17.58	1.68	6 21.2
29	8	47	4.19	0.769	18	49	19.5	3.18	0.719 6616	583.9	17.53	1.68	6 17.6
30	8	47	22.96	0.796	18	48	1.8	3.29	0.720 9818	583.2	17.47	1.67	6 14.0
May 1	8	47	42.37	+0.822	+18	46	41.4	-3.40	0.722 2976	+582.3	17.42	1.67	6 10.3
2	8	48	2.43	0.849	18	45	18.4	3.51	0.723 6088	585.3	17.37	1.66	6 6.7
3	8	48	23.11	0.875	18	43	52.8	3.62	0.724 9152	585.3	17.32	1.66	6 3.2
4	8	48	44.42	0.901	18	42	24.6	3.73	0.726 2164	584.1	17.26	1.65	5 59.6
5	8	49	6.35	0.926	18	40	53.8	3.84	0.727 5123	583.8	17.21	1.65	5 56.0
6	8	49	28.89	+0.952	+18	39	20.5	-3.94	0.728 8026	+583.4	17.16	1.64	5 52.4
7	8	49	52.03	0.977	18	37	44.6	4.05	0.730 0871	583.9	17.11	1.64	5 48.9
8	8	50	15.78	1.002	18	36	6.1	4.15	0.731 3655	583.4	17.06	1.63	5 45.4
9	8	50	40.11	1.028	18	34	25.2	4.26	0.732 6376	583.7	17.01	1.63	5 41.9
10	8	51	5.03	1.050	18	32	41.7	4.36	0.733 9031	583.9	16.96	1.62	5 38.3
11	8	51	30.52	+1.074	+18	30	55.7	-4.47	0.735 1619	+583.0	16.91	1.62	5 34.8
12	8	51	56.59	1.098	18	29	7.2	4.57	0.736 4137	582.1	16.86	1.61	5 31.3
13	8	52	23.22	1.121	18	27	16.3	4.67	0.737 6583	581.7	16.81	1.61	5 27.8
14	8	52	50.41	1.144	18	25	22.9	4.78	0.738 8956	581.9	16.77	1.61	5 24.4
15	8	53	18.15	1.167	18	23	27.0	4.88	0.740 1252	580.7	16.72	1.60	5 20.9
16	8	53	46.43	+1.190	+18	21	28.7	-4.98	0.741 3470	+580.4	16.67	1.60	5 17.4
17	8	54	15.25	+1.212	+18	19	27.9	-5.08	0.742 5607	+580.0	16.63	1.59	5 14.0

# JUPITER, 1920.

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## GREENWICH MEAN TIME.

Date.	Apparent Right Ascension.	Var. per Hour.	Apparent Declination.	Var. per Hour.	Logarithm of Distance from Earth.	Var. per Hour.	Polar Semi- diam- eter.	Hor. Paral- lax.	Transit, Meridian of Green- wich.
	Mean.	Mean.	Mean.	Mean.	Mean.	Mean.	Mean.	Mean.	
	h m s	s	° ' "	"			"	"	h m
May 17	8 54 15.25	+1.312	+18 19 27.9	-5.06	0.742 5607	+304.0	16.63	1.59	5 14.0
18	8 54 44.60	1.304	18 17 24.8	5.18	0.743 7660	309.5	16.58	1.59	5 10.5
19	8 55 14.48	1.296	18 15 19.2	5.26	0.744 9629	315.9	16.53	1.58	5 7.1
20	8 55 44.87	1.277	18 13 11.3	5.33	0.746 1510	323.2	16.49	1.58	5 3.7
21	8 56 15.76	1.268	18 11 1.1	5.43	0.747 3308	331.4	16.44	1.57	5 0.3
22	8 56 47.15	+1.248	+18 8 48.5	-5.57	0.748 5003	+340.5	16.40	1.57	4 56.8
23	8 57 19.03	1.239	18 6 33.6	5.67	0.749 6611	351.7	16.36	1.57	4 53.4
24	8 57 51.39	1.230	18 4 16.4	5.76	0.750 8124	377.7	16.31	1.56	4 50.1
25	8 58 24.22	1.221	18 1 56.9	5.86	0.751 9543	423.7	16.27	1.56	4 46.7
26	8 58 57.52	1.207	17 59 35.2	5.95	0.753 0863	480.6	16.23	1.55	4 43.3
27	8 59 31.27	+1.416	+17 57 11.2	-6.06	0.754 2085	+495.5	16.19	1.55	4 39.9
28	9 0 5.47	1.404	17 54 45.0	6.14	0.755 3208	531.4	16.15	1.55	4 36.5
29	9 0 40.11	1.402	17 52 16.6	6.23	0.756 4230	577.1	16.10	1.54	4 33.2
30	9 1 15.19	1.470	17 49 46.0	6.32	0.757 5149	633.8	16.06	1.54	4 29.8
31	9 1 50.69	1.488	17 47 13.3	6.41	0.758 5965	691.5	16.02	1.53	4 26.5
June 1	9 2 26.61	+1.505	+17 44 38.4	-6.50	0.759 6678	+444.2	15.98	1.53	4 23.2
2	9 3 2.94	1.522	17 42 1.3	6.59	0.760 7287	493.8	15.95	1.53	4 19.8
3	9 3 39.68	1.530	17 39 22.1	6.68	0.761 7790	545.4	15.91	1.52	4 16.5
4	9 4 16.81	1.555	17 36 40.8	6.77	0.762 8186	600.9	15.87	1.52	4 13.2
5	9 4 54.34	1.572	17 33 57.3	6.85	0.763 8474	660.4	15.83	1.52	4 9.9
6	9 5 32.25	+1.588	+17 31 11.8	-6.94	0.764 8653	+421.9	15.79	1.51	4 6.6
7	9 6 10.54	1.603	17 28 24.2	7.03	0.765 8723	517.3	15.76	1.51	4 3.3
8	9 6 49.21	1.619	17 25 34.5	7.11	0.766 8682	613.6	15.72	1.51	4 0.0
9	9 7 28.24	1.634	17 22 42.7	7.20	0.767 8528	720.9	15.69	1.50	3 56.7
10	9 8 7.03	1.649	17 19 48.9	7.28	0.768 8262	840.2	15.65	1.50	3 53.5
11	9 8 47.38	+1.664	+17 16 53.1	-7.37	0.769 7882	+396.4	15.62	1.50	3 50.2
12	9 9 27.48	1.678	17 13 55.2	7.45	0.770 7387	536.6	15.58	1.49	3 46.9
13	9 10 7.93	1.692	17 10 55.3	7.54	0.771 6776	698.8	15.55	1.49	3 43.7
14	9 10 48.71	1.706	17 7 53.5	7.62	0.772 6048	883.9	15.52	1.49	3 40.4
15	9 11 29.82	1.730	17 4 49.7	7.70	0.773 5201	1091.9	15.48	1.48	3 37.1
16	9 12 11.25	+1.733	+17 1 44.0	-7.78	0.774 4234	+375.9	15.45	1.48	3 33.9
17	9 12 53.00	1.746	16 58 36.3	7.86	0.775 3147	598.9	15.42	1.48	3 30.7
18	9 13 35.06	1.759	16 55 26.7	7.94	0.776 1989	860.8	15.39	1.47	3 27.4
19	9 14 17.42	1.771	16 52 15.2	8.02	0.777 0609	1156.7	15.36	1.47	3 24.2
20	9 15 0.07	1.783	16 49 1.9	8.09	0.777 9155	1488.5	15.33	1.47	3 21.0
21	9 15 43.01	+1.795	+16 45 46.7	-8.17	0.778 7578	+345.4	15.30	1.46	3 17.8
22	9 16 26.24	1.807	16 42 29.6	8.25	0.779 5876	513.1	15.27	1.46	3 14.5
23	9 17 9.74	1.813	16 39 10.8	8.32	0.780 4048	717.9	15.24	1.46	3 11.3
24	9 17 53.50	1.820	16 35 50.2	8.40	0.781 2096	963.7	15.21	1.46	3 8.1
25	9 18 37.53	1.840	16 32 27.8	8.47	0.782 0018	1247.5	15.18	1.45	3 4.9
26	9 19 21.81	+1.850	+16 29 3.6	-8.54	0.782 7814	+322.2	15.16	1.45	3 1.7
27	9 20 6.34	1.860	16 25 37.7	8.61	0.783 5485	547.0	15.13	1.45	2 58.5
28	9 20 51.11	1.870	16 22 10.2	8.68	0.784 3081	811.7	15.10	1.45	2 55.3
29	9 21 36.12	1.880	16 18 40.9	8.76	0.785 0449	1116.4	15.08	1.44	2 52.2
30	9 22 21.35	1.890	16 15 9.9	8.83	0.785 7740	1461.1	15.06	1.44	2 49.0
July 1	9 23 6.81	+1.899	+16 11 37.3	-8.89	0.786 4903	+295.8	15.03	1.44	2 45.8
2	9 23 52.50	+1.908	+16 8 3.0	-8.96	0.787 1938	+290.4	15.00	1.44	2 42.6

GREENWICH MEAN TIME.

Date.	Apparent Right Ascension.	Var. per Hour.	Apparent Declination.	Var. per Hour.	Logarithm of Distance from Earth.	Var. per Hour.	Polar Semi-diameter.	Hor. Parallax.	Transit, Meridian of Greenwich.
	Noon.	Noon.	Noon.	Noon.	Noon.	Noon.	Noon.	Noon.	h m
July 1	9 23 6.81	+1.899	+16 11 37.3	- 3.89	0.786 4986	+295.3	15.03	1.44	2 45.8
2	9 23 52.50	1.906	16 8 3.0	3.96	0.787 1938	296.4	15.80	1.44	2 42.6
3	9 24 38.40	1.917	16 4 27.1	9.03	0.787 8844	298.1	14.98	1.43	2 39.5
4	9 25 24.51	1.926	16 0 49.5	9.10	0.788 5682	279.3	14.96	1.43	2 36.3
5	9 26 10.83	1.934	15 57 10.3	9.16	0.789 2272	274.4	14.93	1.43	2 33.1
6	9 26 57.34	+1.943	+15 53 29.6	- 9.23	0.789 8792	+269.0	14.91	1.43	2 30.0
7	9 27 44.06	1.950	15 49 47.2	9.30	0.790 5182	265.5	14.89	1.43	2 26.8
8	9 28 30.96	1.958	15 46 3.3	9.36	0.791 1442	261.1	14.87	1.42	2 23.7
9	9 29 18.06	1.966	15 42 17.9	9.43	0.791 7571	256.6	14.85	1.42	2 20.5
10	9 30 5.32	1.973	15 38 30.9	9.49	0.792 3568	247.1	14.83	1.42	2 17.4
11	9 30 52.76	+1.980	+15 34 42.5	- 9.55	0.792 9493	+241.6	14.81	1.42	2 14.2
12	9 31 40.38	1.988	15 30 52.5	9.61	0.793 5164	236.0	14.79	1.42	2 11.1
13	9 32 28.17	1.994	15 27 1.1	9.67	0.794 0763	230.5	14.77	1.41	2 7.9
14	9 33 16.11	2.001	15 23 8.2	9.73	0.794 6227	224.9	14.75	1.41	2 4.8
15	9 34 4.21	2.007	15 19 13.9	9.79	0.795 1558	219.3	14.73	1.41	2 1.7
16	9 34 52.46	+2.014	+15 15 18.3	- 9.85	0.795 6753	+213.6	14.71	1.41	1 58.5
17	9 35 40.86	2.019	15 11 21.3	9.90	0.796 1813	208.0	14.70	1.41	1 55.4
18	9 36 29.39	2.025	15 7 23.0	9.96	0.796 6738	202.4	14.68	1.41	1 52.3
19	9 37 18.05	2.030	15 3 23.3	10.01	0.797 1527	196.7	14.66	1.40	1 49.2
20	9 38 6.84	2.035	14 59 22.3	10.07	0.797 6180	191.0	14.65	1.40	1 46.0
21	9 38 55.75	+2.040	+14 55 20.0	-10.12	0.798 0696	+185.3	14.63	1.40	1 42.9
22	9 39 44.77	2.045	14 51 16.5	10.17	0.798 5075	179.6	14.62	1.40	1 39.8
23	9 40 33.90	2.049	14 47 11.8	10.22	0.798 9318	173.9	14.60	1.40	1 36.7
24	9 41 23.14	2.054	14 43 5.9	10.27	0.799 3424	168.2	14.59	1.40	1 33.6
25	9 42 12.48	2.058	14 38 58.8	10.32	0.799 7394	162.6	14.58	1.40	1 30.4
26	9 43 1.91	+2.063	+14 34 50.6	-10.37	0.800 1228	+156.9	14.56	1.39	1 27.3
27	9 43 51.43	2.065	14 30 41.2	10.41	0.800 4928	151.3	14.55	1.39	1 24.2
28	9 44 41.03	2.068	14 26 30.7	10.46	0.800 8436	145.5	14.54	1.39	1 21.1
29	9 45 30.71	2.072	14 22 19.1	10.50	0.801 1909	139.8	14.53	1.39	1 18.0
30	9 46 20.47	2.075	14 18 6.5	10.55	0.801 5196	134.1	14.52	1.39	1 14.9
31	9 47 10.31	+2.078	+14 13 52.8	-10.59	0.801 8346	+128.4	14.51	1.39	1 11.8
Aug. 1	9 48 0.22	2.081	14 9 38.0	10.64	0.802 1360	122.7	14.50	1.39	1 8.7
2	9 48 50.19	2.084	14 5 22.3	10.68	0.802 4237	117.0	14.49	1.39	1 5.6
3	9 49 40.23	2.086	14 1 5.5	10.72	0.802 6976	111.3	14.48	1.39	1 2.5
4	9 50 30.33	2.088	13 56 47.8	10.76	0.802 9578	105.5	14.47	1.39	0 59.4
5	9 51 20.47	+2.090	+13 52 29.1	-10.80	0.803 2042	+ 99.8	14.46	1.38	0 56.3
6	9 52 10.67	2.092	13 48 9.5	10.84	0.803 4367	94.0	14.45	1.38	0 53.2
7	9 53 0.91	2.094	13 43 48.9	10.88	0.803 6554	88.2	14.44	1.38	0 50.1
8	9 53 51.19	2.096	13 39 27.5	10.91	0.803 8602	82.4	14.44	1.38	0 47.0
9	9 54 41.50	2.097	13 35 5.3	10.94	0.804 0511	76.6	14.43	1.38	0 43.9
10	9 55 31.85	+2.099	+13 30 42.2	-10.98	0.804 2280	+ 70.8	14.43	1.38	0 40.8
11	9 56 22.23	2.100	13 26 18.3	11.01	0.804 3909	64.9	14.42	1.38	0 37.7
12	9 57 12.63	2.100	13 21 53.7	11.04	0.804 5397	59.1	14.42	1.38	0 34.6
13	9 58 3.05	2.101	13 17 28.3	11.07	0.804 6744	53.2	14.41	1.38	0 31.5
14	9 58 53.48	2.101	13 13 2.2	11.10	0.804 7950	47.3	14.41	1.38	0 28.4
15	9 59 43.92	+2.102	+13 8 35.5	-11.13	0.804 9015	+ 41.4	14.40	1.38	0 25.3
16	10 0 34.37	+2.102	+13 4 8.1	-11.15	0.804 9939	+ 35.6	14.40	1.38	0 22.2



GREENWICH MEAN TIME.

Date.	Apparent Right Ascension.			Var. per Hour.	Apparent Declination.			Var. per Hour.	Logarithm of Distance from Earth.	Var. per Hour.	Polar Semi-diameter.	Hor. Parallax.		Transit, Meridian of Greenwich.
	Noon.				Noon.							Noon.	Noon.	
	h	m	s	s	°	'	"	"			"	"	h	m
Aug. 16	10	0	34.37	+2.103	+13	4	8.1	-11.15	0.804 9939	+ 35.6	14.40	1.38	0	22.2
17	10	1	24.81	2.101	12	59	40.1	11.18	0.805 0723	29.3	14.40	1.38	0	19.1
18	10	2	15.24	2.101	12	55	11.5	11.20	0.805 1367	23.9	14.40	1.38	0	16.0
19	10	3	5.66	2.100	12	50	42.3	11.23	0.805 1870	18.0	14.39	1.38	0	12.9
20	10	3	56.06	2.100	12	46	12.7	11.25	0.805 2231	12.1	14.39	1.38	0	9.8
21	10	4	46.44	+2.099	+12	41	42.5	-11.27	0.805 2450	+ 6.2	14.39	1.38	0	6.7
22	10	5	36.79	2.098	12	37	11.8	11.29	0.805 2527	+ 0.3	14.39	1.38	0	3.6
23	10	6	27.12	2.096	12	32	40.7	11.30	0.805 2462	- 5.6	14.39	1.38	0	0.5
24	10	7	17.41	2.095	12	28	9.2	11.32	0.805 2256	11.5	14.39	1.38	23	54.3
25	10	8	7.66	2.093	12	23	37.3	11.34	0.805 1910	17.3	14.39	1.38	23	51.2
26	10	8	57.87	+2.091	+12	19	5.0	-11.35	0.805 1424	- 23.1	14.40	1.38	23	48.1
27	10	9	48.03	2.089	12	14	32.4	11.36	0.805 0799	29.0	14.40	1.38	23	45.0
28	10	10	38.15	2.087	12	9	59.5	11.37	0.805 0034	34.3	14.40	1.38	23	41.9
29	10	11	28.20	2.084	12	5	26.4	11.38	0.804 9129	40.6	14.40	1.38	23	38.8
30	10	12	18.20	2.082	12	0	53.0	11.40	0.804 8083	46.5	14.41	1.38	23	35.7
31	10	13	8.14	+2.079	+11	56	19.3	-11.41	0.804 6897	- 53.3	14.41	1.38	23	32.6
Sept. 1	10	13	58.01	2.076	11	51	45.5	11.41	0.804 5571	53.3	14.41	1.38	23	29.5
2	10	14	47.81	2.074	11	47	11.5	11.42	0.804 4104	64.0	14.42	1.38	23	26.4
3	10	15	37.55	2.071	11	42	37.3	11.43	0.804 2497	69.9	14.43	1.38	23	23.3
4	10	16	27.21	2.068	11	38	3.0	11.43	0.804 0748	75.3	14.43	1.38	23	20.2
5	10	17	16.79	+2.064	+11	33	28.6	-11.43	0.803 8858	- 31.7	14.44	1.38	23	17.1
6	10	18	6.28	2.060	11	28	54.2	11.43	0.803 6826	37.6	14.44	1.38	23	14.0
7	10	18	55.69	2.057	11	24	19.8	11.43	0.803 4653	43.5	14.45	1.38	23	10.9
8	10	19	45.00	2.052	11	19	45.4	11.43	0.803 2337	49.5	14.46	1.38	23	7.7
9	10	20	34.21	2.048	11	15	11.1	11.43	0.802 9879	105.4	14.47	1.39	23	4.6
10	10	21	23.32	+2.044	+11	10	36.8	-11.42	0.802 7279	-111.3	14.48	1.39	23	1.5
11	10	22	12.32	2.039	11	6	2.7	11.42	0.802 4537	117.2	14.48	1.39	22	58.4
12	10	23	1.21	2.034	11	1	28.7	11.41	0.802 1653	123.2	14.49	1.39	22	55.3
13	10	23	49.98	2.030	10	56	55.0	11.40	0.801 8625	129.1	14.50	1.39	22	52.2
14	10	24	38.62	2.024	10	52	21.5	11.39	0.801 5455	135.0	14.52	1.39	22	49.0
15	10	25	27.13	+2.018	+10	47	48.3	-11.38	0.801 2143	-140.9	14.53	1.39	22	45.9
16	10	26	15.50	2.012	10	43	15.4	11.36	0.800 8690	146.8	14.54	1.39	22	42.8
17	10	27	3.73	2.007	10	38	42.9	11.35	0.800 5095	152.7	14.55	1.39	22	39.6
18	10	27	51.82	2.001	10	34	10.8	11.33	0.800 1359	158.6	14.56	1.39	22	36.5
19	10	28	39.76	1.994	10	29	39.1	11.31	0.799 7483	164.4	14.58	1.40	22	33.3
20	10	29	27.55	+1.988	+10	25	7.9	-11.29	0.799 3466	-170.3	14.59	1.40	22	30.2
21	10	30	15.18	1.981	10	20	37.3	11.27	0.798 9310	176.1	14.60	1.40	22	27.1
22	10	31	2.65	1.974	10	16	7.1	11.25	0.798 5014	181.9	14.63	1.40	22	23.9
23	10	31	49.95	1.967	10	11	37.5	11.22	0.798 0578	187.7	14.68	1.40	22	20.8
24	10	32	37.08	1.960	10	7	8.5	11.20	0.797 6008	193.5	14.65	1.40	22	17.6
25	10	33	24.04	+1.956	+10	2	40.1	-11.17	0.797 1239	-199.3	14.66	1.40	22	14.5
26	10	34	10.81	1.948	9	58	12.4	11.14	0.796 6437	205.1	14.68	1.41	22	11.3
27	10	34	57.40	1.937	9	53	45.4	11.11	0.796 1446	210.8	14.70	1.41	22	8.1
28	10	35	43.81	1.929	9	49	19.2	11.08	0.795 6317	216.6	14.71	1.41	22	5.0
29	10	36	30.02	1.921	9	44	53.7	11.05	0.795 1051	222.3	14.73	1.41	22	1.8
30	10	37	16.04	+1.913	+ 9	40	29.0	-11.01	0.794 5646	-228.1	14.75	1.41	21	58.6
Oct. 1	10	38	1.86	+1.903	+ 9	36	5.2	-10.98	0.794 0104	-233.8	14.77	1.41	21	55.5

## GREENWICH MEAN TIME.

Date.	Apparent Right Ascension.			Var. per Hour.	Apparent Declination.			Var. per Hour.	Logarithm of Distance from Earth.	Var. per Hour.	Polar Semi-diameter.	Hor. Parallax.	Transit, Meridian of Greenwich.
	h	m	s		h	'	"						
Oct. 1	10	38	1.86	+1.905	+9	36	5.2	-10.98	0.794 0104	-293.3	14.77	1.41	21 55.5
2	10	38	47.47	1.896	9	31	42.2	10.94	0.793 4423	293.6	14.79	1.42	21 52.3
3	10	39	32.87	1.887	9	27	20.2	10.90	0.792 8604	245.3	14.81	1.42	21 49.1
4	10	40	18.06	1.878	9	22	59.2	10.85	0.792 2647	261.1	14.83	1.42	21 45.9
5	10	41	3.03	1.869	9	18	39.2	10.81	0.791 6552	268.3	14.85	1.42	21 42.7
6	10	41	47.78	+1.860	+9	14	20.2	-10.77	0.791 0319	-263.6	14.87	1.42	21 39.5
7	10	42	32.29	1.850	9	10	2.4	10.72	0.790 8949	263.3	14.89	1.43	21 36.3
8	10	43	16.56	1.840	9	5	45.7	10.67	0.789 7442	274.0	14.91	1.43	21 33.1
9	10	44	0.59	1.830	9	1	30.2	10.62	0.789 0797	279.7	14.94	1.43	21 29.9
10	10	44	44.38	1.819	8	57	15.9	10.57	0.788 4016	263.4	14.96	1.43	21 26.7
11	10	45	27.91	+1.808	+8	53	2.9	-10.51	0.787 7099	-261.1	14.99	1.43	21 23.5
12	10	46	11.18	1.797	8	48	51.2	10.46	0.787 0046	266.7	15.01	1.44	21 20.3
13	10	46	54.18	1.786	8	44	40.9	10.40	0.786 2850	262.3	15.03	1.44	21 17.1
14	10	47	36.92	1.775	8	40	32.0	10.34	0.785 5538	267.8	15.06	1.44	21 13.8
15	10	48	19.37	1.763	8	36	24.6	10.28	0.784 8083	213.4	15.09	1.44	21 10.6
16	10	49	1.53	+1.751	+8	32	18.7	-10.21	0.784 0495	-218.9	15.11	1.45	21 7.4
17	10	49	43.41	1.739	8	28	14.3	10.15	0.783 2775	224.4	15.14	1.45	21 4.1
18	10	50	24.99	1.726	8	24	11.5	10.08	0.782 4923	239.9	15.17	1.45	21 0.9
19	10	51	6.28	1.714	8	20	10.4	10.01	0.781 6941	235.3	15.19	1.45	20 57.6
20	10	51	47.25	1.701	8	16	10.9	9.94	0.780 8830	240.6	15.22	1.46	20 54.4
21	10	52	27.91	+1.688	+8	12	13.1	-9.87	0.780 0591	-246.0	15.25	1.46	20 51.1
22	10	53	8.26	1.675	8	8	17.1	9.80	0.779 2224	261.3	15.28	1.46	20 47.8
23	10	53	48.29	1.661	8	4	22.9	9.72	0.778 3731	266.5	15.31	1.47	20 44.6
24	10	54	27.99	1.647	8	0	30.6	9.64	0.777 5111	261.3	15.34	1.47	20 41.3
25	10	55	7.36	1.633	7	56	40.1	9.56	0.776 6365	267.0	15.37	1.47	20 38.0
26	10	55	46.39	+1.619	+7	52	51.6	-9.48	0.775 7495	-272.2	15.40	1.47	20 34.7
27	10	56	25.08	1.606	7	49	5.0	9.40	0.774 8501	277.3	15.44	1.48	20 31.4
28	10	57	3.43	1.591	7	45	20.5	9.31	0.773 9383	263.5	15.47	1.48	20 28.1
29	10	57	41.43	1.576	7	41	38.0	9.23	0.773 0143	267.5	15.50	1.48	20 24.8
30	10	58	19.06	1.561	7	37	57.6	9.14	0.772 0782	262.6	15.53	1.49	20 21.5
31	10	58	56.34	+1.545	+7	34	19.3	-9.06	0.771 1299	-267.6	15.57	1.49	20 18.2
Nov. 1	10	59	33.24	1.530	7	30	43.3	8.96	0.770 1696	262.6	15.60	1.49	20 14.9
2	11	0	9.77	1.514	7	27	9.5	8.86	0.769 1972	267.6	15.64	1.50	20 11.5
3	11	0	45.91	1.498	7	23	38.0	8.76	0.768 2130	212.6	15.67	1.50	20 8.2
4	11	1	21.66	1.481	7	20	8.8	8.67	0.767 2169	217.5	15.71	1.50	20 4.8
5	11	1	57.02	+1.465	+7	16	42.0	-8.56	0.766 2092	-222.3	15.75	1.51	20 1.5
6	11	2	31.98	1.448	7	13	17.7	8.46	0.765 1899	237.1	15.78	1.51	19 58.1
7	11	3	6.52	1.431	7	9	55.9	8.36	0.764 1591	231.9	15.82	1.51	19 54.8
8	11	3	40.65	1.413	7	6	36.6	8.25	0.763 1170	236.5	15.86	1.52	19 51.4
9	11	4	14.35	1.396	7	3	19.9	8.14	0.762 0688	241.1	15.90	1.52	19 48.0
10	11	4	47.61	+1.377	+7	0	5.9	-8.03	0.760 9995	-245.7	15.94	1.53	19 44.6
11	11	5	20.44	1.359	6	56	54.6	7.91	0.759 9244	240.2	15.97	1.53	19 41.2
12	11	5	52.82	1.340	6	53	46.0	7.80	0.758 8386	244.6	16.02	1.53	19 37.8
13	11	6	24.75	1.321	6	50	40.3	7.68	0.757 7423	248.9	16.06	1.54	19 34.4
14	11	6	56.22	1.302	6	47	37.4	7.56	0.756 6357	243.2	16.10	1.54	19 31.0
15	11	7	27.23	+1.283	+6	44	37.4	-7.44	0.755 5190	-247.4	16.14	1.54	19 27.6
16	11	7	57.76	+1.262	+6	41	40.4	-7.31	0.754 3924	-251.5	16.18	1.55	19 24.2

GREENWICH MEAN TIME.

Date.	Apparent Right Ascension.	Var. per Hour.	Apparent Declination.	Var. per Hour.	Logarithm of Distance from Earth.	Var. per Hour.	Polar Semi-diameter.	Hor. Parallax.	Transit Meridian of Greenwich.
	Mean.	Mean.	Mean.	Mean.	Mean.	Mean.	Mean.	Mean.	h m
Nov. 16	11 7 57.76	+1.262	+6 41 40.4	-7.31	0.754 3924	-471.5	16.18	1.55	19 24.2
17	11 8 27.82	1.262	6 38 46.3	7.19	0.753 2590	475.5	16.22	1.55	19 20.7
18	11 8 57.40	1.222	6 35 55.3	7.04	0.752 1100	479.5	16.26	1.56	19 17.3
19	11 9 26.48	1.201	6 33 7.3	6.93	0.750 9546	483.3	16.31	1.56	19 13.8
20	11 9 55.07	1.181	6 30 22.5	6.80	0.749 7900	487.1	16.35	1.57	19 10.3
21	11 10 23.16	+1.160	+6 27 40.8	-6.67	0.748 6165	-490.8	16.40	1.57	19 6.9
22	11 10 50.74	1.139	6 25 2.3	6.54	0.747 4342	494.4	16.44	1.57	19 3.4
23	11 11 17.82	1.117	6 22 27.1	6.40	0.746 2433	497.9	16.49	1.58	18 59.9
24	11 11 44.37	1.095	6 19 55.1	6.26	0.745 0441	501.4	16.53	1.58	18 56.4
25	11 12 10.39	1.073	6 17 26.5	6.12	0.743 8367	504.8	16.58	1.59	18 52.9
26	11 12 35.89	+1.051	+6 15 1.2	-5.98	0.742 6213	-508.0	16.62	1.59	18 49.4
27	11 13 0.85	1.029	6 12 39.4	5.84	0.741 3981	511.2	16.67	1.60	18 45.9
28	11 13 25.27	1.006	6 10 21.0	5.69	0.740 1673	514.4	16.72	1.60	18 42.3
29	11 13 49.14	0.983	6 8 6.2	5.54	0.738 9291	517.4	16.77	1.61	18 38.8
30	11 14 12.46	0.960	6 5 54.9	5.39	0.737 6837	520.4	16.81	1.61	18 35.2
Dec. 1	11 14 35.21	+0.936	+6 3 47.3	-5.24	0.736 4314	-523.2	16.86	1.61	18 31.7
2	11 14 57.39	0.912	6 1 43.3	5.09	0.735 1724	525.9	16.91	1.62	18 28.1
3	11 15 18.99	0.888	5 59 43.0	4.93	0.733 9070	528.5	16.97	1.62	18 24.5
4	11 15 40.01	0.864	5 57 46.5	4.78	0.732 6354	531.1	17.01	1.63	18 20.9
5	11 16 0.44	0.839	5 55 53.8	4.62	0.731 3579	533.5	17.06	1.63	18 17.3
6	11 16 20.26	+0.814	+5 54 4.9	-4.46	0.730 0748	-535.7	17.11	1.64	18 13.7
7	11 16 39.49	0.788	5 52 19.9	4.29	0.728 7865	537.8	17.16	1.64	18 10.1
8	11 16 58.10	0.763	5 50 38.8	4.13	0.727 4932	539.8	17.21	1.65	18 6.5
9	11 17 16.10	0.737	5 49 1.8	3.96	0.726 1954	541.6	17.27	1.65	18 2.8
10	11 17 33.47	0.711	5 47 28.7	3.79	0.724 8933	543.4	17.32	1.66	17 59.2
11	11 17 50.21	+0.684	+5 45 59.7	-3.63	0.723 5872	-544.9	17.37	1.66	17 55.5
12	11 18 6.32	0.658	5 44 34.8	3.46	0.722 2776	546.3	17.42	1.67	17 51.8
13	11 18 21.78	0.631	5 43 14.0	3.29	0.720 9648	547.6	17.47	1.67	17 48.1
14	11 18 36.60	0.604	5 41 57.4	3.11	0.719 6492	548.7	17.53	1.68	17 44.4
15	11 18 50.77	0.577	5 40 44.9	2.93	0.718 3311	549.6	17.58	1.68	17 40.7
16	11 19 4.29	+0.549	+5 39 36.7	-2.75	0.717 0110	-550.4	17.63	1.69	17 37.0
17	11 19 17.14	0.522	5 38 32.7	2.58	0.715 6898	551.0	17.69	1.69	17 33.3
18	11 19 29.38	0.494	5 37 33.0	2.40	0.714 3663	551.5	17.74	1.70	17 29.6
19	11 19 40.85	0.466	5 36 37.6	2.22	0.713 0423	551.8	17.80	1.70	17 25.8
20	11 19 51.70	0.438	5 35 46.5	2.04	0.711 7178	551.9	17.85	1.71	17 22.1
21	11 20 1.87	+0.410	+5 34 59.8	-1.86	0.710 3982	-551.9	17.90	1.71	17 18.3
22	11 20 11.37	0.381	5 34 17.4	1.68	0.709 0689	551.7	17.96	1.72	17 14.5
23	11 20 20.18	0.353	5 33 39.3	1.49	0.707 7452	551.3	18.01	1.72	17 10.7
24	11 20 28.31	0.324	5 33 5.7	1.31	0.706 4226	550.8	18.07	1.73	17 6.9
25	11 20 35.75	0.296	5 32 36.5	1.13	0.705 1014	550.1	18.12	1.73	17 3.1
26	11 20 42.50	+0.267	+5 32 11.7	-0.94	0.703 7821	-549.3	18.18	1.74	16 59.3
27	11 20 48.55	0.238	5 31 51.4	0.75	0.702 4650	548.3	18.23	1.75	16 55.4
28	11 20 53.90	0.208	5 31 35.6	0.56	0.701 1505	547.0	18.29	1.75	16 51.6
29	11 20 58.55	0.179	5 31 24.3	0.38	0.699 8392	545.6	18.35	1.76	16 47.7
30	11 21 2.50	0.150	5 31 17.5	-0.19	0.698 5314	544.1	18.40	1.76	16 43.8
31	11 21 5.74	+0.120	+5 31 15.2	0.00	0.697 2277	-543.3	18.46	1.77	16 40.0
32	11 21 8.26	...	+5 31 17.5	...	0.695 9285	...	18.51	1.77	16 36.1

FOR GREENWICH MEAN NOON.

Date.	Heliocentric Longitude, Mean Equinox of Date.			Var. per Day.	Reduction to Orbit.	Heliocentric Latitude.			Var. per Day.	Logarithm of Radius Vector.	Var. per Day.	
	°	'	"	'	"	°	'	"	"			
Jan.	2	130	36	29.9	4 47.23	+23.7	+0	40 27.2	+5.63	0.724 9631	+263.4	
	6	130	55	38.5	4 47.06	23.8	0	40 49.6	5.60	0.725 0083	262.6	
	10	131	14	46.5	4 46.94	24.0	0	41 12.0	5.59	0.725 1132	261.9	
	14	131	33	54.0	4 46.81	24.1	0	41 34.3	5.56	0.725 2178	261.0	
	18	131	53	1.0	4 46.67	24.2	0	41 56.5	5.53	0.725 3220	260.1	
	22	132	12	7.4	4 46.53	+24.4	+0	42 18.5	+5.50	0.725 4259	+259.2	
Feb.	26	132	31	13.2	4 46.40	24.5	0	42 40.5	5.49	0.725 5294	258.4	
	30	132	50	18.6	4 46.27	24.6	0	43 2.4	5.46	0.725 6326	257.6	
	3	133	9	23.4	4 46.14	24.7	0	43 24.2	5.44	0.725 7355	256.7	
	7	133	28	27.7	4 46.00	24.8	0	43 45.9	5.42	0.725 8380	255.9	
	11	133	47	31.4	4 45.85	+25.0	+0	44 7.6	+5.41	0.725 9402	+255.1	
	15	134	6	34.5	4 45.72	25.1	0	44 29.2	5.38	0.726 0421	254.2	
	19	134	25	37.2	4 45.60	25.2	0	44 50.6	5.35	0.726 1436	253.3	
	23	134	44	39.3	4 45.46	25.3	0	45 12.0	5.34	0.726 2447	252.4	
	27	135	3	40.9	4 45.33	25.4	0	45 33.3	5.31	0.726 3455	251.5	
	Mar.	2	135	22	41.9	4 45.20	+25.5	+0	45 54.5	+5.29	0.726 4459	+250.5
6		135	41	42.5	4 45.07	25.6	0	46 15.6	5.26	0.726 5459	249.6	
10		136	0	42.5	4 44.94	25.6	0	46 36.6	5.23	0.726 6456	248.7	
14		136	19	42.0	4 44.81	25.7	0	46 57.4	5.20	0.726 7449	247.8	
18		136	38	41.0	4 44.69	25.8	0	47 18.2	5.19	0.726 8438	246.8	
22		136	57	39.5	4 44.56	+25.9	+0	47 38.9	+5.17	0.726 9423	+245.9	
26		137	16	37.5	4 44.43	26.0	0	47 59.6	5.15	0.727 0405	245.0	
30		137	35	34.9	4 44.30	26.1	0	48 20.1	5.11	0.727 1383	243.9	
Apr.	3	137	54	31.9	4 44.17	26.1	0	48 40.5	5.10	0.727 2356	242.9	
	7	138	13	28.3	4 44.04	26.2	0	49 0.9	5.07	0.727 3326	242.0	
	11	138	32	24.2	4 43.92	+26.2	+0	49 21.1	+5.04	0.727 4292	+241.1	
	15	138	51	19.7	4 43.80	26.3	0	49 41.2	5.01	0.727 5255	240.1	
	19	139	10	14.8	4 43.68	26.4	0	50 1.2	4.99	0.727 6213	239.0	
	23	139	29	9.1	4 43.56	26.4	0	50 21.1	4.96	0.727 7167	238.0	
	27	139	48	3.1	4 43.44	26.5	0	50 40.9	4.95	0.727 8117	237.0	
May	1	140	6	56.6	4 43.30	+26.5	+0	51 0.7	+4.92	0.727 9063	+236.1	
	5	140	25	49.5	4 43.18	26.6	0	51 20.3	4.90	0.728 0006	235.1	
	9	140	44	42.0	4 43.07	26.6	0	51 39.9	4.87	0.728 0944	234.0	
	13	141	3	34.1	4 42.95	26.6	0	51 59.3	4.84	0.728 1878	233.0	
	17	141	22	25.6	4 42.81	26.7	0	52 18.6	4.82	0.728 2808	232.0	
	21	141	41	16.6	4 42.70	+26.7	+0	52 37.9	+4.80	0.728 3734	+231.0	
	25	142	0	7.2	4 42.59	26.7	0	52 57.0	4.78	0.728 4656	229.9	
	29	142	18	57.3	4 42.48	26.8	0	53 16.0	4.73	0.728 5573	228.8	
	June	2	142	37	47.0	4 42.36	26.8	0	53 34.8	4.70	0.728 6486	227.9
6	142	56	36.2	4 42.26	26.8	0	53 53.6	4.69	0.728 7396	226.9		
July	10	143	15	24.8	4 42.11	+26.8	+0	54 12.3	+4.66	0.728 8301	+225.8	
	14	143	34	13.1	4 42.00	26.8	0	54 30.9	4.63	0.728 9202	224.7	
	18	143	53	0.8	4 41.88	26.8	0	54 49.3	4.60	0.729 0099	223.6	
	22	144	11	48.1	4 41.77	26.9	0	55 7.7	4.59	0.729 0991	222.5	
	26	144	30	35.0	4 41.66	26.9	0	55 26.0	4.55	0.729 1879	221.5	
	30	144	49	21.4	4 41.54	+26.9	+0	55 44.1	+4.53	0.729 2763	+220.5	
	July	4	145	8	7.3	4 41.43	+26.9	+0	56 2.2	+4.51	0.729 3643	+219.4

FOR GREENWICH MEAN NOON.

Date.	Heliocentric Longitude, Mean Equinox of Date.	Var. per Day.	Reduction to Orbit.	Heliocentric Latitude.	Var. per Day.	Logarithm of Radius Vector.	Var. per Day	
July	4	145 8 7.3	4 41.43	+26.9	+0 56 2.2	+4.51	0.729 3643	+219.4
	8	145 26 52.8	4 41.32	26.8	0 56 20.2	4.43	0.729 4518	218.1
	12	145 45 37.9	4 41.21	26.8	0 56 38.0	4.45	0.729 5383	217.0
	16	145 4 22.5	4 41.30	26.8	0 56 55.8	4.42	0.729 6254	216.0
	20	146 23 6.7	4 40.39	26.8	0 57 13.4	4.39	0.729 7116	214.9
	24	146 41 50.4	4 40.38	+26.8	+0 57 30.9	+4.37	0.729 7973	+213.6
	28	147 0 33.7	4 40.37	26.8	0 57 48.4	4.35	0.729 8825	212.5
	Aug.	1	147 19 18.6	4 40.36	26.7	0 58 5.7	4.31	0.729 9673
5		147 37 59.0	4 40.35	26.7	0 58 22.9	4.28	0.730 0517	210.4
9		147 56 41.0	4 40.34	26.7	0 58 40.0	4.26	0.730 1356	209.1
13		148 15 22.5	4 40.34	+26.6	+0 58 57.0	+4.23	0.730 2190	+207.9
17		148 34 3.7	4 40.34	26.6	0 59 13.8	4.19	0.730 3019	206.8
21		148 52 44.4	4 40.13	26.6	0 59 30.5	4.16	0.730 3844	205.7
25		149 11 24.7	4 40.03	26.5	0 59 47.1	4.15	0.730 4665	204.5
29		149 30 4.6	4 39.31	26.5	1 0 3.7	4.12	0.730 5480	203.4
Sept.	2	149 48 44.0	4 39.31	+26.4	+1 0 20.1	+4.09	0.730 6292	+202.3
	6	150 7 23.1	4 39.71	26.4	1 0 36.4	4.06	0.730 7098	201.0
	10	150 26 1.7	4 39.60	26.3	1 0 52.6	4.03	0.730 7900	200.0
	14	150 44 39.9	4 39.31	26.3	1 1 8.6	4.00	0.730 8698	198.3
	18	151 3 17.8	4 39.41	26.2	1 1 24.6	3.98	0.730 9490	197.5
	22	151 21 55.2	4 39.30	+26.1	+1 1 40.4	+3.95	0.731 0278	+196.4
	26	151 40 32.2	4 39.31	26.1	1 1 56.2	3.92	0.731 1061	195.1
	30	151 59 3.9	4 39.11	26.0	1 2 11.8	3.89	0.731 1839	193.9
Oct.	4	152 17 45.1	4 39.01	25.9	1 2 27.3	3.86	0.731 2612	192.7
	8	152 36 21.0	4 38.91	25.8	1 2 42.7	3.84	0.731 3381	191.5
	12	152 54 50.4	4 38.81	+25.8	+1 2 58.0	+3.80	0.731 4144	+190.3
	16	153 13 31.5	4 38.73	25.7	1 3 13.1	3.76	0.731 4903	189.1
	20	153 32 6.2	4 38.61	25.6	1 3 28.1	3.73	0.731 5657	187.9
	24	153 50 40.4	4 38.39	25.5	1 3 43.1	3.72	0.731 6406	186.6
	28	154 9 14.4	4 38.44	25.4	1 3 57.9	3.69	0.731 7150	185.4
	Nov.	1	154 27 47.9	4 38.34	+25.3	+1 4 12.6	+3.65	0.731 7889
5		154 46 21.1	4 38.33	25.2	1 4 27.1	3.62	0.731 8623	182.9
9		155 4 53.9	4 38.13	25.1	1 4 41.6	3.60	0.731 9352	181.6
13		155 23 26.3	4 38.03	25.0	1 4 55.9	3.58	0.732 0076	180.5
17		155 41 58.4	4 37.97	24.9	1 5 10.2	3.55	0.732 0796	179.3
21		156 0 30.1	4 37.83	+24.8	+1 5 24.3	+3.51	0.732 1510	+178.0
25		156 19 1.4	4 37.79	24.7	1 5 38.3	3.48	0.732 2220	176.8
29		156 37 32.4	4 37.70	24.5	1 5 52.1	3.45	0.732 2924	175.5
Dec.	3	156 56 3.0	4 37.43	24.4	1 6 5.9	3.42	0.732 3624	174.2
	7	157 14 33.3	4 37.44	24.3	1 6 19.5	3.39	0.732 4318	172.9
	11	157 33 3.3	4 37.44	+24.2	+1 6 33.0	+3.36	0.732 5007	+171.6
	15	157 51 32.8	4 37.38	24.1	1 6 46.4	3.34	0.732 5691	170.4
	19	158 10 2.1	4 37.37	23.9	1 6 59.7	3.31	0.732 6370	169.1
	23	158 28 31.0	4 37.19	23.8	1 7 12.9	3.28	0.732 7044	167.9
	27	158 46 59.5	4 37.10	23.6	1 7 25.9	3.24	0.732 7713	166.5
	31	159 5 27.8	4 37.32	+23.5	+1 7 38.8	+3.21	0.732 8376	+165.1
35	159 23 55.7	4 36.93	+23.4	+1 7 51.6	+3.19	0.732 9034	+164.0	

## GREENWICH MEAN TIME.

Date.	Apparent Right Ascension.			Var. per Hour.	Apparent Declination.			Var. per Hour.	Logarithm of Distance from Earth.	Var. per Hour.	Polar Semi-diameter.	Hor. Parallax.	Transit, Meridian of Greenwich.
	Noon.			Noon.	Noon.			Noon.	Noon.	Noon.	Noon.	Noon.	
	h	m	s	"	°	'	"	"		"	"	"	h m
Jan. 1	10	54	54.36	-0.142	+8	52	54.1	+1.56	0.944 1892	-300.1	8.48	1.00	16 12.8
2	10	54	50.76	0.159	8	53	32.6	1.65	0.943 4658	297.6	8.49	1.00	16 8.8
3	10	54	46.75	0.175	8	54	13.5	1.75	0.942 7546	295.6	8.51	1.00	16 4.8
4	10	54	42.35	0.192	8	54	56.7	1.86	0.942 0498	293.3	8.52	1.01	16 0.8
5	10	54	37.54	0.209	8	55	42.3	1.95	0.941 3516	290.5	8.53	1.01	15 56.8
6	10	54	32.34	-0.225	+8	56	30.3	+2.05	0.940 6603	-288.6	8.55	1.01	15 52.8
7	10	54	26.74	0.241	8	57	20.7	2.15	0.939 9761	283.5	8.56	1.01	15 48.7
8	10	54	20.75	0.258	8	58	13.4	2.24	0.939 2994	280.4	8.58	1.01	15 44.7
9	10	54	14.37	0.274	8	59	8.3	2.34	0.938 6303	277.1	8.59	1.01	15 40.6
10	10	54	7.60	0.290	9	0	5.5	2.43	0.937 9692	273.7	8.60	1.02	15 36.6
11	10	54	0.45	-0.305	+9	1	4.9	+2.52	0.937 3164	-270.2	8.61	1.02	15 32.5
12	10	53	52.91	0.322	9	2	6.6	2.62	0.936 6721	265.6	8.63	1.02	15 28.5
13	10	53	44.99	0.338	9	3	10.5	2.71	0.936 0366	262.9	8.64	1.02	15 24.4
14	10	53	36.69	0.354	9	4	16.5	2.79	0.935 4103	260.0	8.65	1.02	15 20.4
15	10	53	28.02	0.369	9	5	24.6	2.88	0.934 7933	255.1	8.66	1.02	15 16.3
16	10	53	18.99	-0.384	+9	6	34.9	+2.97	0.934 1859	-251.0	8.68	1.02	15 12.2
17	10	53	9.60	0.399	9	7	47.2	3.05	0.933 5884	246.3	8.69	1.02	15 8.1
18	10	52	59.85	0.414	9	9	1.5	3.14	0.933 0012	242.5	8.70	1.03	15 4.0
19	10	52	49.74	0.428	9	10	17.8	3.22	0.932 4244	238.1	8.71	1.03	14 59.9
20	10	52	39.29	0.443	9	11	36.1	3.30	0.931 8584	233.5	8.72	1.03	14 55.8
21	10	52	28.49	-0.457	+9	12	56.3	+3.38	0.931 3084	-228.9	8.73	1.03	14 51.7
22	10	52	17.36	0.471	9	14	18.3	3.45	0.930 7597	224.1	8.75	1.03	14 47.5
23	10	52	5.90	0.484	9	15	42.1	3.53	0.930 2276	219.3	8.76	1.03	14 43.4
24	10	51	54.11	0.498	9	17	7.7	3.60	0.929 7073	214.3	8.77	1.04	14 39.3
25	10	51	42.01	0.511	9	18	35.0	3.67	0.929 1991	209.2	8.78	1.04	14 35.2
26	10	51	29.60	-0.524	+9	20	4.0	+3.74	0.928 7032	-204.0	8.79	1.04	14 31.0
27	10	51	16.88	0.536	9	21	34.6	3.81	0.928 2196	198.8	8.80	1.04	14 26.9
28	10	51	3.87	0.548	9	23	6.8	3.87	0.927 7491	193.4	8.81	1.04	14 22.7
29	10	50	50.56	0.560	9	24	40.5	3.93	0.927 2914	188.0	8.82	1.04	14 18.6
30	10	50	36.98	0.571	9	26	15.6	3.99	0.926 8469	182.5	8.82	1.04	14 14.4
31	10	50	23.13	-0.583	+9	27	52.1	+4.05	0.926 4156	-176.9	8.83	1.04	14 10.3
Feb. 1	10	50	9.01	0.594	9	29	30.0	4.10	0.925 9979	171.3	8.84	1.04	14 6.1
2	10	49	54.63	0.604	9	31	9.1	4.16	0.925 5966	165.5	8.85	1.04	14 1.9
3	10	49	40.01	0.614	9	32	49.5	4.21	0.925 2035	159.7	8.86	1.04	13 57.7
4	10	49	25.14	0.624	9	34	31.2	4.26	0.924 8273	153.8	8.86	1.05	13 53.6
5	10	49	10.04	-0.634	+9	36	14.0	+4.31	0.924 4682	-147.9	8.87	1.05	13 49.4
6	10	48	54.70	0.644	9	37	57.9	4.35	0.924 1175	141.3	8.88	1.05	13 45.2
7	10	48	39.15	0.653	9	39	42.8	4.39	0.923 7844	135.7	8.89	1.05	13 41.0
8	10	48	23.38	0.661	9	41	28.8	4.44	0.923 4690	129.6	8.89	1.05	13 36.8
9	10	48	7.41	0.669	9	43	15.7	4.47	0.923 1624	123.4	8.90	1.05	13 32.6
10	10	47	51.25	-0.677	+9	45	3.4	+4.50	0.922 8739	-117.1	8.91	1.05	13 28.4
11	10	47	34.90	0.684	9	46	51.9	4.54	0.922 6005	110.7	8.91	1.05	13 24.2
12	10	47	18.37	0.692	9	48	41.2	4.57	0.922 3425	104.3	8.92	1.05	13 20.0
13	10	47	1.68	0.699	9	50	31.3	4.60	0.922 1000	97.8	8.92	1.05	13 15.8
14	10	46	44.83	0.705	9	52	21.9	4.63	0.921 8730	91.3	8.93	1.05	13 11.5
15	10	46	27.83	-0.711	+9	54	13.1	+4.64	0.921 6618	-84.7	8.93	1.05	13 7.3
16	10	46	10.68	-0.717	+9	56	4.8	+4.66	0.921 4664	-78.1	8.93	1.05	13 3.1

GREENWICH MEAN TIME.

Date.	Apparent Right Ascension.	Var. per Hour.	Apparent Declination.	Var. per Hour.	Logarithm of Distance from Earth.	Var. per Hour.	Polar Semi-diameter.	Hor. Parallax.	Transit, Meridian of Greenwich.
	Non.	Non.	Non.	Non.	Non.	Non.	Non.	Non.	
	h m s	s	° ' "	"			"	"	h m
Feb. 16	10 46 10.66	-0.717	+ 9 56 4.8	+4.66	0.921 4664	- 79.1	8.96	1.05	13 3.1
17	10 45 53.41	0.723	9 57 57.0	4.66	0.921 2870	71.4	8.94	1.06	12 58.9
18	10 45 36.01	0.737	9 59 49.5	4.66	0.921 1237	64.7	8.94	1.06	12 54.7
19	10 45 18.51	0.761	10 1 42.3	4.70	0.920 9764	58.0	8.94	1.06	12 50.5
20	10 45 0.91	0.785	10 3 35.4	4.71	0.920 8455	51.1	8.95	1.06	12 46.2
21	10 44 43.21	-0.780	+10 5 23.6	+4.72	0.920 7309	- 44.4	8.95	1.06	12 42.0
22	10 44 25.44	0.743	10 7 21.9	4.72	0.920 6326	37.5	8.95	1.06	12 37.8
23	10 44 7.61	0.744	10 9 15.3	4.73	0.920 5507	30.7	8.95	1.06	12 33.6
24	10 43 49.72	0.746	10 11 8.8	4.73	0.920 4851	23.9	8.95	1.06	12 29.3
25	10 43 31.78	0.748	10 13 2.2	4.72	0.920 4358	17.1	8.95	1.06	12 25.1
26	10 43 13.81	-0.740	+10 14 55.4	+4.71	0.920 4000	- 10.3	8.95	1.06	12 20.9
27	10 42 55.82	0.750	10 16 48.4	4.70	0.920 3806	- 3.4	8.96	1.06	12 16.6
28	10 42 37.81	0.761	10 18 41.1	4.69	0.920 3667	+ 3.5	8.96	1.06	12 12.4
29	10 42 19.79	0.761	10 20 33.4	4.67	0.920 4632	10.3	8.95	1.06	12 8.2
Mar. 1	10 42 1.77	0.750	10 22 25.4	4.66	0.920 4360	17.1	8.95	1.06	12 3.9
2	10 41 43.78	-0.740	+10 24 16.9	+4.64	0.920 4352	+ 23.9	8.95	1.06	11 59.7
3	10 41 25.81	0.748	10 26 7.9	4.61	0.920 5565	30.4	8.95	1.06	11 55.5
4	10 41 7.88	0.746	10 27 58.4	4.59	0.920 6320	37.3	8.95	1.06	11 51.3
5	10 40 49.90	0.744	10 29 48.3	4.56	0.920 7296	44.0	8.95	1.06	11 47.0
6	10 40 32.15	0.743	10 31 37.4	4.53	0.920 8432	50.7	8.95	1.06	11 42.8
7	10 40 14.36	-0.730	+10 33 25.8	+4.50	0.920 9729	+ 57.4	8.94	1.06	11 38.6
8	10 39 56.67	0.736	10 35 13.4	4.47	0.921 1186	64.0	8.94	1.06	11 34.4
9	10 39 39.05	0.723	10 37 0.2	4.43	0.921 2802	70.6	8.94	1.06	11 30.1
10	10 39 21.52	0.736	10 38 46.1	4.39	0.921 4577	77.3	8.95	1.05	11 25.9
11	10 39 4.09	0.724	10 40 31.1	4.35	0.921 6510	83.8	8.95	1.05	11 21.7
12	10 38 46.78	-0.719	+10 42 15.0	+4.31	0.921 8599	+ 90.3	8.93	1.05	11 17.5
13	10 38 29.58	0.714	10 43 57.9	4.26	0.922 0844	96.7	8.92	1.05	11 13.2
14	10 38 12.52	0.706	10 45 39.6	4.21	0.922 3243	103.1	8.92	1.05	11 9.0
15	10 37 55.59	0.702	10 47 20.2	4.16	0.922 5795	109.5	8.91	1.05	11 4.8
16	10 37 38.82	0.696	10 48 59.5	4.11	0.922 8500	115.8	8.91	1.05	11 0.6
17	10 37 22.19	-0.689	+10 50 37.6	+4.06	0.923 1355	+122.1	8.90	1.05	10 56.4
18	10 37 5.74	0.682	10 52 14.3	4.00	0.923 4360	128.3	8.89	1.05	10 52.2
19	10 36 49.47	0.674	10 53 49.7	3.94	0.923 7514	134.5	8.89	1.05	10 48.0
20	10 36 32.38	0.666	10 55 23.6	3.88	0.924 0815	140.6	8.88	1.05	10 43.8
21	10 36 17.49	0.658	10 56 56.1	3.82	0.924 4261	146.5	8.87	1.05	10 39.6
22	10 36 1.81	-0.649	+10 58 27.0	+3.75	0.924 7849	+152.3	8.87	1.05	10 35.4
23	10 35 46.34	0.640	10 59 56.3	3.69	0.925 1579	158.3	8.86	1.04	10 31.2
24	10 35 31.09	0.630	11 1 24.0	3.62	0.925 5448	164.1	8.85	1.04	10 27.1
25	10 35 16.08	0.621	11 2 50.1	3.55	0.925 9454	169.7	8.84	1.04	10 22.9
26	10 35 1.30	0.611	11 4 14.4	3.48	0.926 3594	175.3	8.83	1.04	10 18.7
27	10 34 46.77	-0.600	+11 5 37.0	+3.40	0.926 7867	+180.8	8.83	1.04	10 14.6
28	10 34 32.50	0.590	11 6 57.8	3.33	0.927 2270	186.1	8.82	1.04	10 10.4
29	10 34 18.48	0.578	11 8 16.9	3.26	0.927 6901	191.4	8.81	1.04	10 6.2
30	10 34 4.74	0.567	11 9 34.1	3.18	0.928 1458	196.6	8.80	1.04	10 2.0
31	10 33 51.27	0.556	11 10 49.4	3.10	0.928 6238	201.7	8.79	1.04	9 57.9
Apr. 1	10 33 38.07	-0.544	+11 12 2.9	+3.02	0.929 1140	+206.7	8.78	1.04	9 53.8
2	10 33 25.16	-0.532	+11 13 14.4	+2.94	0.929 6161	+211.6	8.77	1.04	9 49.6

GREENWICH MEAN TIME.

Date.	Apparent Right Ascension.	Var. per Hour.	Apparent Declination.	Var. per Hour.	Logarithm of Distance from Earth.	Var. per Hour.	Polar Semi-diameter.	Hor. Parallax.	Transit Meridian of Greenwich.
	Noon.	Noon.	Noon.	Noon.	Noon.	Noon.	Noon.	Noon.	Noon.
	h m s	s	° ' "	"			"	"	h m
Apr. 1	10 33 38.07	-0.544	+11 12 2.9	+3.02	0.929 1140	+206.7	8.78	1.04	9 53.8
2	10 33 25.16	0.532	11 13 14.4	2.94	0.929 6161	211.6	8.77	1.04	9 49.6
3	10 33 12.55	0.519	11 14 23.9	2.86	0.930 1299	216.5	8.76	1.03	9 45.5
4	10 33 0.23	0.507	11 15 31.5	2.78	0.930 6551	221.2	8.75	1.03	9 41.3
5	10 32 48.21	0.494	11 16 37.1	2.69	0.931 1916	225.8	8.74	1.03	9 37.2
6	10 32 36.51	-0.481	+11 17 40.6	+2.60	0.931 7391	+230.4	8.73	1.03	9 33.1
7	10 32 25.12	0.468	11 18 42.0	2.52	0.932 2974	234.8	8.72	1.03	9 29.0
8	10 32 14.06	0.454	11 19 41.4	2.43	0.932 8662	239.2	8.70	1.03	9 24.8
9	10 32 3.31	0.441	11 20 38.7	2.34	0.933 4454	243.4	8.69	1.03	9 20.8
10	10 31 52.89	0.427	11 21 33.8	2.25	0.934 0347	247.6	8.68	1.02	9 16.6
11	10 31 42.81	-0.413	+11 22 26.7	+2.16	0.934 6339	+251.7	8.67	1.02	9 12.5
12	10 31 33.07	0.398	11 23 17.4	2.07	0.935 2427	255.6	8.65	1.02	9 8.4
13	10 31 23.68	0.384	11 24 6.0	1.98	0.935 8608	259.5	8.64	1.02	9 4.4
14	10 31 14.64	0.369	11 24 52.3	1.88	0.936 4881	263.2	8.63	1.02	9 0.3
15	10 31 5.95	0.355	11 25 36.4	1.79	0.937 1243	266.9	8.62	1.02	8 56.2
16	10 30 57.62	-0.340	+11 26 18.2	+1.69	0.937 7690	+270.4	8.61	1.02	8 52.1
17	10 30 49.65	0.324	11 26 57.7	1.60	0.938 4221	273.8	8.59	1.01	8 48.1
18	10 30 42.05	0.309	11 27 35.0	1.50	0.939 0833	277.1	8.58	1.01	8 44.0
19	10 30 34.83	0.293	11 28 9.9	1.41	0.939 7522	280.3	8.57	1.01	8 40.0
20	10 30 27.98	0.277	11 28 42.5	1.31	0.940 4287	283.4	8.55	1.01	8 35.9
21	10 30 21.51	-0.262	+11 29 12.8	+1.21	0.941 1125	+286.4	8.54	1.01	8 31.9
22	10 30 15.42	0.246	11 29 40.7	1.11	0.941 8033	289.2	8.52	1.01	8 27.9
23	10 30 9.71	0.230	11 30 6.3	1.02	0.942 5007	291.9	8.51	1.00	8 23.8
24	10 30 4.39	0.214	11 30 29.5	0.92	0.943 2046	294.6	8.50	1.00	8 19.8
25	10 29 59.46	0.197	11 30 50.4	0.82	0.943 9148	297.0	8.48	1.00	8 15.8
26	10 29 54.91	-0.181	+11 31 8.9	+0.72	0.944 6304	+299.4	8.47	1.00	8 11.8
27	10 29 50.75	0.165	11 31 25.0	0.62	0.945 3517	301.6	8.46	1.00	8 7.8
28	10 29 46.99	0.149	11 31 38.8	0.52	0.946 0783	303.8	8.44	1.00	8 3.8
29	10 29 43.62	0.132	11 31 50.2	0.42	0.946 8100	305.9	8.43	1.00	7 59.8
30	10 29 40.64	0.116	11 31 59.2	0.32	0.947 5465	307.8	8.41	0.99	7 55.9
May 1	10 29 38.05	-0.100	+11 32 5.8	+0.22	0.948 2876	+309.7	8.40	0.99	7 51.9
2	10 29 35.86	0.083	11 32 10.1	0.13	0.949 0330	311.4	8.38	0.99	7 47.9
3	10 29 34.07	0.066	11 32 12.1	+0.03	0.949 7825	313.1	8.37	0.99	7 44.0
4	10 29 32.67	0.050	11 32 11.7	-0.07	0.950 5359	314.7	8.36	0.99	7 40.0
5	10 29 31.67	0.033	11 32 8.9	0.16	0.951 2929	316.1	8.34	0.98	7 36.0
6	10 29 31.07	-0.017	+11 32 3.8	-0.26	0.952 0533	+317.5	8.33	0.98	7 32.1
7	10 29 30.86	0.000	11 31 56.3	0.36	0.952 8168	318.7	8.31	0.98	7 28.2
8	10 29 31.05	+0.016	11 31 46.5	0.46	0.953 5832	319.9	8.30	0.98	7 24.3
9	10 29 31.63	0.033	11 31 34.3	0.56	0.954 3523	321.0	8.28	0.98	7 20.3
10	10 29 32.62	0.049	11 31 19.7	0.66	0.955 1239	321.9	8.27	0.98	7 16.4
11	10 29 34.00	+0.066	+11 31 2.8	-0.75	0.955 8976	+322.8	8.25	0.97	7 12.5
12	10 29 35.78	0.082	11 30 43.5	0.85	0.956 6734	323.6	8.24	0.97	7 8.6
13	10 29 37.96	0.099	11 30 21.9	0.95	0.957 4509	324.3	8.22	0.97	7 4.7
14	10 29 40.53	0.115	11 29 57.9	1.05	0.958 2300	324.9	8.21	0.97	7 0.9
15	10 29 43.50	0.132	11 29 31.7	1.14	0.959 0103	325.4	8.19	0.97	6 57.0
16	10 29 46.87	+0.149	+11 29 3.1	-1.24	0.959 7917	+325.6	8.18	0.96	6 53.1
17	10 29 50.63	+0.165	+11 28 32.2	-1.33	0.960 5740	+325.1	8.17	0.96	6 49.2



GREENWICH MEAN TIME.

Date.	Apparait Right Ascension.	Var. per Hour.	Apparent Declination.	Var. per Hour.	Logarithm of Distance from Earth.	Var. per Hour.	Polar Semi- diam- eter.	Hor. Paral- lax.	Transit, Meridian of Green- wich.
	Noon.	Noon.	Noon.	Noon.	Noon.	Noon.	Noon.	Noon.	
	h m s	s	° ' "	"			"	"	h m
May 17	10 29 50.63	+0.165	+11 28 32.2	-1.33	0.960 5740	+326.1	8.17	0.96	6 49.2
18	10 29 54.79	0.161	11 27 59.1	1.43	0.961 3568	326.2	8.15	0.96	6 45.4
19	10 29 59.34	0.166	11 27 23.7	1.52	0.962 1399	326.3	8.14	0.96	6 41.5
20	10 30 4.29	0.214	11 26 46.0	1.62	0.962 9231	326.3	8.12	0.96	6 37.6
21	10 30 9.62	-0.280	11 26 6.0	1.71	0.963 7062	326.2	8.11	0.96	6 33.8
22	10 30 15.35	+0.247	+11 25 23.7	-1.81	0.964 4889	+326.0	8.09	0.96	6 30.0
23	10 30 21.46	0.263	11 24 39.2	1.90	0.965 2710	325.7	8.08	0.95	6 26.2
24	10 30 27.96	0.279	11 23 52.5	1.99	0.966 0522	325.3	8.06	0.95	6 22.3
25	10 30 34.83	0.294	11 23 3.6	2.03	0.966 8324	324.8	8.05	0.95	6 18.5
26	10 30 42.09	0.310	11 22 12.5	2.17	0.967 6113	324.2	8.03	0.95	6 14.7
27	10 30 49.72	+0.336	+11 21 19.2	-2.27	0.968 3888	+323.6	8.02	0.95	6 10.9
28	10 30 57.73	0.341	11 20 23.7	2.36	0.969 1647	322.9	8.01	0.94	6 7.1
29	10 31 6.10	0.357	11 19 26.1	2.44	0.969 9389	322.2	7.99	0.94	6 3.3
30	10 31 14.85	0.372	11 18 26.4	2.53	0.970 7111	321.3	7.98	0.94	5 59.5
31	10 31 23.96	0.387	11 17 24.5	2.62	0.971 4812	320.4	7.96	0.94	5 55.7
June 1	10 31 33.43	+0.402	+11 16 20.6	-2.71	0.972 2490	+319.4	7.95	0.94	5 52.0
2	10 31 43.26	0.417	11 15 14.6	2.79	0.973 0143	318.3	7.93	0.94	5 48.2
3	10 31 53.45	0.432	11 14 6.5	2.88	0.973 7769	317.2	7.92	0.94	5 44.4
4	10 32 4.00	0.447	11 12 56.4	2.96	0.974 5367	316.0	7.91	0.93	5 40.7
5	10 32 14.90	0.461	11 11 44.2	3.05	0.975 2935	314.7	7.89	0.93	5 37.0
6	10 32 26.15	+0.476	+11 10 30.0	-3.13	0.976 0472	+313.4	7.88	0.93	5 33.2
7	10 32 37.75	0.490	11 9 13.8	3.22	0.976 7976	311.9	7.87	0.93	5 29.5
8	10 32 49.69	0.505	11 7 55.6	3.30	0.977 5445	310.5	7.85	0.93	5 25.7
9	10 33 1.98	0.519	11 6 36.4	3.38	0.978 2878	309.0	7.84	0.92	5 22.0
10	10 33 14.60	0.533	11 5 13.3	3.46	0.979 0273	307.3	7.82	0.92	5 18.3
11	10 33 27.56	+0.547	+11 3 49.2	-3.54	0.979 7629	+306.6	7.81	0.92	5 14.6
12	10 33 40.86	0.561	11 2 23.2	3.62	0.980 4943	305.9	7.80	0.92	5 10.9
13	10 33 54.49	0.575	11 0 56.2	3.70	0.981 2215	305.1	7.79	0.92	5 7.1
14	10 34 8.45	0.589	10 59 25.4	3.78	0.981 9443	300.2	7.77	0.92	5 3.4
15	10 34 22.73	0.602	10 57 53.7	3.86	0.982 6624	298.2	7.76	0.92	4 59.7
16	10 34 37.34	+0.616	+10 56 20.1	-3.94	0.983 3758	+296.2	7.75	0.91	4 56.0
17	10 34 52.27	0.629	10 54 44.7	4.01	0.984 0843	294.1	7.74	0.91	4 52.4
18	10 35 7.51	0.642	10 53 7.5	4.09	0.984 7877	292.0	7.72	0.91	4 48.7
19	10 35 23.07	0.655	10 51 28.4	4.16	0.985 4858	289.7	7.71	0.91	4 45.0
20	10 35 38.93	0.667	10 49 47.6	4.24	0.986 1784	287.5	7.70	0.91	4 41.4
21	10 35 55.10	+0.680	+10 48 5.0	-4.31	0.986 8656	+285.1	7.69	0.91	4 37.7
22	10 36 11.56	0.692	10 46 20.7	4.38	0.987 5471	282.7	7.67	0.91	4 34.0
23	10 36 28.33	0.706	10 44 34.7	4.45	0.988 2228	280.3	7.66	0.90	4 30.4
24	10 36 45.38	0.717	10 42 47.0	4.52	0.988 8926	277.8	7.65	0.90	4 26.7
25	10 37 2.73	0.729	10 40 57.6	4.59	0.989 5564	275.3	7.64	0.90	4 23.1
26	10 37 29.35	+0.740	+10 39 6.6	-4.66	0.990 2141	+272.7	7.63	0.90	4 19.4
27	10 37 38.26	0.752	10 37 14.0	4.73	0.990 8656	270.1	7.61	0.90	4 15.8
28	10 37 56.44	0.763	10 35 19.7	4.79	0.991 5107	267.5	7.60	0.90	4 12.2
29	10 38 14.89	0.774	10 33 23.9	4.86	0.992 1494	264.8	7.59	0.90	4 8.6
30	10 38 33.61	0.784	10 31 26.5	4.92	0.992 7816	262.0	7.58	0.90	4 4.9
July 1	10 38 52.60	+0.797	+10 29 27.6	-4.99	0.993 4071	+259.2	7.57	0.89	4 1.3
2	10 39 11.85	+0.807	+10 27 27.1	-5.05	0.994 0259	+256.4	7.56	0.89	3 57.7

GREENWICH MEAN TIME.

Date.	Apparent Right Ascension.			Var. per Hour.	Apparent Declination.			Var. per Hour.	Logarithm of Distance from Earth.	Var. per Hour.	Polar Semi-diameter.	Hor. Parallax.	Transit, Meridian of Greenwich.	
	Noon.			Noon.	Noon.			Noon.	Noon.	Noon.	Noon.	Noon.	Noon.	
	h	m	s	s	°	'	"	"			"	"	h	m
July 1	10	38	52.00	+0.797	+10	29	27.6	-4.90	0.998 4071	+289.2	7.57	0.89	4	1.3
2	10	39	11.85	0.807	10	27	27.1	5.05	0.994 0259	286.4	7.56	0.89	3	57.7
3	10	39	31.35	0.818	10	25	25.1	5.11	0.994 6378	283.5	7.55	0.89	3	54.1
4	10	39	51.11	0.829	10	23	21.7	5.17	0.995 2428	280.6	7.54	0.89	3	50.5
5	10	40	11.12	0.839	10	21	16.8	5.24	0.995 8408	277.7	7.53	0.89	3	46.9
6	10	40	31.38	+0.849	+10	19	10.4	-5.30	0.996 4318	+244.7	7.52	0.89	3	43.3
7	10	40	51.89	0.860	10	17	2.6	5.35	0.997 0155	241.7	7.51	0.89	3	39.7
8	10	41	12.64	0.869	10	14	53.4	5.41	0.997 5920	238.7	7.50	0.88	3	36.1
9	10	41	33.62	0.879	10	12	42.8	5.47	0.998 1611	235.6	7.49	0.88	3	32.5
10	10	41	54.34	0.889	10	10	30.8	5.53	0.998 7227	232.4	7.48	0.88	3	29.0
11	10	42	16.29	+0.898	+10	8	17.5	-5.58	0.999 2766	+239.2	7.47	0.88	3	25.4
12	10	42	37.96	0.908	10	6	2.8	5.64	0.999 8229	236.0	7.46	0.88	3	21.8
13	10	42	59.86	0.917	10	3	46.8	5.70	1.000 3613	232.7	7.45	0.88	3	18.2
14	10	43	21.98	0.926	10	1	29.4	5.75	1.000 8919	229.4	7.44	0.88	3	14.7
15	10	43	44.32	0.935	9	59	10.8	5.80	1.001 4144	226.0	7.43	0.88	3	11.1
16	10	44	6.87	+0.944	+9	56	51.0	-5.85	1.001 9289	+222.6	7.42	0.88	3	7.6
17	10	44	29.62	0.952	9	54	30.0	5.90	1.002 4351	209.2	7.41	0.88	3	4.0
18	10	44	52.57	0.960	9	52	7.8	5.95	1.002 9330	205.7	7.41	0.87	3	0.5
19	10	45	15.72	0.969	9	49	44.5	6.00	1.003 4226	202.2	7.40	0.87	2	56.9
20	10	45	39.07	0.977	9	47	20.0	6.05	1.003 9038	198.7	7.39	0.87	2	53.4
21	10	46	2.61	+0.985	+9	44	54.3	-6.09	1.004 3764	+195.1	7.38	0.87	2	49.8
22	10	46	26.34	0.993	9	42	27.6	6.14	1.004 8405	191.6	7.37	0.87	2	46.3
23	10	46	50.25	1.000	9	39	59.8	6.18	1.005 2960	188.0	7.37	0.87	2	42.8
24	10	47	14.33	1.007	9	37	30.9	6.22	1.005 7428	184.4	7.36	0.87	2	39.2
25	10	47	38.58	1.014	9	35	1.0	6.26	1.006 1809	180.7	7.35	0.87	2	35.7
26	10	48	3.01	+1.021	+9	32	30.2	-6.31	1.006 6101	+177.9	7.34	0.87	2	32.2
27	10	48	27.60	1.028	9	29	58.3	6.35	1.007 0306	173.4	7.34	0.87	2	28.6
28	10	48	52.35	1.035	9	27	25.5	6.39	1.007 4422	169.8	7.33	0.86	2	25.1
29	10	49	17.26	1.041	9	24	51.7	6.43	1.007 8449	165.9	7.32	0.86	2	21.6
30	10	49	42.32	1.048	9	22	17.0	6.46	1.008 2385	162.1	7.32	0.86	2	18.1
31	10	50	7.54	+1.054	+9	19	41.4	-6.50	1.008 6232	+158.4	7.31	0.86	2	14.6
Aug. 1	10	50	32.90	1.060	9	17	4.9	6.54	1.008 9988	154.6	7.30	0.86	2	11.1
2	10	50	58.40	1.066	9	14	27.6	6.57	1.009 3654	150.8	7.30	0.86	2	7.6
3	10	51	24.05	1.071	9	11	49.4	6.61	1.009 7228	147.0	7.29	0.86	2	4.1
4	10	51	49.83	1.077	9	9	10.4	6.64	1.010 0710	143.1	7.29	0.86	2	0.6
5	10	52	15.74	+1.082	+9	6	30.6	-6.67	1.010 4099	+139.2	7.28	0.86	1	57.1
6	10	52	41.78	1.088	9	3	50.1	6.70	1.010 7395	135.4	7.27	0.86	1	53.6
7	10	53	7.95	1.093	9	1	8.8	6.74	1.011 0596	131.4	7.27	0.86	1	50.0
8	10	53	34.24	1.098	8	58	26.7	6.77	1.011 3704	127.5	7.26	0.86	1	46.5
9	10	54	0.65	1.103	8	55	44.0	6.80	1.011 6718	123.5	7.26	0.86	1	43.0
10	10	54	27.18	+1.108	+8	53	0.5	-6.83	1.011 9633	+119.5	7.25	0.86	1	39.6
11	10	54	53.82	1.113	8	50	16.4	6.85	1.012 2454	115.5	7.25	0.86	1	36.1
12	10	55	20.56	1.116	8	47	31.7	6.88	1.012 5178	111.5	7.24	0.86	1	32.6
13	10	55	47.40	1.121	8	44	46.4	6.90	1.012 7805	107.4	7.24	0.85	1	29.1
14	10	56	14.35	1.126	8	42	0.5	6.93	1.013 0334	103.4	7.24	0.85	1	25.6
15	10	56	41.39	+1.129	+8	39	14.0	-6.95	1.013 2766	+99.2	7.23	0.85	1	22.1
16	10	57	8.52	+1.132	+8	36	27.0	-6.97	1.013 5099	+95.1	7.23	0.85	1	18.7

GREENWICH MEAN TIME.

Date.	Apparent Right Ascension.			Var. per Hour.	Apparent Declination.			Var. per Hour.	Logarithm of Distance from Earth.	Var. per Hour.	Polar Semi-diameter.	Hor. Parallax.	Transit, Meridian of Greenwich.
	Noon.			Noon.	Noon.			Noon.	Noon.	Noon.	Noon.	Noon.	
	h	m	s	s	°	'	"	"			"	"	h m
Aug. 16	10	57	8.52	+1.132	+8	36	27.0	-6.97	1.013 5099	+95.1	7.23	0.85	1 18.7
17	10	57	35.73	1.136	8	33	39.5	6.90	1.013 7333	91.0	7.22	0.85	1 15.2
18	10	58	3.03	1.130	8	30	51.5	7.01	1.013 9468	86.9	7.22	0.85	1 11.7
19	10	58	30.40	1.142	8	28	3.1	7.08	1.014 1503	82.7	7.22	0.85	1 8.2
20	10	58	57.85	1.145	8	25	14.2	7.04	1.014 3439	78.6	7.21	0.85	1 4.7
21	10	59	25.36	+1.148	+8	22	25.0	-7.06	1.014 5276	+74.5	7.21	0.85	1 1.3
22	10	59	52.94	1.150	8	19	35.4	7.08	1.014 7013	70.3	7.21	0.85	0 57.8
23	11	0	20.58	1.158	8	16	45.4	7.00	1.014 8650	66.1	7.21	0.85	0 54.3
24	11	0	48.27	1.155	8	13	55.1	7.10	1.015 0187	61.9	7.20	0.85	0 50.8
25	11	1	16.02	1.157	8	11	4.5	7.11	1.015 1623	57.7	7.20	0.85	0 47.4
26	11	1	43.82	+1.159	+8	8	13.6	-7.12	1.015 2959	+55.6	7.20	0.85	0 43.9
27	11	2	11.67	1.161	8	5	22.5	7.14	1.015 4195	49.4	7.20	0.85	0 40.4
28	11	2	39.56	1.168	8	2	31.1	7.15	1.015 5331	45.2	7.19	0.85	0 37.0
29	11	3	7.48	1.164	7	59	39.5	7.15	1.015 6365	41.0	7.19	0.85	0 33.5
30	11	3	35.44	1.166	7	56	47.7	7.16	1.015 7299	36.8	7.19	0.85	0 30.0
31	11	4	3.43	+1.167	+7	53	55.8	-7.17	1.015 8131	+32.6	7.19	0.85	0 26.6
Sept. 1	11	4	31.45	1.168	7	51	3.7	7.17	1.015 8863	28.4	7.19	0.85	0 23.1
2	11	4	59.49	1.169	7	48	11.5	7.18	1.015 9493	24.1	7.19	0.85	0 19.6
3	11	5	27.56	1.170	7	45	19.2	7.18	1.016 0021	19.9	7.19	0.85	0 16.2
4	11	5	55.65	1.171	7	42	26.8	7.19	1.016 0448	15.7	7.19	0.85	0 12.7
5	11	6	23.75	+1.171	+7	39	34.3	-7.19	1.016 0773	+11.4	7.19	0.85	0 9.2
6	11	6	51.85	1.171	7	36	41.9	7.19	1.016 0996	7.1	7.19	0.85	0 5.8
7	11	7	19.97	1.172	7	33	49.4	7.19	1.016 1116	+ 2.9	7.18	0.85	0 2.3
8	11	7	48.09	1.171	7	30	57.0	7.18	1.016 1133	- 1.4	7.18	0.85	23 55.4
9	11	8	16.20	1.171	7	28	4.7	7.18	1.016 1047	5.7	7.18	0.85	23 51.9
10	11	8	44.31	+1.171	+7	25	12.4	-7.18	1.016 0858	-10.0	7.19	0.85	23 48.4
11	11	9	12.41	1.171	7	22	20.2	7.17	1.016 0566	14.3	7.19	0.85	23 44.9
12	11	9	40.50	1.170	7	19	28.2	7.16	1.016 0171	18.6	7.19	0.85	23 41.5
13	11	10	8.56	1.169	7	16	36.3	7.16	1.015 9672	23.9	7.19	0.85	23 38.0
14	11	10	36.60	1.168	7	13	44.7	7.15	1.015 9071	27.2	7.19	0.85	23 34.5
15	11	11	4.62	+1.167	+7	10	53.3	-7.14	1.015 8366	-31.5	7.19	0.85	23 31.1
16	11	11	32.60	1.166	7	8	2.1	7.13	1.015 7558	35.3	7.19	0.85	23 27.6
17	11	12	0.54	1.168	7	5	11.2	7.11	1.015 6647	40.1	7.19	0.85	23 24.1
18	11	12	28.44	1.161	7	2	20.7	7.10	1.015 5683	44.4	7.19	0.85	23 20.7
19	11	12	56.29	1.160	6	59	30.5	7.09	1.015 4516	48.7	7.20	0.85	23 17.2
20	11	13	24.10	+1.158	+6	56	40.6	-7.07	1.015 3297	-52.9	7.20	0.85	23 13.7
21	11	13	51.86	1.155	6	53	51.2	7.06	1.015 1976	57.2	7.20	0.85	23 10.3
22	11	14	19.56	1.153	6	51	2.2	7.08	1.015 0552	61.5	7.20	0.85	23 6.8
23	11	14	47.20	1.150	6	48	13.6	7.02	1.014 9026	65.7	7.20	0.85	23 3.3
24	11	15	14.77	1.147	6	45	25.4	7.00	1.014 7399	69.9	7.21	0.85	22 59.8
25	11	15	42.28	+1.145	+6	42	37.7	-6.98	1.014 5970	-74.1	7.21	0.85	22 56.4
26	11	16	9.72	1.142	6	39	50.6	6.95	1.014 3841	78.3	7.21	0.85	22 52.9
27	11	16	37.08	1.138	6	37	4.1	6.93	1.014 1911	82.5	7.22	0.85	22 49.5
28	11	17	4.36	1.135	6	34	18.1	6.90	1.013 9361	86.7	7.22	0.85	22 46.0
29	11	17	31.56	1.131	6	31	32.7	6.88	1.013 7751	90.9	7.22	0.85	22 42.5
30	11	17	58.67	+1.128	+6	28	47.9	-6.85	1.013 5520	-95.0	7.23	0.85	22 39.0
Oct. 1	11	18	25.70	+1.124	+6	26	3.7	-6.83	1.013 3189	-99.2	7.23	0.85	22 35.5

GREENWICH MEAN TIME.

Date.	Apparent Right Ascension.			Var. per Hour.	Apparent Declination.			Var. per Hour.	Logarithm of Distance from Earth.	Var. per Hour.	Polar Semi-diameter.	Hor. Parallax.	Transit Meridian of Greenwich.		
	h	m	s		°	'	"						h	m	
Oct.	1	11	18	25.70	+1.124	+6	26	8.7	-6.83	1.013 9189	-99.2	7.23	0.85	22	35.5
	2	11	18	52.63	1.120	6	23	20.2	6.80	1.013 0757	102.4	7.24	0.85	22	32.0
	3	11	19	19.46	1.116	6	20	37.4	6.77	1.012 8225	107.6	7.24	0.85	22	28.5
	4	11	19	46.19	1.112	6	17	55.4	6.74	1.012 5594	111.7	7.24	0.86	22	25.0
	5	11	20	12.82	1.107	6	15	14.1	6.70	1.012 2864	115.8	7.25	0.86	22	21.5
	6	11	20	39.33	+1.102	+6	12	33.6	-6.67	1.012 0034	-120.0	7.25	0.86	22	18.0
	7	11	21	5.73	1.097	6	9	53.9	6.64	1.011 7105	124.1	7.26	0.86	22	14.5
	8	11	21	32.01	1.092	6	7	15.1	6.60	1.011 4077	128.2	7.26	0.86	22	11.0
	9	11	21	58.17	1.087	6	4	37.1	6.56	1.011 0951	132.3	7.27	0.86	22	7.5
	10	11	22	24.20	1.082	6	2	0.0	-6.52	1.010 7726	136.4	7.27	0.86	22	4.0
	11	11	22	50.10	+1.076	+5	59	23.9	-6.48	1.010 4403	-140.5	7.28	0.86	22	0.5
	12	11	23	15.86	1.070	5	56	48.8	6.44	1.010 0982	144.6	7.29	0.86	21	57.0
	13	11	23	41.48	1.065	5	54	14.6	6.40	1.009 7464	148.6	7.29	0.86	21	53.5
	14	11	24	6.96	1.060	5	51	41.5	6.36	1.009 3849	152.6	7.30	0.86	21	50.0
	15	11	24	32.29	1.052	5	49	9.4	6.31	1.009 0139	156.6	7.30	0.86	21	46.5
	16	11	24	57.46	+1.046	+5	46	38.5	-6.27	1.008 6333	-160.5	7.31	0.86	21	43.0
	17	11	25	22.47	1.039	5	44	8.6	6.22	1.008 2433	164.5	7.32	0.86	21	39.5
	18	11	25	47.31	-1.031	5	41	39.9	6.17	1.007 8439	168.4	7.32	0.86	21	35.9
	19	11	26	11.98	1.026	5	39	12.4	6.12	1.007 4352	172.2	7.33	0.86	21	32.4
	20	11	26	36.49	1.017	5	36	46.1	6.07	1.007 0173	176.0	7.34	0.87	21	28.9
	21	11	27	0.82	+1.010	+5	34	21.0	-6.02	1.006 5902	-179.8	7.34	0.87	21	25.3
	22	11	27	24.97	1.002	5	31	57.1	5.97	1.006 1541	183.6	7.35	0.87	21	21.8
	23	11	27	48.94	0.995	5	29	34.5	5.91	1.005 7089	187.4	7.36	0.87	21	18.3
	24	11	28	12.72	0.987	5	27	13.3	5.86	1.005 2547	191.1	7.37	0.87	21	14.7
	25	11	28	36.31	0.979	5	24	53.4	5.80	1.004 7916	194.8	7.38	0.87	21	11.2
	26	11	28	59.70	+0.971	+5	22	34.8	-5.75	1.004 3196	-198.5	7.38	0.87	21	7.7
	27	11	29	22.90	0.962	5	20	17.6	5.69	1.003 8389	202.1	7.39	0.87	21	4.1
	28	11	29	45.89	0.954	5	18	1.8	5.63	1.003 3496	205.7	7.40	0.87	21	0.5
	29	11	30	8.68	0.945	5	15	47.4	5.57	1.002 8517	209.3	7.41	0.87	20	57.0
	30	11	30	31.26	0.936	5	13	34.5	5.51	1.002 3452	212.8	7.42	0.88	20	53.4
31	11	30	53.62	+0.927	+5	11	23.1	-5.44	1.001 8393	-216.3	7.42	0.88	20	49.8	
Nov.	1	11	31	15.76	0.918	5	9	13.2	5.38	1.001 3070	219.8	7.43	0.88	20	46.3
	2	11	31	37.68	0.909	5	7	4.9	5.31	1.000 7753	223.3	7.44	0.88	20	42.7
	3	11	31	59.38	0.899	5	4	58.1	5.25	1.000 2354	226.7	7.45	0.88	20	39.1
	4	11	32	20.85	0.890	5	2	58.0	5.18	0.999 6872	230.1	7.46	0.88	20	35.5
	5	11	32	42.08	+0.880	+5	0	49.5	-5.11	0.999 1399	-233.5	7.47	0.88	20	31.9
	6	11	33	3.07	0.870	4	58	47.7	5.04	0.998 5665	236.8	7.48	0.88	20	28.4
	7	11	33	23.82	0.860	4	56	47.5	4.97	0.997 9942	240.1	7.49	0.88	20	24.8
	8	11	33	44.31	0.849	4	54	49.1	4.90	0.997 4141	243.3	7.50	0.88	20	21.2
	9	11	34	4.55	0.838	4	52	52.4	4.83	0.996 8264	246.5	7.51	0.89	20	17.6
	10	11	34	24.53	+0.827	+4	50	57.5	-4.75	0.996 2311	-249.6	7.52	0.89	20	14.0
	11	11	34	44.25	0.816	4	49	4.4	4.67	0.995 6283	252.7	7.53	0.89	20	10.4
	12	11	35	3.70	0.805	4	47	13.2	4.59	0.995 0183	255.7	7.54	0.89	20	6.8
	13	11	35	22.87	0.793	4	45	23.9	4.52	0.994 4011	258.7	7.55	0.89	20	3.2
	14	11	35	41.77	0.782	4	43	36.4	4.44	0.993 7767	261.6	7.56	0.89	19	59.5
	15	11	36	0.40	+0.770	+4	41	50.9	-4.35	0.993 1454	-264.5	7.57	0.89	19	55.9
	16	11	36	18.73	+0.758	+4	40	7.4	-4.27	0.992 5073	-267.3	7.59	0.90	19	52.3

GREENWICH MEAN TIME.

Date.	Apparent Right Ascension.	Var. per Hour.	Apparent Declination.	Var. per Hour.	Logarithm of Distance from Earth.	Var. per Hour.	Polar Semi- diameter.	Hor. Paral- lax.	Transit, Meridian of Green- wich.
	Noon.	Noon.	Noon.	Noon.	Noon.	Noon.	Noon.	Noon.	h m
Nov. 16	11 36 18.73	+0.758	+4 40 7.4	-4.27	0.992 5073	-267.3	7.59	0.90	19 52.3
17	11 36 36.78	0.746	4 38 25.8	4.19	0.991 8626	270.0	7.60	0.90	19 48.6
18	11 36 54.54	0.734	4 36 46.2	4.11	0.991 2113	271.7	7.61	0.90	19 45.0
19	11 37 12.00	0.721	4 35 8.6	4.02	0.990 5537	275.3	7.62	0.90	19 41.4
20	11 37 29.16	0.709	4 33 33.1	3.94	0.989 8898	277.9	7.63	0.90	19 37.7
21	11 37 46.02	+0.696	+4 31 59.6	-3.85	0.989 2199	-280.4	7.64	0.90	19 34.0
22	11 38 2.57	0.683	4 30 23.2	3.77	0.988 5440	282.3	7.66	0.90	19 30.4
23	11 38 18.82	0.671	4 28 58.8	3.68	0.987 8624	285.2	7.67	0.90	19 26.7
24	11 38 34.76	0.658	4 27 31.6	3.59	0.987 1751	287.5	7.68	0.91	19 23.0
25	11 38 50.98	0.644	4 26 6.6	3.50	0.986 4823	289.8	7.69	0.91	19 19.3
26	11 39 5.48	+0.631	+4 24 43.7	-3.41	0.985 7842	-292.0	7.70	0.91	19 15.7
27	11 39 20.46	0.617	4 23 23.1	3.31	0.985 0808	294.1	7.72	0.91	19 12.0
28	11 39 35.31	0.604	4 22 4.6	3.22	0.984 3724	296.2	7.73	0.91	19 8.3
29	11 39 49.63	0.590	4 20 48.4	3.13	0.983 6590	298.2	7.74	0.91	19 4.6
30	11 40 3.82	0.576	4 19 34.4	3.04	0.982 9408	300.2	7.75	0.92	19 0.9
Dec. 1	11 40 17.28	+0.562	+4 18 22.7	-2.94	0.982 2179	-302.1	7.77	0.92	18 57.2
2	11 40 30.60	0.548	4 17 13.3	2.84	0.981 4906	303.9	7.78	0.92	18 53.5
3	11 40 43.56	0.533	4 16 6.2	2.75	0.980 7590	305.7	7.79	0.92	18 49.7
4	11 40 56.18	0.519	4 15 1.5	2.66	0.980 0232	307.4	7.81	0.92	18 46.0
5	11 41 8.45	0.504	4 13 59.2	2.55	0.979 2835	309.0	7.82	0.92	18 42.3
6	11 41 20.36	+0.489	+4 12 59.2	-2.45	0.978 5401	-310.5	7.83	0.92	18 38.5
7	11 41 31.92	0.474	4 12 1.7	2.35	0.977 7931	312.0	7.85	0.93	18 34.8
8	11 41 43.11	0.459	4 11 6.6	2.24	0.977 0427	313.3	7.86	0.93	18 31.0
9	11 41 53.93	0.443	4 10 14.0	2.14	0.976 2893	314.5	7.88	0.93	18 27.3
10	11 42 4.39	0.428	4 9 23.8	2.04	0.975 5329	315.7	7.89	0.93	18 23.5
11	11 42 14.47	+0.412	+4 8 36.1	-1.94	0.974 7739	-316.8	7.90	0.93	18 19.8
12	11 42 24.18	0.397	4 7 50.9	1.83	0.974 0124	317.9	7.92	0.93	18 16.0
13	11 42 33.52	0.381	4 7 8.2	1.73	0.973 2486	318.7	7.93	0.94	18 12.2
14	11 42 42.47	0.365	4 6 28.0	1.62	0.972 4828	319.5	7.94	0.94	18 8.4
15	11 42 51.04	0.349	4 5 50.4	1.51	0.971 7151	320.2	7.96	0.94	18 4.6
16	11 42 59.23	+0.333	+4 5 15.3	-1.41	0.970 9459	-320.8	7.97	0.94	18 0.8
17	11 43 7.03	0.317	4 4 42.8	1.30	0.970 1753	321.3	7.99	0.94	17 57.0
18	11 43 14.45	0.301	4 4 12.8	1.20	0.969 4096	321.7	8.00	0.94	17 53.2
19	11 43 21.48	0.285	4 3 45.4	1.09	0.968 6310	322.1	8.01	0.95	17 49.4
20	11 43 28.12	0.268	4 3 20.6	0.98	0.967 8577	322.3	8.03	0.95	17 45.5
21	11 43 34.36	+0.252	+4 2 58.3	-0.87	0.967 0840	-322.4	8.04	0.95	17 41.7
22	11 43 40.21	0.235	4 2 38.6	0.77	0.966 3101	322.4	8.06	0.95	17 37.9
23	11 43 45.66	0.219	4 2 21.5	0.66	0.965 5363	322.4	8.07	0.95	17 34.1
24	11 43 50.72	0.202	4 2 7.0	0.55	0.964 7627	322.2	8.09	0.95	17 30.2
25	11 43 55.98	0.186	4 1 55.1	0.44	0.963 9896	322.0	8.10	0.96	17 26.3
26	11 43 59.65	+0.170	+4 1 45.8	-0.33	0.963 2171	-321.7	8.11	0.96	17 22.5
27	11 44 3.82	0.153	4 1 39.1	0.22	0.962 4456	321.3	8.13	0.96	17 18.6
28	11 44 6.99	0.136	4 1 35.0	0.11	0.961 6752	320.7	8.14	0.96	17 14.7
29	11 44 10.05	0.119	4 1 33.6	-0.01	0.960 9061	320.1	8.16	0.96	17 10.8
30	11 44 12.71	0.102	4 1 34.7	+0.10	0.960 1387	319.4	8.17	0.96	17 6.9
31	11 44 14.97	+0.086	+4 1 38.5	+0.21	0.959 3732	-318.3	8.19	0.97	17 3.0
32	11 44 16.82	+0.069	+4 1 44.9	+0.32	0.958 6098	-317.6	8.20	0.97	16 59.1

FOR GREENWICH MEAN NOON.

Date.	Heliocentric Longitude, Mean Equinox of Date.	Var. per Day.	Reduction to Orbit.	Heliocentric Latitude.	Var. per Day.	Logarithm of Radius Vector.	Var. per Day.
Jan.	2 156 17 2.7	2 6.96	+1 37.4	+1 42 25.8	+4.01	0.968 4367	+131.6
	10 156 33 58.1	2 6.89	1 37.4	1 42 57.8	3.99	0.968 5421	131.9
	18 156 50 53.0	2 6.84	1 37.5	1 43 29.6	3.97	0.968 6477	132.0
Feb.	26 157 7 47.4	2 6.78	1 37.5	1 44 1.2	3.95	0.968 7534	132.3
	3 157 24 41.4	2 6.73	1 37.5	1 44 32.7	3.93	0.968 8594	132.6
	11 157 41 34.9	2 6.66	+1 37.5	+1 45 4.0	+3.91	0.968 9656	+132.8
Mar.	19 157 58 27.8	2 6.60	1 37.5	1 45 35.2	3.89	0.969 0719	133.0
	27 158 15 20.3	2 6.54	1 37.5	1 46 6.2	3.87	0.969 1784	133.3
	6 158 32 12.3	2 6.48	1 37.5	1 46 37.0	3.85	0.969 2852	133.5
Apr.	14 158 49 3.8	2 6.42	1 37.5	1 47 7.7	3.83	0.969 3921	133.7
	22 159 5 54.8	2 6.35	+1 37.5	+1 47 38.2	+3.80	0.969 4992	+133.9
	30 159 22 45.3	2 6.29	1 37.4	1 48 8.5	3.78	0.969 6064	134.1
May	7 159 39 35.3	2 6.23	1 37.4	1 48 38.7	3.76	0.969 7138	134.3
	15 159 56 24.9	2 6.17	1 37.3	1 49 8.7	3.74	0.969 8214	134.5
	23 160 13 13.9	2 6.11	1 37.2	1 49 38.5	3.72	0.969 9290	134.6
June	1 160 30 2.4	2 6.05	+1 37.2	+1 50 8.1	+3.70	0.970 0368	+134.8
	9 160 46 50.5	2 5.99	1 37.1	1 50 37.6	3.68	0.970 1447	135.0
	17 161 3 38.1	2 5.92	1 37.0	1 51 6.9	3.65	0.970 2528	135.2
July	25 161 20 25.1	2 5.86	1 36.9	1 51 36.0	3.63	0.970 3610	135.3
	2 161 37 11.7	2 5.80	1 36.8	1 52 5.0	3.61	0.970 4693	135.4
	10 161 53 57.8	2 5.74	+1 36.6	+1 52 33.8	+3.59	0.970 5777	+135.6
Aug.	18 162 10 43.4	2 5.67	1 36.5	1 53 2.4	3.57	0.970 6863	135.7
	26 162 27 28.4	2 5.61	1 36.3	1 53 30.8	3.54	0.970 7949	135.8
	4 162 44 13.0	2 5.55	1 36.2	1 53 59.0	3.52	0.970 9037	136.0
Sept.	12 163 0 57.1	2 5.49	1 36.0	1 54 27.1	3.50	0.971 0126	136.2
	20 163 17 40.7	2 5.43	+1 35.9	+1 54 55.0	+3.48	0.971 1217	+136.4
	28 163 34 23.8	2 5.37	1 35.7	1 55 22.7	3.46	0.971 2309	136.6
Oct.	5 163 51 6.4	2 5.30	1 35.5	1 55 50.3	3.44	0.971 3403	136.7
	13 164 7 48.5	2 5.24	1 35.3	1 56 17.6	3.41	0.971 4497	136.8
	21 164 24 30.1	2 5.18	1 35.1	1 56 44.8	3.39	0.971 5592	136.9
Nov.	29 164 41 11.2	2 5.12	+1 34.9	+1 57 11.8	+3.37	0.971 6688	+137.0
	6 164 57 51.8	2 5.06	1 34.6	1 57 38.7	3.35	0.971 7785	137.2
	14 165 14 31.9	2 4.99	1 34.4	1 58 5.3	3.32	0.971 8883	137.3
Dec.	22 165 31 11.4	2 4.92	1 34.2	1 58 31.8	3.30	0.971 9982	137.4
	30 165 47 50.5	2 4.86	1 33.9	1 58 58.1	3.28	0.972 1082	137.5
	8 166 4 29.1	2 4.80	+1 33.7	+1 59 24.2	+3.25	0.972 2183	+137.7
Jan.	16 166 21 7.2	2 4.74	1 33.4	1 59 50.1	3.23	0.972 3285	137.8
	24 166 37 44.8	2 4.68	1 33.1	2 0 15.9	3.21	0.972 4388	137.9
	1 Nov. 1 166 54 21.9	2 4.62	1 32.8	2 0 41.4	3.19	0.972 5491	137.9
Feb.	9 167 10 58.5	2 4.56	1 32.5	2 1 6.8	3.17	0.972 6594	137.9
	17 167 27 34.6	2 4.49	+1 32.2	+2 1 32.0	+3.14	0.972 7698	+138.0
	25 167 44 10.2	2 4.43	1 31.9	2 1 57.0	3.12	0.972 8803	138.1
Mar.	3 168 0 45.3	2 4.37	1 31.6	2 2 21.9	3.10	0.972 9909	138.2
	11 168 17 19.9	2 4.30	1 31.3	2 2 46.5	3.07	0.973 1015	138.3
	19 168 33 54.0	2 4.24	1 30.9	2 3 11.0	3.05	0.973 2122	138.4
Apr.	27 168 50 27.6	2 4.18	+1 30.6	+2 3 35.3	+3.03	0.973 3230	+138.5
	35 169 7 0.7	2 4.12	+1 30.2	+2 3 59.4	+3.00	0.973 4339	+138.6

# URANUS, 1920.

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## GREENWICH MEAN TIME.

Date.	Apparent Right Ascension.		Var. per Day.	Apparent Declination.		Var. per Day.	Logarithm of Distance from Earth.	Var. per Day.	Semi-diameter.	Hor. Parallax.	Transit, Meridian of Greenwich.	
	Noon.			Noon.								Noon.
	h	m	s	°	'	"					h	m
Jan.	0	22	5	22.54	+ 9.520	-12 31 50.1	+63.65	1.315 0318	+2993.0	1.66	0.43	3 29.4
	4	22	6	1.69	10.040	12 28 9.7	66.52	1.316 1195	2994.2	1.66	0.42	3 14.3
	8	22	6	42.88	10.540	12 24 18.2	69.20	1.317 1379	2995.0	1.65	0.42	2 59.2
	12	22	7	25.96	10.995	12 20 16.3	61.72	1.318 0631	2995.7	1.65	0.42	2 44.2
	16	22	8	10.79	11.413	12 16 4.7	64.02	1.318 9516	2971.5	1.64	0.42	2 29.3
Feb.	20	22	8	57.21	+11.799	-12 11 44.4	+66.10	1.319 7392	+1996.0	1.64	0.42	2 14.3
	24	22	9	45.04	12.119	12 7 16.2	67.96	1.320 4485	1995.3	1.64	0.42	1 59.4
	28	22	10	34.10	12.494	12 2 41.1	69.54	1.321 0613	1995.3	1.64	0.42	1 44.5
	1	22	11	24.21	12.841	11 58 0.2	70.87	1.321 5912	1912.9	1.63	0.42	1 29.6
	5	22	12	15.17	12.994	11 53 14.4	72.02	1.322 0313	998.1	1.63	0.42	1 14.7
Mar.	9	22	13	6.88	+12.990	-11 48 24.4	+73.39	1.322 3313	+ 790.5	1.63	0.42	0 59.8
	13	22	13	59.06	13.106	11 43 31.5	73.55	1.322 6392	896.9	1.63	0.42	0 44.9
	17	22	14	51.60	13.168	11 38 36.3	73.97	1.322 8042	296.1	1.63	0.42	0 30.1
	21	22	15	44.31	13.185	11 33 40.1	74.08	1.322 8759	+ 61.9	1.63	0.42	0 15.2
	25	22	16	37.02	13.158	11 28 43.9	73.95	1.322 8588	- 171.8	1.63	0.42	0 0 15.2
Apr.	29	22	17	29.52	+13.094	-11 23 48.8	+73.57	1.322 7388	- 402.6	1.63	0.42	23 41.8
	4	22	18	21.64	12.972	11 18 55.6	73.99	1.322 5321	690.3	1.63	0.42	23 26.9
	8	22	19	13.24	12.818	11 14 5.2	73.14	1.322 2349	855.3	1.63	0.42	23 12.1
	12	22	20	4.18	12.628	11 9 18.8	71.05	1.321 8482	1977.6	1.63	0.42	22 57.2
	16	22	20	54.17	12.398	11 4 37.1	69.71	1.321 3733	1396.2	1.64	0.42	22 42.3
May	20	22	21	49.18	+12.100	-11 0 1.4	+68.14	1.320 8119	-1510.1	1.64	0.42	22 27.4
	24	22	22	39.99	11.799	10 55 32.3	66.33	1.320 1661	1717.4	1.64	0.42	22 12.4
	28	22	23	17.44	11.480	10 51 11.1	64.24	1.319 4391	1919.3	1.64	0.42	21 57.5
	1	22	24	2.38	11.026	10 46 58.6	61.98	1.318 6343	2306.5	1.65	0.42	21 42.5
	5	22	24	45.68	10.609	10 42 55.5	59.55	1.317 7549	2399.4	1.65	0.42	21 27.5
June	9	22	25	27.21	+10.149	-10 39 2.5	+59.88	1.316 8039	-2463.9	1.65	0.42	21 12.4
	13	22	26	6.88	9.649	10 35 20.7	54.01	1.315 7849	3630.5	1.66	0.43	20 57.3
	17	22	26	44.48	9.131	10 31 50.7	50.92	1.314 7009	2796.4	1.66	0.43	20 42.2
	21	22	27	19.88	8.566	10 28 33.6	47.66	1.313 5574	2029.8	1.67	0.43	20 27.1
	25	22	27	52.94	7.964	10 25 29.6	44.25	1.312 3586	2661.8	1.67	0.43	20 11.9
July	29	22	28	23.67	+ 7.375	-10 22 39.8	+40.66	1.311 1097	-3180.1	1.67	0.43	19 56.7
	3	22	28	51.91	6.748	10 20 4.5	36.97	1.309 8162	2285.8	1.68	0.43	19 41.4
	7	22	29	17.59	6.091	10 17 44.2	33.15	1.308 4827	2379.4	1.68	0.43	19 26.1
	11	22	29	40.61	5.419	10 15 39.5	29.19	1.307 1144	2490.1	1.69	0.43	19 10.7
	15	22	30	0.92	4.739	10 13 50.8	25.13	1.305 7165	2695.8	1.70	0.43	18 55.3
Aug	19	22	30	18.42	+ 4.018	-10 12 18.6	+20.95	1.304 2951	-2677.0	1.70	0.44	18 39.9
	23	22	30	33.06	3.296	10 11 3.3	16.71	1.302 8571	2910.5	1.71	0.44	18 24.4
	27	22	30	44.78	2.569	10 10 4.9	12.48	1.301 4088	2993.5	1.71	0.44	18 8.8
	31	22	30	58.00	1.899	10 9 23.5	8.19	1.299 9594	2980.8	1.72	0.44	17 53.2
	4	22	30	59.49	1.198	10 8 59.4	+ 3.90	1.298 5083	2917.1	1.72	0.44	17 37.6
Sept	8	22	31	2.44	+ 0.573	-10 8 52.3	- 0.37	1.297 0945	-2985.8	1.73	0.44	17 21.9
	12	22	31	2.47	- 0.266	10 9 2.4	4.67	1.295 6379	2942.7	1.74	0.45	17 6.2
	16	22	30	59.55	1.094	10 9 29.6	6.91	1.294 2380	2479.1	1.74	0.45	16 50.4
	20	22	30	58.73	1.834	10 10 13.6	13.07	1.292 8570	2392.6	1.75	0.45	16 34.6
	24	22	30	45.06	2.618	10 11 14.0	17.11	1.291 5172	2298.4	1.75	0.45	16 18.7
Oct	28	22	30	33.63	- 3.200	-10 12 30.3	-21.62	1.290 2208	-3184.4	1.76	0.45	16 2.8
	2	22	30	19.49	- 3.863	-10 14 2.0	-24.80	1.288 9717	-3055.2	1.76	0.45	15 46.8

GREENWICH MEAN TIME.

Date.	Apparent Right Ascension.			Var. per Day.	Apparent Declination.			Var. per Day.	Logarithm of Distance from Earth.	Var. per Day.	Semi-diameter.	Hor. Parallax.	Transit, Meridian of Greenwich.
	Noon.				Noon.								
	h	m	s	s	°	'	"	"		"	"		h m
July 2	22	30	19.49	-3.863	-10	14	2.0	-24.80	1.288 9717	-3055.2	1.76	0.45	15 46.8
6	22	30	2.76	4.497	10	15	48.5	28.41	1.287 7783	2909.9	1.77	0.45	15 30.8
10	22	29	43.54	5.118	10	17	49.1	81.88	1.286 6459	2749.3	1.77	0.45	15 14.7
14	22	29	21.88	5.704	10	20	3.3	85.15	1.285 5810	2572.6	1.78	0.46	14 58.6
18	22	28	57.96	6.261	10	22	30.0	88.17	1.284 5898	2381.1	1.78	0.46	14 42.5
22	22	28	31.93	-6.755	-10	25	8.3	-46.95	1.283 6779	-2176.4	1.78	0.46	14 26.3
26	22	28	8.96	7.216	10	27	57.2	48.41	1.282 8503	1939.4	1.79	0.46	14 10.1
30	22	27	34.26	7.696	10	30	55.2	48.61	1.282 1118	1732.1	1.79	0.46	13 53.9
Aug. 3	22	27	2.96	8.004	10	34	1.7	47.57	1.281 4659	1495.0	1.79	0.46	13 37.7
7	22	26	30.20	8.326	10	37	15.3	49.19	1.280 9170	1248.5	1.79	0.46	13 21.4
11	22	25	56.42	-8.598	-10	40	34.8	-50.51	1.280 4682	-993.8	1.80	0.46	13 5.1
15	22	25	21.58	8.911	10	43	58.9	51.47	1.280 1230	731.0	1.80	0.46	12 48.8
19	22	24	46.01	8.964	10	47	26.1	59.07	1.279 8841	462.9	1.80	0.46	12 32.5
23	22	24	9.95	9.055	10	50	55.0	53.31	1.279 7580	-192.6	1.80	0.46	12 16.2
27	22	23	33.65	9.088	10	54	24.2	52.26	1.279 7301	+ 78.3	1.80	0.46	11 59.8
31	22	22	57.32	-9.063	-10	57	52.6	-51.86	1.279 8156	+ 349.0	1.80	0.46	11 43.5
Sept. 4	22	22	21.22	9.361	11	1	18.6	51.09	1.280 0092	619.1	1.80	0.46	11 27.2
8	22	21	45.55	8.842	11	4	40.9	49.99	1.280 3107	386.3	1.80	0.46	11 10.9
12	22	21	10.57	8.685	11	7	58.1	48.87	1.280 7193	1153.2	1.80	0.46	10 54.6
16	22	20	36.55	8.379	11	11	9.0	46.79	1.281 2324	1411.5	1.79	0.46	10 38.3
20	22	20	3.69	-8.045	-11	14	12.0	-44.70	1.281 8475	+1002.7	1.79	0.46	10 22.0
24	22	19	32.26	7.665	11	17	6.2	42.33	1.282 5611	1902.3	1.79	0.46	10 5.8
28	22	19	2.48	7.341	11	19	50.3	39.99	1.283 3679	2131.2	1.79	0.46	9 49.6
Oct. 2	22	18	34.40	6.765	11	22	23.4	36.79	1.284 2647	2350.3	1.78	0.46	9 33.4
6	22	18	8.37	6.244	11	24	44.3	33.64	1.285 2466	2556.9	1.78	0.46	9 17.2
10	22	17	44.51	-5.676	-11	26	52.2	-30.85	1.286 3094	+2761.8	1.77	0.45	9 1.1
14	22	17	23.02	5.022	11	28	46.0	26.63	1.287 4460	2929.9	1.77	0.45	8 45.0
18	22	17	4.06	4.415	11	30	25.0	23.85	1.288 6511	3091.6	1.76	0.45	8 29.0
22	22	16	47.74	3.787	11	31	48.6	18.92	1.289 9169	3235.0	1.76	0.45	8 13.0
26	22	16	34.20	3.026	11	32	56.2	14.84	1.291 2369	3382.4	1.75	0.45	7 57.0
30	22	16	23.54	-2.304	-11	33	47.2	-10.66	1.292 6045	+3472.2	1.75	0.45	7 41.1
Nov. 3	22	16	15.79	1.562	11	34	21.4	6.41	1.294 0124	3594.9	1.74	0.45	7 25.3
7	22	16	11.07	0.797	11	34	38.4	- 2.07	1.295 4541	3840.9	1.74	0.45	7 9.5
11	22	16	9.43	-0.029	11	34	37.9	+ 2.33	1.296 9225	3996.3	1.73	0.44	6 53.7
15	22	16	10.92	+0.763	11	34	19.7	6.78	1.298 4069	3733.4	1.72	0.44	6 38.0
19	22	16	15.55	+1.349	-11	33	43.7	+11.31	1.299 9060	+3749.9	1.72	0.44	6 22.4
23	22	16	23.31	2.339	11	32	50.1	15.58	1.301 4064	3749.0	1.71	0.44	6 6.8
27	22	16	34.18	3.109	11	31	39.1	19.92	1.302 9029	3790.9	1.71	0.44	5 51.2
Dec. 1	22	16	48.10	3.861	11	30	10.8	24.20	1.304 3390	3897.1	1.70	0.44	5 35.7
5	22	17	5.06	4.616	11	28	25.6	28.41	1.305 8583	3945.8	1.69	0.43	5 20.3
9	22	17	25.01	+5.383	-11	26	23.6	+23.87	1.307 3083	+4376.6	1.69	0.43	5 4.9
13	22	17	47.86	6.078	11	24	5.2	26.61	1.308 7174	3490.8	1.68	0.43	4 49.6
17	22	18	13.56	6.763	11	21	30.9	49.51	1.310 0999	3399.4	1.68	0.43	4 34.3
21	22	18	41.96	7.439	11	18	41.4	44.20	1.311 4270	3273.3	1.67	0.43	4 19.0
25	22	19	12.96	8.092	11	15	37.5	47.76	1.312 7106	3144.1	1.67	0.43	4 3.8
29	22	19	46.42	+8.663	-11	12	19.5	+51.19	1.313 9407	+3033.4	1.66	0.43	3 48.6
33	22	20	22.25	...	-11	8	48.2	...	1.315 1119	...	1.66	0.43	3 33.5



FOR GREENWICH MEAN NOON.

Date.	Heliocentric Longitude, Mean Equinox of Date.	Var. per Day.	Reduction to Orbit.	Heliocentric Latitude.	Var. per Day.	Logarithm of Radius Vector.	Var. per Day.
Jan. 0	331 6 24.2	38.73	+4.0	-0 45 14.5	-0.11	1.301 8945	+12.2
10	331 12 51.5	38.73	3.9	0 45 15.8	0.11	1.301 9067	12.1
20	331 19 18.8	38.73	3.9	0 45 16.7	0.11	1.301 9188	12.1
30	331 25 46.1	38.73	+3.9	-0 45 17.8	-0.11	1.301 9309	+12.1
Feb. 9	331 32 13.3	38.73	3.8	0 45 18.9	0.11	1.301 9429	12.0
19	331 38 40.5	38.73	3.8	0 45 20.0	0.11	1.301 9549	12.0
29	331 45 7.7	38.73	+3.8	-0 45 21.1	-0.11	1.301 9668	+11.9
Mar. 10	331 51 34.9	38.73	3.7	0 45 22.2	0.11	1.301 9787	11.9
20	331 58 2.1	38.73	3.7	0 45 23.2	0.10	1.301 9905	11.8
30	332 4 29.2	38.71	+3.7	-0 45 24.2	-0.10	1.302 0023	+11.8
Apr. 9	332 10 56.3	38.71	3.6	0 45 25.2	0.10	1.302 0140	11.7
19	332 17 23.4	38.71	3.6	0 45 26.3	0.10	1.302 0257	11.7
29	332 23 50.5	38.71	+3.6	-0 45 27.3	-0.10	1.302 0373	+11.6
May 9	332 30 17.5	38.70	3.5	0 45 28.3	0.10	1.302 0489	11.6
19	332 36 44.5	38.70	3.5	0 45 29.3	0.10	1.302 0604	11.5
29	332 43 11.5	38.70	+3.5	-0 45 30.3	-0.10	1.302 0718	+11.4
June 8	332 49 38.5	38.70	3.4	0 45 31.2	0.09	1.302 0832	11.4
18	332 56 5.5	38.70	3.4	0 45 32.2	0.09	1.302 0946	11.4
28	333 2 32.4	38.69	+3.4	-0 45 33.1	-0.09	1.302 1059	+11.3
July 8	333 8 59.3	38.69	3.3	0 45 34.1	0.09	1.302 1171	11.2
18	333 15 26.2	38.69	3.3	0 45 35.0	0.09	1.302 1283	11.2
28	333 21 53.1	38.69	+3.3	-0 45 35.9	-0.09	1.302 1394	+11.1
Aug. 7	333 28 19.9	38.68	3.2	0 45 36.8	0.09	1.302 1505	11.1
17	333 34 46.7	38.68	3.2	0 45 37.7	0.09	1.302 1615	11.0
27	333 41 13.5	38.68	+3.2	-0 45 38.6	-0.09	1.302 1725	+11.0
Sept. 6	333 47 40.3	38.68	3.1	0 45 39.5	0.09	1.302 1834	10.9
16	333 54 7.0	38.68	3.1	0 45 40.4	0.09	1.302 1942	10.8
26	334 0 33.8	38.67	+3.1	-0 45 41.3	-0.08	1.302 2050	+10.8
Oct. 6	334 7 0.5	38.67	3.0	0 45 42.1	0.08	1.302 2157	10.7
16	334 13 27.2	38.67	3.0	0 45 43.0	0.08	1.302 2264	10.7
26	334 19 53.9	38.67	+3.0	-0 45 43.8	-0.08	1.302 2370	+10.6
Nov. 5	334 26 20.6	38.67	2.9	0 45 44.6	0.08	1.302 2476	10.6
15	334 32 47.2	38.67	2.9	0 45 45.4	0.08	1.302 2581	10.5
25	334 39 13.9	38.66	+2.9	-0 45 46.2	-0.08	1.302 2685	+10.4
Dec. 5	334 45 40.5	38.66	2.8	0 45 47.0	0.08	1.302 2789	10.4
15	334 52 7.1	38.66	2.8	0 45 47.8	0.08	1.302 2892	10.3
25	334 58 33.6	38.65	+2.8	-0 45 48.6	-0.08	1.302 2994	+10.2
35	335 5 0.2	38.65	+2.7	-0 45 49.4	-0.08	1.302 3096	+10.2

GREENWICH MEAN TIME.

Date.	Apparent Right Ascension.			Var. per Day.	Apparent Declination.			Var. per Day.	Logarithm of Distance from Earth.	Var. per Day.	Semi-diameter.	Hor. Parallax.	Transit, Meridian of Greenwich.
	h	m	s		°	'	"						
Jan. 0	8	53	41.00	-5.498	+17	27	18.7	+23.04	1.465 6822	-1309.3	1.25	0.30	14 15.8
	4	8	53 18.47	5.808	17	28	53.4	24.25	1.465 1654	1211.7	1.25	0.30	13 59.7
	8	8	52 54.71	6.072	17	30	32.5	25.30	1.464 7137	1046.7	1.25	0.30	13 43.6
	12	8	52 29.94	6.306	17	32	15.6	26.21	1.464 8288	876.3	1.25	0.30	13 27.5
	16	8	52 4.32	6.496	17	34	1.9	26.92	1.464 0135	699.3	1.26	0.30	13 11.3
	20	8	51 38.03	-6.645	+17	35	50.7	+27.46	1.463 7709	-517.6	1.26	0.30	12 55.1
	24	8	51 11.22	6.749	17	37	41.3	27.81	1.463 5998	333.2	1.26	0.30	12 39.0
Feb. 1	8	50 44.10	6.806	17	39	32.9	27.97	1.463 5037	-146.3	1.26	0.30	12 22.8	
	5	8	50 16.84	6.816	17	41	24.8	27.94	1.463 4824	+39.5	1.26	0.30	12 6.6
	9	8	49 49.63	6.785	17	43	16.2	27.75	1.463 5351	223.3	1.26	0.30	11 50.4
	13	8	49 22.62	-6.711	+17	45	6.6	+27.42	1.463 6609	+406.2	1.26	0.30	11 34.3
	17	8	48 56.09	6.593	17	46	55.3	26.89	1.463 8599	583.1	1.26	0.30	11 18.1
	21	8	48 29.93	6.435	17	48	41.5	26.19	1.464 1309	766.1	1.26	0.30	11 1.9
	25	8	48 4.58	6.232	17	50	24.6	25.33	1.464 4721	939.0	1.25	0.30	10 45.8
Mar. 4	8	47 40.13	5.985	17	52	3.9	24.30	1.464 8813	1106.0	1.25	0.30	10 29.7	
	8	47 16.75	-5.702	+17	53	38.8	+23.13	1.465 8559	+1265.5	1.25	0.30	10 13.5	
	12	8	46 54.56	5.384	17	55	8.8	21.84	1.465 8926	1416.6	1.25	0.30	9 57.5
	16	8	46 33.72	5.085	17	56	33.4	20.45	1.466 4882	1559.9	1.25	0.30	9 41.4
	20	8	46 14.32	4.666	17	57	52.2	18.92	1.467 1394	1904.9	1.25	0.30	9 25.3
	24	8	45 56.51	4.246	17	59	4.6	17.28	1.467 8429	1829.9	1.24	0.30	9 9.3
	28	8	45 40.39	-3.809	+18	0	10.3	+15.56	1.468 5947	+1935.3	1.24	0.30	8 53.3
Apr. 1	8	45 26.07	3.345	18	1	8.9	13.72	1.469 3901	2039.3	1.24	0.30	8 37.4	
	5	8	45 13.65	2.865	18	2	0.9	11.85	1.470 2250	2132.2	1.24	0.30	8 21.4
	9	8	45 3.17	2.367	18	2	43.6	9.91	1.471 0943	2213.0	1.24	0.30	8 5.5
	13	8	44 54.73	1.857	18	3	19.2	7.90	1.471 9939	2282.3	1.23	0.30	7 49.7
	17	8	44 48.33	-1.338	+18	3	46.8	+5.88	1.472 9190	+2340.6	1.23	0.30	7 33.8
	21	8	44 44.04	0.806	18	4	6.2	3.83	1.473 8649	2387.7	1.23	0.30	7 18.0
	25	8	44 41.89	-0.268	18	4	17.4	+1.76	1.474 8276	2423.3	1.22	0.29	7 2.3
May 3	8	44 41.90	+0.374	18	4	20.2	-0.36	1.475 8019	2446.2	1.22	0.29	6 46.6	
	7	8	44 44.08	0.817	18	4	14.5	2.48	1.476 7829	2456.6	1.22	0.29	6 30.9
	11	8	44 48.43	+1.358	+18	4	0.4	+4.57	1.477 7657	+2455.7	1.22	0.29	6 15.2
	15	8	44 54.90	1.833	18	3	38.0	6.62	1.478 7460	2442.7	1.21	0.29	5 59.6
	19	8	45 3.49	2.407	18	3	7.5	8.63	1.479 7193	2421.4	1.21	0.29	5 44.0
	23	8	45 14.15	2.924	18	2	29.0	10.68	1.480 6818	2390.0	1.21	0.29	5 28.5
	27	8	45 26.87	3.432	18	1	42.1	12.70	1.481 6299	2347.3	1.21	0.29	5 13.0
June 1	8	45 41.59	+3.928	+18	0	47.5	-14.61	1.482 5586	+2294.3	1.20	0.29	4 57.5	
	5	8	45 58.27	4.406	17	59	45.3	16.50	1.483 4637	2230.4	1.20	0.29	4 42.0
	9	8	46 16.81	4.863	17	58	35.6	18.31	1.484 3417	2158.3	1.20	0.29	4 26.6
	13	8	46 37.15	5.302	17	57	18.9	20.07	1.485 1891	2077.4	1.20	0.29	4 11.2
	17	8	46 59.20	5.720	17	55	55.1	21.77	1.486 0026	1983.9	1.19	0.29	3 55.9
	21	8	47 22.89	+6.122	+17	54	24.8	-23.40	1.486 7793	+1893.7	1.19	0.29	3 40.5
	25	8	47 48.15	6.508	17	52	48.0	24.97	1.487 5165	1790.5	1.19	0.29	3 25.2
July 2	8	48 14.88	6.869	17	51	5.2	26.41	1.488 2107	1679.3	1.19	0.29	3 9.9	
	6	8	48 42.99	7.190	17	49	16.8	27.79	1.488 8594	1562.3	1.19	0.29	2 54.7
	10	8	49 12.36	7.492	17	47	23.0	29.07	1.489 4597	1438.6	1.18	0.29	2 39.4
	14	8	49 42.89	+7.767	+17	45	24.4	-30.34	1.490 0997	+1310.7	1.18	0.28	2 24.2
	18	8	50 14.46	+8.015	+17	43	21.2	-31.34	1.490 5077	+1173.3	1.18	0.28	2 9.0

GREENWICH MEAN TIME.

Date.	Apparent Right Ascension.	Var. per Day.	Apparent Declination.	Var. per Day.	Logarithm of Distance from Earth.	Var. per Day.	Semi-diameter.	Hor. Parallax.	Transit Meridian of Greenwich.
	Noon.	Noon.	Noon.	Noon.	Noon.	Noon.	Noon.	Noon.	
	h m s	s	" " "	"			"	"	h m
July 2	8 50 14.48	+6.015	+17 43 21.2	-31.34	1.490 5077	+1178.3	1.18	0.28	2 9.0
6	8 50 46.98	8.340	17 41 13.8	32.33	1.490 9518	1041.5	1.18	0.28	1 53.8
10	8 51 20.34	8.636	17 39 2.7	33.20	1.491 3406	901.2	1.18	0.28	1 38.7
14	8 51 54.43	8.904	17 36 48.3	34.06	1.491 6723	756.5	1.18	0.28	1 23.5
18	8 52 29.18	8.788	17 34 30.9	34.66	1.491 9454	608.6	1.18	0.28	1 8.3
22	8 53 4.30	+8.645	+17 32' 11.2	-35.18	1.492 1589	+ 458.5	1.18	0.28	0 53.2
26	8 53 39.86	8.920	17 29 49.6	35.58	1.492 3120	307.1	1.18	0.28	0 38.1
30	8 54 15.02	8.968	17 27 26.7	35.88	1.492 4045	155.1	1.18	0.28	0 22.9
Aug. 3	8 54 51.52	8.981	17 25 2.7	36.10	1.492 4360	+ 2.5	1.18	0.28	0 7.8
7	8 55 27.43	8.970	17 22 38.1	36.16	1.492 4064	- 150.9	1.18	0.28	23 48.8
11	8 56 3.24	+8.928	+17 20 13.6	-36.08	1.492 3154	- 304.7	1.18	0.28	23 33.7
15	8 56 38.81	8.853	17 17 49.6	35.88	1.492 1627	453.1	1.18	0.28	23 18.6
19	8 57 14.02	8.745	17 15 26.7	35.56	1.491 9491	609.9	1.18	0.28	23 3.4
23	8 57 48.78	8.607	17 13 5.3	35.10	1.491 6751	780.3	1.18	0.28	22 48.3
27	8 58 22.34	8.441	17 10 46.1	34.49	1.491 3422	904.8	1.18	0.28	22 33.1
31	8 58 56.22	+8.245	+17 8 29.5	-33.78	1.490 9516	-1048.1	1.18	0.28	22 18.0
Sept. 4	8 59 23.77	8.026	17 6 16.0	32.96	1.490 5041	1188.5	1.18	0.28	22 2.8
8	9 0 0.39	7.776	17 4 6.0	32.00	1.490 0013	1235.3	1.18	0.28	21 47.6
12	9 0 30.94	7.495	17 2 0.2	30.90	1.489 4445	1457.6	1.18	0.28	21 32.3
16	9 1 0.31	7.184	16 59 59.0	29.66	1.488 8360	1584.1	1.19	0.29	21 17.1
20	9 1 23.36	+6.848	+16 58 3.1	-28.29	1.488 1781	-1704.1	1.19	0.29	21 1.8
24	9 1 55.06	6.487	16 56 12.8	26.83	1.487 4736	1817.3	1.19	0.29	20 46.5
28	9 2 20.25	6.194	16 54 28.6	25.24	1.486 7252	1928.4	1.19	0.29	20 31.2
Oct. 2	9 2 43.36	5.697	16 52 51.0	23.58	1.485 9358	2023.6	1.19	0.29	20 15.9
6	9 3 5.80	5.268	16 51 20.1	21.81	1.485 1081	2114.7	1.20	0.29	20 0.5
10	9 3 25.98	+4.818	+16 49 56.7	-19.88	1.484 2452	-2198.3	1.20	0.29	19 45.1
14	9 3 44.32	4.347	16 48 41.2	17.87	1.483 3508	2272.0	1.20	0.29	19 29.7
18	9 4 0.76	3.856	16 47 33.8	15.83	1.482 4290	2334.3	1.20	0.29	19 14.2
22	9 4 15.15	3.352	16 46 34.7	13.69	1.481 4843	2387.7	1.21	0.29	18 58.7
26	9 4 27.53	2.838	16 45 44.4	11.47	1.480 5202	2430.2	1.21	0.29	18 43.2
30	9 4 37.84	+2.315	+16 45 3.0	-9.22	1.479 5416	-2461.6	1.21	0.29	18 27.6
Nov. 3	9 4 46.03	1.778	16 44 30.7	6.92	1.478 5523	2482.8	1.21	0.29	18 12.0
7	9 4 52.05	1.232	16 44 7.7	4.55	1.477 5569	2492.2	1.22	0.29	17 56.4
11	9 4 55.38	0.681	16 43 54.3	2.17	1.476 5602	2488.9	1.22	0.29	17 40.7
15	9 4 57.50	+0.139	16 43 50.3	+ 0.19	1.475 5675	2472.6	1.22	0.29	17 25.0
19	9 4 58.92	-0.418	+16 43 55.8	+ 2.55	1.474 5838	-2443.9	1.23	0.29	17 9.3
23	9 4 54.16	0.900	16 44 10.7	4.80	1.473 6140	2402.9	1.23	0.30	16 53.5
27	9 4 49.25	1.494	16 44 34.9	7.29	1.472 6631	2349.5	1.23	0.30	16 37.7
Dec. 1	9 4 42.22	2.019	16 45 8.2	9.44	1.471 7360	2284.3	1.23	0.30	16 21.8
5	9 4 33.11	2.535	16 45 50.4	11.69	1.470 8372	2207.8	1.24	0.30	16 5.9
9	9 4 21.96	-3.085	+16 46 41.5	+13.82	1.469 9715	-2118.0	1.24	0.30	15 50.0
13	9 4 8.86	3.512	16 47 40.8	15.94	1.469 1445	2015.5	1.24	0.30	15 34.1
17	9 3 53.59	3.968	16 48 48.1	17.77	1.468 3006	1902.2	1.24	0.30	15 18.1
21	9 3 37.15	4.396	16 50 2.8	19.58	1.467 6242	1777.8	1.25	0.30	15 2.1
25	9 3 18.77	4.793	16 51 24.6	21.27	1.466 9396	1644.3	1.25	0.30	14 46.1
29	9 2 58.34	-5.164	+16 52 52.8	+23.51	1.466 3099	-1502.1	1.25	0.30	14 30.0
33	9 2 37.50	...	+16 54 26.9	...	1.465 7390	...	1.25	0.30	14 13.9

## FOR GREENWICH MEAN NOON.

Date.	Heliocentric Longitude, Mean Equinox of Date.			Var. per Day.	Reduction to Orbit.	Heliocentric Latitude.			Var. per Day.	Logarithm of Radius Vector.	Var. per Day.	
	°	'	"	"	"	°	'	"	"		"	
Jan.	0	129	58	0.1	21.74	-1.6	-0	1	43.4	+0.67	1.477 9428	+3.8
	10	130	1	37.5	21.74	1.5	0	1	36.7	0.67	1.477 9466	3.8
	20	130	5	14.9	21.74	1.4	0	1	30.0	0.67	1.477 9504	3.8
Feb.	30	130	8	52.3	21.74	-1.3	-0	1	23.3	+0.67	1.477 9542	+3.8
	9	130	12	29.7	21.74	1.2	0	1	16.6	0.67	1.477 9580	3.8
	19	130	16	7.1	21.74	1.1	0	1	9.9	0.67	1.477 9618	3.8
Mar.	29	130	19	44.5	21.74	-1.0	-0	1	3.2	+0.67	1.477 9655	+3.8
	10	130	23	21.9	21.74	0.9	0	0	56.5	0.67	1.477 9693	3.8
	20	130	26	59.3	21.74	0.8	0	0	49.8	0.67	1.477 9730	3.7
Apr.	30	130	30	36.7	21.74	-0.7	-0	0	43.1	+0.67	1.477 9767	+3.7
	9	130	34	14.0	21.74	0.6	0	0	36.4	0.67	1.477 9804	3.7
	19	130	37	51.4	21.74	0.5	0	0	29.7	0.67	1.477 9841	3.7
May	29	130	41	28.8	21.74	-0.4	-0	0	23.0	+0.67	1.477 9878	+3.7
	9	130	45	6.1	21.73	0.3	0	0	16.3	0.67	1.477 9914	3.6
	19	130	48	43.4	21.73	-0.2	0	0	9.6	0.67	1.477 9950	3.6
June	29	130	52	20.8	21.73	0.0	-0	0	2.9	+0.67	1.477 9986	+3.6
	8	130	55	58.1	21.73	+0.1	+0	0	3.8	0.67	1.478 0022	3.6
	18	130	59	35.4	21.73	0.2	0	0	10.5	0.67	1.478 0058	3.6
July	28	131	3	12.7	21.73	+0.3	+0	0	17.2	+0.67	1.478 0094	+3.6
	8	131	6	50.0	21.73	0.4	0	0	24.0	0.67	1.478 0130	3.6
	18	131	10	27.3	21.73	0.5	0	0	30.7	0.67	1.478 0166	3.6
Aug.	28	131	14	4.6	21.73	+0.6	+0	0	37.4	+0.67	1.478 0201	+3.5
	7	131	17	41.9	21.73	0.7	0	0	44.1	0.67	1.478 0236	3.5
	17	131	21	19.2	21.73	0.8	0	0	50.8	0.67	1.478 0272	3.5
Sept.	27	131	24	56.5	21.73	+0.9	+0	0	57.5	+0.67	1.478 0307	+3.5
	6	131	28	33.8	21.73	1.0	0	1	4.2	0.67	1.478 0342	3.5
	16	131	32	11.1	21.73	1.1	0	1	10.9	0.67	1.478 0377	3.5
Oct.	26	131	35	48.4	21.73	+1.2	+0	1	17.6	+0.67	1.478 0412	+3.5
	6	131	39	25.7	21.73	1.3	0	1	24.3	0.67	1.478 0447	3.5
	16	131	43	3.0	21.73	1.4	0	1	31.0	0.67	1.478 0482	3.5
Nov.	26	131	46	40.2	21.73	+1.5	+0	1	37.7	+0.67	1.478 0516	+3.4
	5	131	50	17.5	21.73	1.6	0	1	44.4	0.67	1.478 0550	3.4
	15	131	53	54.8	21.73	1.7	0	1	51.1	0.67	1.478 0584	3.4
Dec.	25	131	57	32.0	21.73	+1.8	+0	1	57.8	+0.67	1.478 0618	+3.4
	5	132	1	9.2	21.73	1.9	0	2	4.5	0.67	1.478 0652	3.4
	15	132	4	46.5	21.73	2.0	0	2	11.2	0.67	1.478 0686	3.4
	25	132	8	23.7	21.73	+2.1	+0	2	17.9	+0.67	1.478 0720	+3.4
	35	132	12	0.9	21.73	+2.3	+0	2	24.6	+0.67	1.478 0754	+3.4

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**PART II.**

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**ASTRONOMICAL EPHEMERIS FOR THE  
MERIDIAN OF WASHINGTON.**

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# 200 FORMULÆ FOR THE REDUCTION OF STARS, 1920.

The constants of precession, nutation and aberration adopted by the *Conférence Internationale des Étoiles Fondamentales* which met in Paris in May, 1896, are given on page xvi, and together with the notation of BESSEL are used in the formulæ which follow.

## BESSELIAN STAR-NUMBERS.

<i>Terms of Long Period.</i>	<i>Terms of Short Period.</i>
$A-\tau - 0.342\ 21 \sin \Omega$	$-0.004\ 05 \sin 2 \mathcal{C}$
$+ 0.004\ 15 \sin 2 \Omega$	$+0.000\ 23 \sin (\mathcal{C} + \Gamma')$
$- 0.025\ 26 \sin 2 L$	$+0.001\ 34 \sin (\mathcal{C} - \Gamma')$
$+ 0.002\ 51 \sin (L - \Gamma)$	$-0.000\ 68 \sin (2 \mathcal{C} - \Omega)$
$- 0.000\ 99 \sin (3 L - \Gamma)$	$-0.000\ 52 \sin (3 \mathcal{C} - \Gamma')$
$+ 0.000\ 42 \sin (L + \Gamma)$	$+0.000\ 30 \sin (\mathcal{C} - 2 L + \Gamma')$
$+ 0.000\ 25 \sin (2 L - \Omega)$	$+0.000\ 12 \sin 2 (\mathcal{C} - L)$
"	"
$B - 9.210 \cos \Omega$	$-0.088 \cos 2 \mathcal{C}$
$+ 0.090 \cos 2 \Omega$	$-0.018 \cos (2 \mathcal{C} - \Omega)$
$- 0.551 \cos 2 L$	$-0.011 \cos (3 \mathcal{C} - \Gamma')$
$- 0.022 \cos (3 L - \Gamma)$	$+0.005 \cos (\mathcal{C} + \Gamma')$
$+ 0.009 \cos (L + \Gamma)$	
$+ 0.007 \cos (2 L - \Omega)$	
$C - 20.4700 \cos \omega \cos \odot$	
$D - 20.4700 \sin \odot$	
$E - 0.0414 \sin \Omega + 0''.0005 \sin 2 \Omega - 0''.0081 \sin 2 L$	

## BESSEL'S Star-Constants.

$a = 3''.072\ 71 + 1''.336\ 35 \sin \alpha_0 \tan \delta_0$	$a' = 20''.0451 \cos \alpha_0$
$b = \frac{1}{2} \cos \alpha_0 \tan \delta_0$	$b' = -\sin \alpha_0$
$c = \frac{1}{2} \cos \alpha_0 \sec \delta_0$	$c' = \tan \omega \cos \delta_0 - \sin \alpha_0 \sin \delta_0$
$d = \frac{1}{2} \sin \alpha_0 \sec \delta_0$	$d' = \cos \alpha_0 \sin \delta_0$

## Formulæ for Reduction to Apparent Position.

$$\alpha = \alpha_0 + \tau\mu + Aa + Bb + Cc + Dd + \frac{1}{2}E \quad (\text{in time})$$

$$\delta = \delta_0 + \tau\mu' + Aa' + Bb' + Cc' + Dd' \quad (\text{in arc})$$

## INDEPENDENT STAR-NUMBERS.

$$f + f' = +48''.0906 A + E \quad (\text{in arc})$$

$$- +3''.07271A + \frac{1}{2}E \quad (\text{in time})$$

$$f' = -0''.0124 \sin 2 \mathcal{C} + 0''.0041 \sin (\mathcal{C} - \Gamma') + 0''.0007 \sin (\mathcal{C} + \Gamma')$$

$$- 0''.0021 \sin (2 \mathcal{C} - \Omega) - 0''.0016 \sin (3 \mathcal{C} - \Gamma')$$

$$+ 0''.0009 \sin (\mathcal{C} - 2 L + \Gamma') + 0''.0004 \sin 2 (\mathcal{C} - L)$$

$$g \sin G = B \qquad h \sin H = C \qquad i = C \tan \omega$$

$$g \cos G = 20''.0451 A \qquad h \cos H = D$$

## Formulæ for Reduction to Apparent Position.

$$\alpha = \alpha_0 + f + f' + \tau\mu + \frac{1}{2}g \sin (G + \alpha_0) \tan \delta_0 + \frac{1}{2}h \sin (H + \alpha_0) \sec \delta_0 \quad (\text{in time})$$

$$\delta = \delta_0 + \tau\mu' + g \cos (G + \alpha_0) + h \cos (H + \alpha_0) \sin \delta_0 + i \cos \delta_0 \quad (\text{in arc})$$

In the above formulæ,

$\tau$  denotes the time reckoned in units of one year, from the beginning of the Besselian fictitious year (1920, January 0<sup>d</sup>.943, Washington mean time),

$\alpha_0, \delta_0,$  the star's mean R. A. and Decl. at the beginning of the fictitious year,  
 $\alpha, \delta,$  the star's apparent right ascension and declination at the time  $\tau,$   
 $\mu, \mu',$  the annual proper motion in right ascension and declination,

$\odot,$  the Sun's true longitude,  
 $L,$  the Sun's mean longitude,  
 $\Omega,$  the longitude of the Moon's ascending node,

$\omega,$  the obliquity of the ecliptic,  
 $\Gamma,$  the long. of the Sun's perigee,  
 $\Gamma',$  the long. of the Moon's perigee,  
 $\mathcal{C},$  the Moon's mean longitude.

The independent star-numbers are more convenient than BESSEL'S when only one or two apparent positions of a star are required, or when BESSEL'S star-constants are not known with sufficient accuracy.

In using the star-constants of the *British Association Catalogue*,  $a, b, c, d, a', b', c', d'$ , with the star-numbers of this Ephemeris, the quantities to be computed are  $Ac, Bd, Ca, Db, -Ac', -Bd', -Ca', -Db'$ .

In the computation of the Besselian star-numbers given for Washington mean midnight of each day of the year, on pages 202-205, the short-period terms—that is, the terms involving the Moon's mean longitude—have been included.

In the computation of the independent star-numbers, pages 206-213, the short-period terms have been included in the two columns headed  $G$  and  $\text{Log } g$ . The quantities  $f$  and  $f'$  give separately the effect of the long-period and short-period terms.  $f'$  differs but slightly from the quantity  $-0''.1866 \sin 2 \zeta + 0''.0622 \sin (\zeta - \Gamma')$  given on page 37 of the *Procès-Verbaux* of the Paris Conference of 1896, which quantity that conference decided should be omitted in the reduction of stars from mean to apparent place.

In computing the ephemerides of the circumpolar stars in this volume, all short-period terms have been included. The quantity  $f'$ , which was omitted from the ephemerides of the circumpolar stars given in the *American Ephemeris and Nautical Almanac* for the years 1900 to 1915, inclusive, is now included in these ephemerides in accordance with the decision of the *Congrès International des Éphémérides Astronomiques* held in Paris in October, 1911. See page 43 of *Procès-Verbaux* of that Congress.

In the computation of the ephemerides of the ten-day stars, no short-period terms have been included. These terms attain two maxima and two minima during the tropical month. At maximum and minimum they may amount in right ascension to  $\pm(0''.020 + 0''.008 \tan \delta)$ , and in declination to  $\pm 0''.13$ . For computing the effect of these terms for the correction of the positions of stars interpolated from the ten-day ephemerides, the following formulæ may be used, in which  $\Delta\alpha$  and  $\Delta\delta$  denote the effect of the short-period terms in right ascension and declination, respectively, and  $\delta''\psi$  and  $\delta''\omega$ , the sum of the short-period terms of the nutation in longitude and obliquity:

$$\begin{aligned} \Delta\alpha &= D\psi\alpha \delta''\psi + D\omega\alpha \delta''\omega \\ \Delta\delta &= D\psi\delta \delta''\psi + D\omega\delta \delta''\omega \end{aligned}$$

The values of  $\delta''\psi$  and of  $\delta''\omega$  for Washington mean midnight are given for each day of the year on pages 215-216, and have been computed as follows:

$$\delta''\psi = 50''.37 A_2 \qquad \delta''\omega = -B_2$$

in which  $A_2$  and  $B_2$  are the sums of the short-period terms given in the expressions for  $A$  and  $B$  on page 200.

The quantities  $D\psi\alpha, D\omega\alpha, D\psi\delta,$  and  $D\omega\delta$  are given for each ten-day star on pages 316-513, and have been computed by means of the following formulæ:

$$\begin{aligned} D\psi\alpha &= \frac{1}{\gamma} (\cos \omega + \sin \alpha \tan \delta \sin \omega) & D\omega\alpha &= -\frac{1}{\gamma} \cos \alpha \tan \delta \\ D\psi\delta &= \cos \alpha \sin \omega & D\omega\delta &= \sin \alpha \end{aligned}$$

In the *Star List of the American Ephemeris* for the years 1910 and 1911 and in the *American Ephemeris and Nautical Almanac* for the years 1912 to 1915, inclusive, the value used for the derivative of the right ascension with reference to  $\psi$  was

$$D'\psi\alpha = \frac{1}{\gamma} \sin \alpha \tan \delta \sin \omega$$

and the addition of the term  $\frac{1}{\gamma} \cos \omega$  is made in accordance with the above-mentioned decision of the *Congrès International des Éphémérides Astronomiques* of 1911 with reference to the quantity  $f'$ .

## FOR WASHINGTON MEAN MIDNIGHT.

Solar Day. (Sid. Hr.)	Log A.	Log B.	Log C.	Log D.	Solar Day. (Sid. Hr.)	Log A.	Log B.	Log C.	Log D.		
Jan. 0	+9.44261	+0.7877	-0.49153	+1.90511	Feb. 15	+9.62006	+0.7607	-1.19352	+1.05588		
1	9.44883	0.7905	0.55332	1.90375	16	9.62412	0.7592	1.19654	1.04420		
2	9.45635	0.7929	0.57495	1.90224	17	9.62676	0.7551	1.20336	1.03206		
3	9.46469	0.7939	0.61115	1.90060	18	9.62878	0.7518	1.20600	1.01945		
4	9.47316	0.7936	0.64443	1.29880	19	9.63011	0.7488	1.21245	1.00632		
h (7.0)	5	+9.48104	+0.7917	-0.67521	+1.29686	(10.0)	20	+9.63085	+0.7465	-1.21673	+0.99265
6	9.48766	0.7889	0.70383	1.29478	21	9.63131	0.7454	1.22082	0.97841		
7	9.49275	0.7858	0.73054	1.29254	22	9.63181	0.7458	1.22474	0.96355		
8	9.49646	0.7830	0.75558	1.29016	23	9.63274	0.7474	1.22850	0.94803		
9	9.49913	0.7811	0.77913	1.28763	24	9.63445	0.7498	1.23208	0.93181		
10	+9.50128	+0.7805	-0.80132	+1.28494	25	+9.63711	+0.7521	-1.23550	+0.91483		
11	9.50349	0.7810	0.82231	1.28210	26	9.64058	0.7537	1.23876	0.89703		
12	9.50615	0.7823	0.84221	1.27910	27	9.64455	0.7540	1.24187	0.87834		
13	9.50950	0.7841	0.86109	1.27594	28	9.64849	0.7527	1.24481	0.85868		
14	9.51362	0.7858	0.87906	1.27262	29	9.65194	0.7500	1.24760	0.83796		
15	+9.51835	+0.7870	-0.89619	+1.26914	Mar. 1	+9.65455	+0.7465	-1.25024	+0.81606		
16	9.52348	0.7877	0.91252	1.26549	2	9.65622	0.7480	1.25274	0.79290		
17	9.52886	0.7876	0.92813	1.26167	3	9.65703	0.7402	1.25508	0.76890		
18	9.53425	0.7866	0.94307	1.25768	4	9.65727	0.7386	1.25728	0.74208		
19	9.53941	0.7848	0.95737	1.25351	5	9.65732	0.7386	1.25933	0.71406		
h (8.0)	20	+9.54411	+0.7823	-0.97108	+1.24917	(11.0)	6	+9.65758	+0.7398	-1.26124	+0.68396
21	9.54812	0.7793	0.98424	1.24464	7	9.65827	0.7418	1.26301	0.65153		
22	9.55127	0.7762	0.99688	1.23993	8	9.65950	0.7442	1.26464	0.61633		
23	9.55358	0.7734	1.00902	1.23503	9	9.66124	0.7465	1.26613	0.57790		
24	9.55526	0.7715	1.02070	1.22994	10	9.66340	0.7483	1.26749	0.53562		
25	+9.55669	+0.7708	-1.03193	+1.22465	11	+9.66585	+0.7494	-1.26871	+0.48865		
26	9.55837	0.7714	1.04274	1.21916	12	9.66842	0.7496	1.26979	0.43585		
27	9.56076	0.7730	1.05316	1.21346	13	9.67097	0.7491	1.27074	0.37561		
28	9.56418	0.7752	1.06319	1.20755	14	9.67332	0.7477	1.27155	0.30553		
29	9.56871	0.7769	1.07286	1.20142	15	9.67531	0.7458	1.27223	0.22181		
30	+9.57408	+0.7776	-1.08218	+1.19506	16	+9.67683	+0.7437	-1.27279	+0.11790		
31	9.57978	0.7768	1.09117	1.18848	17	9.67780	0.7416	1.27321	9.98093		
Feb. 1	9.58524	0.7746	1.09985	1.18166	18	9.67827	0.7402	1.27349	9.77965		
2	9.58994	0.7712	1.10821	1.17459	19	9.67840	0.7400	1.27365	+9.39293		
3	9.59354	0.7672	1.11628	1.16728	20	9.67849	0.7411	1.27368	-9.03212		
h (9.0)	4	+9.59598	+0.7635	-1.12407	+1.15970	(12.0)	21	+9.67887	+0.7436	-1.27357	-9.66439
5	9.59750	0.7606	1.13158	1.15185	22	9.67991	0.7470	1.27334	9.91195		
6	9.59850	0.7588	1.13884	1.14372	23	9.68180	0.7507	1.27297	0.06823		
7	9.59940	0.7584	1.14583	1.13529	24	9.68447	0.7539	1.27248	0.18233		
8	9.60067	0.7591	1.15258	1.12657	25	9.68770	0.7560	1.27185	0.27322		
9	+9.60225	+0.7604	-1.15909	+1.11753	26	+9.69109	+0.7565	-1.27109	-0.34785		
10	9.60453	0.7619	1.16537	1.10814	27	9.69420	0.7556	1.27021	0.41136		
11	9.60736	0.7631	1.17143	1.09845	28	9.69666	0.7537	1.26919	0.46661		
12	9.61058	0.7636	1.17726	1.08839	29	9.69825	0.7515	1.26804	0.51548		
13	9.61401	0.7635	1.18289	1.07795	30	9.69906	0.7498	1.26676	0.55925		
14	+9.61753	+0.7625	-1.18830	+1.06712	31	+9.69927	+0.7492	-1.26535	-0.59887		
15	+9.62098	+0.7607	-1.19352	+1.05588	Apr. 1	+9.69922	+0.7500	-1.26381	-0.63504		



FOR WASHINGTON MEAN MIDNIGHT.

Solar Day. (Std. Hr.)	Log A.	Log B.	Log C.	Log D.	Solar Day. (Std. Hr.)	Log A.	Log B.	Log C.	Log D.
Apr. 1	+0.69922	+0.7500	-1.26381	-0.63504	May 17	+9.77673	+0.8300	-1.01039	-1.23446
2	9.69931	0.7521	1.26213	0.66829	18	9.78002	0.8334	0.99896	1.23912
3	9.69976	0.7553	1.26032	0.69903	19	9.78367	0.8355	0.98710	1.24361
4	9.70072	0.7589	1.25837	0.72761	h 20	9.78731	0.8364	0.97480	1.24793
h 5	9.70223	0.7625	1.25629	0.75423	(16.0) 21	9.79063	0.8360	0.96201	1.25208
(13.0) 6	+9.70418	+0.7656	-1.25407	-0.77923	22	+9.79334	+0.8350	-0.94871	-1.25608
7	9.70642	0.7682	1.25171	0.80279	23	9.79533	0.8338	0.93487	1.25991
8	9.70883	0.7699	1.24921	0.82495	24	9.79669	0.8331	0.92046	1.26359
9	9.71128	0.7708	1.24657	0.84591	25	9.79764	0.8334	0.90543	1.26711
10	9.71360	0.7710	1.24378	0.86577	26	9.79845	0.8349	0.88975	1.27048
11	+9.71565	+0.7706	-1.24085	-0.88464	27	+9.79944	+0.8373	-0.87336	-1.27371
12	9.71734	0.7699	1.23778	0.90258	28	9.80080	0.8404	0.85620	1.27679
13	9.71857	0.7691	1.23456	0.91963	29	9.80260	0.8436	0.83322	1.27972
14	9.71936	0.7687	1.23119	0.93601	30	9.80481	0.8466	0.81934	1.28252
15	9.71982	0.7693	1.22766	0.95161	31	9.80734	0.8491	0.79949	1.28517
16	+9.72018	+0.7710	-1.22398	-0.96654	June 1	+9.81008	+0.8510	-0.77856	-1.28768
17	9.72075	0.7740	1.22014	0.98085	2	9.81288	0.8521	0.75645	1.29007
18	9.72183	0.7780	1.21615	0.99457	3	9.81562	0.8525	0.73303	1.29232
19	9.72366	0.7825	1.21199	1.00774	4	9.81821	0.8523	0.70816	1.29444
h 20	9.72624	0.7866	1.20766	1.02040	h 5	9.82063	0.8516	0.68165	1.29642
(14.0) 21	+9.72945	+0.7899	-1.20317	-1.03256	(17.0) 6	+9.82250	+0.8506	-0.65329	-1.29827
22	9.73297	0.7919	1.19851	1.04427	7	9.82412	0.8498	0.62283	1.30000
23	9.73635	0.7924	1.19367	1.05554	8	9.82540	0.8493	0.58994	1.30160
24	9.73920	0.7918	1.18865	1.06639	9	9.82645	0.8496	0.55423	1.30307
25	9.74134	0.7906	1.18346	1.07685	10	9.82749	0.8508	0.51520	1.30441
26	+9.74272	+0.7897	-1.17807	-1.08694	11	+9.82879	+0.8530	-0.47217	-1.30563
27	9.74347	0.7895	1.17250	1.09667	12	9.83058	0.8558	0.42429	1.30673
28	9.74389	0.7906	1.16672	1.10605	13	9.83298	0.8588	0.37033	1.30770
29	9.74432	0.7928	1.16075	1.11512	14	9.83595	0.8614	0.30857	1.30855
30	9.74504	0.7962	1.15457	1.12387	15	9.83933	0.8631	0.23642	1.30928
May 1	+9.74621	+0.8000	-1.14818	-1.13232	16	+9.84285	+0.8635	-0.14973	-1.30989
2	9.74790	0.8039	1.14158	1.14049	17	9.84619	0.8628	0.04112	1.31037
3	9.75004	0.8075	1.13474	1.14838	18	9.84907	0.8611	9.89588	1.31074
4	9.75250	0.8106	1.12768	1.15600	19	9.85130	0.8592	9.67594	1.31098
h 5	9.75517	0.8128	1.12037	1.16336	h 20	9.85293	0.8574	-9.20801	1.31110
(15.0) 6	+9.75788	+0.8143	-1.11282	-1.17048	(18.0) 21	+9.85408	+0.8565	+9.17978	-1.31110
7	9.76049	0.8151	1.10501	1.17736	22	9.85502	0.8566	9.66642	1.31098
8	9.76290	0.8153	1.09694	1.18400	23	9.85601	0.8577	9.89005	1.31075
9	9.76501	0.8150	1.08859	1.19043	24	9.85723	0.8596	0.03683	1.31039
10	9.76674	0.8146	1.07995	1.19663	25	9.85881	0.8617	0.14622	1.30991
11	+9.76807	+0.8144	-1.07101	-1.20262	26	+9.86076	+0.8638	+0.23342	-1.30931
12	9.76905	0.8148	1.06177	1.20841	27	9.86301	0.8655	0.30590	1.30858
13	9.76987	0.8162	1.05220	1.21400	28	9.86547	0.8665	0.36789	1.30774
14	9.77080	0.8187	1.04229	1.21940	29	9.86801	0.8669	0.42201	1.30678
15	9.77213	0.8221	1.03203	1.22460	30	9.87050	0.8665	0.47002	1.30569
16	+9.77407	+0.8261	-1.02141	-1.22962	July 1	+9.87286	+0.8655	+0.51314	-1.30448
17	+9.77673	+0.8300	-1.01039	-1.23446	2	+9.87501	+0.8640	+0.55224	-1.30314

E = +0'.03 - +0.002

FOR WASHINGTON MEAN MIDNIGHT.

Solar Day. (Sid. Hr.)	Log A.	Log B.	Log C.	Log D.	Solar Day. (Sid. Hr.)	Log A.	Log B.	Log C.	Log D.
July 1	+9.87286	+0.8655	+0.51314	-1.30448	Aug. 16	+9.94124	+0.8326	+1.18151	-1.08058
2	9.87501	0.8640	0.55224	1.30314	17	9.94163	0.8330	1.18672	1.07036
3	9.87686	0.8622	0.58801	1.30168	18	9.94225	0.8341	1.19175	1.05978
4	9.87838	0.8604	0.62095	1.30010	19	9.94315	0.8355	1.19661	1.04880
5	9.87958	0.8588	0.65145	1.29838	20	9.94432	0.8368	1.20128	1.03741
h (19.0) 6	+9.88053	+0.8579	+0.67984	-1.29654	h (22.0) 21	+9.94571	+0.8374	+1.20579	-1.02557
7	9.88139	0.8578	0.70638	1.29458	22	9.94722	0.8375	1.21014	1.01328
8	9.88234	0.8587	0.73127	1.29248	23	9.94874	0.8368	1.21432	1.00050
9	9.88361	0.8603	0.75471	1.29025	24	9.95017	0.8354	1.21834	0.98720
10	9.88540	0.8623	0.77683	1.28789	25	9.95146	0.8336	1.22220	0.97334
11	+9.88771	+0.8641	+0.79778	-1.28539	26	+9.95256	+0.8313	+1.22590	-0.95830
12	9.89047	0.8652	0.81764	1.28276	27	9.95342	0.8288	1.22946	0.94382
13	9.89344	0.8652	0.83652	1.27999	28	9.95400	0.8265	1.23286	0.92807
14	9.89637	0.8639	0.85451	1.27708	29	9.95434	0.8246	1.23612	0.91158
15	9.89895	0.8616	0.87166	1.27403	30	9.95450	0.8236	1.23924	0.89432
16	+9.90104	+0.8588	+0.88806	-1.27083	31	+9.95461	+0.8237	+1.24220	-0.87619
17	9.90256	0.8560	0.90373	1.26749	Sept. 1	9.95486	0.8245	1.24503	0.85714
18	9.90359	0.8538	0.91874	1.26400	2	9.95543	0.8263	1.24772	0.83708
19	9.90433	0.8527	0.93314	1.26037	3	9.95640	0.8284	1.25027	0.81590
h (20.0) 20	9.90501	0.8527	0.94696	1.25658	h (23.0) 4	9.95779	0.8301	1.25268	0.79348
21	+9.90585	+0.8535	+0.96024	-1.25263	5	+9.95950	+0.8309	+1.25495	-0.76971
22	9.90697	0.8548	0.97301	1.24853	6	9.96134	0.8306	1.25709	0.74440
23	9.90840	0.8582	0.98530	1.24426	7	9.96307	0.8290	1.25910	0.71738
24	9.91013	0.8573	0.99714	1.23983	8	9.96449	0.8265	1.26098	0.68842
25	9.91206	0.8578	1.00854	1.23524	9	9.96546	0.8237	1.26272	0.65724
26	+9.91408	+0.8576	+1.01953	-1.23046	10	+9.96596	+0.8212	+1.26433	-0.62349
27	9.91610	0.8567	1.03014	1.22552	11	9.96614	0.8196	1.26581	0.58673
28	9.91800	0.8552	1.04038	1.22039	12	9.96618	0.8193	1.26717	0.54641
29	9.91972	0.8531	1.05027	1.21508	13	9.96625	0.8201	1.26839	0.50180
30	9.92119	0.8507	1.05982	1.20958	14	9.96650	0.8219	1.26949	0.45191
31	+9.92240	+0.8482	+1.06905	-1.20389	15	+9.96702	+0.8241	+1.27046	-0.39535
Aug. 1	9.92328	0.8458	1.07797	1.19799	16	9.96784	0.8262	1.27180	0.33014
2	9.92389	0.8440	1.08660	1.19189	17	9.96892	0.8280	1.27201	0.25319
3	9.92438	0.8430	1.09494	1.18558	18	9.97011	0.8291	1.27260	0.15939
4	9.92487	0.8430	1.10301	1.17905	h (0.0) 19	9.97136	0.8294	1.27306	0.09936
h (21.0) 5	+9.92558	+0.8439	+1.11081	-1.17229	20	+9.97267	+0.8292	+1.27339	-0.87262
6	9.92667	0.8454	1.11836	1.16530	21	9.97367	0.8283	1.27360	0.59810
7	9.92823	0.8469	1.12567	1.15807	22	9.97461	0.8270	1.27368	-8.66888
8	9.93023	0.8479	1.13273	1.15060	23	9.97532	0.8256	1.27363	+9.48182
9	9.93250	0.8479	1.13957	1.14286	24	9.97581	0.8241	1.27346	9.81500
10	+9.93481	+0.8466	+1.14618	-1.13485	25	+9.97607	+0.8231	+1.27316	+0.00141
11	9.93692	0.8442	1.15258	1.12657	26	9.97616	0.8228	1.27273	0.13134
12	9.93862	0.8411	1.15877	1.11800	27	9.97618	0.8234	1.27217	0.23117
13	9.93982	0.8378	1.16475	1.10913	28	9.97629	0.8251	1.27149	0.31222
14	9.94056	0.8350	1.17053	1.09994	29	9.97665	0.8276	1.27067	0.39042
15	+9.94096	+0.8332	+1.17612	-1.09043	30	+9.97733	+0.8307	+1.26973	+0.43928
16	+9.94124	+0.8326	+1.18151	-1.08058	Oct. 1	+9.97852	+0.8336	+1.26865	+0.49102

FOR WASHINGTON MEAN MIDNIGHT.

Solar Day. (Sid. Hr.)	Log A.	Log B.	Log C.	Log D.	Solar Day. (Sid. Hr.)	Log A.	Log B.	Log C.	Log D.
Oct. 1	+9.97852	+0.8336	+1.26865	+0.49102	Nov. 16	+0.02360	+0.8885	+1.03686	+1.22220
2	9.98002	0.8358	1.26744	0.53716	17	0.02465	0.8882	1.02590	1.22754
3	9.98172	0.8370	1.26610	0.57878	18	0.02549	0.8881	1.01452	1.23268
h 4	9.98338	0.8369	1.26463	0.61666	h 19	0.02615	0.8883	1.00269	1.23764
(1.0) 5	9.98480	0.8358	1.26302	0.65140	(4.0) 20	0.02671	0.8892	0.99039	1.24240
6	+9.98584	+0.8342	+1.26127	+0.68347	21	+0.02728	+0.8909	+0.97758	+1.24698
7	9.98646	0.8327	1.25939	0.71823	22	0.02801	0.8934	0.96424	1.25138
8	9.98672	0.8319	1.25736	0.74098	23	0.02901	0.8963	0.95034	1.25560
9	9.98675	0.8322	1.25520	0.76696	24	0.03036	0.8996	0.93583	1.25966
10	9.98678	0.8338	1.25289	0.79136	25	0.03209	0.9025	0.92067	1.26354
11	+9.98700	+0.8363	+1.25044	+0.81435	26	+0.03413	+0.9046	+0.90482	+1.26725
12	9.98747	0.8395	1.24784	0.83607	27	0.03626	0.9057	0.88822	1.27080
13	9.98826	0.8426	1.24510	0.85665	28	0.03831	0.9057	0.87081	1.27418
14	9.98932	0.8455	1.24220	0.87618	29	0.04010	0.9049	0.85253	1.27741
15	9.99054	0.8478	1.23916	0.89476	30	0.04150	0.9038	0.83330	1.28048
16	+9.99186	+0.8494	+1.23596	+0.91246	Dec. 1	+0.04254	+0.9029	+0.81302	+1.28339
17	9.99315	0.8503	1.23260	0.92935	2	0.04328	0.9026	0.79159	1.28616
18	9.99436	0.8506	1.22908	0.94548	3	0.04386	0.9033	0.76890	1.28876
19	9.99544	0.8504	1.22540	0.96092	h 4	0.04447	0.9049	0.74481	1.29122
h 20	9.99634	0.8500	1.22156	0.97572	(5.0) 5	0.04528	0.9073	0.71915	1.29353
(3.0) 21	+9.99704	+0.8496	+1.21754	+0.98990	6	+0.04636	+0.9099	+0.69172	+1.29570
22	9.99752	0.8494	1.21836	1.00351	7	0.04770	0.9124	0.66229	1.29771
23	9.99784	0.8498	1.20900	1.01659	8	0.04924	0.9145	0.63055	1.29958
24	9.99807	0.8510	1.20446	1.02917	9	0.05091	0.9160	0.59617	1.30131
25	9.99837	0.8531	1.19974	1.04127	10	0.05264	0.9167	0.55866	1.30290
26	+9.99885	+0.8561	+1.19483	+1.05292	11	+0.05429	+0.9169	+0.51744	+1.30434
27	9.99966	0.8597	1.18972	1.06414	12	0.05585	0.9165	0.47174	1.30564
28	0.00089	0.8633	1.18442	1.07496	13	0.05726	0.9158	0.42049	1.30681
29	0.00249	0.8664	1.17892	1.08539	14	0.05849	0.9149	0.36221	1.30783
30	0.00435	0.8686	1.17321	1.09546	15	0.05952	0.9140	0.29471	1.30871
31	+0.00623	+0.8696	+1.16729	+1.10517	16	+0.06038	+0.9134	+0.21458	+1.30946
Nov. 1	0.00796	0.8695	1.16115	1.11454	17	0.06111	0.9131	0.11605	1.31006
2	0.00937	0.8687	1.15478	1.12360	18	0.06178	0.9136	9.98822	1.31053
3	0.01038	0.8679	1.14817	1.13234	19	0.06255	0.9149	9.80605	1.31087
h 4	0.01099	0.8675	1.14133	1.14078	h 20	0.06349	0.9167	+9.48592	1.31106
(3.0) 5	+0.01137	+0.8680	+1.13423	+1.14894	(6.0) 21	+0.06477	+0.9189	-8.44113	+1.31112
6	0.01167	0.8695	1.12688	1.15682	22	0.06639	0.9200	9.55798	1.31104
7	0.01207	0.8721	1.11926	1.16444	23	0.06830	0.9224	9.84203	1.31082
8	0.01272	0.8753	1.11137	1.17179	24	0.07089	0.9229	0.01223	1.31047
9	0.01367	0.8786	1.10319	1.17890	25	0.07247	0.9224	0.13410	1.30997
10	+0.01491	+0.8818	+1.09471	+1.18576	26	+0.07435	+0.9209	-0.22905	+1.30934
11	0.01636	0.8845	1.08592	1.19238	27	0.07589	0.9190	0.30682	1.30857
12	0.01792	0.8864	1.07682	1.19878	28	0.07708	0.9170	0.37264	1.30766
13	0.01950	0.8877	1.06737	1.20495	29	0.07794	0.9155	0.42967	1.30662
14	0.02100	0.8884	1.05757	1.21091	30	0.07860	0.9148	0.47995	1.30543
15	+0.02238	+0.8886	+1.04741	+1.21666	31	+0.07922	+0.9152	-0.52490	+1.30410
16	+0.02360	+0.8885	+1.03686	+1.22220	32	+0.07993	+0.9162	-0.56560	+1.30263

## FOR WASHINGTON MEAN MIDNIGHT.

Solar Day. (Sidereal Hour.)	$\tau$	$f$		$f'$		$G$		$H$		Log $\rho$ .	Log $\lambda$ .	$i$	Log $i$ .
		In Time.		In Time.		In Arc.	In Time.	In Arc.	In Time.				
Jan.	0	-0.0012	+0.869	-0.015		47 50.2	3 11.3	351 16.0	23 25.1	0.91773	1.31017	-1.35	-0.1288
	1	+0.0015	0.880	0.013		47 37.0	3 10.5	350 19.7	23 21.3	0.92212	1.30997	1.49	0.1726
	2	0.0043	0.890	0.009		47 16.4	3 9.1	349 23.3	23 17.5	0.92681	1.30974	1.63	0.2122
	3	0.0070	0.900	-0.002		46 47.6	3 7.2	348 26.8	23 13.8	0.93128	1.30949	1.77	0.2484
	4	0.0097	0.911	+0.005		46 12.8	3 4.9	347 30.2	23 10.0	0.93506	1.30921	1.91	0.2817
h (7.0)	5	0.0125	+0.922	+0.011		45 34.4	3 2.3	346 33.6	23 6.2	0.93795	1.30892	-2.05	-0.3125
	6	0.0152	0.932	0.015		44 57.1	2 59.8	345 36.9	23 2.5	0.93977	1.30861	2.19	0.3411
	7	0.0180	0.942	0.016		44 24.7	2 57.6	344 40.1	22 58.7	0.94081	1.30828	2.33	0.3678
	8	0.0207	0.953	0.014		43 58.8	2 55.9	343 43.3	22 54.8	0.94139	1.30793	2.47	0.3928
	9	0.0234	0.963	0.009		43 40.9	2 54.7	342 46.3	22 51.1	0.94189	1.30757	2.61	0.4164
	10	0.0262	+0.973	+0.004		43 29.7	2 54.0	341 49.2	22 47.3	0.94269	1.30718	-2.75	-0.4386
	11	0.0289	0.983	-0.001		43 22.9	2 53.5	340 52.1	22 43.5	0.94412	1.30678	2.88	0.4596
	12	0.0316	0.993	0.005		43 17.8	2 53.2	339 54.8	22 39.7	0.94614	1.30635	3.02	0.4795
	13	0.0344	1.003	0.008		43 11.5	2 52.8	338 57.4	22 35.8	0.94874	1.30591	3.15	0.4984
	14	0.0371	1.013	0.008		43 1.9	2 52.1	337 59.9	22 32.0	0.95173	1.30545	3.28	0.5163
	15	0.0399	+1.023	-0.007		42 48.3	2 51.2	337 2.3	22 28.2	0.95486	1.30499	-3.42	-0.5334
	16	0.0426	1.033	0.005		42 30.6	2 50.0	336 4.6	22 24.3	0.95793	1.30450	3.55	0.5498
	17	0.0453	1.042	-0.001		42 9.0	2 48.6	335 6.7	22 20.4	0.96082	1.30400	3.68	0.5654
	18	0.0481	1.052	+0.002		41 44.0	2 46.9	334 8.7	22 16.6	0.96338	1.30349	3.80	0.5803
	19	0.0508	1.061	0.005		41 16.5	2 45.1	333 10.6	22 12.7	0.96548	1.30295	3.93	0.5946
h (8.0)	20	0.0536	+1.071	+0.007		40 48.3	2 43.2	332 12.3	22 8.8	0.96706	1.30241	-4.06	-0.6083
	21	0.0563	1.080	0.008		40 20.8	2 41.4	331 13.9	22 4.9	0.96810	1.30186	4.18	0.6215
	22	0.0590	1.089	0.006		39 56.4	2 39.8	330 15.3	22 1.0	0.96864	1.30129	4.31	0.6341
	23	0.0618	1.099	+0.003		39 36.6	2 38.4	329 16.7	21 57.1	0.96887	1.30070	4.43	0.6463
	24	0.0645	1.108	-0.002		39 22.7	2 37.5	328 17.8	21 53.2	0.96911	1.30012	4.55	0.6580
	25	0.0672	+1.117	-0.007		39 14.4	2 37.0	327 18.9	21 49.3	0.96973	1.29952	-4.67	-0.6692
	26	0.0700	1.125	0.012		39 10.3	2 36.7	326 19.8	21 45.3	0.97093	1.29891	4.79	0.6800
	27	0.0727	1.134	0.014		39 7.4	2 36.5	325 20.5	21 41.4	0.97303	1.29830	4.90	0.6904
	28	0.0754	1.143	0.014		39 2.3	2 36.2	324 21.1	21 37.4	0.97592	1.29767	5.02	0.7004
	29	0.0782	1.152	0.011		38 51.5	2 35.4	323 21.6	21 33.4	0.97935	1.29703	5.13	0.7101
	30	0.0809	+1.160	-0.005		38 33.4	2 34.2	322 21.8	21 29.5	0.98290	1.29639	-5.24	-0.7194
	31	0.0837	1.168	+0.002		38 8.7	2 32.6	321 22.0	21 25.5	0.98612	1.29574	5.35	0.7284
Feb.	1	0.0864	1.177	0.008		37 39.1	2 30.6	320 21.9	21 21.5	0.98867	1.29510	5.46	0.7371
	2	0.0891	1.185	0.013		37 8.1	2 28.5	319 21.7	21 17.4	0.99037	1.29444	5.57	0.7455
	3	0.0919	1.193	0.015		36 39.5	2 26.6	318 21.4	21 13.4	0.99126	1.29379	5.67	0.7535
h (9.0)	4	0.0946	+1.201	+0.014		36 16.0	2 25.1	317 20.9	21 9.4	0.99151	1.29312	-5.77	-0.7613
	5	0.0974	1.209	0.010		35 59.3	2 24.0	316 20.2	21 5.3	0.99149	1.29247	5.87	0.7688
	6	0.1001	1.217	+0.005		35 48.9	2 23.3	315 19.3	21 1.3	0.99157	1.29181	5.97	0.7761
	7	0.1028	1.224	0.000		35 44.1	2 22.9	314 18.3	20 57.2	0.99200	1.29114	6.07	0.7831
	8	0.1056	1.232	-0.005		35 42.3	2 22.8	313 17.1	20 53.1	0.99300	1.29048	6.16	0.7898
	9	0.1083	+1.239	-0.007		35 40.9	2 22.7	312 15.8	20 49.1	0.99456	1.28982	-6.26	-0.7964
	10	0.1110	1.247	0.008		35 37.8	2 22.5	311 14.2	20 45.0	0.99656	1.28916	6.35	0.8026
	11	0.1138	1.254	0.007		35 31.6	2 22.1	310 12.5	20 40.8	0.99882	1.28851	6.44	0.8087
	12	0.1165	1.261	0.005		35 21.8	2 21.5	309 10.7	20 36.7	1.00114	1.28786	6.52	0.8145
	13	0.1193	1.268	-0.002		35 8.5	2 20.6	308 8.7	20 32.6	1.00340	1.28722	6.61	0.8202
	14	0.1220	+1.275	+0.001		34 51.8	2 19.5	307 6.5	20 28.4	1.00543	1.28658	-6.69	-0.8256
	15	0.1247	1.282	+0.004		34 32.2	2 18.1	306 4.2	20 24.3	1.00721	1.28595	-6.77	-0.8306

FOR WASHINGTON MEAN MIDNIGHT.

Solar Day. (Sidereal Hour.)	$\tau$	$f$		$G$		$H$		Log $\mu$	Log $\lambda$	$i$	Log $i$		
		In Time.	In Time.	In Arc.	In Time.	In Arc.	In Time.						
Feb.	15	0.1247	+1.282	+0.004	34 32.2	2 18.1	306 4.2	20 24.3	1.00721	1.28595	-6.77	-0.8308	
	16	0.1275	1.289	0.007	34 11.4	2 16.8	305 1.6	20 20.1	1.00653	1.28531	6.85	0.8358	
	17	0.1302	1.296	0.008	33 50.1	2 15.3	303 59.0	20 15.9	1.00936	1.28470	6.93	0.8406	
	18	0.1330	1.302	0.007	33 30.6	2 14.0	302 56.2	20 11.7	1.00973	1.28410	7.00	0.8453	
	19	0.1357	1.309	+0.005	33 14.9	2 13.0	301 53.2	20 7.5	1.00976	1.28350	7.07	0.8497	
	(10.0)	20	0.1384	+1.315	0.000	33 4.0	2 12.3	300 50.0	20 3.3	1.00958	1.28291	-7.14	-0.8540
	21	0.1412	1.322	-0.004	32 58.6	2 11.9	299 46.8	19 59.1	1.00961	1.28233	7.21	0.8581	
	22	0.1439	1.328	0.009	32 58.0	2 11.9	298 43.5	19 54.9	1.01010	1.28177	7.28	0.8620	
	23	0.1466	1.334	0.013	33 0.7	2 12.0	297 39.9	19 50.7	1.01117	1.28122	7.34	0.8658	
	24	0.1494	1.340	0.014	33 8.9	2 12.2	296 36.3	19 46.4	1.01309	1.28069	7.40	0.8693	
25	0.1521	+1.346	-0.011	33 1.8	2 12.1	295 32.6	19 42.2	1.01567	1.28017	-7.46	-0.8728		
26	0.1548	1.352	-0.007	32 55.0	2 11.7	294 28.7	19 37.9	1.01859	1.27966	7.52	0.8760		
27	0.1576	1.358	0.000	32 41.6	2 10.8	293 24.7	19 33.6	1.02147	1.27918	7.57	0.8791		
28	0.1603	1.364	+0.006	32 22.8	2 9.5	292 20.6	19 29.4	1.02387	1.27871	7.62	0.8821		
29	0.1631	1.370	0.011	32 1.0	2 8.1	291 16.5	19 25.1	1.02561	1.27826	7.67	0.8849		
Mar.	1	0.1658	+1.375	+0.014	31 39.4	2 6.6	290 12.2	19 20.8	1.02652	1.27782	-7.72	-0.8875	
	2	0.1685	1.381	0.014	31 21.0	2 5.4	289 7.8	19 16.5	1.02677	1.27741	7.76	0.8900	
	3	0.1713	1.387	0.011	31 8.3	2 4.5	288 3.4	19 12.2	1.02660	1.27702	7.80	0.8923	
	4	0.1740	1.392	0.006	31 2.0	2 4.1	286 58.8	19 7.9	1.02637	1.27664	7.84	0.8945	
	5	0.1768	1.398	+0.001	31 1.6	2 4.1	285 54.2	19 3.6	1.02639	1.27628	7.88	0.8966	
	(11.0)	6	0.1795	+1.403	-0.004	31 4.9	2 4.3	284 49.4	18 59.3	1.02639	1.27594	-7.92	-0.8985
	7	0.1822	1.408	0.007	31 9.7	2 4.6	283 44.8	18 55.0	1.02796	1.27563	7.95	0.9004	
	8	0.1850	1.414	0.008	31 18.8	2 4.9	282 40.0	18 50.7	1.02950	1.27534	7.98	0.9019	
	9	0.1877	1.419	0.008	31 15.7	2 5.0	281 35.1	18 46.3	1.03139	1.27507	8.01	0.9034	
	10	0.1904	1.424	0.006	31 14.2	2 4.9	280 30.2	18 42.0	1.03346	1.27483	8.03	0.9048	
11	0.1932	+1.429	-0.004	31 9.5	2 4.6	279 25.3	18 37.7	1.03552	1.27461	-8.05	-0.9060		
12	0.1959	1.434	0.000	31 1.3	2 4.1	278 20.3	18 33.4	1.03749	1.27441	8.07	0.9070		
13	0.1987	1.440	+0.003	30 50.6	2 3.4	277 15.3	18 29.0	1.03920	1.27423	8.09	0.9080		
14	0.2014	1.445	0.006	30 37.8	2 2.5	276 10.3	18 24.7	1.04059	1.27408	8.11	0.9088		
15	0.2041	1.450	0.007	30 24.4	2 1.6	275 5.3	18 20.4	1.04158	1.27394	8.12	0.9095		
16	0.2069	+1.455	+0.007	30 11.6	2 0.8	274 0.2	18 16.0	1.04216	1.27385	-8.13	-0.9100		
17	0.2096	1.460	0.005	30 1.2	2 0.1	272 55.2	18 11.7	1.04237	1.27377	8.14	0.9105		
18	0.2124	1.465	+0.002	29 54.9	1 59.7	271 50.2	18 7.3	1.04238	1.27372	8.14	0.9108		
19	0.2151	1.470	-0.003	29 53.5	1 59.6	270 45.2	18 3.0	1.04241	1.27369	8.15	0.9109		
20	0.2178	1.475	0.008	29 57.0	1 59.8	269 40.3	17 58.7	1.04275	1.27369	8.15	0.9109		
21	0.2206	+1.480	-0.011	30 4.2	2 0.3	268 35.4	17 54.4	1.04365	1.27372	-8.14	-0.9108		
(12.0)	22	0.2233	1.485	0.013	30 12.5	2 0.8	267 30.5	17 50.0	1.04530	1.27375	8.14	0.9106	
23	0.2260	1.490	0.012	30 18.7	2 1.2	266 25.7	17 45.7	1.04765	1.27381	8.13	0.9102		
24	0.2288	1.496	0.008	30 20.6	2 1.4	265 21.0	17 41.4	1.05046	1.27392	8.12	0.9097		
25	0.2315	1.501	-0.002	30 16.6	2 1.1	264 16.4	17 37.1	1.05340	1.27403	8.11	0.9091		
26	0.2342	+1.506	+0.005	30 6.8	2 0.5	263 11.8	17 32.8	1.05607	1.27416	-8.10	-0.9084		
27	0.2370	1.511	0.011	29 53.0	1 59.5	262 7.2	17 28.5	1.05817	1.27433	8.08	0.9075		
28	0.2397	1.516	0.014	29 38.2	1 58.5	261 2.8	17 24.2	1.06056	1.27452	8.06	0.9064		
29	0.2425	1.521	0.015	29 25.2	1 57.7	259 58.5	17 19.9	1.06022	1.27472	8.04	0.9053		
30	0.2452	1.526	0.012	29 16.7	1 57.1	258 54.3	17 15.6	1.06043	1.27495	8.02	0.9040		
31	0.2479	+1.532	+0.008	29 14.0	1 56.9	257 50.2	17 11.3	1.06045	1.27521	-7.99	-0.9026		
Apr.	1	0.2507	+1.537	+0.002	29 16.8	1 57.1	256 46.2	17 7.1	1.06060	1.27549	-7.96	-0.9011	

FOR WASHINGTON MEAN MIDNIGHT.

Solar Day. (Sidereal Hour.)	$\tau$	$f$		$g$		$H$		Log $g$	Log $h$	$i$	Log $i$
		In Time.	In Time.	In Arc.	In Time.	In Arc.	In Time.				
Apr. 1	0.2507	+1.537	+0.002	29 16.8	1 57.1	256 46.2	17 7.1	1.06060	1.27549	-7.96	-0.9011
2	0.2534	1.542	-0.003	29 23.7	1 57.6	256 42.4	17 2.8	1.06118	1.27579	7.93	0.8994
3	0.2562	1.548	0.006	29 32.9	1 58.2	254 38.7	16 58.6	1.06228	1.27611	7.90	0.8976
4	0.2589	1.553	0.008	29 41.9	1 58.8	253 35.1	16 54.3	1.06388	1.27645	7.86	0.8956
5	0.2616	1.558	0.009	29 49.0	1 59.3	252 31.7	16 50.1	1.06591	1.27680	7.83	0.8935
h (13.0) 6	0.2644	+1.564	-0.007	29 53.2	1 59.5	251 28.4	16 45.9	1.06816	1.27718	-7.79	-0.8913
7	0.2671	1.569	0.005	29 54.1	1 59.6	250 25.2	16 41.7	1.07049	1.27758	7.75	0.8890
8	0.2698	1.575	-0.001	29 51.9	1 59.5	249 22.2	16 37.5	1.07272	1.27799	7.70	0.8865
9	0.2726	1.581	+0.002	29 46.7	1 59.1	248 19.3	16 33.3	1.07480	1.27843	7.65	0.8838
10	0.2753	1.586	0.005	29 39.5	1 58.6	247 16.6	16 29.1	1.07659	1.27887	7.60	0.8810
11	0.2781	+1.592	+0.006	29 31.1	1 58.1	246 14.1	16 24.9	1.07804	1.27933	-7.55	-0.8781
12	0.2808	1.598	0.007	29 22.8	1 57.5	245 11.7	16 20.8	1.07914	1.27982	7.50	0.8750
13	0.2835	1.603	0.005	29 15.9	1 57.1	244 9.5	16 16.6	1.07988	1.28033	7.45	0.8718
14	0.2863	1.610	+0.002	29 12.1	1 56.8	243 7.5	16 12.5	1.08040	1.28083	7.39	0.8684
15	0.2890	1.616	-0.002	29 12.3	1 56.8	242 5.7	16 8.4	1.08089	1.28134	7.33	0.8649
16	0.2918	+1.622	-0.007	29 17.0	1 57.1	241 4.0	16 4.3	1.08157	1.28188	-7.26	-0.8612
17	0.2945	1.628	0.011	29 25.2	1 57.7	240 2.5	16 0.2	1.08272	1.28242	7.20	0.8574
18	0.2972	1.634	0.013	29 35.1	1 58.3	239 1.2	15 56.1	1.08451	1.28299	7.14	0.8534
19	0.3000	1.640	0.013	29 44.1	1 58.9	238 0.1	15 52.0	1.08699	1.28356	7.07	0.8492
h (14.0) 20	0.3027	1.647	0.009	29 49.5	1 59.3	236 59.2	15 48.0	1.08997	1.28413	7.00	0.8449
21	0.3054	+1.653	-0.004	29 49.8	1 59.3	235 58.5	15 43.9	1.09319	1.28472	-6.93	-0.8404
22	0.3082	1.660	+0.003	29 44.4	1 59.0	234 58.0	15 39.9	1.09632	1.28532	6.85	0.8358
23	0.3109	1.666	0.010	29 34.7	1 58.3	233 57.7	15 35.8	1.09900	1.28593	6.77	0.8309
24	0.3136	1.673	0.014	29 22.9	1 57.4	232 57.6	15 31.8	1.10109	1.28653	6.70	0.8259
25	0.3164	1.680	0.016	29 11.9	1 56.8	231 57.8	15 27.9	1.10236	1.28715	6.62	0.8207
26	0.3191	+1.687	+0.014	29 4.0	1 56.3	230 58.1	15 23.9	1.10319	1.28776	-6.54	-0.8153
27	0.3219	1.694	0.010	29 0.9	1 56.1	229 58.6	15 19.9	1.10372	1.28839	6.45	0.8098
28	0.3246	1.701	+0.005	29 3.0	1 56.2	228 59.3	15 16.0	1.10429	1.28902	6.37	0.8040
29	0.3273	1.708	-0.001	29 9.3	1 56.6	228 0.3	15 12.0	1.10516	1.28964	6.28	0.7980
30	0.3301	1.715	0.005	29 18.0	1 57.2	227 1.4	15 8.1	1.10650	1.29027	6.19	0.7918
May 1	0.3328	+1.723	-0.008	29 27.1	1 57.8	226 2.8	15 4.2	1.10832	1.29090	-6.10	-0.7854
2	0.3356	1.730	0.009	29 34.7	1 58.3	225 4.3	15 0.3	1.11055	1.29156	6.01	0.7788
3	0.3383	1.737	0.008	29 39.7	1 58.6	224 6.0	14 56.4	1.11305	1.29218	5.92	0.7720
4	0.3410	1.745	0.005	29 41.6	1 58.8	223 8.0	14 52.6	1.11564	1.29282	5.82	0.7649
h (15.0) 5	0.3438	1.753	-0.002	29 40.2	1 58.7	222 10.1	14 48.7	1.11821	1.29344	5.72	0.7576
6	0.3465	+1.760	+0.001	29 36.1	1 58.4	221 12.5	14 44.8	1.12068	1.29406	-5.62	-0.7501
7	0.3492	1.768	0.004	29 29.8	1 58.0	220 15.0	14 41.0	1.12279	1.29470	5.52	0.7423
8	0.3520	1.776	0.006	29 22.2	1 57.3	219 17.7	14 37.2	1.12467	1.29532	5.42	0.7342
9	0.3547	1.784	0.006	29 14.2	1 56.9	218 20.6	14 33.4	1.12620	1.29594	5.32	0.7258
10	0.3575	1.792	0.006	29 7.1	1 56.5	217 23.7	14 29.6	1.12743	1.29655	5.21	0.7172
11	0.3602	+1.800	+0.003	29 2.0	1 56.1	216 26.9	14 25.8	1.12840	1.29715	-5.11	-0.7083
12	0.3629	1.808	-0.001	29 0.1	1 56.0	215 30.3	14 22.0	1.12923	1.29775	5.00	0.6990
13	0.3657	1.817	0.006	29 1.9	1 56.1	214 33.9	14 18.3	1.13019	1.29834	4.89	0.6895
14	0.3684	1.825	0.011	29 7.1	1 56.5	213 37.7	14 14.5	1.13149	1.29894	4.78	0.6796
15	0.3712	1.833	0.014	29 14.2	1 56.9	212 41.6	14 10.8	1.13332	1.29951	4.67	0.6693
16	0.3739	+1.842	-0.014	29 21.6	1 57.3	211 45.8	14 7.1	1.13574	1.30008	-4.56	-0.6587
17	0.3766	+1.851	-0.011	29 25.4	1 57.7	210 50.1	14 3.3	1.13872	1.30065	-4.44	-0.6476

INDEPENDENT STAR-NUMBERS, 1920.

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FOR WASHINGTON MEAN MIDNIGHT.

Solar Day. (Sidereal Hour.)	r	f		g		H		Log g.	Log h.	i	Log i.		
		In Time.	In Time.	In Arc.	In Time.	In Arc.	In Time.						
May	17	0.3766	+1.851	-0.011	29 25.4	1 57.7	210 50.1	14 3.8	1.13872	1.30665	-4.44	-0.6478	
	18	0.3794	1.860	-0.006	29 25.6	1 57.7	209 54.5	13 59.6	1.14200	1.30119	4.39	0.6362	
	19	0.3821	1.868	+0.001	29 20.5	1 57.4	208 59.1	13 55.9	1.14531	1.30173	4.21	0.6244	
	h	20	0.3848	1.877	0.007	29 11.0	1 56.7	208 3.9	13 52.3	1.14827	1.30225	4.10	0.6121
	(16.0)	21	0.3876	1.886	0.013	28 56.8	1 55.9	207 8.9	13 48.6	1.15074	1.30277	3.98	0.5993
	22	0.3903	+1.895	+0.016	28 46.1	1 55.1	206 13.9	13 44.9	1.15257	1.30328	-3.86	-0.5860	
	23	0.3930	1.904	0.016	28 35.5	1 54.4	205 19.1	13 41.8	1.15382	1.30377	3.73	0.5721	
	24	0.3958	1.913	0.012	28 28.9	1 53.9	204 24.5	13 37.6	1.15472	1.30425	3.61	0.5577	
	25	0.3985	1.923	0.007	28 26.8	1 53.8	203 30.1	13 34.0	1.15554	1.30471	3.49	0.5427	
	26	0.4013	1.932	+0.002	28 28.9	1 53.9	202 35.7	13 30.4	1.15648	1.30516	3.37	0.5270	
	27	0.4040	+1.941	-0.003	28 33.6	1 54.3	201 41.5	13 26.8	1.15730	1.30561	-3.24	-0.5106	
28	0.4067	1.951	0.006	28 39.3	1 54.6	200 47.4	13 23.2	1.15855	1.30608	3.12	0.4935		
29	0.4095	1.960	0.006	28 44.1	1 54.9	199 53.5	13 19.6	1.16169	1.30644	2.99	0.4755		
30	0.4122	1.970	0.007	28 46.8	1 55.1	198 59.6	13 16.0	1.16403	1.30683	2.86	0.4566		
31	0.4150	1.979	0.006	28 46.7	1 55.1	198 5.9	13 12.4	1.16660	1.30721	2.73	0.4368		
June	1	0.4177	+1.989	-0.003	28 43.7	1 54.9	197 12.3	13 8.8	1.16914	1.30756	-2.60	-0.4158	
	2	0.4204	1.998	0.000	28 38.0	1 54.5	196 18.8	13 5.3	1.17154	1.30791	2.47	0.3937	
	3	0.4232	2.008	+0.003	28 30.2	1 54.0	195 25.4	13 1.7	1.17374	1.30825	2.35	0.3703	
	4	0.4259	2.018	0.006	28 21.0	1 53.4	194 32.0	12 58.1	1.17571	1.30858	2.22	0.3454	
	h	5	0.4286	2.028	0.007	28 11.1	1 52.7	193 38.8	12 54.6	1.17736	1.30885	2.08	0.3189
	(17.0)	6	0.4314	+2.038	+0.006	28 1.5	1 52.1	192 45.7	12 51.0	1.17867	1.30913	-1.95	-0.2906
	7	0.4341	2.047	+0.004	27 53.4	1 51.6	191 52.6	12 47.4	1.17975	1.30940	1.82	0.2601	
	8	0.4369	2.057	0.000	27 47.6	1 51.2	190 59.5	12 44.0	1.18065	1.30964	1.69	0.2272	
	9	0.4396	2.067	-0.005	27 45.2	1 51.1	190 6.6	12 40.4	1.18153	1.30987	1.55	0.1915	
	10	0.4423	2.077	0.010	27 45.8	1 51.1	189 13.7	12 36.9	1.18262	1.31007	1.42	0.1525	
	11	0.4451	+2.087	-0.014	27 43.6	1 51.2	188 20.9	12 33.4	1.18412	1.31026	-1.29	-0.1094	
	12	0.4478	2.097	0.015	27 52.1	1 51.5	187 28.1	12 29.9	1.18613	1.31043	1.15	0.0816	
	13	0.4506	2.107	0.014	27 54.4	1 51.6	186 35.4	12 26.4	1.18863	1.31058	1.02	0.0076	
	14	0.4533	2.117	0.010	27 52.8	1 51.5	185 42.6	12 22.8	1.19153	1.31071	0.88	9.9458	
	15	0.4560	2.127	-0.003	27 47.2	1 51.1	184 50.0	12 19.3	1.19455	1.31083	0.75	9.8737	
16	0.4588	+2.137	+0.004	27 37.1	1 50.5	183 57.4	12 15.8	1.19740	1.31092	-0.61	-9.7870		
17	0.4615	2.148	0.010	27 23.8	1 49.6	183 4.8	12 12.3	1.19987	1.31100	0.48	9.6784		
18	0.4642	2.158	0.015	27 9.2	1 48.6	182 12.2	12 8.8	1.20179	1.31106	0.34	9.5331		
19	0.4670	2.168	0.016	26 55.8	1 47.7	181 19.6	12 5.3	1.20316	1.31109	0.21	9.3132		
h	20	0.4697	2.178	0.014	26 45.0	1 47.0	180 27.1	12 1.8	1.20410	1.31111	-0.07	-8.8453	
(18.0)	21	0.4724	+2.188	+0.010	26 38.4	1 46.6	179 34.6	11 58.3	1.20493	1.31111	+0.07	+8.8170	
22	0.4752	2.198	+0.004	26 35.8	1 46.4	178 42.1	11 54.8	1.20561	1.31109	0.20	9.8037		
23	0.4779	2.208	-0.001	26 36.2	1 46.4	177 49.6	11 51.3	1.20662	1.31106	0.34	9.5273		
24	0.4807	2.218	0.005	26 33.2	1 46.5	176 57.1	11 47.8	1.20796	1.31101	0.47	9.6741		
25	0.4834	2.229	0.007	26 40.1	1 46.7	176 4.5	11 44.3	1.20967	1.31093	0.61	9.7835		
26	0.4861	+2.239	-0.007	26 40.5	1 46.7	175 12.0	11 40.8	1.21164	1.31084	+0.74	+9.8707		
27	0.4889	2.249	0.006	26 33.6	1 46.6	174 19.4	11 37.3	1.21377	1.31072	0.88	9.9432		
28	0.4916	2.259	-0.003	26 34.1	1 46.3	173 26.9	11 33.8	1.21595	1.31058	1.01	0.0052		
29	0.4944	2.269	0.000	26 27.2	1 45.8	172 34.3	11 30.3	1.21805	1.31044	1.15	0.0593		
30	0.4971	2.278	+0.003	26 18.2	1 45.2	171 41.6	11 26.8	1.21996	1.31027	1.28	0.1073		
July	1	0.4998	+2.289	+0.006	26 7.7	1 44.5	170 49.0	11 23.3	1.22168	1.31008	+1.41	+0.1504	
	2	0.5026	+2.299	+0.007	25 56.4	1 43.8	169 56.1	11 19.7	1.22314	1.30988	+1.55	+0.1895	

## FOR WASHINGTON MEAN MIDNIGHT.

Solar Day. (Sidereal Hour.)	$\tau$	$f$		$G$		$H$		Log $g$ .	Log $h$ .	$i$	Log $l$ .				
		In Time.	In Time.	In Arc.	In Time.	In Arc.	In Time.								
July	y	s	s	°	'	h	m	°	'	h	m				
	1	0.4998	+2.289	+0.006	26 7.7	1 44.5	170 49.0	11 23.3	1.22168	1.31006	+1.41	+0.1504			
	2	0.5026	2.299	0.007	25 56.4	1 43.8	169 56.1	11 19.7	1.22314	1.30988	1.55	0.1896			
	3	0.5053	2.309	0.007	25 45.0	1 43.0	169 3.4	11 16.2	1.22429	1.30965	1.68	0.2253			
	4	0.5080	2.319	0.006	25 34.6	1 42.3	168 10.6	11 12.7	1.22520	1.30941	1.81	0.2582			
	5	0.5108	2.329	+0.002	25 26.2	1 41.7	167 17.7	11 9.2	1.22587	1.30915	1.94	0.2887			
	h (19.0)	6	0.5135	+2.339	-0.008	25 20.4	1 41.4	166 24.7	11 5.6	1.22647	1.30887	+2.08	+0.3171		
	7	0.5163	2.348	0.008	25 17.5	1 41.2	165 31.6	11 2.1	1.22712	1.30859	2.21	0.3436			
	8	0.5190	2.358	0.013	25 17.2	1 41.1	164 38.5	10 58.6	1.22809	1.30828	2.34	0.3685			
	9	0.5217	2.368	0.015	25 18.3	1 41.2	163 45.3	10 55.0	1.22943	1.30795	2.47	0.3920			
10	0.5245	2.377	0.015	25 19.0	1 41.2	162 52.0	10 51.5	1.23126	1.30760	2.59	0.4141				
11	0.5272	+2.387	-0.012	25 17.5	1 41.2	161 58.6	10 47.9	1.23348	1.30724	+2.72	+0.4350				
12	0.5300	2.396	-0.007	25 12.3	1 40.8	161 5.1	10 44.3	1.23593	1.30687	2.85	0.4549				
13	0.5327	2.406	0.009	25 3.2	1 40.2	160 11.5	10 40.3	1.23830	1.30648	2.98	0.4738				
14	0.5354	2.415	+0.007	24 50.4	1 39.4	159 17.8	10 37.2	1.24054	1.30607	3.10	0.4918				
15	0.5382	2.425	0.012	24 35.8	1 38.4	158 24.0	10 33.6	1.24227	1.30565	3.23	0.5080				
16	0.5409	+2.434	+0.015	24 21.1	1 37.4	157 30.0	10 30.0	1.24352	1.30521	+3.35	+0.5253				
17	0.5436	2.443	0.014	24 8.3	1 36.6	156 36.0	10 26.4	1.24431	1.30476	3.48	0.5410				
18	0.5464	2.452	-0.011	23 59.0	1 35.9	155 41.8	10 22.8	1.24481	1.30430	3.60	0.5560				
19	0.5491	2.462	+0.006	23 53.5	1 35.6	154 47.5	10 19.2	1.24524	1.30383	3.72	0.5704				
h (20.0)	20	0.5518	2.471	0.000	23 51.4	1 35.4	153 53.1	10 15.5	1.24581	1.30334	3.84	0.5842			
21	0.5546	+2.480	-0.004	23 51.4	1 35.4	152 58.6	10 11.9	1.24665	1.30284	+3.96	+0.5975				
22	0.5573	2.488	0.006	23 51.9	1 35.5	152 3.9	10 8.3	1.24779	1.30233	4.08	0.6103				
23	0.5601	2.497	0.007	23 51.8	1 35.5	151 9.1	10 4.6	1.24922	1.30180	4.19	0.6226				
24	0.5628	2.506	0.006	23 49.9	1 35.3	150 14.1	10 0.9	1.25084	1.30127	4.31	0.6344				
25	0.5655	2.515	-0.003	23 45.7	1 35.0	149 19.1	9 57.3	1.25254	1.30073	4.43	0.6458				
26	0.5683	+2.523	0.000	23 39.3	1 34.6	148 23.8	9 53.6	1.25421	1.30018	+4.54	+0.6566				
27	0.5710	2.532	+0.003	23 30.8	1 34.1	147 28.4	9 49.9	1.25576	1.29962	4.65	0.6674				
28	0.5738	2.540	0.006	23 20.9	1 33.4	146 32.9	9 46.2	1.25709	1.29904	4.76	0.6776				
29	0.5765	2.549	0.008	23 10.1	1 32.7	145 37.2	9 42.5	1.25825	1.29846	4.87	0.6875				
30	0.5792	2.557	0.008	22 58.9	1 31.9	144 41.3	9 38.8	1.25912	1.29788	4.98	0.6971				
31	0.5820	+2.565	+0.007	22 48.4	1 31.2	143 45.3	9 35.0	1.25976	1.29729	+5.09	+0.7063				
Aug.	1	0.5847	2.573	+0.004	22 39.2	1 30.6	142 49.1	9 31.3	1.26016	1.29668	5.19	0.7152			
2	0.5874	2.582	0.000	22 82.3	1 30.2	141 52.7	9 27.5	1.26040	1.29608	5.30	0.7239				
3	0.5902	2.589	-0.005	22 28.2	1 29.9	140 56.2	9 23.7	1.26068	1.29547	5.40	0.7322				
4	0.5929	2.597	0.010	22 26.9	1 29.3	139 59.4	9 20.0	1.26110	1.29486	5.50	0.7403				
h (21.0)	5	0.5957	+2.605	-0.014	22 27.5	1 29.8	139 2.5	9 16.2	1.26185	1.29424	+5.60	+0.7491			
6	0.5984	2.613	0.015	22 28.6	1 29.9	138 5.4	9 12.4	1.26299	1.29362	5.70	0.7556				
7	0.6011	2.620	0.013	22 28.5	1 29.9	137 8.1	9 8.5	1.26454	1.29299	5.79	0.7629				
8	0.6039	2.628	0.009	22 25.7	1 29.7	136 10.7	9 4.7	1.26640	1.29237	5.89	0.7700				
9	0.6066	2.635	-0.003	22 19.3	1 29.3	135 18.0	9 0.9	1.26834	1.29174	5.98	0.7768				
10	0.6094	+2.642	+0.004	22 9.4	1 28.6	134 15.1	8 57.0	1.27014	1.29110	+6.07	+0.7834				
11	0.6121	2.650	0.010	21 57.0	1 27.8	133 17.1	8 53.1	1.27161	1.29048	6.16	0.7898				
12	0.6148	2.657	0.013	21 43.6	1 26.9	132 18.9	8 49.3	1.27265	1.28986	6.25	0.7960				
13	0.6176	2.664	0.013	21 31.5	1 26.1	131 20.5	8 45.4	1.27323	1.28923	6.34	0.8020				
14	0.6203	2.671	0.011	21 22.0	1 25.5	130 21.8	8 41.5	1.27350	1.28860	6.43	0.8078				
15	0.6230	+2.678	+0.006	21 16.1	1 25.1	129 23.0	8 37.5	1.27361	1.28799	+6.51	+0.8134				
16	0.6258	+2.685	+0.001	21 13.7	1 24.9	128 24.1	8 33.6	1.27378	1.28787	+6.59	+0.8182				



FOR WASHINGTON MEAN MIDNIGHT.

Solar Day. (Sidereal Hour.)	r	f		g		H		Log $\phi$ .	Log $\lambda$ .	i	Log i.	
		In Time.	In Time.	In Arc.	In Time.	In Arc.	In Time.					
Aug. 16	y	0.6258	+2.685	+0.001	21 13.7	1 24.9	128 24.1	8 33.6	1.27378	1.28737	+6.59	+0.8188
17		0.6285	2.691	-0.003	21 13.8	1 24.9	127 24.9	8 29.7	1.27416	1.28876	6.67	0.8240
18		0.6312	2.698	0.006	21 15.2	1 25.0	126 25.6	8 25.7	1.27484	1.28616	6.74	0.8290
19		0.6340	2.705	0.007	21 16.5	1 25.1	125 26.0	8 21.7	1.27582	1.28556	6.82	0.8339
20		0.6367	2.711	0.006	21 16.6	1 25.1	124 26.3	8 17.8	1.27699	1.28497	6.89	0.8385
h (23.0)		0.6395	+2.717	-0.004	21 14.8	1 25.0	123 26.4	8 13.8	1.27829	1.28438	+6.97	+0.8430
22		0.6422	2.724	-0.001	21 10.8	1 24.7	122 26.3	8 9.8	1.27958	1.28381	7.04	0.8474
23		0.6449	2.730	+0.002	21 4.9	1 24.3	121 26.0	8 5.7	1.28084	1.28324	7.11	0.8516
24		0.6477	2.736	0.005	20 57.6	1 23.8	120 25.5	8 1.7	1.28191	1.28268	7.17	0.8556
25		0.6504	2.742	0.007	20 49.2	1 23.8	119 24.9	7 57.7	1.28290	1.28214	7.24	0.8595
26		0.6532	+2.748	+0.008	20 40.3	1 22.7	118 24.2	7 53.6	1.28349	1.28160	+7.30	+0.8632
27		0.6559	2.754	0.008	20 31.7	1 22.1	117 23.2	7 49.5	1.28393	1.28108	7.36	0.8667
28		0.6586	2.760	0.005	20 24.1	1 21.6	116 22.0	7 45.5	1.28415	1.28057	7.41	0.8701
29		0.6614	2.766	+0.002	20 18.4	1 21.2	115 20.7	7 41.4	1.28422	1.28007	7.47	0.8735
30		0.6641	2.772	-0.003	20 15.3	1 21.0	114 19.2	7 37.3	1.28424	1.27960	7.53	0.8765
31		0.6668	+2.778	-0.008	20 15.3	1 21.0	113 17.6	7 33.2	1.28435	1.27913	+7.58	+0.8795
Sept. 1		0.6696	2.783	0.012	20 16.9	1 21.1	112 15.8	7 29.1	1.28467	1.27868	7.63	0.8823
2		0.6723	2.789	0.014	20 20.0	1 21.3	111 13.8	7 24.9	1.28539	1.27824	7.67	0.8850
3		0.6750	2.794	0.013	20 22.7	1 21.5	110 11.7	7 20.8	1.28648	1.27783	7.72	0.8875
h (23.0)		0.6778	2.800	0.010	20 23.7	1 21.6	109 9.4	7 16.6	1.28792	1.27742	7.76	0.8899
5		0.6805	+2.805	-0.004	20 21.4	1 21.4	108 7.0	7 12.5	1.28952	1.27703	+7.80	+0.8922
6		0.6833	2.811	+0.002	20 15.8	1 21.1	107 4.4	7 8.3	1.29110	1.27667	7.84	0.8944
7		0.6860	2.816	0.008	20 7.0	1 20.5	106 1.6	7 4.1	1.29242	1.27631	7.88	0.8964
8		0.6887	2.821	0.012	19 57.3	1 19.8	104 58.8	6 59.9	1.29339	1.27599	7.91	0.8982
9		0.6915	2.827	0.013	19 47.8	1 19.2	103 55.8	6 55.7	1.29391	1.27568	7.94	0.9000
10		0.6942	+2.832	+0.011	19 40.3	1 18.7	102 52.7	6 51.5	1.29408	1.27539	+7.97	+0.9016
11		0.6970	2.837	0.007	19 35.9	1 18.4	101 49.5	6 47.3	1.29407	1.27513	8.00	0.9031
12		0.6997	2.842	+0.002	19 34.9	1 18.3	100 46.2	6 43.1	1.29407	1.27487	8.02	0.9044
13		0.7024	2.847	-0.002	19 36.8	1 18.5	99 42.8	6 38.9	1.29421	1.27466	8.05	0.9056
14		0.7052	2.852	0.006	19 40.6	1 18.7	98 39.2	6 34.6	1.29464	1.27446	8.07	0.9068
15		0.7079	+2.857	-0.007	19 44.8	1 19.0	97 35.6	6 30.4	1.29535	1.27429	+8.09	+0.9077
16		0.7106	2.862	0.007	19 48.1	1 19.2	96 31.9	6 26.1	1.29632	1.27413	8.10	0.9086
17		0.7134	2.867	0.005	19 49.8	1 19.3	95 28.1	6 21.9	1.29748	1.27399	8.12	0.9093
18		0.7161	2.872	-0.002	19 49.6	1 19.3	94 24.4	6 17.6	1.29866	1.27388	8.13	0.9099
h (23.0)		0.7189	2.877	+0.001	19 47.3	1 19.2	93 20.5	6 13.4	1.29983	1.27380	8.13	0.9103
20		0.7216	+2.882	+0.004	19 43.6	1 18.9	92 16.5	6 9.1	1.30084	1.27373	+8.14	+0.9106
21		0.7243	2.887	0.007	19 38.8	1 18.6	91 12.5	6 4.8	1.30173	1.27370	8.15	0.9109
22		0.7271	2.892	0.008	19 33.2	1 18.2	90 8.5	6 0.6	1.30242	1.27368	8.15	0.9109
23		0.7298	2.897	0.008	19 27.8	1 17.9	89 4.5	5 56.3	1.30288	1.27369	8.15	0.9109
24		0.7326	2.902	0.006	19 23.0	1 17.5	88 0.4	5 52.0	1.30316	1.27372	8.14	0.9107
25		0.7353	+2.907	+0.003	19 19.7	1 17.3	86 56.3	5 47.8	1.30328	1.27378	+8.13	+0.9104
26		0.7380	2.912	-0.002	19 18.7	1 17.2	85 52.2	5 43.5	1.30332	1.27386	8.13	0.9100
27		0.7408	2.917	0.006	19 20.2	1 17.3	84 48.0	5 39.2	1.30341	1.27396	8.12	0.9094
28		0.7435	2.922	0.011	19 24.1	1 17.6	83 43.9	5 34.9	1.30369	1.27409	8.11	0.9088
29		0.7462	2.927	0.013	19 29.6	1 18.0	82 39.8	5 30.7	1.30429	1.27424	8.09	0.9079
30		0.7490	+2.932	-0.013	19 35.4	1 18.4	81 35.7	5 26.4	1.30529	1.27442	+8.07	+0.9070
Oct. 1		0.7517	+2.937	-0.011	19 39.8	1 18.7	80 31.6	5 22.1	1.30664	1.27462	+8.05	+0.9059

FOR WASHINGTON MEAN MIDNIGHT.

Solar Day. (Sidereal Hour.)	$\tau$	$f$		$f'$		$G$		$H$		Log $\rho$ .	Log $h$ .	$i$	Log $i$ .
		In Time.		In Time.		In Arc.	In Time.	In Arc.	In Time.				
Oct.	1	0.7517	+2.987	-0.011	19 39.8	1 18.7	80 31.6	5 22.1	1.30664	1.27462	+8.05	+0.9069	
	2	0.7544	2.942	-0.006	19 41.7	1 18.8	79 27.5	5 17.8	1.30821	1.27463	8.03	0.9047	
	3	0.7572	2.947	+0.001	19 40.3	1 18.7	78 23.4	5 13.6	1.30985	1.27508	8.01	0.9034	
	h	4	0.7599	2.952	0.007	19 36.0	1 18.4	77 19.4	5 9.3	1.31131	1.27535	7.96	0.9019
	(1.0)	5	0.7627	2.957	0.012	19 29.6	1 18.0	76 15.5	5 5.0	1.31246	1.27563	7.95	0.9003
	6	0.7654	+2.962	+0.013	19 23.1	1 17.5	75 11.5	5 0.8	1.31319	1.27594	+7.92	+0.8965	
	7	0.7681	2.967	0.012	19 17.8	1 17.2	74 7.6	4 56.5	1.31358	1.27628	7.88	0.8966	
	8	0.7709	2.973	0.009	19 15.2	1 17.0	73 3.8	4 52.3	1.31373	1.27662	7.85	0.8946	
	9	0.7736	2.978	+0.004	19 15.9	1 17.1	72 0.0	4 48.0	1.31379	1.27699	7.81	0.8925	
	10	0.7764	2.983	-0.001	19 19.6	1 17.3	70 56.8	4 43.8	1.31398	1.27738	7.76	0.8902	
	11	0.7791	+2.989	-0.005	19 25.2	1 17.7	69 52.8	4 39.5	1.31446	1.27779	+7.72	+0.8877	
	12	0.7818	2.994	0.008	19 32.2	1 18.1	68 49.2	4 35.3	1.31523	1.27821	7.68	0.8851	
	13	0.7846	3.000	0.008	19 37.9	1 18.5	67 45.7	4 31.0	1.31623	1.27866	7.63	0.8824	
	14	0.7873	3.006	0.006	19 42.5	1 18.8	66 42.4	4 26.8	1.31754	1.27912	7.58	0.8795	
	15	0.7900	3.011	-0.003	19 45.2	1 19.0	65 39.2	4 22.6	1.31889	1.27961	7.52	0.8764	
	16	0.7928	+3.017	0.000	19 45.8	1 19.0	64 36.1	4 18.4	1.32023	1.28010	+7.47	+0.8732	
	17	0.7955	3.023	+0.003	19 44.9	1 19.0	63 33.1	4 14.2	1.32149	1.28062	7.41	0.8699	
	18	0.7983	3.029	0.006	19 42.6	1 18.8	62 30.2	4 10.0	1.32259	1.28114	7.35	0.8663	
	19	0.8010	3.035	0.007	19 39.6	1 18.6	61 27.5	4 5.8	1.32353	1.28168	7.29	0.8627	
	h	20	0.8037	3.041	0.007	19 36.3	1 18.4	60 24.9	4 1.7	1.32429	1.28223	7.22	0.8588
	(2.0)	21	0.8065	+3.047	+0.006	19 33.4	1 18.2	59 22.4	3 57.5	1.32486	1.28280	+7.16	+0.8548
	22	0.8092	3.053	+0.003	19 31.8	1 18.1	58 20.0	3 53.3	1.32526	1.28337	7.09	0.8506	
	23	0.8120	3.059	-0.001	19 32.0	1 18.1	57 17.8	3 49.2	1.32559	1.28396	7.02	0.8463	
	24	0.8147	3.066	0.005	19 34.4	1 18.3	56 15.7	3 45.0	1.32593	1.28455	6.94	0.8417	
	25	0.8174	3.072	0.010	19 39.0	1 18.6	55 13.7	3 40.9	1.32644	1.28517	6.87	0.8370	
	26	0.8202	+3.079	-0.013	19 45.3	1 19.0	54 11.9	3 36.8	1.32720	1.28578	+6.79	+0.8321	
	27	0.8229	3.085	0.014	19 52.3	1 19.5	53 10.2	3 32.7	1.32833	1.28640	6.71	0.8270	
	28	0.8256	3.092	0.012	19 58.3	1 19.9	52 8.7	3 28.6	1.32984	1.28703	6.63	0.8217	
	29	0.8284	3.099	0.007	20 2.2	1 20.1	51 7.3	3 24.5	1.33162	1.28767	6.55	0.8162	
	30	0.8311	3.106	-0.001	20 2.9	1 20.2	50 6.1	3 20.4	1.33351	1.28831	6.46	0.8105	
31	0.8338	+3.113	+0.006	20 0.7	1 20.0	49 5.0	3 16.3	1.33523	1.28896	+6.38	+0.8046		
Nov.	1	0.8366	3.120	0.011	19 56.1	1 19.7	48 4.1	3 12.3	1.33681	1.28961	6.29	0.7994	
2	0.8393	3.127	0.014	19 50.6	1 19.4	47 3.3	3 8.2	1.33796	1.29026	6.19	0.7920		
3	0.8421	3.135	0.014	19 45.9	1 19.1	46 2.6	3 4.2	1.33876	1.29092	6.10	0.7854		
h	4	0.8448	3.142	0.011	19 43.3	1 18.9	45 2.2	3 0.1	1.33925	1.29156	6.01	0.7796	
(3.0)	5	0.8475	+3.149	+0.006	19 43.6	1 18.9	44 1.8	2 56.1	1.33964	1.29223	+5.91	+0.7715	
6	0.8503	3.157	+0.001	19 46.8	1 19.1	43 1.6	2 52.1	1.34009	1.29289	5.81	0.7641		
7	0.8530	3.165	-0.004	19 52.2	1 19.5	42 1.5	2 48.1	1.34074	1.29354	5.71	0.7565		
8	0.8558	3.172	0.007	19 58.6	1 19.9	41 1.6	2 44.1	1.34170	1.29419	5.60	0.7496		
9	0.8585	3.180	0.008	20 4.8	1 20.3	40 1.8	2 40.1	1.34291	1.29484	5.50	0.7404		
10	0.8612	+3.188	-0.007	20 9.8	1 20.7	39 2.2	2 36.1	1.34438	1.29548	+5.40	+0.7320		
11	0.8640	3.196	0.004	20 12.8	1 20.9	38 2.8	2 32.2	1.34598	1.29612	5.29	0.7232		
12	0.8667	3.205	-0.001	20 13.9	1 20.9	37 3.5	2 28.2	1.34759	1.29676	5.18	0.7141		
13	0.8694	3.213	+0.002	20 13.2	1 20.9	36 4.4	2 24.3	1.34914	1.29740	5.07	0.7046		
14	0.8722	3.221	0.005	20 11.1	1 20.7	35 5.4	2 20.4	1.35053	1.29803	4.95	0.6948		
15	0.8749	+3.230	+0.007	20 8.1	1 20.5	34 6.5	2 16.4	1.35177	1.29864	+4.84	+0.6847		
16	0.8777	+3.238	+0.007	20 4.7	1 20.3	33 7.7	2 12.5	1.35284	1.29924	+4.72	+0.6741		

FOR WASHINGTON MEAN MIDNIGHT.

Solar Day. (Sidereal Hour.)	$\tau$	$f$		$f'$		$g$		$H$		Log $g$ .	Log $h$ .	$i$	Log $i$ .
		In Time.		In Time.		In Arc.	In Time.	In Arc.	In Time.				
Nov. 16	0.8777	+3.238	+0.007	20 4.7	1 20.3	33 7.7	2 12.5	1.35284	1.29924	+4.72	+0.6741		
17	0.8804	3.247	0.007	20 1.3	1 20.1	32 9.1	2 8.6	1.35374	1.29984	4.61	0.6632		
18	0.8831	3.256	+0.004	19 58.8	1 19.9	31 10.7	2 4.7	1.35440	1.30043	4.49	0.6518		
h 19	0.8859	3.265	0.000	19 57.7	1 19.8	30 12.4	2 0.8	1.35507	1.30102	4.37	0.6400		
(4.0) 20	0.8886	3.274	-0.004	19 58.5	1 19.9	29 14.3	1 57.0	1.35566	1.30159	4.24	0.6276		
21	0.8914	+3.283	-0.009	20 1.3	1 20.1	28 16.2	1 53.1	1.35637	1.30214	+4.12	+0.6148		
22	0.8941	3.292	0.013	20 5.9	1 20.4	27 18.3	1 49.2	1.35729	1.30268	3.99	0.6015		
23	0.8968	3.301	0.015	20 10.9	1 20.7	26 20.4	1 45.4	1.35852	1.30320	3.87	0.5876		
24	0.8996	3.310	0.014	20 15.7	1 21.0	25 22.8	1 41.5	1.36011	1.30374	3.74	0.5731		
25	0.9023	3.320	0.010	20 18.7	1 21.2	24 25.3	1 37.7	1.36198	1.30425	3.61	0.5579		
26	0.9050	+3.329	-0.004	20 19.0	1 21.3	23 27.9	1 33.9	1.36404	1.30473	+3.48	+0.5421		
27	0.9078	3.339	+0.003	20 16.3	1 21.1	22 30.5	1 30.0	1.36604	1.30521	3.35	0.5255		
28	0.9105	3.348	0.009	20 11.1	1 20.7	21 33.3	1 26.2	1.36784	1.30567	3.22	0.5081		
29	0.9132	3.358	0.014	20 4.4	1 20.3	20 36.2	1 22.4	1.36933	1.30612	3.09	0.4898		
30	0.9160	3.368	0.015	19 58.0	1 19.9	19 39.2	1 18.6	1.37043	1.30655	2.96	0.4706		
Dec. 1	0.9187	+3.377	+0.013	19 58.0	1 19.5	18 42.2	1 14.8	1.37124	1.30695	+2.82	+0.4503		
2	0.9215	3.387	0.009	19 50.5	1 19.4	17 45.3	1 11.0	1.37185	1.30735	2.68	0.4288		
3	0.9242	3.397	+0.003	19 50.7	1 19.4	16 48.5	1 7.2	1.37248	1.30772	2.55	0.4062		
h 4	0.9269	3.407	-0.002	19 53.3	1 19.5	15 51.8	1 3.5	1.37319	1.30808	2.41	0.3821		
(5.0) 5	0.9297	3.417	0.005	19 57.3	1 19.8	14 55.2	0 59.7	1.37418	1.30843	2.27	0.3564		
6	0.9324	+3.427	-0.007	20 1.2	1 20.1	13 58.6	0 55.9	1.37544	1.30875	+2.13	+0.3290		
7	0.9352	3.438	0.007	20 4.3	1 20.3	13 2.1	0 52.1	1.37690	1.30904	1.99	0.2996		
8	0.9379	3.448	0.005	20 5.6	1 20.4	12 5.7	0 48.4	1.37852	1.30933	1.85	0.2678		
9	0.9406	3.458	-0.002	20 5.1	1 20.3	11 9.3	0 44.6	1.38016	1.30960	1.71	0.2334		
10	0.9434	3.468	+0.002	20 2.6	1 20.2	10 12.9	0 40.9	1.38178	1.30984	1.57	0.1959		
11	0.9461	+3.479	+0.005	19 58.8	1 19.9	9 16.6	0 37.1	1.38326	1.31006	+1.43	+0.1547		
12	0.9488	3.489	0.007	19 53.9	1 19.6	8 20.4	0 33.4	1.38459	1.31026	1.29	0.1090		
13	0.9516	3.499	0.008	19 48.5	1 19.2	7 24.2	0 29.6	1.38576	1.31044	1.14	0.0578		
14	0.9543	3.510	0.007	19 43.1	1 18.9	6 28.0	0 25.9	1.38674	1.31060	1.00	9.9995		
15	0.9571	3.520	0.005	19 38.2	1 18.5	5 31.8	0 22.1	1.38753	1.31074	0.86	9.9320		
16	0.9598	+3.531	+0.002	19 34.7	1 18.3	4 35.7	0 18.4	1.38825	1.31086	+0.71	+9.8518		
17	0.9625	3.541	-0.003	19 32.2	1 18.1	3 39.6	0 14.6	1.38887	1.31095	0.57	9.7533		
18	0.9653	3.552	0.008	19 31.8	1 18.1	2 43.6	0 10.9	1.38952	1.31102	0.42	9.6255		
19	0.9680	3.562	0.012	19 32.9	1 18.2	1 47.5	0 7.2	1.39035	1.31108	0.28	9.4483		
h 20	0.9708	3.573	0.015	19 35.1	1 18.3	0 51.4	0 3.4	1.39139	1.31111	+0.13	+9.1232		
(6.0) 21	0.9735	+3.584	-0.015	19 37.4	1 18.5	359 55.4	23 59.7	1.39277	1.31112	-0.01	-8.0784		
22	0.9762	3.594	0.012	19 38.4	1 18.6	358 59.3	23 56.0	1.39443	1.31111	0.16	9.1952		
23	0.9790	3.605	-0.007	19 37.3	1 18.5	358 3.2	23 52.2	1.39629	1.31107	0.30	9.4793		
24	0.9817	3.615	0.000	19 33.4	1 18.2	357 7.2	23 48.5	1.39821	1.31102	0.45	9.6495		
25	0.9844	3.626	+0.006	19 28.9	1 17.8	356 11.0	23 44.7	1.40000	1.31093	0.59	9.7714		
26	0.9872	+3.636	+0.012	19 18.7	1 17.2	355 14.9	23 41.0	1.40149	1.31083	-0.73	-9.8663		
27	0.9899	3.647	0.014	19 10.0	1 16.7	354 18.7	23 37.2	1.40267	1.31072	0.88	9.9441		
28	0.9926	3.657	0.014	19 2.2	1 16.2	353 22.5	23 33.5	1.40352	1.31058	1.02	0.0099		
29	0.9954	3.668	0.011	18 56.5	1 15.8	352 26.3	23 29.8	1.40413	1.31042	1.17	0.0669		
30	0.9981	3.678	0.008	18 53.4	1 15.6	351 30.0	23 26.0	1.40466	1.31028	1.31	0.1172		
31	1.0009	+3.688	+0.001	18 52.6	1 15.5	350 33.6	23 22.2	1.40524	1.31002	-1.45	-0.1622		
32	1.0036	+3.699	-0.004	18 53.5	1 15.6	349 37.2	23 18.5	1.40599	1.30980	-1.59	-0.2028		

# 214 BESSELIAN AND INDEPENDENT STAR-NUMBERS, 1920.

## FOR WASHINGTON SIDEREAL TWELVE HOURS.

Mean Solar Date.	Log A <sub>1</sub> .	Log B <sub>1</sub> .	Log C.	Log D.	f	G <sub>1</sub>	H	Log ρ.	Log λ.	Log i.
Jan. 0.72	+9.4514	+0.7882	-0.5018	+1.3048	+0.871	47 17	351 3	0.9220	1.3101	-0.1386
10.69	9.5004	0.7862	0.8055	1.2844	0.975	43 56	341 38	0.9450	1.3071	0.4427
20.67	9.5419	0.7802	0.9733	1.2484	1.073	40 49	332 3	0.9049	1.3023	0.6105
30.64	9.5765	0.7716	1.0835	1.1942	1.161	38 1	322 13	0.9821	1.2963	0.7207
Feb. 9.61	9.6051	0.7619	1.1598	1.1165	1.240	35 36	312 9	0.9970	1.2897	0.7971
19.58	+9.6287	+0.7529	-1.2128	+1.0052	+1.310	33 35	301 48	1.0101	1.2835	-0.8501
29.56	9.6484	0.7465	1.2478	0.8368	1.370	32 1	291 13	1.0221	1.2782	0.8850
Mar. 10.53	9.6654	0.7440	1.2675	+0.5341	1.424	30 52	280 28	1.0337	1.2748	0.9048
20.50	9.6807	0.7465	1.2737	-9.0380	1.475	30 8	269 40	1.0457	1.2737	0.9109
30.48	9.6956	0.7541	1.2668	0.5583	1.526	29 43	258 56	1.0588	1.2749	0.9040
Apr. 9.45	+9.7107	+0.7660	-1.2467	-0.8449	+1.581	29 32	248 22	1.0731	1.2784	-0.8840
19.42	9.7269	0.7810	1.2123	1.0067	1.639	29 28	238 5	1.0891	1.2835	0.8496
29.40	9.7443	0.7978	1.1614	1.1142	1.707	29 26	228 6	1.1063	1.2896	0.7986
May 9.37	9.7631	0.8145	1.0897	1.1896	1.783	29 19	218 28	1.1246	1.2959	0.7270
19.34	9.7832	0.8300	0.9890	1.2429	1.867	29 4	209 8	1.1437	1.3016	0.6263
29.31	+9.8040	+0.8432	-0.8417	-1.2792	+1.958	28 36	200 4	1.1627	1.3064	-0.4789
June 8.29	9.8249	0.8532	0.5972	1.3013	2.054	28 2	191 11	1.1811	1.3096	0.2345
18.26	9.8456	0.8597	-9.9356	1.3106	2.156	27 15	182 25	1.1988	1.3111	-9.5729
28.23	9.8655	0.8626	+0.3521	1.3080	2.256	26 22	173 41	1.2152	1.3106	+9.9893
July 8.20	9.8841	0.8620	0.7241	1.2931	2.355	25 22	164 54	1.2301	1.3084	0.3612
18.18	+9.9012	+0.8583	+0.9140	-1.2652	+2.449	24 19	155 59	1.2435	1.3044	+0.5512
28.15	9.9164	0.8522	1.0368	1.2222	2.537	23 17	146 52	1.2553	1.2992	0.6741
Aug. 7.12	9.9300	0.8448	1.1230	1.1608	2.617	22 18	137 30	1.2658	1.2932	0.7602
17.09	9.9417	0.8370	1.1847	1.0746	2.689	21 24	127 49	1.2747	1.2870	0.8219
27.07	9.9518	0.8302	1.2280	0.9505	2.751	20 39	117 50	1.2827	1.2813	0.8652
Sept. 6.04	+9.9606	+0.8257	+1.2561	-0.7564	+2.808	20 5	107 33	1.2898	1.2768	+0.8934
16.01	9.9685	0.8245	1.2709	-0.3632	2.860	19 42	97 3	1.2967	1.2742	0.9082
25.99	9.9760	0.8272	1.2730	+0.0694	2.910	19 30	86 25	1.3037	1.2738	0.9102
Oct. 5.96	9.9835	0.8340	1.2623	0.6667	2.959	19 28	75 46	1.3111	1.2758	0.8995
15.93	9.9914	0.8444	1.2378	0.9626	3.014	19 34	65 12	1.3193	1.2798	0.8751
25.90	+0.0001	+0.8574	+1.1978	+1.0461	+3.075	19 45	54 49	1.3284	1.2854	+0.8350
Nov. 4.88	0.0099	0.8716	1.1387	1.1439	3.145	19 56	44 40	1.3387	1.2918	0.7759
14.85	0.0207	0.8858	1.0541	1.2130	3.224	20 5	34 45	1.3499	1.2982	0.6913
24.82	0.0325	0.8985	0.9311	1.2609	3.313	20 8	25 4	1.3619	1.3039	0.5682
Dec. 4.79	0.0451	0.9087	0.7375	1.2919	3.410	20 1	15 35	1.3742	1.3082	0.3746
14.77	+0.0580	+0.9156	+0.3452	+1.3081	+3.513	19 46	6 13	1.3864	1.3106	+9.9824
24.74	0.0707	0.9189	-0.0447	1.3104	3.618	19 23	356 54	1.3980	1.3110	-9.6820
34.71	+0.0830	+0.9184	-0.6435	+1.2989	+3.721	18 51	347 32	1.4089	1.3092	-0.2806

E = +0.002

The above numbers give the same reductions from mean to apparent place as are employed in computing the apparent places of the stars, given on pages 316 to 513, from the mean places, given on pages 217 to 230. In order to render exact interpolation possible through intervals of ten days, all short period terms have been omitted.

TERMS OF SHORT PERIOD IN NUTATION, 1920. 215

FOR WASHINGTON MEAN MIDNIGHT.

Date.	$\delta''\psi$	$\delta''\omega$	Date.	$\delta''\psi$	$\delta''\omega$	Date.	$\delta''\psi$	$\delta''\omega$	Date.	$\delta''\psi$	$\delta''\omega$
Jan. 0	"	"	Feb. 15	"	"	Apr. 1	"	"	May 17	"	"
1	-0.25	+0.01	16	+0.07	-0.06	2	+0.04	+0.08	18	-0.19	-0.04
2	0.22	-0.03	17	0.11	0.04	3	-0.04	0.07	19	-0.10	0.07
3	0.15	0.07	18	0.13	-0.01	4	0.11	0.04	20	+0.01	0.08
4	-0.04	0.08	19	0.12	+0.03	5	0.14	+0.01	21	0.12	0.07
5	+0.08	0.08	20	0.08	0.06	6	0.14	-0.02	22	0.21	0.05
6	+0.18	-0.06	21	+0.01	+0.07	7	-0.12	-0.05	23	+0.26	-0.01
7	0.24	-0.02	22	-0.07	0.08	8	0.08	0.06	24	0.26	+0.03
8	0.26	+0.02	23	0.15	0.06	9	-0.02	0.07	25	0.20	0.06
9	0.22	0.06	24	0.21	+0.03	10	+0.03	0.07	26	0.12	0.08
10	0.15	0.08	25	0.22	-0.01	11	0.07	0.05	27	+0.03	0.08
11	+0.06	+0.08	26	-0.19	-0.04	12	+0.10	-0.02	28	-0.05	+0.06
12	-0.02	0.07	27	-0.11	0.07	13	0.11	+0.01	29	0.11	+0.03
13	0.09	0.04	28	0.00	0.08	14	0.09	0.04	30	0.13	0.00
14	0.12	+0.01	29	+0.10	0.07	15	+0.04	0.06	31	0.12	-0.03
15	0.13	-0.02	30	0.19	0.05	16	-0.03	0.08	June 1	0.09	0.06
16	-0.11	-0.05	Mar. 1	+0.23	-0.01	17	-0.11	+0.07	2	-0.04	-0.07
17	0.07	0.06	2	0.23	+0.03	18	0.18	0.05	3	+0.01	0.07
18	-0.02	0.07	3	0.18	0.06	19	0.21	+0.02	4	0.06	0.06
19	+0.03	0.07	4	0.10	0.08	20	0.21	-0.02	5	0.09	0.04
20	0.08	0.05	5	+0.01	0.08	21	0.15	0.05	6	0.11	-0.01
21	+0.12	-0.03	6	-0.06	+0.06	22	-0.06	-0.08	7	+0.10	+0.02
22	0.13	0.00	7	0.12	+0.03	23	+0.05	0.08	8	+0.06	0.05
23	0.11	+0.04	8	0.14	0.00	24	0.16	0.07	9	0.00	0.07
24	+0.05	0.06	9	0.13	-0.03	25	0.23	-0.03	10	-0.08	0.08
25	-0.03	0.08	10	0.10	0.05	26	0.26	+0.01	11	0.16	0.07
26	-0.11	+0.08	11	-0.06	-0.07	27	+0.23	+0.04	12	-0.22	+0.04
27	0.19	0.06	12	0.00	0.07	28	0.16	0.07	13	0.25	+0.01
28	0.23	+0.02	13	+0.05	0.06	29	+0.06	0.08	14	0.23	-0.03
29	0.23	-0.02	14	0.09	0.04	30	-0.01	0.07	15	0.16	0.06
30	0.18	0.06	15	0.12	-0.02	May 1	0.08	0.05	16	-0.05	0.08
31	-0.06	-0.08	16	+0.12	+0.02	2	-0.13	+0.02	17	+0.07	-0.08
Feb. 1	+0.03	0.08	17	0.09	0.05	3	0.14	-0.01	18	0.17	0.06
2	0.13	0.06	18	+0.03	0.07	4	0.12	0.04	19	0.24	-0.02
3	0.21	-0.03	19	+0.03	0.07	5	0.09	0.06	20	0.26	+0.02
4	0.24	+0.01	20	-0.06	0.08	6	-0.04	0.07	21	0.23	0.05
5	+0.22	+0.05	21	0.12	0.07	7	+0.02	-0.07	22	+0.16	+0.08
6	0.16	0.07	22	-0.19	+0.04	8	0.06	0.05	23	+0.07	0.08
7	+0.08	0.08	23	0.21	+0.01	9	0.10	-0.03	24	-0.02	0.07
8	0.00	0.07	24	0.19	-0.03	10	0.11	0.00	25	0.08	0.04
9	-0.07	0.05	25	0.12	0.06	11	0.09	+0.03	26	0.11	+0.01
10	-0.12	+0.02	26	+0.08	-0.08	12	+0.05	+0.05	27	-0.12	-0.02
11	0.13	-0.01	27	0.17	0.06	13	-0.02	0.07	28	0.09	0.05
12	0.12	0.04	28	0.23	-0.02	14	0.10	0.08	29	-0.05	0.07
13	0.09	0.06	29	0.24	+0.02	15	0.18	0.06	30	+0.01	0.07
14	-0.04	0.07	30	0.20	0.06	16	0.22	+0.03	July 1	0.05	0.06
15	+0.01	-0.07	31	+0.13	+0.08	17	-0.23	0.00	2	+0.10	-0.05
	+0.07	-0.06	Apr. 1	+0.04	+0.08		-0.19	-0.04		+0.12	-0.02

# 216 TERMS OF SHORT PERIOD IN NUTATION, 1920.

## FOR WASHINGTON MEAN MIDNIGHT.

Date.	$\delta''\psi$	$\delta''\omega$	Date.	$\delta''\psi$	$\delta''\omega$	Date.	$\delta''\psi$	$\delta''\omega$	Date.	$\delta''\psi$	$\delta''\omega$	
<b>July</b>	"	"	<b>Aug.</b>	"	"	<b>Oct.</b>	"	"	<b>Nov.</b>	"	"	
1	+0.10	-0.05	16	+0.02	+0.08	1	-0.17	-0.05	16	+0.12	-0.01	
2	0.12	-0.02	17	-0.05	0.06	2	-0.09	0.07	17	0.11	+0.02	
3	0.12	+0.01	18	0.10	+0.03	3	+0.01	0.08	18	+0.07	0.06	
4	0.09	0.04	19	0.11	0.00	4	0.11	0.07	19	0.00	0.07	
5	+0.03	0.06	20	0.10	-0.04	5	0.19	-0.04	20	-0.07	0.07	
6	-0.05	+0.07	21	-0.06	-0.06	6	+0.22	0.00	21	-0.15	+0.07	
7	0.13	0.07	22	-0.02	0.07	7	0.20	+0.04	22	0.21	0.04	
8	0.21	0.05	23	+0.04	0.07	8	0.14	0.07	23	0.24	+0.01	
9	0.25	+0.02	24	0.09	0.06	9	+0.06	0.08	24	0.22	-0.03	
10	0.25	-0.02	25	0.12	0.04	10	-0.02	0.07	25	0.16	0.06	
11	-0.20	-0.05	26	+0.14	-0.01	11	-0.09	+0.05	26	-0.06	-0.08	
12	-0.11	0.08	27	0.12	+0.02	12	0.13	+0.02	27	+0.05	0.08	
13	0.00	0.08	28	0.09	0.05	13	0.13	-0.02	28	0.15	0.06	
14	+0.12	0.07	29	+0.03	0.07	14	0.10	0.04	29	0.22	-0.02	
15	0.20	-0.03	30	-0.05	0.07	15	-0.06	0.06	30	0.24	+0.02	
16	+0.24	+0.01	31	-0.13	+0.07	16	0.00	-0.07	<b>Dec.</b>	1	+0.21	+0.05
17	0.23	0.04	<b>Sept.</b>	1	0.20	0.04	17	+0.05	0.06	2	0.14	0.07
18	0.17	0.07	2	0.23	+0.01	18	0.09	0.05	3	+0.06	0.08	
19	0.09	0.08	3	0.22	-0.03	19	0.12	-0.03	4	-0.03	0.07	
20	+0.01	0.07	4	0.16	0.06	20	0.12	0.00	5	0.09	+0.04	
21	-0.06	+0.05	5	-0.07	-0.08	21	+0.10	+0.03	6	-0.12	0.00	
22	0.10	+0.02	6	+0.03	0.08	22	+0.06	0.05	7	0.11	-0.03	
23	0.11	-0.02	7	0.13	0.06	23	-0.01	0.07	8	0.08	0.05	
24	0.09	0.04	8	0.19	-0.02	24	0.09	0.07	9	-0.03	0.07	
25	-0.05	0.06	9	0.21	+0.02	25	0.16	0.06	10	+0.03	0.07	
26	0.00	-0.07	10	+0.18	+0.05	26	-0.21	+0.03	11	+0.08	-0.06	
27	+0.05	0.07	11	0.12	0.08	27	0.22	0.00	12	0.11	0.04	
28	0.09	0.05	12	+0.04	0.08	28	0.19	-0.04	13	0.13	-0.02	
29	0.12	-0.03	13	-0.04	0.07	29	0.12	0.07	14	0.12	+0.01	
30	0.13	0.00	14	0.10	0.04	30	-0.01	0.08	15	0.08	0.04	
31	+0.11	+0.03	15	-0.12	+0.01	31	+0.09	-0.07	16	+0.03	+0.06	
<b>Aug.</b>	1	+0.07	16	0.11	-0.03	<b>Nov.</b>	1	0.18	0.05	17	-0.05	0.07
2	-0.01	0.07	17	0.08	0.05	2	0.23	-0.01	18	0.13	0.07	
3	0.09	0.07	18	-0.08	0.07	3	0.23	+0.03	19	0.20	0.05	
4	0.17	0.06	19	+0.02	0.07	4	0.18	0.06	20	0.25	+0.02	
5	-0.23	+0.03	20	+0.07	-0.06	5	+0.10	+0.08	21	-0.25	-0.01	
6	0.25	0.00	21	0.11	0.04	6	+0.01	0.08	22	0.20	0.05	
7	0.22	-0.04	22	0.13	-0.02	7	-0.06	0.06	23	0.12	0.07	
8	0.15	0.07	23	0.13	+0.01	8	0.11	+0.03	24	-0.01	0.08	
9	-0.04	0.08	24	0.10	0.04	9	0.18	-0.01	25	+0.10	0.07	
10	+0.07	-0.07	25	+0.05	+0.06	10	-0.11	-0.04	26	+0.19	-0.04	
11	0.16	0.05	26	-0.03	0.07	11	0.07	0.06	27	0.23	0.00	
12	0.21	-0.01	27	0.10	0.07	12	-0.02	0.07	28	0.22	+0.04	
13	0.22	+0.03	28	0.17	0.05	13	+0.04	0.07	29	0.17	0.07	
14	0.18	0.06	29	0.22	+0.02	14	0.08	0.06	30	0.09	0.08	
15	+0.10	+0.08	30	-0.22	-0.01	15	+0.11	-0.03	31	+0.01	+0.07	
16	+0.02	+0.08	<b>Oct.</b>	1	-0.17	-0.05	16	+0.12	-0.01	32	-0.06	+0.05

# MEAN PLACES OF TEN-DAY STARS, 1920. 217

FOR JANUARY 0<sup>h</sup>.943, WASHINGTON MEAN TIME.

Name of Star.	Magni- tude.	Spec- trum.	Right Ascension.			Annual Vari- ation.	Annual P. M.	Declination.			Annual Vari- ation.	Annual P. M.	
			h	m	s			"	"	"			
33 Piscium . . . . .	4.7	K0	0	1	14.469	+3.0714	-.0006	-	6	9	18.36	+20.136	+0.691
α Andromedæ ( <i>Alpheratz</i> ) . . . . .	2.2	A0p	0	4	14.932	3.0970	+0.0107	+28	38	55.63	19.379	-0.163	
β Cassiopeia . . . . .	2.4	F5	0	4	53.989	3.1878	+0.0681	+58	42	30.86	19.360	-0.130	
ε Phœnicis . . . . .	3.9	K0	0	5	21.239	3.0488	+0.0696	-46	11	20.18	19.367	-0.193	
22 Andromedæ . . . . .	5.1	F0	0	6	9.452	3.1115	+0.0021	+45	37	37.55	20.033	-0.004	
γ Pegasi . . . . .	2.9	B2	0	9	6.854	+3.0870	+0.0605	+14	44	19.91	+20.019	-0.010	
δ Andromedæ . . . . .	4.5	A2	0	14	8.636	3.1230	-.0044	+36	20	30.22	19.360	-0.047	
ι Ceti . . . . .	3.8	K0	0	15	21.129	3.0508	-.0013	-	9	16	2.28	19.971	-0.030
ζ Tucanæ . . . . .	4.3	F8	0	15	54.919	3.1444	+0.2737	-65	20	40.44	21.169	+1.172	
44 Piscium . . . . .	6.0	G5	0	21	18.059	3.0745	-.0014	+	1	29	48.00	19.965	-0.023
β Hydri . . . . .	2.9	G0	0	21	34.368	+3.1928	+0.0633	-77	42	17.27	+20.375	+0.318	
α Phœnicis . . . . .	2.4	K0	0	22	20.052	3.0713	+0.0188	-42	44	25.56	19.547	-0.403	
12 Ceti . . . . .	6.0	K5	0	25	57.382	3.0622	+0.0011	-	4	23	56.80	19.916	0.000
13 Ceti . . . . . †	5.2	G0	0	31	7.777	3.0872	+0.0272	-	4	1	58.90	19.943	-0.017
ζ Cassiopeia . . . . .	3.7	B2	0	32	30.382	3.3312	+0.0686	+53	27	24.59	19.387	-0.607	
τ Andromedæ . . . . .	4.4	B3	0	32	36.215	+3.1500	+0.0619	+33	16	44.90	+19.348	0.000	
ε Andromedæ . . . . .	4.5	G5	0	34	19.449	3.1655	-.0172	+28	52	39.24	19.567	-0.254	
δ Andromedæ . . . . .	3.5	K0	0	35	2.757	3.2032	+0.0110	+30	25	23.71	19.714	-0.067	
α Cassiopeia ( <i>Schedir</i> ) . . . . . †	var.	K0	0	35	57.439	3.3697	+0.0683	+56	5	55.71	19.767	-0.032	
μ Phœnicis . . . . .	4.6	K0	0	37	32.799	3.3833	-.0044	-46	31	27.94	19.745	-0.032	
β Ceti . . . . .	2.2	K0	0	39	34.481	+3.0122	+0.0100	-18	25	31.48	+19.739	+0.641	
ο Cassiopeia . . . . .	4.7	B2	0	40	16.615	3.3335	+0.0623	+47	50	48.48	19.730	-0.006	
21 Cassiopeia . . . . .	5.0	A2	0	40	20.245	3.0144	-.0060	+74	33	3.78	19.709	-0.026	
ζ Andromedæ . . . . .	4.3	K0	0	43	5.673	3.1737	-.0073	+23	49	55.98	19.613	-0.078	
η Cassiopeia . . . . . †	3.6	F8	0	44	15.089	3.0109	+0.1433	+57	23	33.14	19.197	-0.476	
δ Piscium . . . . .	4.6	K5	0	44	31.303	+3.1105	+0.0655	+	7	8	59.86	+19.624	-0.044
λ Hydri . . . . .	5.0	K5	0	45	49.557	3.0992	+0.0425	-75	21	30.64	19.845	-0.001	
20 Ceti . . . . .	4.9	K0	0	48	55.069	3.0644	-.0005	-	1	34	41.70	19.587	-0.003
γ Cassiopeia . . . . .	2.2	B0p	0	51	52.033	3.0016	+0.0636	+60	17	1.83	19.539	-0.605	
μ Andromedæ . . . . .	3.9	A2	0	52	18.427	3.3227	+0.0132	+38	3	56.47	19.555	+0.030	
α Sculptoris . . . . .	4.4	B5	0	54	45.040	+3.3809	-.0013	-29	47	23.31	+19.468	-0.013	
β Sculptoris . . . . .	4.4	K0	0	58	47.385	3.1117	-.0054	+	7	27	34.99	19.415	+0.026
β Phœnicis . . . . . †	3.4	K0	1	2	30.844	3.0730	-.0057	-47	8	50.21	19.380	-0.024	
μ Cassiopeia . . . . .	5.3	G5	1	2	56.122	3.0732	+0.3019	+54	31	42.96	17.737	-1.556	
η Ceti . . . . .	3.6	K0	1	4	33.914	3.0175	+0.0143	-10	36	21.26	19.120	-0.126	
β Andromedæ . . . . .	2.4	Ma	1	5	14.818	+3.3522	+0.0148	+35	11	48.23	+19.121	-0.117	
τ Piscium . . . . .	4.7	K0	1	7	14.985	3.3064	+0.0656	+29	39	55.04	19.160	-0.029	
ζ Piscium . . . . . †	5.6	A5	1	9	32.994	3.1324	+0.0096	+	7	9	9.60	19.077	-0.032
ι Tucanæ . . . . . †	5.0	F8	1	13	3.426	3.0336	+0.0743	-69	18	3.89	19.194	+0.069	
ψ Piscium . . . . .	5.3	A2	1	13	40.266	3.0930	-.0033	+	3	11	36.64	18.993	-0.026
θ Piscium . . . . .	4.7	A2	1	15	3.894	+3.3019	+0.0616	+26	50	38.29	+18.972	-0.008	
θ Ceti . . . . .	3.8	K0	1	20	1.438	3.0979	-.0057	-	8	35	44.81	18.631	-0.215
δ Cassiopeia . . . . .	2.8	A5	1	20	34.154	3.0046	+0.0407	+59	49	12.62	18.782	-0.037	
β Phœnicis . . . . .	3.4	K5	1	24	53.536	3.0071	-.0020	-43	43	40.85	18.461	-0.225	
38 Cassiopeia . . . . .	6.0	F5	1	25	15.076	4.4220	+0.0263	+69	51	12.76	18.602	-0.072	
γ Piscium . . . . .	3.7	G5	1	27	11.955	+3.3006	+0.0015	+14	56	1.90	+18.000	-0.003	
40 Cassiopeia . . . . .	5.5	K0	1	32	5.528	4.7427	-.0011	+72	37	59.05	18.447	-0.002	
τ Andromedæ . . . . .	4.2	G0	1	32	5.681	3.5118	-.0153	+41	0	21.10	18.072	-0.377	
ν Piscium . . . . .	5.6	F0	1	32	51.282	3.1772	-.0049	+11	43	57.72	18.457	+0.034	
ν Persei . . . . .	3.8	K0	1	33	4.363	3.0700	+0.0084	+48	13	24.16	18.265	-0.119	
α Eridani ( <i>Achernar</i> ) . . . . .	0.6	B5	1	34	44.150	+3.2357	+0.0103	-57	38	34.71	+18.316	-0.041	
ο Cassiopeia . . . . .	5.5	A0p	1	36	23.628	4.4060	+0.0683	+67	38	20.71	18.266	-0.002	
ν Piscium . . . . .	4.7	K0	1	37	16.977	3.2202	-.0015	+	5	4	59.77	18.370	+0.003
φ Persei . . . . .	4.2	B0p	1	38	36.202	3.7470	+0.0031	+50	17	10.72	18.262	-0.015	
τ Ceti . . . . .	3.6	K0	1	40	21.064	3.7806	-.1198	-16	21	29.78	19.013	+0.850	
ο Piscium . . . . .	-4.5	K0	1	41	10.012	+3.1855	+0.0049	+	8	45	19.97	+18.160	+0.045
ε Sculptoris . . . . . †	5.4	F0	1	41	53.704	+2.3044	+0.0032	-25	27	6.63	+18.045	-0.051	

12 Ceti, dup. 5=5, 6=3, 0'' 3  
 α Cassiop., var. irreg. 2=3, 2=3  
 γ Cassiop., comp. 7=6, 4'' n. pr.

β Phœnicis, dup. 4=1, 4=1, 1''  
 ζ Piscium, star 6=5, 24'' n. l.

ι Tucanæ, comp. 7=6, 6'' n.  
 ε Sculptoris, comp. 6=5, 5'' n. l.

# 218 MEAN PLACES OF TEN-DAY STARS, 1920.

FOR JANUARY 0<sup>h</sup>.943, WASHINGTON MEAN TIME.

Name of Star.	Magni- tude.	Spec- trum.	Right Ascension.	Annual Variation.	Annual P. M.	Declination.	Annual Variation.	Annual P. M.
			h m s	" "	" "	" ' "	" "	" "
ζ Ceti . . . . .	3.9	K0	1 47 30.664	+3.9203	+0.0230	-10 43 46.86	+17.333	-0.237
α Trianguli . . . . .	3.6	F5	1 48 30.938	3.4146	+0.0115	+29 11 22.96	17.609	-0.231
ε Cassiopeie . . . . .	3.4	B3	1 48 37.351	4.2394	+0.0033	+63 16 36.68	17.331	-0.315
ξ Piscium . . . . .	4.8	K0	1 49 24.735	3.1043	+0.0115	+ 2 47 35.23	17.335	+0.321
β Arietis . . . . .	2.7	A5	1 50 12.984	3.3033	+0.0034	+20 25 3.04	17.631	-0.111
ψ Phoenicis . . . . .	4.4	Mb	1 50 26.211	+2.4033	-0.0194	-46 41 39.88	+17.638	-0.104
ν Ceti . . . . .	4.2	K5	1 56 14.995	2.3257	+0.0033	-21 27 53.53	17.513	-0.309
α Hydri . . . . .	3.0	F0	1 56 14.490	1.3317	+0.0776	-61 57 31.73	17.548	+0.023
50 Cassiopeie . . . . .	4.1	A0	1 56 34.230	5.6709	-0.0032	+72 2 6.10	17.523	+0.320
γ Andromedæ pr. . . . .	2.3	K0	1 58 58.831	3.6733	+0.0046	+41 56 47.53	17.353	-0.331
γ Andromedæ seq. . . . .	5.1	A	Δα +0.842	.....	.....	Δδ +4.57	.....	.....
α Arietis . . . . .	2.2	K2	2 2 39.559	+3.3771	+0.0139	+23 5 5.30	+17.608	-0.144
β Trianguli . . . . .	3.1	A5	2 4 46.653	3.3630	+0.0127	+34 36 34.30	17.103	-0.044
55 Cassiopeie . . . . .	6.2	F5	2 8 10.970	4.6746	-0.0239	+66 9 1.25	16.938	-0.303
6 Persei . . . . .	5.4	K0	2 8 16.482	3.9763	+0.0366	+50 41 41.73	16.330	-0.167
ξ <sup>1</sup> Ceti . . . . .	4.5	G5	2 8 45.442	+3.1773	-0.0113	+ 8 23 18.94	+16.943	-0.316
μ Fornacis . . . . .	5.2	A0	2 9 22.820	2.6377	-0.0037	-31 5 56.29	16.913	-0.022
γ Trianguli . . . . .	4.1	A0	2 12 33.169	3.5599	+0.0040	+33 23 40.44	16.733	-0.053
67 Ceti . . . . .	5.7	G5	2 12 59.506	2.9909	+0.0034	- 6 47 35.06	16.633	-0.110
φ Eridani . . . . .	3.8	B8	2 13 38.979	2.1410	+0.0033	-51 52 55.76	16.704	-0.029
ο Ceti (Mira) . . . . .	var.	Md	2 15 18.239	+3.0294	+0.002	- 3 20 24.54	+16.423	-0.239
κ Fornacis . . . . .	5.4	F5	2 18 52.860	2.7447	+0.0133	-24 10 46.09	16.309	-0.377
δ Hydri . . . . .	4.3	A2	2 20 19.195	1.0593	-0.0007	-69 1 23.21	16.434	+0.330
ε Cassiopeie . . . . .	4.6	A5p	2 22 27.232	4.9094	-0.003	+67 2 37.44	16.306	+0.310
ξ <sup>2</sup> Ceti . . . . .	4.3	A0	2 23 54.173	3.1370	+0.0025	+ 8 6 7.85	16.315	-0.307
σ Ceti . . . . .	4.8	F5	2 28 17.641	+2.3413	-0.0033	-15 35 41.77	+16.391	-0.103
36 H. Cassiopeie . . . . .	5.3	K0	2 30 23.564	5.4496	-0.0033	+72 23 10.42	15.399	+0.317
ν Ceti . . . . .	5.0	G5	2 31 40.403	+3.1456	-0.0025	+ 5 14 41.75	15.795	-0.035
μ Hydri . . . . .	5.3	K0	2 33 19.632	-1.3338	+0.0025	-79 27 31.06	15.893	-0.033
ν Arietis . . . . .	5.4	A2	2 34 16.216	+3.4030	+0.001	+21 36 58.26	15.631	-0.021
δ Ceti . . . . .	4.0	B2	2 35 22.827	+3.0735	+0.0011	- 0 0 56.89	+15.616	+0.304
ε Hydri . . . . .	4.3	B9	2 38 21.297	0.9154	+0.0168	-68 36 34.38	15.453	+0.006
θ Persei . . . . .	4.2	G0	2 38 48.616	4.0339	+0.0033	+48 53 27.79	15.330	-0.303
γ Ceti seq. . . . .	3.7	A0	2 39 9.195	3.1064	-0.0036	+ 2 53 57.73	15.332	-0.131
ν Ceti . . . . .	4.4	B5	2 40 18.830	2.3539	-0.0013	-14 11 48.52	15.323	-0.311
μ Ceti . . . . .	4.4	A5	2 40 36.873	+3.3400	+0.0133	+ 9 46 37.99	+15.306	-0.035
η Persei . . . . .	3.9	K0	2 44 51.025	4.3610	+0.0041	+55 33 52.32	15.033	-0.313
41 Arietis . . . . .	3.7	B8	2 45 16.209	3.5260	+0.0039	+26 55 54.00	14.944	-0.111
β Fornacis . . . . .	4.5	K0	2 45 44.553	2.5121	+0.0030	-32 44 28.99	15.183	+0.134
σ Arietis . . . . .	5.5	B5	2 47 4.853	3.3033	+0.0116	+14 45 11.07	14.916	-0.304
τ <sup>2</sup> Eridani . . . . .	4.8	K0	2 47 24.493	+2.7201	-0.0044	-21 19 58.86	+14.914	-0.317
τ Persei . . . . .	4.1	G0p	2 48 34.528	4.2394	+0.0033	+52 26 10.03	14.859	-0.303
η Eridani . . . . .	4.0	K0	2 52 31.120	1.9304	+0.0030	- 9 12 56.83	14.416	-0.313
ε Arietis (mean) . . . . .	4.6	A2	2 54 38.013	3.2233	-0.0009	+21 1 16.16	14.492	-0.016
θ Eridani . . . . .	3.4	A2	2 55 13.794	2.7267	-0.0025	-40 37 28.86	14.499	+0.304
47 H. Cephei . . . . .	5.7	Ma	2 55 23.204	+7.3713	-0.0102	+79 6 15.96	+14.467	+0.310
α Ceti . . . . .	2.8	Ma	2 58 5.723	2.3337	-0.0009	+ 3 46 35.96	14.313	-0.373
τ <sup>3</sup> Eridani . . . . .	4.2	A3	2 58 51.880	2.6449	-0.0104	-23 56 14.14	14.300	-0.314
γ Persei . . . . .	3.1	G0p	2 58 59.526	4.3310	+0.0010	+53 11 39.46	14.233	-0.304
ρ Persei . . . . .	var.	Mb	3 0 2.626	3.3369	+0.0116	+38 31 52.13	14.093	-0.115
μ Horologii . . . . .	5.2	F0	3 1 43.402	+1.4033	-0.0133	-60 2 50.83	+14.013	-0.304
θ Hydri . . . . .	5.5	B3	3 2 4.632	6.1037	+0.0034	-72 12 53.51	14.009	+0.314
β Persei (Algol) . . . . .	var.	B3	3 2 57.403	3.3632	+0.0036	+40 33 54.40	13.963	-0.303
δ Arietis . . . . .	4.5	K0	3 7 3.069	1.4270	+0.0110	+19 25 30.40	13.733	+0.301
12 Eridani . . . . .	4.0	F3	3 8 40.295	1.3633	+0.0241	-29 18 6.65	14.304	+0.333
48 H. Cephei . . . . .	5.0	F0	3 10 6.901	+7.3333	+0.0204	+77 26 33.89	+13.489	-0.305
ζ Arietis . . . . .	5.0	A0	3 10 17.963	+3.4443	-0.0019	+20 44 55.60	+13.441	-0.303

ο Ceti, var., 3314, 1<sup>h</sup>.7-9<sup>m</sup>.6, star 9=1.8  
 ε Cassiop., triple, 7<sup>m</sup>, 8<sup>m</sup>, 2", 8"  
 γ Ceti, comp. 6=2, 2", 7 pr.

ν Persei, star 8=5, 28" n. pr.  
 ε Arietis, dup., 5=2, 9=6, 1", 2"  
 θ Eridani, comp. 4=4, 1, 8".

ρ Persei, var. irreg., 9=4-9=2  
 β Persei, var., 24.37, 2=1-9=2  
 12 Eridani, comp. 7=, 1", 4 n. pr.



# MEAN PLACES OF TEN-DAY STARS, 1920. 219

FOR JANUARY 04.943, WASHINGTON MEAN TIME.

Name of Star.	Magni- tude.	Spec- trum.	Right Ascension.			Annual Vari- ation.	Annual P. M.	Declination.			Annual Vari- ation.	Annual P. M.		
			h	m	s			"	"	"				
38 G. Horologii . . . . .	5.7	N	3	10	31.333	+1.5132	-.0005	-57	37	15.09	+13.562	-0.006		
† Eridani . . . . .	4.9	A3	3	11	56.766	2.9126	-.0008	-	9	6 57.71	13.470	+0.053		
† Arietis . . . . .	5.2	B3	3	16	36.308	3.4662	+0.0023	+20	51	34.24	13.078	-0.033		
† Eridani . . . . .	4.3	G5	3	16	43.950	+2.3970	+2.9036	-43	22	30.02	13.586	+0.756		
† Hydri . . . . .	5.5	F2	3	17	55.394	-1.5441	+0.0551	-77	40	52.49	13.063	+0.040		
α Persei . . . . .	1.9	F5	3	18	36.147	+4.3714	+0.0030	+49	34	39.32	+12.950	-0.026		
ο Tauri . . . . .	3.8	G5	3	20	30.341	3.3260	-.0046	+	8	44 53.68	12.777	-0.074		
2 H. Camelopardalis . . . . .	4.4	A0	3	22	34.750	4.2410	+0.0027	+59	39	46.30	12.712	+0.001		
ξ Tauri . . . . .	3.8	B8	3	22	49.374	3.2490	+0.0040	+	9	27 16.26	12.646	-0.046		
ζ Tauri . . . . .	4.3	K0	3	26	27.233	3.3007	+0.0016	+12	39	48.47	12.440	+0.002		
ε Eridani . . . . .	3.8	K0p	3	29	9.618	+2.2335	-.0060	-	9	43 41.33	+12.366	+0.027		
† Eridani . . . . .	4.3	B6	3	30	15.147	2.6445	+0.0023	-21	54	1.98	12.146	-0.030		
δ Persei . . . . .	3.1	B5	3	37	13.269	4.2630	+0.0035	+47	31	58.67	11.650	-0.026		
δ Eridani . . . . .	3.7	K0	3	39	24.914	2.5733	-.0061	-10	2	0.74	12.370	+0.731		
γ Persei . . . . .	3.9	F5	3	39	45.181	4.0665	-.0004	+42	19	37.51	11.445	0.000		
5 H. Camelopardalis . . . . .	4.7	A0	3	41	53.330	+6.3930	+0.0059	+71	5	14.49	+11.305	-0.057		
γ Tauri (Alcyon) . . . . .	3.0	B5	3	42	43.529	3.5635	+0.0016	+23	51	31.49	11.263	-0.030		
† Eridani . . . . .	4.3	F8	3	43	24.337	2.5897	-.0115	-23	29	4.37	10.771	-0.481		
g Eridani . . . . .	4.2	K0	3	46	27.659	+2.2452	-.0026	-36	26	29.87	11.002	-0.028		
γ Hydri . . . . .	3.2	Ma	3	48	27.629	-0.9590	+0.0097	-74	29	3.95	11.000	+0.117		
† Persei . . . . .	2.9	B1	3	49	5.935	+3.7067	+0.0010	+31	38	49.72	+10.332	-0.014		
† H. Camelopardalis . . . . .	5.2	K0p	3	50	13.223	5.0976	+0.0008	+60	52	33.36	10.731	-0.017		
† Persei . . . . .	3.0	B0	3	52	23.846	4.0206	+0.0031	+39	46	47.92	10.559	-0.037		
ξ Persei . . . . .	4.0	Oe5	3	53	46.193	3.8880	+0.0012	+35	33	43.11	10.474	-0.017		
† Eridani . . . . .	3.2	K5	3	54	17.785	2.7987	+0.0047	-13	44	6.89	10.241	-0.111		
λ Tauri . . . . .	†	var.	B3	3	56	14.768	+3.3231	+0.0023	+12	15	55.08	+10.294	-0.011	
δ Reticuli . . . . .	4.4	Ma	3	57	23.393	0.9418	-.0020	-61	37	31.73	10.331	-0.002		
γ Tauri . . . . .	3.9	A0	3	58	53.951	3.1901	+0.0008	+	5	46 5.83	10.109	-0.005		
Δ Tauri . . . . .	4.5	K0	3	59	57.770	3.5440	+0.0009	+21	51	51.88	9.967	-0.058		
c Persei . . . . .	4.0	B3p	4	2	50.889	4.2489	+0.0042	+47	30	0.74	9.774	-0.032		
p Tauri . . . . .	5.6	F0	4	5	57.327	+3.6560	-.0024	+26	16	23.68	+	9.496	-0.042	
† Eridani . . . . .	4.1	F5	4	7	57.571	3.9276	+0.0007	-	7	2 42.72	9.499	+0.006		
μ Tauri . . . . .	4.3	B3	4	11	11.312	3.2541	+0.0010	+	8	41 34.83	9.130	-0.024		
α Horologii . . . . .	3.8	K0	4	11	21.034	1.9875	+0.0040	-42	29	23.93	8.930	-0.231		
α Reticuli . . . . .	3.4	G5	4	13	23.368	0.7661	+0.0048	-62	40	25.89	9.036	+0.044		
γ Tauri . . . . .	3.9	K0	4	15	14.813	+3.4121	+0.0039	+15	26	7.80	+	8.331	-0.026	
δ Tauri . . . . .	3.9	K0	4	18	19.127	3.4575	+0.0075	+17	21	21.45	8.574	-0.030		
† Eridani . . . . .	4.1	K5	4	21	1.898	+2.3580	+0.0053	-34	12	7.26	8.432	+0.042		
δ Mensæ . . . . .	5.6	K0	4	23	20.568	-4.1386	+0.0043	-80	24	9.00	8.377	+0.073		
ε Tauri . . . . .	3.6	K0	4	23	56.589	+3.5013	+0.0032	+19	0	14.82	8.123	-0.024		
† Persei . . . . .	6.1	F0	4	27	46.904	+4.3163	+0.0012	+42	53	39.58	+	7.354	+0.004	
α Tauri (Aldebaran) . . . . .	1.1	K5	4	31	19.679	3.4405	+0.0047	+16	20	58.45	7.374	-0.139		
α Doradus . . . . .	3.5	A0p	4	32	15.994	1.3952	+0.0067	-55	12	36.43	7.476	-0.011		
† Eridani . . . . .	4.1	B2	4	32	19.219	2.9960	-.0006	-	3	30 53.95	7.483	0.000		
53 Eridani . . . . .	4.0	K0	4	34	30.884	2.7487	-.0061	-14	27	33.95	7.151	-0.154		
† Tauri . . . . .	4.3	B5	4	37	26.439	+3.5992	+0.0007	+22	48	16.50	+	7.046	-0.030	
α Oculi . . . . .	4.5	F2	4	37	58.916	1.9362	-.0149	-42	0	58.53	6.915	-9.106		
Groombridge 848 . . . . .	6.0	F0	4	38	2.441	8.9285	+0.0044	+75	47	52.83	6.872	-0.144		
4 Camelopardalis . . . . .	5.4	A2	4	41	19.974	4.9886	+0.0032	+56	37	0.16	6.596	-0.143		
μ Eridani . . . . .	4.2	B5	4	41	30.088	2.9990	+0.0011	-	3	24 0.91	6.723	-0.009		
† Orionis . . . . .	3.3	F8	4	45	29.748	+3.3535	+0.0312	+	6	49 22.04	+	6.426	+0.023	
9 Camelopardalis . . . . .	4.4	B0	4	46	5.289	5.9515	+0.0030	+66	12	31.33	6.363	+0.005		
† Tauri . . . . .	5.1	F0	4	46	41.534	3.5061	+0.0059	+18	42	17.44	6.268	-0.035		
† Orionis . . . . .	3.9	B3	4	50	5.001	3.1243	+0.0002	+	2	18 38.91	6.026	+0.005		
ε Aurigæ . . . . .	2.9	K2	4	51	46.869	3.9045	+0.0009	+33	2	26.49	5.858	-0.021		
ε Aurigæ . . . . .	†	var.	F5p	4	56	13.526	+4.3031	+0.0012	+43	42	22.61	+	5.468	-0.013
β Camelopardalis . . . . .	4.2	G0	4	56	17.657	+5.3277	-.0004	+60	19	37.59	+	6.489	-0.011	

38 Horologii, remarkable purplish red star.  
 ε Eridani, comp. 9<sup>m</sup>, s. 7<sup>m</sup>.

γ Tauri, quad., comps. 6<sup>m</sup>.3, 7<sup>m</sup>.6, 8<sup>m</sup>.2, 11<sup>m</sup>7<sup>s</sup>, 181<sup>m</sup>, 189<sup>m</sup>.  
 9 H. Camelop., comp. 8<sup>m</sup>, 1<sup>m</sup>.9 n. l.  
 ε Persei, comp. 8<sup>m</sup>, 8<sup>m</sup>.5 n. l.

λ Tauri, var., 34.95, 3<sup>m</sup>.3-4<sup>m</sup>.2  
 Δ Tauri, star 6<sup>m</sup>.5 f. 33<sup>m</sup>, 253<sup>m</sup> s.  
 m Persei, star 7<sup>m</sup>, 115<sup>m</sup> s. pr.  
 ε Aurigæ, var. irreg., 3<sup>m</sup>-0<sup>m</sup>.4<sup>m</sup>5

# 220 MEAN PLACES OF TEN-DAY STARS, 1920.

FOR JANUARY 04.948, WASHINGTON MEAN TIME.

Name of Star.	Magni- tude.	Spec- trum.	Right Ascension.			Annual Vari- ation.	Annual P. M.	Declination.			Annual Vari- ation.	Annual P. M.
			h	m	s			"	"	"		
ζ Aurigæ . . . . .	3.9	K0p	4 56	52.972	+4.1904	+0.013	+40 57 37.75	+5.430	-0.023			
ε Tauri . . . . .	4.7	A5	4 58	18.762	3.5881	+0.056	+21 28 36.30	5.361	-0.049			
11 Orionis . . . . .	4.6	B9	4 59	59.784	3.4270	+0.013	+15 17 37.78	5.158	-0.086			
η Aurigæ . . . . .	3.3	B3	5 0	54.140	4.2049	+0.039	+41 7 39.46	5.040	-0.072			
ε Leporis . . . . .	3.3	K5	5 2	4.427	2.5396	+0.012	-22 28 39.37	4.940	-0.064			
β Eridani . . . . .	2.9	A2	5 3	54.996	+2.9444	-0.058	- 5 11 19.66	+4.782	-0.074			
μ Aurigæ . . . . .	4.8	A3	5 7	57.048	4.1023	-0.020	+33 23 27.83	4.432	-0.080			
19 H. Camelopardalis	5.2	F8	5 9	29.718	9.8422	-0.074	+79 8 32.94	4.850	+0.155			
μ Leporis . . . . .	3.3	A0p	5 9	20.243	2.6041	+0.027	-16 17 57.35	4.267	-0.028			
β Orionis (Rigel) . . . . .	0.3	B8p	5 10	41.539	2.8825	.0000	- 8 17 34.99	4.279	0.000			
α Aurigæ (Capella) . . . . .	0.2	G0	5 10	46.594	+4.4205	+0.086	+45 55 5.23	+3.842	-0.420			
λ Aurigæ . . . . .	4.8	G0	5 13	30.675	4.2182	+0.040	+40 1 45.78	3.878	-0.080			
τ Orionis . . . . .	3.7	B5	5 13	43.239	2.9127	-0.009	- 6 55 47.41	4.015	-0.085			
ο Columbae . . . . .	4.9	K0	5 14	35.769	2.1589	+0.027	-34 58 22.56	3.894	-0.382			
γ Orionis (Bellatrix) . . . . .	1.7	B2	5 20	50.362	3.2172	-0.004	+ 6 16 41.76	3.391	-0.027			
β Tauri . . . . .	1.8	B8	5 21	14.010	+3.7917	+0.025	+28 32 28.14	+3.198	-0.177			
17 Camelopardalis . . . . .	5.8	K5	5 22	36.625	5.6612	+0.008	+63 0 7.99	3.249	-0.007			
β Leporis . . . . .	3.0	G0	5 24	49.051	2.5794	.0000	-20 49 20.24	2.976	-0.009			
χ Aurigæ . . . . .	4.9	B1	5 27	31.183	3.9043	+0.006	+32 8 2.80	2.818	-0.028			
δ Orionis . . . . .	2.5	B0	5 27	55.130	3.0644	.0000	- 0 21 26.29	2.794	-0.002			
Groombridge 966 . . . . .	6.4	K5	5 29	1.098	+8.0121	-0.002	-74 59 36.64	+2.719	+0.017			
α Leporis . . . . .	2.7	F0	5 29	12.094	2.6468	+0.003	+17 52 43.18	2.665	0.000			
φ <sup>1</sup> Orionis . . . . .	4.5	B0	5 30	25.656	3.2923	-0.002	+ 9 26 11.05	2.564	-0.015			
ο Orionis . . . . .	2.9	Oe5	5 31	31.162	2.9343	+0.001	- 5 57 41.20	2.482	-0.082			
ε Orionis . . . . .	1.8	B0	5 32	9.206	3.0437	.0000	- 1 15 6.89	2.431	+0.001			
ζ Tauri . . . . .	3.0	B3	5 32	51.775	+3.5652	+0.006	+21 5 41.43	+2.336	-0.023			
ζ Orionis . . . . .	2.0	B0	5 36	43.309	3.0271	+0.005	- 1 59 2.40	3.019	-0.014			
α Columbae . . . . .	2.8	B5p	5 36	45.127	2.1796	+0.006	-34 6 58.01	1.992	-0.028			
ο Aurigæ . . . . .	5.5	A0	5 39	42.044	4.6460	-0.018	+49 47 33.69	1.755	-0.021			
ζ Leporis . . . . .	3.7	A2	5 43	19.798	2.7180	-0.013	-14 51 2.94	1.486	-0.001			
κ Orionis . . . . .	2.2	B0	5 43	57.721	+2.8480	+0.001	- 9 41 49.44	+1.206	-0.003			
δ Doradus . . . . .	4.5	A5	5 44	37.620	0.1026	-0.061	-65 45 55.97	1.843	-0.001			
ν Aurigæ . . . . .	4.2	K0	5 45	56.871	4.1576	-0.001	+39 7 35.44	1.242	+0.013			
ζ Leporis . . . . .	3.9	K0	5 47	52.823	2.5797	+0.011	-20 53 5.87	0.410	-0.640			
α Orionis (Betelgeuse) . . . . .	var.	Ma	5 50	50.426	3.2480	+0.020	+ 7 23 35.77	0.510	+0.000			
η Leporis . . . . .	3.8	F5	5 52	45.688	+2.7324	-0.028	-14 10 52.93	+0.774	+0.121			
δ Aurigæ . . . . .	3.9	K0	5 52	56.462	4.9490	+0.018	+54 16 49.20	0.499	-0.115			
β Aurigæ . . . . .	2.1	A0p	5 53	39.670	4.4090	-0.038	+44 56 26.89	0.848	-0.008			
θ Aurigæ . . . . .	2.7	A0p	5 54	15.960	4.6918	+0.047	+37 12 29.82	+0.431	-0.001			
1 Geminorum . . . . .	4.3	G5	5 59	15.448	3.6479	+0.002	+23 16 7.73	-0.044	-0.100			
1 G. Puppis . . . . .	6.2	F8	6 2	10.209	+1.7269	-0.068	-45 2 9.69	+0.035	+0.226			
ν Orionis . . . . .	4.4	B2	6 3	0.290	3.4265	+0.012	+14 46 44.95	-0.283	-0.020			
22 H. Camelopardalis . . . . .	4.7	A0	6 10	2.079	6.6178	+0.025	+69 21 0.54	0.901	-0.114			
η Geminorum . . . . .	var.	Ma	6 10	2.967	3.6227	-0.039	+22 31 52.25	0.895	-0.016			
2 Lyncis . . . . .	4.4	A0	6 12	34.099	5.2962	+0.012	+59 2 30.34	1.000	+0.000			
ζ Canis Majoris . . . . .	3.1	B3	6 17	14.435	+2.8019	-0.006	-30 1 38.60	-1.530	-0.020			
μ Geminorum . . . . .	3.2	Ma	6 18	7.278	3.6307	+0.046	+22 33 21.23	1.608	-0.114			
ψ <sup>1</sup> Aurigæ . . . . .	5.1	K2	6 18	44.416	4.6257	+0.029	+49 19 49.13	1.641	-0.604			
β Canis Majoris . . . . .	2.0	B1	6 19	10.590	2.6416	-0.006	-17 54 54.68	1.672	+0.004			
8 Monocerotis . . . . .	4.5	A5	6 19	31.766	3.1802	-0.004	+ 4 38 4.47	1.697	+0.009			
α Argus (Canopus) . . . . .	-0.9	F0	6 22	10.561	+1.3319	+0.022	-52 39 5.82	-1.928	+0.000			
10 Monocerotis . . . . .	5.0	B3	6 24	0.611	2.9642	+0.019	- 4 42 41.78	2.000	+0.000			
ν Geminorum . . . . .	4.1	B5	6 24	12.793	3.5628	-0.005	+20 15 50.39	2.130	-0.020			
8 Lyncis . . . . .	6.0	G0	6 30	23.079	5.4911	-0.067	+61 33 12.10	2.926	-0.276			
23 Canis Majoris . . . . .	4.5	A0	6 31	42.233	2.5158	+0.022	-22 54 0.03	2.780	+0.025			
23 H. Camelopardalis . . . . .	5.6	F8	6 32	36.451	+10.3910	-0.022	+79 39 15.57	-3.476	-0.622			
γ Geminorum . . . . .	1.9	A0	6 33	5.464	+3.4480	+0.033	+16 28 7.29	-2.923	-0.046			

β Orionis, comp. 8<sup>m</sup>.0, 9<sup>s</sup>.5 s. p.      ζ Orionis, comp. 4<sup>m</sup>.2, 3<sup>s</sup>.4 s. f.  
 δ Orionis, star 6<sup>m</sup>.9, 32<sup>s</sup>.6 n.      α Orionis, red star, var. irreg., 1<sup>m</sup>.0-  
 ε Orionis, comp. 7<sup>m</sup>.3, 11<sup>s</sup>.5 s. f.      1<sup>m</sup>.4  
 1 Puppis, star 5<sup>m</sup>.8, f. 13<sup>s</sup>.180<sup>n</sup> s.      η Gem., var., 23<sup>d</sup>.4, 3<sup>m</sup>.2-4<sup>m</sup>.2, comp.  
 8<sup>m</sup>.8, 1<sup>s</sup>.2 n. p.      8 Monoc., star 6<sup>m</sup>.5, 13<sup>s</sup>.7 n. f.

# MEAN PLACES OF TEN-DAY STARS, 1920. 221

FOR JANUARY 04.943, WASHINGTON MEAN TIME.

Name of Star.	Magni- tude.	Spec- trum.	Right Ascension.			Annual Vari- ation.	Annual P. M.	Declination.			Annual Vari- ation.	Annual P. M.
			h	m	s			"	"	"		
51 Aurigæ . . . . .	5.7	K0	6	33	7.013	+4.1894	-.0020	+39	27	45.82	- 3.990	-0.113
γ Argus . . . . .	3.2	B8	6	35	18.893	1.8368	+0.0068	-43	7	30.85	3.066	-0.019
8 Monocerotis . . . . .	4.7	Oe5	6	36	34.359	3.3046	.0000	+ 9	58	14.95	3.193	-0.008
ε Geminorum . . . . .	3.2	G5	6	39	0.668	3.6927	-.0001	+25	12	41.74	3.414	-0.018
ξ Geminorum . . . . .	3.4	F5	6	40	48.001	3.3683	-.0076	+12	58	58.83	3.742	-0.193
ψ <sup>2</sup> Aurigæ . . . . .	5.3	G0	6	40	58.609	+4.3394	+0.0018	+43	39	30.51	- 3.405	+0.160
α Canis Majoris ( <i>Sirius</i> ) †	-1.6	A0	6	41	37.364	3.6434	-.0373	-16	36	19.86	4.837	-1.206
18 Monocerotis . . . . .	4.7	K0	6	43	41.947	3.1230	-.0020	+ 2	30	2.78	3.814	-0.016
43 Camelopardalis . . . . .	5.1	B5	6	45	5.310	6.4961	+0.0021	+68	59	0.54	3.906	+0.012
α Pictoris . . . . .	3.3	A5	6	47	22.328	0.6174	-.0104	-61	51	19.53	3.376	+0.238
θ Geminorum . . . . .	3.6	A2	6	47	31.119	+3.9678	+0.0010	+34	3	32.51	- 4.178	-0.060
τ Argus . . . . .	2.8	K0	6	47	57.050	1.4833	+0.0024	-50	31	9.12	4.370	-0.187
15 Lynx . . . . .	4.5	K0	6	50	21.421	5.3056	+0.0021	+58	31	45.68	4.499	-0.130
θ Canis Majoris . . . . .	4.2	K2	6	50	28.411	2.7830	-.0091	-11	56	14.39	4.396	-0.007
ε Canis Majoris . . . . .	1.6	B1	6	55	28.889	3.3575	-.0001	-28	51	44.49	4.983	+0.003
ζ Geminorum . . . . .	var.	G0	6	59	21.929	+3.5804	-.0002	+20	41	19.65	- 5.142	-0.007
σ Canis Majoris . . . . .	3.1	B5p	6	59	41.035	2.5049	-.0006	-23	42	55.74	5.186	+0.005
γ Canis Majoris . . . . .	4.1	B5	7	0	8.364	2.7145	+0.0002	-15	30	50.99	5.200	-0.010
δ Canis Majoris . . . . .	2.0	F8	7	5	8.246	2.4332	-.0015	-26	15	55.21	5.617	+0.003
63 Aurigæ . . . . .	5.1	K2	7	6	9.387	4.1222	+0.0052	+39	27	8.59	5.700	-0.003
51 Geminorum . . . . .	5.3	Mb	7	8	46.761	+3.4478	+0.0019	+16	17	45.10	- 5.967	-0.042
γ <sup>2</sup> Volantis . . . . .	3.9	K0	7	9	25.773	-0.5928	+0.0004	-70	22	9.41	5.908	+0.078
λ Geminorum . . . . .	3.6	A2	7	13	29.822	+3.4500	-.0029	+16	41	8.74	6.364	-0.045
τ Argus . . . . .	2.7	K5	7	14	19.037	2.1190	-.0008	-36	57	12.12	6.396	-0.010
δ Geminorum . . . . .	3.5	F0	7	15	30.844	+3.5861	-.0010	+22	7	50.91	6.487	-0.015
δ Volantis . . . . .	4.0	F5	7	16	52.898	-0.0206	+0.0004	-67	48	39.15	- 6.605	-0.006
ε Geminorum . . . . .	3.9	K0	7	20	45.628	+3.7399	-.0066	+27	57	29.81	7.006	-0.067
γ Canis Majoris . . . . .	2.4	B5p	7	20	55.892	2.3738	+0.0003	-29	8	46.37	6.925	+0.007
Groombridge 1308 . . . . .	5.8	K0	7	22	34.327	6.2706	+0.0018	+68	37	51.59	7.112	-0.046
β Canis Minoris . . . . .	3.1	B8	7	22	48.815	3.2658	-.0032	+ 8	27	5.54	7.133	-0.047
ρ Geminorum . . . . .	4.2	F0	7	23	58.103	+3.9825	+0.0118	+31	56	41.97	- 6.998	+0.133
σ Argus . . . . .	3.3	K5	7	23	41.506	1.9019	-.0072	-43	8	19.74	7.228	+0.130
α <sup>2</sup> Geminorum ( <i>Castor</i> ) . . . . .	2.0	A0	7	29	29.900	3.5325	-0.0144	+32	3	55.95	7.712	-0.082
α <sup>1</sup> Geminorum . . . . .	2.8	A0	Δα	-0.240	.....	.....	.....	Δδ	-4.12	.....	.....	.....
25 Monocerotis . . . . .	5.2	F5	7	33	18.009	2.9818	-.0066	- 3	55	52.68	7.915	+0.022
α Can. Min. ( <i>Procyon</i> ) †	0.5	F5	7	35	6.901	+3.1415	-.0471	+ 5	25	51.03	- 9.119	-1.637
24 Lynx . . . . .	5.0	A2	7	36	14.854	5.0913	-.0043	+58	53	56.83	8.229	-0.066
κ Geminorum . . . . .	3.7	G5	7	39	37.254	3.6390	-.0014	+24	35	27.21	8.501	-0.060
β Geminorum ( <i>Pollux</i> ) . . . . .	1.2	K0	7	40	25.395	3.6751	-.0470	+28	13	13.97	8.680	-0.055
4 Puppis . . . . .	5.1	F2	7	42	15.853	2.7636	-.0003	-14	22	6.54	8.668	-0.002
ξ Argus . . . . .	3.5	G0	7	45	55.781	+2.5223	-.0004	-24	39	29.37	- 8.968	0.000
φ Geminorum . . . . .	5.0	A2	7	48	36.263	3.6759	-.0020	+26	58	26.65	9.174	-0.027
26 Lynx . . . . .	5.7	K0	7	48	53.674	4.3796	-.0022	+47	46	23.88	9.175	-0.005
Groombridge 1374 . . . . .	5.6	K0	7	50	39.003	7.2948	-.0022	+74	8	1.51	9.343	-0.087
χ Argus . . . . .	3.6	B3	7	54	44.721	1.5357	-.0043	-52	46	2.77	9.616	+0.006
ω Cancri . . . . .	5.9	K0	7	56	5.575	+3.6832	+0.0003	+25	36	46.28	- 9.729	-0.604
χ Geminorum . . . . .	5.0	K0	7	58	36.508	3.6896	-.0012	+28	1	10.73	9.970	-0.063
27 Lynx . . . . .	4.9	A2	8	2	26.983	4.5378	-.0032	+51	44	19.20	10.210	-0.003
ρ Argus . . . . .	2.9	F5	8	4	8.201	2.5547	-.0065	-24	4	22.02	10.282	+0.062
3 H. Ursæ Majoris . . . . .	5.5	G5	8	4	52.265	6.0959	+0.0002	+63	42	40.75	10.384	+0.005
γ Argus . . . . .	2.2	Oap	8	7	4.096	+1.3496	-.0003	-47	6	1.45	-10.564	-0.011
ζ Cancri ( <i>mean</i> ) . . . . .	4.7	G0	8	7	37.574	3.4440	+0.0051	+17	53	24.80	10.723	-0.129
Bradley 1147 . . . . .	5.7	G5	8	9	31.913	7.6077	+0.0077	+76	0	10.97	10.743	-0.008
20 Puppis . . . . .	5.0	G5	8	9	39.345	2.7579	-.0009	-15	32	46.80	10.744	+0.001
β Cancri . . . . .	3.8	K2	8	12	10.682	3.2653	-.0065	+ 9	25	59.00	10.983	-0.062
31 Lynx . . . . .	4.4	K5	8	17	22.015	+4.1198	+0.0015	+43	26	45.50	-11.406	-0.100
δ <sup>1</sup> Cancri . . . . .	5.9	F0	8	18	47.132	+3.4385	-.0068	+18	35	24.00	-11.441	-0.081

8 Monoc., comp. 8=3, 2".9 s. pr.     γ Volantis, comp. 8=3, 12".9 n. pr.     γ Argus, star 8=, 42".5 s. or.  
 15 Lynx, dup., 4=9, 6=2, 0".7     ε Gem., comp. 8=, 7".0 s. pr.     ζ Cancri, triple; binary 8=6, 6=3, 1",  
 α Can. Maj. comp. 9=, 7".3 s. l.     σ Argus, star 8=, 22".4 n. l.     with comp. 6=0, 5".4 s. l.  
 ζ Gem., var., 10=15, 3=7-4=3     κ Gem., comp. 8=5, 6".6 s. pr.

Positions given for Sirius and Procyon are those of the centers of their orbits. Corrections given on page x remain to be applied to reduce to the positions of the stars.

# 222 MEAN PLACES OF TEN-DAY STARS, 1920.

FOR JANUARY 0<sup>h</sup>.04<sup>s</sup>, WASHINGTON MEAN TIME.

Name of Star.	Magni- tude.	Spec- trum.	Right Ascension.		Annual Variation.		Declination.			Annual Variation.	
			h	m	s	"	"	"	"	"	"
e Argus	1.7	K0p	8 20	52.415	+1.2833	-0.0042	-59	15	6.21	-11.553	+0.008
30 Monocerotis	4.0	A0	8 21	39.866	+2.9994	-0.0039	- 3	38	40.32	11.636	-0.019
o Chamaeleontis	4.3	K0	8 23	3.862	-1.7855	-0.0451	-77	13	37.32	11.698	+0.028
o Urse Majoris	8.5	G0	8 23	37.959	+5.0083	-0.0180	+60	59	13.20	11.868	-0.112
Groombridge 1450	6.0	K0	8 27	43.261	3.9979	-0.0032	+38	17	30.54	12.223	-0.178
η Cancrī	5.5	K0	8 28	5.130	+3.4737	-0.0085	+20	42	49.77	-12.124	-0.055
Groombridge 1446	6.3	K0	8 30	50.902	6.7837	-0.0043	+73	54	39.40	12.379	-0.117
δ Hydræ	4.2	A0	8 33	25.353	3.1778	-0.0045	+ 5	59	0.97	12.453	-0.024
σ Hydræ	4.5	K0	8 34	34.658	3.1890	-0.0068	+ 3	37	23.62	12.531	-0.012
γ Cancrī	4.7	A0	8 38	39.584	3.4761	-0.0071	+21	45	25.87	12.538	-0.043
δ Cancrī	4.2	K0	8 40	8.496	+3.4132	-0.0039	+18	26	57.08	-13.124	-0.240
α Pyxidīs	8.7	B2	8 40	22.617	2.4112	-0.0033	-32	53	50.37	12.969	+0.011
ε Cancrī	4.2	G5	8 41	51.647	3.6869	-0.0036	+29	3	12.44	13.060	-0.031
ε Argus	2.0	A0	8 42	29.457	1.6516	-0.0035	-54	24	53.92	13.151	-0.100
ε Hydræ	3.5	F8	8 42	32.479	3.1794	-0.0127	+ 6	42	47.66	13.108	-0.048
ε <sup>2</sup> Cancrī (mean)	5.5	K0	8 49	22.092	+3.6669	+0.0034	+30	52	59.95	-12.533	-0.021
ζ Hydræ	3.3	K0	8 51	10.026	3.1741	-0.0060	+ 6	15	2.99	13.611	+0.007
ε Urse Majoris	3.1	A5	8 53	44.322	4.1305	-0.0435	+48	21	24.16	14.030	-0.248
α Cancrī	4.3	A3	8 54	6.846	3.2840	+0.0024	+12	10	5.40	12.547	-0.042
b <sup>1</sup> Carinæ	5.1	B3	8 55	0.903	1.4678	-0.0034	-58	55	13.30	13.221	-0.019
κ Urse Majoris	3.7	A0	8 58	10.325	+4.1065	-0.0027	+47	28	25.95	-14.127	-0.067
ε <sup>2</sup> Urse Majoris	4.9	F8	9 3	22.594	5.3155	-0.003	+67	27	38.21	14.448	-0.066
κ Cancrī	5.1	B8	9 3	24.981	3.2522	-0.0042	+10	59	27.31	14.597	-0.013
λ Argus	2.2	K5	9 5	8.169	2.2064	-0.0015	-43	6	33.26	14.490	-0.007
θ Hydræ	3.8	A0	9 10	12.280	3.1233	+0.0088	+ 2	39	9.26	15.108	-0.312
β Argus	1.8	A0	9 12	19.670	+0.6981	-0.0310	-69	23	15.29	-14.322	+0.004
83 Cancrī	6.6	F5	9 14	31.191	3.3529	-0.0076	+18	2	42.81	15.179	-0.136
ε Argus	2.2	F0	9 14	56.802	1.6039	-0.0065	-58	56	20.74	15.061	+0.006
40 Lynx	3.3	K5	9 18	11.193	3.6622	-0.0178	+34	43	54.03	15.127	+0.012
θ Pyxidīs	4.9	Ma	9 17	56.838	2.6515	-0.0048	-25	37	29.22	15.271	-0.633
α Hydræ	2.2	K2	9 23	39.396	+2.9496	-0.0010	- 8	18	40.00	-15.526	+0.033
h Urse Majoris	3.8	F0	9 25	14.472	4.7601	+0.0183	+63	24	45.49	15.622	+0.024
d Urse Majoris	4.6	G0	9 27	26.240	5.3519	-0.0111	+70	10	58.99	15.994	+0.071
θ Urse Majoris	3.3	F8	9 27	31.000	4.0276	-0.0226	+52	2	34.18	16.312	-0.543
ψ Argus	3.6	F5	9 27	32.761	2.3597	-0.0131	-40	6	58.67	15.723	+0.086
ξ Leonis	5.1	G5	9 27	38.157	+3.2864	-0.0063	+11	39	17.33	-15.900	-0.024
10 Leonis Minoris	4.6	G5	9 29	19.704	3.6837	+0.0011	+36	45	12.91	15.888	-0.021
o Leonis	3.8	F5p	9 36	52.984	3.2045	-0.0096	+10	15	25.38	16.295	-0.033
o Antilæ	5.0	F5	9 40	38.100	2.6733	-0.0036	-27	24	9.51	16.423	+0.029
e Leonis	3.1	G0p	9 41	18.824	3.4101	-0.0034	+24	8	35.51	16.508	-0.022
v Argus	3.2	F0	9 45	6.191	+1.5006	-0.0025	-64	42	2.78	-16.089	-0.017
v Urse Majoris	3.9	F0	9 45	18.902	4.2831	-0.0382	+59	24	57.01	16.340	-0.157
θ Sextantis	6.0	A3	9 47	12.210	3.0244	+0.0011	- 3	52	3.98	16.302	-0.026
μ Leonis	4.1	K0	9 48	13.005	3.4161	-0.0171	+26	23	3.90	16.576	-0.054
Groombridge 1586	6.0	K0	9 51	15.864	5.4196	-0.0197	+73	15	38.69	17.025	-0.090
19 Leonis Minoris	5.2	F5	9 52	47.449	+3.6833	-0.0111	+41	26	14.48	-17.058	-0.022
φ Argus	3.7	B5	9 54	3.066	2.1921	-0.0033	-54	11	12.45	17.114	-0.030
π Leonis	4.9	Ma	9 55	59.235	3.1718	-0.0029	+ 8	25	43.03	17.208	-0.037
γ Leonis	3.6	A0p	10 2	58.313	3.2721	-0.0022	+17	9	12.08	17.492	-0.004
α Leonis (Regulus)	1.3	B8	10 4	6.814	3.1977	-0.0189	+12	21	31.39	17.333	-0.002
λ Hydræ	3.8	K0	10 6	41.278	+2.9248	-0.0187	-11	57	29.08	-17.732	-0.086
q Velorum	4.1	A2	10 11	22.426	2.5135	-0.0153	-41	43	30.69	17.203	+0.622
82 Urse Majoris	5.7	A3	10 12	14.606	4.3877	-0.0140	+65	30	29.21	17.282	-0.012
ζ Leonis	3.6	F0	10 12	14.663	3.3414	+0.0044	+23	48	59.51	17.379	-0.090
λ Urse Majoris	3.5	A0	10 12	16.788	3.6399	-0.0142	+43	18	52.24	17.310	-0.038
γ Leonis pr.	2.6	K0	10 15	33.371	+3.3108	+0.0212	+20	14	48.26	-12.122	-0.122
μ Urse Majoris	3.2	K5	10 17	34.200	+3.5461	-0.0088	+41	54	8.60	-15.946	+0.027

a Cancrī, star 6=6, 30'' S n. pr.  
 β Argus, comp. 5=2, 3'' S.  
 ε Hydræ, triple; binary 3=5, 6=8,  
 0''/2, with comp. 7=3, 3''/3

ε<sup>2</sup> Cancrī, dup., 3=9, 6=4, 1''/4  
 b<sup>1</sup> Carinæ, comp. 7=2, 5' l.  
 ε<sup>2</sup> Urs. Maj., binary, 4=9, 9=, 1''/3

φ Argus, dup., 3=3, 6=0, 0''/3  
 v Argus, comp. 6=0, 4''/9. S. l.  
 γ Leonis, comp. 3=3, 3''/7. S. l.

# MEAN PLACES OF TEN-DAY STARS, 1920. 223

FOR JANUARY 0<sup>h</sup>.948, WASHINGTON MEAN TIME.

Name of Star.	Magni- tude.	Spec- trum.	Right Ascension.			Annual Vari- ation.	Annual P. M.	Declination.			Annual Vari- ation.	Annual P. M.
			h	m	s			"	"	"		
30 H. Ursae Majoris	4.9	A0	10 18	23.235	+4.3462	-.0084	+65 58 17.86	-18.126	-0.018			
μ Hydrae	4.1	K5	10 22	13.239	2.9607	-.0069	-16 25 38.64	18.337	-0.079			
31 Leonis Minoris	4.4	K0	10 23	15.812	2.4777	-.0094	+37 7 3.23	18.898	-0.112			
α Antliae	4.4	K5	10 23	29.343	2.7429	-.0060	-30 39 37.49	18.817	-0.023			
36 Ursae Majoris	4.8	F5	10 25	31.148	3.8575	-.0208	+56 23 28.55	18.405	-0.039			
9 H. Draconis	5.0	G5	10 28	20.275	+5.1711	-.0084	+76 7 32.64	-18.472	-0.009			
ρ Leonis	5.8	B0p	10 28	36.048	3.1612	-.0004	+ 9 43 7.51	18.476	-0.003			
33 Sextantis	6.4	K0	10 37	19.992	3.0618	-.0100	- 1 19 13.38	18.866	-0.110			
41 Leonis Minoris	5.0	A2	10 39	4.175	3.2683	-.0084	+23 36 27.53	18.799	+0.009			
θ Argus	8.0	B0	10 40	5.888	2.1334	-.0043	-63 58 32.30	18.866	-0.027			
42 Leonis Minoris	5.4	B9	10 41	25.239	+3.3414	-.0024	+31 6 14.58	-18.920	-0.041			
γ Argus	var.	Pec.	10 41	57.199	2.3319	-.0002	-59 15 49.28	18.908	-0.009			
μ Argus	2.8	G5	10 43	19.481	2.5745	+0.0066	-48 59 50.97	19.015	-0.061			
3 <sup>2</sup> Chamaeleontis	4.6	B3	10 45	2.788	0.5891	-.0192	-80 7 5.60	18.966	-0.004			
ι Leonis	5.3	A0	10 45	8.255	3.1469	+0.0001	+10 58 7.62	19.016	-0.083			
γ Hydrae	8.3	Ma	10 45	40.566	+2.9485	+0.0061	-15 46 28.03	-18.700	+0.211			
46 Leonis Minoris	8.9	K0	10 48	50.561	3.3622	+0.0074	+34 38 47.60	19.370	-0.283			
54 Leonis	4.5	A0	10 51	17.076	3.2422	-.0060	+25 10 36.42	19.160	-0.018			
ε Antliae	4.7	K0	10 52	59.497	2.7968	+0.0112	-36 42 26.87	19.323	-0.138			
Groombridge 1706	6.3	G5	10 53	35.883	4.8737	-.0264	+78 11 56.82	19.245	-0.085			
α Crateris	4.2	K0	10 55	52.500	+2.9310	-.0377	-17 52 21.73	-19.168	+0.108			
δ Leonis	5.0	K0	10 56	25.778	3.0990	+0.0004	+ 4 2 50.19	19.301	-0.022			
β Ursae Majoris	2.4	A0	10 57	1.510	3.6376	+0.0105	+56 48 41.56	19.267	+0.026			
α Ursae Majoris	2.0	K0	10 58	48.810	3.7346	-.0164	+62 10 59.49	19.406	-0.071			
χ Leonis	4.7	F0	11 0	53.493	3.0968	-.0284	+ 7 46 8.12	19.433	-0.041			
γ <sup>4</sup> Leonis	5.7	K0	11 2	49.429	+3.0612	-.0286	+ 2 23 24.75	-19.505	-0.080			
ψ Ursae Majoris	3.2	K0	11 5	10.889	3.3333	-.0083	+44 55 58.29	19.507	-0.033			
β Crateris	4.5	A2	11 7	43.269	2.9483	.0000	-22 23 26.30	19.623	-0.106			
δ Leonis	2.6	A2	11 9	51.408	3.1946	+0.0106	+20 57 43.89	19.708	-0.141			
θ Leonis	3.4	A0	11 10	2.610	3.1800	-.0049	+15 52 1.36	19.655	-0.085			
γ Ursae Majoris	3.7	K0	11 14	9.739	+3.2469	-.0018	+33 31 51.89	-19.619	+0.096			
δ Crateris	3.8	K0	11 15	20.368	2.9977	-.0086	-14 20 43.60	19.471	+0.195			
σ Leonis	4.1	A0	11 17	0.745	3.0448	-.0062	+ 6 28 4.98	19.706	-0.013			
τ Centauri	4.3	B5	11 17	21.181	2.7376	-.0041	-54 3 8.79	19.719	-0.013			
ε Leonis	4.0	F5	11 19	45.276	3.1283	+0.0103	+10 58 12.21	19.520	-0.023			
τ Leonis	5.2	K0	11 23	49.413	+3.0657	+0.0098	+ 3 17 49.24	-19.312	-0.016			
λ Draconis	4.1	Ma	11 26	40.407	3.5610	-.0073	+69 46 21.99	19.354	-0.021			
ξ Hydrae	3.7	G5	11 29	3.845	2.9471	-.0188	-31 24 53.77	19.917	-0.065			
λ Centauri	3.3	B9	11 32	4.898	2.7324	-.0073	-62 34 37.64	19.923	-0.027			
ν Leonis	4.5	K0	11 32	51.156	3.0716	.0000	- 0 22 54.93	19.866	+0.089			
π Chamaeleontis	5.7	F0	11 33	57.099	+3.4383	-.0323	-75 27 13.27	-19.938	-0.023			
θ Draconis	5.5	K0	11 38	1.503	3.3689	-.0060	+67 11 15.84	19.918	+0.085			
ζ Crateris	4.9	G5	11 40	42.343	3.0382	+0.0018	-17 54 21.33	20.015	-0.041			
χ Ursae Majoris	3.8	K0	11 41	49.986	3.1783	-.0126	+48 13 22.85	19.962	+0.089			
β Leonis (Denebola)	2.2	A2	11 44	58.839	3.0691	-.0341	+15 1 9.56	20.120	-0.118			
β Virginis	3.8	F8	11 46	31.686	+3.1251	+0.0496	+ 2 12 56.31	-20.265	-0.275			
Groombridge 1830	6.5	G5	11 48	22.410	3.4662	+0.3399	+38 17 34.69	25.893	-5.784			
γ Ursae Majoris	2.5	A0	11 49	37.859	3.1673	+0.0115	+54 8 22.41	20.690	+0.004			
π Virginis	4.6	A3	11 56	46.403	3.0741	-.0009	+ 7 3 37.50	20.975	-0.082			
ο Virginis	4.2	G5	12 1	8.078	3.0569	-.0148	+ 9 10 37.91	20.619	+0.082			
δ Centauri	2.9	B3p	12 4	12.277	+3.0072	-.0060	-50 16 37.41	-20.673	-0.080			
ε Corvi	3.2	K0	12 6	0.452	3.0619	-.0051	-22 10 29.70	20.036	+0.003			
4 H. Draconis	5.1	A5	12 8	28.181	3.8418	+0.0206	+78 3 38.67	20.012	+0.019			
δ Crucis	3.1	B3	12 10	53.595	3.1776	+0.0221	-58 18 15.51	20.061	-0.088			
δ Ursae Majoris	3.4	A2	12 11	28.568	3.9638	+0.0150	+57 28 37.46	20.015	+0.065			
γ Corvi	2.8	B8	12 11	41.351	+3.0633	-.0114	-47 6 51.84	-20.003	+0.017			
2 Canum Venaticorum	5.8	K5	12 12	7.401	+3.0149	+0.0338	+11 6 19.06	-20.068	-0.046			

γ Argus, var. irreg., 1<sup>h</sup>.6-0<sup>m</sup>.6  
μ Argus, comp. 7<sup>m</sup>, 2<sup>h</sup>.2 n. l.

3<sup>2</sup> Chamae, star 5<sup>m</sup>.5 pr. 32<sup>h</sup>, 266<sup>m</sup> n.  
54 Leonis, comp. 6<sup>m</sup>.3, 6<sup>h</sup>.4 s. l.

ε Leonis, comp. 6<sup>m</sup>.8, 3<sup>h</sup>.6 n. l.  
2 Can. Ven., star 8<sup>m</sup>, 11<sup>h</sup>.8 s. pr.

# 224 MEAN PLACES OF TEN-DAY STARS, 1920.

FOR JANUARY 0<sup>d</sup>.04<sup>s</sup>, WASHINGTON MEAN TIME.

Name of Star.	Magni- tude.	Spec- trum.	Right Ascension.	Annual Vari- ation.	Annual P. M.	Declination.	Annual Vari- ation.	Annual P. M.
			h m s	s	s	° ' "	"	"
β Chamæleonis . . . . .	4.4	B5	12 13 37.188	+3.4873	-0.0188	-78 52 4.91	-19.983	+0.007
γ Virginis . . . . .	4.0	A0	12 15 48.776	3.0695	-0.0066	- 0 13 20.38	20.025	-0.007
α <sup>1</sup> Crucis . . . . .	1.6	B1	12 22 8.125	3.3155	-0.0094	-62 39 21.40	19.901	-0.009
α <sup>2</sup> Crucis . . . . .	2.1		Δα +0.624	.....	.....	Δδ -1.83	.....	.....
20 Comæ . . . . .	5.7	A2	12 25 42.271	3.0179	+0.0066	+21 20 20.32	19.955	-0.005
δ Corvi . . . . .	3.1	A0	12 25 43.370	+3.1918	-0.0140	-16 4 12.69	-20.008	-0.140
γ Crucis . . . . .	1.6	Mb	12 26 42.944	3.3083	-0.0023	-56 39 54.75	20.170	-0.261
8 Canum Venaticorum . . . . .	4.3	G0	12 29 56.905	2.8554	-0.0617	+41 47 31.03	19.595	+0.279
κ Draconis . . . . .	3.9	B5p	12 30 4.652	2.5750	-0.0113	+70 13 44.66	19.963	+0.019
β Corvi . . . . .	2.8	G5	12 30 10.843	3.1463	-0.0006	-22 57 16.21	19.933	-0.001
24 Comæ seq. . . . .	5.2	K0	12 31 7.063	+3.0104	-0.0097	+18 49 1.96	-19.943	+0.003
α Muscæ . . . . .	2.9	B3	12 32 23.709	3.5466	-0.0069	-68 41 41.80	19.874	-0.009
χ Virginis . . . . .	4.8	K0	12 35 6.918	3.0041	-0.0066	- 7 33 19.86	19.841	-0.001
γ Centauri . . . . .	2.4	A0	12 37 5.841	3.2967	-0.0106	-48 31 14.49	19.803	-0.009
γ Virginis (mean) . . . . .	2.9	F0	12 37 36.409	3.0400	-0.0055	- 1 0 38.94	19.772	+0.004
ρ Virginis . . . . .	5.0	A0	12 37 50.160	+3.0373	+0.0083	+10 40 34.24	-19.879	-0.187
76 Ursæ Majoris . . . . .	5.9	A0	12 38 4.542	2.6394	-0.0085	+63 9 7.52	19.787	-0.013
β Crucis . . . . .	1.5	B1	12 43 2.100	3.4854	-0.0064	-59 15 6.32	19.798	-0.003
31 Comæ . . . . .	5.1	G0	12 47 48.178	3.9235	-0.0023	+27 58 32.61	19.685	-0.024
η Centauri . . . . .	4.3	A5	12 49 0.003	3.3145	+0.0080	-39 44 38.64	19.694	-0.005
ε Ursæ Majoris (Alioth) . . . . .	1.7	A0p	12 50 30.878	+2.6460	+0.0133	+56 23 37.74	-19.873	-0.013
δ Virginis . . . . .	3.7	Ma	12 51 34.371	3.0300	-0.0318	+ 3 49 54.99	19.600	-0.090
α Canum Venat. seq. . . . .	2.9	A0p	12 52 17.286	2.9099	-0.0203	-38 45 0.55	19.477	+0.040
δ Muscæ . . . . .	3.6	K2	12 56 44.489	4.0799	+0.0497	+71 7 3.57	19.465	-0.031
ε Virginis . . . . .	3.0	K0	12 58 11.673	2.9065	-0.0186	+11 23 19.79	19.368	+0.015
θ Virginis . . . . .	4.4	A0	13 5 43.346	+3.1033	-0.0029	- 5 6 44.06	-19.304	-0.040
43 Comæ . . . . .	4.3	G0	13 8 8.525	2.8022	-0.0589	+28 17 0.18	18.287	+0.879
20 Canum Venaticorum . . . . .	4.7	F0	13 13 57.583	2.6950	-0.0094	+40 59 36.62	18.905	+0.015
γ Hydræ . . . . .	3.3	G5	13 14 34.107	3.2564	+0.0446	-22 44 59.35	19.046	-0.053
ι Centauri . . . . .	2.9	A2	13 16 5.553	3.3632	-0.0294	-36 17 26.55	19.047	-0.007
ζ <sup>1</sup> Ursæ Maj. (Mizar) . . . . .	2.4	A0p	13 20 42.514	+2.4213	+0.0153	+55 20 34.14	-18.844	-0.000
ζ <sup>2</sup> Ursæ Majoris . . . . .	4.0	A0	Δα +0.918	.....	.....	Δδ -12.42	.....	.....
α Virginis (Spica) . . . . .	1.2	B2	13 20 58.562	3.1376	-0.0023	-10 44 38.72	18.830	-0.003
Groombridge 2001 . . . . .	6.1	K5	13 24 5.489	1.5947	+0.012	+72 48 23.70	18.730	-0.009
70 Virginis . . . . .	5.2	G5	13 24 31.029	2.9390	-0.0108	+14 12 20.38	19.203	-0.504
ζ Virginis . . . . .	3.4	A2	13 30 36.899	+3.0548	-0.0195	- 0 11 14.15	-18.489	+0.002
17 H. Canum Venaticorum . . . . .	5.0	F0	13 31 13.616	2.6912	+0.0073	+37 35 31.09	18.483	-0.004
ε Centauri . . . . .	2.6	B1	13 34 48.476	3.7832	-0.0030	-53 3 37.10	18.304	-0.009
m Virginis . . . . .	5.2	Ma	13 37 24.637	3.1458	-0.0073	- 8 17 59.26	18.320	+0.003
τ Boötis . . . . .	4.5	F5	13 43 27.623	2.8908	-0.0241	+17 51 17.75	18.011	+0.008
η Ursæ Majoris (Alkaid) . . . . .	1.9	B3	13 44 23.444	+2.3675	-0.0118	+49 42 43.40	-18.004	-0.003
89 Virginis . . . . .	5.1	K0	13 45 31.251	3.2349	-0.0077	-17 44 10.12	17.908	-0.041
ι Centauri . . . . .	3.1	B2p	13 50 32.406	3.7280	-0.0070	-46 53 42.87	17.823	-0.004
η Boötis . . . . .	2.8	G0	13 50 52.538	3.3567	-0.0044	+18 47 53.64	18.108	-0.303
θ Apodis . . . . .	var.	Mb	13 57 28.951	5.7650	-0.0203	-76 24 41.33	17.408	-0.009
11 Boötis . . . . .	6.1	A3	13 57 32.893	+2.7214	-0.0000	+27 46 20.64	-17.461	+0.005
τ Virginis . . . . .	4.5	A2	13 57 34.422	3.0516	+0.0010	+ 1 55 52.07	17.494	-0.009
β Centauri . . . . .	0.9	B1	13 58 9.859	4.2101	-0.0032	-59 59 15.95	17.473	-0.003
ρ Hydræ . . . . .	3.5	K0	14 1 48.674	3.4106	+0.0031	-26 17 51.47	17.436	-0.146
θ Centauri . . . . .	2.3	K0	14 1 58.081	3.5212	-0.0437	-35 58 37.24	17.708	-0.535
α Draconis . . . . .	3.6	A0	14 2 13.427	+1.6217	-0.0071	+64 45 28.26	-17.300	+0.011
d Boötis . . . . .	4.8	F5	14 6 45.074	2.7370	-0.0014	+25 28 11.89	17.134	-0.074
κ Virginis . . . . .	4.3	K0	14 8 37.547	+3.1974	+0.0006	- 9 54 7.11	16.838	+0.132
4 Ursæ Minoris . . . . .	5.0	K0	14 9 8.222	-0.2742	-0.0106	+77 55 24.12	16.932	+0.006
α Virginis . . . . .	4.2	F5	14 11 49.020	+3.1480	-0.0012	- 5 37 9.57	17.347	-0.437
α Boötis (Arcturus) . . . . .	0.2	K0	14 12 0.708	+2.7384	-0.0070	+19 35 53.94	-18.814	-2.004
λ Boötis . . . . .	4.3	A0	14 13 20.654	+2.2630	-0.0173	+46 27 16.47	-16.886	+0.151

δ Corvi, star 3<sup>d</sup>, 34' 4 s. pr.  
 γ Crucis, star 6<sup>d</sup>, 88' 1 s. l.  
 24 Comæ, star 6<sup>d</sup>, 20' 5 pr.  
 γ Cent., dup., 3<sup>d</sup> 1, 3<sup>d</sup> 1, 1' 7

γ Virginis, binary, 3<sup>d</sup> 7, 3<sup>d</sup> 7, 6' 4,  
 P=234<sup>d</sup>  
 α Can. Ven., star 5<sup>d</sup>, 19' 8 s. pr.  
 θ Virginis, comp. 9<sup>d</sup>, 7' 1 n. pr.

ζ<sup>1</sup> Urs. Maj., star Abor 6<sup>d</sup> 0, L 79 4,  
 22' n.  
 θ Apodis, var. irreg., 5<sup>d</sup> 5-6-6

# MEAN PLACES OF TEN-DAY STARS, 1920. 225

FOR JANUARY 0<sup>h</sup>.943, WASHINGTON MEAN TIME.

Name of Star.	Magni- tude.	Spec- trum.	Right Ascension.			Annual Vari- ation.	Annual P. M.	Declination.			Annual Vari- ation.	Annual P. M.
			h	m	s	s	s	°	'	"	"	"
λ Virginis . . . . .	4.6	A2	14 14 46.636			+3.2415	-.0024	-13	0	12.69	-16.657	+0.021
2 Libræ . . . . .	6.3	K0	14 19 7.150			3.2244	-.0014	-11	20	57.50	16.531	-0.067
θ Boötis . . . . .	4.1	F8	14 22 28.459			2.0432	-.0254	+52	13	12.09	16.700	-0.405
f Boötis . . . . .	5.4	A5	14 22 44.073			2.7902	-.0052	+19	35	9.30	16.297	+0.015
ϕ Virginis . . . . .	5.0	K0	14 24 4.726			+3.0694	-.0890	-	1	52 11.81	16.217	-0.004
5 Ursæ Minoris . . . . .	4.4	K2	14 27 40.503			-0.1570	+0.0022	+76	3	6.12	-16.005	+0.021
ρ Boötis . . . . .	3.8	K0	14 28 22.967			+2.4894	-.0073	+30	43	19.09	15.875	+0.113
γ Centauri . . . . .	3.0	F0	14 28 51.451			2.4170	-.0091	+38	39	27.44	15.818	+0.145
η Centauri . . . . .	2.6	B3p	14 30 25.219			3.7988	-.0032	-41	48	25.67	15.912	-0.032
ε Boötis . . . . .	4.5	F0	14 31 11.875			2.6131	+0.0150	+30	5	31.45	15.714	+0.125
α Centauri . . . . .	0.1	G0	14 34 9.224			+4.0563	-.4864	-60	30	21.59	-14.987	+0.722
33 Boötis . . . . .	5.4	A0	14 35 51.671			2.2341	-.0066	+44	44	56.64	15.629	-0.048
α Apodis . . . . .	3.8	K5	14 37 50.900			7.3170	-.0063	-78	42	24.00	15.590	-0.024
μ Virginis . . . . .	4.0	F5	14 38 50.527			3.1592	+0.0071	-	5	18 40.04	15.742	-0.322
ε Boötis . . . . .	2.7	K0p	14 41 29.595			2.6203	-.0035	+27	24	38.78	15.262	+0.009
109 Virginis . . . . .	3.8	A0	14 42 12.181			+3.0315	-.0074	+	2	13 45.36	-15.266	-0.035
8 Libræ . . . . .	5.3	F5	14 46 15.503			3.2140	-.0078	-15	39	55.27	15.072	-0.074
α Libræ . . . . .	2.9	A2	14 46 26.951			3.2145	-.0078	-15	42	36.41	15.063	-0.077
Groombridge 2164 . . . . .	5.7	K2	14 49 24.486			+1.5296	-.0166	+59	37	7.12	14.696	+0.113
β Ursæ Minoris . . . . .	2.2	K5	14 50 55.457			-0.1997	-.0065	+74	28	56.65	14.732	+0.008
ζ <sup>2</sup> Libræ . . . . .	5.6	K0	14 52 25.438			+3.2511	-.0006	-11	5	15.44	-14.636	-0.001
Piazzi 221 . . . . .	5.8	A0	14 52 26.583			2.8299	-.0021	+14	46	7.88	14.644	-0.011
β Lupi . . . . .	2.8	B2p	14 53 16.923			3.9180	-.0070	-42	48	46.00	14.646	-0.062
δ Libræ . . . . .	var.	A0	14 56 41.698			3.2018	-.0051	-	8	12 8.32	14.392	-0.013
β Boötis . . . . .	3.6	G5	14 58 55.962			2.2600	-.0038	+40	42	19.60	14.230	-0.049
γ Scorpii . . . . .	3.4	Ma	14 59 23.029			+3.5089	-.0056	-24	58	5.99	-14.200	-0.048
ψ Boötis . . . . .	4.7	K0	15 1 1.046			2.5794	-.0138	+27	15	31.84	14.128	-0.014
ε Boötis . . . . .	5.0	F0	15 3 47.230			2.6348	+0.0136	+25	10	47.72	14.122	-0.184
ζ Lupi . . . . .	3.5	K0	15 6 31.699			4.2944	-.0126	-51	47	44.15	13.830	-0.066
ι Libræ . . . . .	4.7	A0p	15 7 39.437			3.4150	-.0031	-19	29	23.83	13.746	-0.063
3 Serpentis . . . . .	5.4	K0	15 11 12.648			+2.9603	-.0017	+	5	14 7.98	-13.409	-0.005
γ Trianguli Australis . . . . .	3.1	A0	15 11 25.034			5.5597	-.0137	-68	23	7.68	13.492	-0.042
δ Boötis . . . . .	3.5	K0	15 12 16.664			2.4194	+0.0076	+33	36	45.01	13.530	-0.125
β Libræ . . . . .	2.7	B8	15 12 41.969			+3.2254	-.0066	-	9	5 18.92	13.391	-0.024
γ Ursæ Minoris . . . . .	3.1	A2	15 20 50.720			-0.1121	-.0020	+72	7	7.05	12.815	+0.018
μ Boötis pr. . . . .	4.5	F0	15 21 28.095			+2.2664	-.0121	+37	39	25.38	-12.705	+0.051
τ <sup>1</sup> Serpentis . . . . .	5.5	Ma	15 22 4.664			2.7902	-.0024	+15	42	30.43	12.769	-0.024
α Draconis . . . . .	3.5	K0	15 23 8.994			1.3340	+0.0014	+59	14	44.98	12.693	+0.010
32 Libræ . . . . .	5.9	K0	15 23 44.491			3.8795	+0.0006	-16	26	18.74	12.676	-0.048
β Coronæ Borealis . . . . .	3.7	Fp	15 24 31.844			2.4739	-.0130	+29	22	50.58	12.601	+0.078
ν <sup>1</sup> Boötis . . . . .	5.2	K5	15 28 3.348			+2.1563	+0.0018	+41	6	18.28	-12.351	-0.014
γ Lupi (mean) . . . . .	3.9	B3	15 29 48.194			3.9685	-.0020	-40	53	56.85	12.265	-0.049
γ Libræ . . . . .	4.0	K0	15 31 2.915			3.2530	+0.0047	-14	31	24.69	12.126	+0.007
α Coronæ Borealis . . . . .	2.3	A0	15 31 18.010			2.5396	+0.0090	+26	58	59.16	12.212	-0.109
ζ Coronæ Borealis seq. . . . .	5.1	B8	15 36 21.931			2.2597	-.0006	+36	53	41.41	11.795	-0.012
α Serpentis . . . . .	2.8	K0	15 40 19.562			+2.9533	+0.0089	+	6	40 35.18	-11.432	+0.048
β Serpentis . . . . .	3.7	A2	15 42 29.720			2.7697	+0.0054	+15	40	16.54	11.373	-0.055
α Serpentis . . . . .	4.3	K5	15 45 8.263			2.6997	-.0035	+18	23	15.66	11.296	-0.160
μ Serpentis . . . . .	3.6	A0	15 45 26.592			3.1298	-.0068	-	3	11 10.79	11.132	-0.028
12 H. Draconis . . . . .	5.1	A2	15 45 26.592			0.9063	+0.0047	+62	50	47.14	11.173	-0.008
ε Serpentis . . . . .	3.8	A0	15 46 40.590			+2.9687	+0.0081	+	4	43 4.04	-10.994	+0.079
ζ Ursæ Minoris . . . . .	4.3	A2	15 46 53.101			-2.1987	+0.0068	+78	2	28.37	11.008	-0.004
β Trianguli Australis . . . . .	3.0	F0	15 48 4.786			+5.2615	-.0090	-63	11	6.91	11.820	-0.466
λ Libræ . . . . .	5.1	B3	15 48 41.184			3.4781	-.0017	-19	55	44.77	10.913	-0.046
γ Serpentis . . . . .	3.9	F8	15 52 45.416			2.7790	+0.0213	+15	55	18.67	11.855	-1.289
τ Scorpii . . . . .	3.0	B2p	15 54 0.515			+3.6247	-.0010	-25	53	5.68	-16.531	-0.048
ε Coronæ Borealis . . . . .	4.2	K0	15 54 16.456			+2.4535	-.0065	+27	6	31.33	-10.530	-0.067

φ Virginis, comp. 9<sup>m</sup>. 4<sup>s</sup>. 5 s. f.      δ Libræ, var., 2<sup>d</sup>. 23. 6<sup>m</sup>. 3-6<sup>m</sup>. 3  
 ε Boötis, comp. 5<sup>m</sup>. 1, 2<sup>d</sup>. 8 s. n. p.      μ Boötis, star 6<sup>m</sup>. 7, 109' s.      γ Lupi, binary, 3<sup>m</sup>. 7, 3<sup>s</sup>. 9. 0<sup>m</sup>. 4  
 α Centauri, dup., 0<sup>m</sup>. 3, 1<sup>m</sup>. 7; companion s. pr. The position given is that of the center of gravity of the system.  
 Corrections given on page x remain to be applied to reduce to the position of α<sup>3</sup> Centauri.

# 226 MEAN PLACES OF TEN-DAY STARS, 1920.

FOR JANUARY 0<sup>h</sup>.943, WASHINGTON MEAN TIME.

Name of Star.	Magni- tude.	Spec- trum.	Right Ascension.	Annual Variation.	Annual P. M.	Declination.	Annual Variation.	Annual P. M.
			h m s	" "	" "	" ' "	" "	" "
δ Scorpii . . . . .	2.5	B1p	15 55 85.960	+3.5431	-.0011	-22 23 42.38	-10.389	-0.085
θ Draconis . . . . .	4.1	F8	16 0 23.344	1.1234	-.0392	+58 46 42.82	9.654	+0.330
β Scorpii . . . . .	2.9	B1	16 0 46.892	3.4842	-.0011	-19 35 14.99	9.901	-0.028
κ Herculis . . . . .	5.3	G5	16 4 27.753	2.7033	-.0039	+17 15 32.31	9.706	-0.023
Groombridge 2320 . . . . .	5.4	A0	16 6 5.984	0.1548	-.0074	+68 1 14.48	9.506	+0.063
φ Herculis . . . . .	4.3	A0	16 6 14.964	+1.3090	-.0017	+45 8 38.59	-9.508	+0.066
δ <sup>2</sup> Apodis . . . . .	4.8	Mb	16 8 20.317	8.8703	-.0050	-78 29 48.79	9.440	-0.056
δ Ophiuchi . . . . .	3.0	Ma	16 10 9.081	3.1419	-.0031	- 3 29 21.39	9.388	-0.144
σ Coronae Bor. seq. . . . .	5.8	G0	16 11 40.926	+2.3440	-.0223	+34 3 38.79	9.197	-0.072
19 Ursae Minoris . . . . .	5.5	B8	16 13 5.186	-1.7421	+0.0007	+76 4 46.07	9.008	+0.303
γ <sup>2</sup> Normae . . . . .	4.1	K0	16 13 50.614	+4.4739	-.0216	-49 57 38.36	-9.690	-0.064
ε Ophiuchi . . . . .	3.3	K0	16 14 5.187	3.1732	+0.0054	- 4 29 54.55	8.900	+0.027
σ Scorpii . . . . .	3.1	B1	16 16 19.347	3.6423	-.0011	-25 24 7.25	8.801	-0.089
τ Herculis . . . . .	3.9	B5	16 17 20.166	1.8034	+0.0001	+46 30 11.48	8.653	+0.029
γ Herculis . . . . .	3.8	F0	16 18 23.413	+2.6456	-.0034	+19 20 24.17	8.562	+0.027
η Ursae Minoris . . . . .	5.0	F0	16 19 49.382	-1.7948	-.0233	+75 56 24.86	-8.233	+0.263
γ Apodis . . . . .	3.9	K0	16 21 7.965	+9.1123	-.0406	-78 43 12.88	8.464	-0.083
ω Herculis . . . . .	4.5	Ap	16 21 43.131	2.7621	-.0026	+14 12 59.58	8.394	-0.069
ω Draconis . . . . .	2.9	G5	16 22 54.316	0.8063	-.0020	+61 41 41.91	8.183	+0.066
α Scorpii (Antares) . . . . .	1.2	Map	16 24 29.947	3.6749	-.0006	-26 15 20.21	8.143	-0.026
β Herculis . . . . .	2.8	K0	16 26 46.764	+3.5776	-.0076	+21 39 46.62	-7.965	-0.025
λ Ophiuchi . . . . .	3.8	A0	16 26 52.627	+3.0242	-.0023	+ 2 9 28.92	8.001	-0.079
Δ Draconis . . . . .	5.0	B8p	16 28 7.940	-0.1276	-.0049	+68 56 28.48	7.786	+0.026
τ Scorpii . . . . .	2.9	B0	16 30 53.932	+3.7304	-.0013	-28 3 4.56	7.632	-0.094
ε Herculis . . . . .	4.2	A0	16 31 31.416	1.9337	-.0006	+42 36 4.23	7.522	+0.026
ζ Ophiuchi . . . . .	2.7	B0	16 32 45.098	+3.3013	+0.0007	-10 24 21.97	-7.436	+0.022
24 Scorpii . . . . .	5.0	K0	16 36 56.620	3.4671	-.0017	-17 35 18.16	7.110	-0.004
η Herculis . . . . .	3.0	G0	16 38 16.202	2.2615	-.0034	+31 44 49.05	6.608	+0.300
ζ Herculis . . . . .	3.6	K0	16 40 9.152	2.0560	+0.0031	+39 4 24.95	6.926	-0.026
α Trianguli Australis . . . . .	1.9	K2	16 40 10.736	6.3279	+0.0026	-68 52 58.18	6.891	-0.049
Groombridge 2377 . . . . .	4.9	F0	16 43 46.759	+1.1378	+0.0045	+56 55 23.05	-6.482	+0.023
ε Scorpii . . . . .	2.4	K0	16 44 58.689	3.8905	-.0050	-34 8 57.86	6.708	-0.264
49 Herculis . . . . .	6.4	A0	16 45 26.274	2.7394	+0.0010	+15 6 26.56	6.171	-0.014
ε <sup>1</sup> Arse . . . . .	4.2	K2	16 53 12.065	4.7736	-.0011	-53 2 21.32	5.777	-0.017
κ Ophiuchi . . . . .	3.4	K0	16 53 32.830	2.8234	-.0199	+ 9 29 54.24	5.714	-0.011
30 Ophiuchi . . . . .	5.0	K0	16 56 50.489	+3.1632	-.0017	- 4 6 13.18	-5.520	-0.026
ε Herculis . . . . .	3.9	A0	16 57 13.689	2.2947	-.0036	+1 2 36.10	5.399	+0.023
d Herculis . . . . .	5.3	A2	16 58 39.053	2.2122	-.0016	+33 40 59.54	5.311	-0.009
η Ophiuchi . . . . .	2.6	A0	17 5 47.263	3.4373	+0.0017	-15 37 37.08	4.606	+0.021
η Scorpii . . . . .	3.4	F2	17 6 25.198	4.2981	+0.0023	-43 8 7.02	4.969	-0.206
ζ Draconis . . . . .	3.2	B5	17 8 33.152	+0.1099	-.0021	+65 48 46.94	-4.445	+0.013
α Herculis . . . . .	var.	Mb	17 10 59.934	2.7345	-.0009	+14 28 49.77	4.294	+0.029
δ Herculis . . . . .	3.2	A0	17 11 44.686	2.4633	-.0019	+24 55 57.55	4.848	-0.123
τ Herculis . . . . .	3.4	K2	17 12 15.581	2.0886	-.0026	+36 53 54.69	4.146	-0.001
θ Ophiuchi . . . . .	3.4	B3	17 17 5.667	3.6531	-.0006	-24 55 15.46	3.706	-0.026
ω Herculis . . . . .	5.4	G0	17 17 39.895	+2.9432	+0.0096	+32 34 11.08	-4.798	-1.047
β Arse . . . . .	2.8	K2	17 18 38.769	4.9330	-.0004	-55 27 20.69	3.634	-0.027
δ Ophiuchi . . . . .	4.3	F0	17 21 28.931	3.6512	-.0009	-24 6 11.18	3.491	-0.137
σ Ophiuchi . . . . .	4.4	K0	17 22 32.680	2.9758	+0.0008	+ 4 12 32.11	3.363	+0.028
ε Arse . . . . .	3.8	B8	17 23 52.258	5.4070	-.0006	-60 37 8.89	3.267	-0.120
α Arse . . . . .	3.0	B8p	17 25 39.273	+4.6336	-.0008	-49 48 51.47	-3.696	-0.063
λ Herculis . . . . .	4.5	K0	17 27 39.294	2.4242	+0.0016	+26 10 12.30	2.814	+0.013
λ Scorpii . . . . .	1.7	B2	17 28 10.446	4.0713	-.0008	-37 2 48.04	2.692	-0.027
β Draconis . . . . .	3.0	G0	17 28 37.456	1.3545	-.0017	+52 21 36.27	2.737	+0.020
α Ophiuchi . . . . .	2.1	A5	17 31 13.209	2.7899	+0.0060	+12 37 1.88	2.745	-0.265
ξ Serpentis . . . . .	3.6	A5	17 33 0.241	+3.4322	-.0039	-15 20 57.27	-2.416	-0.020
ε Herculis . . . . .	3.8	B3	17 37 12.407	+1.8667	+0.0028	+46 2 53.84	-1.867	+0.023

β Scorpii, comp. 5=1, 12" 3 n. l.  
 κ Herculis, star 6=5, 29" 7 n. l.  
 σ Cor. Bor., comp. 6=7, 4" 6 s. pr.  
 ε Scorpii, star 8=, 21" pr.  
 γ Draconis, comp. 8=, 5" 4 s. f.

α Scorpii, comp. 7=, 3" 3 pr.  
 λ Ophiuchi, comp. 6=, 1" 3 n. l.  
 ζ Herculis, binary, 3=0, 6=0, 1"  
 η Oph., binary, 3=2, 3=7, 0" 5

α Herculis, var. long., 3=1-3=3,  
 dup., comp. 6=, 4" 6 s. l.  
 δ Herculis, binary, comp. 8=, 11"  
 s. pr.



# MEAN PLACES OF TEN-DAY STARS, 1920. 227

FOR JANUARY 0<sup>h</sup>.943, WASHINGTON MEAN TIME.

Name of Star.	Magni- tude.	Spec- trum.	Right Ascension.			Annual Vari- ation.		Declination.			Annual Vari- ation.	
			h	m	s	"	"	"	"	"	"	"
α Draconis . . . . .	4.9	F5	17 37 25.078	-0.3837	+0.013	+68 47 42.06	-1.654	+0.318				
β Pavonis . . . . .	3.6	K0	17 37 52.565	+6.8823	-0.037	-64 41 15.14	2.012	-0.080				
γ Ophiuchi . . . . .	2.9	K0	17 39 31.202	2.9630	-0.026	+ 4 35 58.89	1.631	+0.153				
δ Scorpii . . . . .	3.1	F5p	17 41 59.337	4.1959	+0.006	-40 5 50.50	1.581	-0.006				
ε Herculis . . . . .	3.5	G5	17 43 19.614	+2.3472	-0.028	+27 45 59.79	2.206	-0.749				
ζ Draconis . . . . .	4.9	F5	17 43 21.488	-1.0723	+0.024	+72 11 18.52	-1.732	-0.268				
η Ophiuchi . . . . .	3.7	A0	17 43 52.835	+3.0474	-0.016	+ 2 44 10.92	1.481	-0.973				
θ Draconis . . . . .	3.9	K0	17 52 8.798	1.0382	+0.120	+56 53 5.40	0.610	+0.977				
89 Herculis . . . . .	5.5	F2	17 52 11.572	+2.4208	+0.013	+28 3 42.70	0.677	+0.006				
35 Draconis . . . . .	5.0	F5	17 53 1.730	-2.6397	+0.115	+76 58 27.63	0.886	+0.243				
ο Herculis . . . . .	4.0	K0	17 53 30.548	+2.0672	+0.006	+37 15 37.21	-0.568	+0.604				
π Ophiuchi . . . . .	3.5	K0	17 54 37.300	3.3629	-0.006	- 9 45 53.72	0.690	-0.120				
ξ Herculis . . . . .	3.8	K0	17 54 39.372	2.3316	+0.072	+29 15 20.43	0.485	-0.618				
η Draconis . . . . .	2.4	K5	17 54 44.895	1.3927	-0.006	+51 29 51.90	0.488	-0.024				
67 Ophiuchi . . . . .	3.9	B5p	17 56 38.316	3.0050	+0.008	+ 2 56 3.71	0.207	-0.613				
θ Aræ . . . . .	3.9	B1	18 0 24.176	+4.6499	-0.010	-50 5 54.86	-0.015	-0.050				
γ Sagittarii . . . . .	3.1	K0	18 0 40.938	3.8420	-0.055	-30 25 35.00	0.140	-0.198				
70 Ophiuchi . . . . .	4.1	K0	18 1 24.654	3.0317	+0.178	+ 2 31 0.86	-0.999	-1.122				
72 Ophiuchi . . . . .	3.7	A2	18 3 33.373	2.8434	-0.045	+ 9 33 5.59	+0.898	+0.067				
ο Herculis . . . . .	3.8	A0	18 4 25.277	2.3395	-0.002	+23 45 2.10	0.230	+0.002				
μ Sagittarii . . . . .	4.0	B8p	18 8 58.704	+3.5370	-0.004	-21 4 51.52	+0.733	-0.002				
ν Sagittarii . . . . .	3.2	M5	18 12 12.875	4.0806	-0.169	-36 47 12.42	0.915	-0.153				
ζ Groombridge 2533 . . . . .	5.4	B5	18 13 9.445	1.8453	-0.006	+42 7 52.96	1.149	-0.001				
36 Draconis . . . . .	5.0	F5	18 13 26.188	0.3456	+0.055	+64 22 11.90	1.200	+0.026				
δ Sagittarii . . . . .	2.8	K0	18 15 52.344	3.8405	+0.023	-29 51 48.30	1.353	-0.034				
η Serpentis . . . . .	3.4	K0	18 17 10.158	+3.1029	-0.078	- 2 55 14.04	+0.806	-0.092				
ε Sagittarii . . . . .	2.0	A0	18 18 51.699	3.9814	-0.041	-34 25 25.00	1.525	-0.182				
109 Herculis . . . . .	3.9	K0	18 20 17.309	2.5260	+0.139	+21 43 56.08	1.511	-0.261				
α Telescopii . . . . .	3.8	B3	18 21 2.515	+4.4407	-0.017	-46 0 50.40	1.799	-0.068				
λ Draconis . . . . .	3.7	F8	18 22 30.116	-1.0790	+0.177	+72 41 54.19	1.594	-0.371				
χ Sagittarii . . . . .	2.9	K0	18 23 2.019	+3.7026	-0.063	-25 28 2.22	+1.812	-0.199				
ς Serpentis . . . . .	5.4	G5	18 25 31.159	3.1215	+0.015	- 2 2 17.22	2.192	-0.085				
1 Aquilæ . . . . .	4.1	K0	18 30 51.214	3.2646	-0.013	- 8 18 3.95	2.375	-0.315				
γ Pavonis . . . . .	4.1	K0	18 33 41.489	7.0176	-0.056	-71 29 55.93	2.772	-0.165				
α Lyræ (Vega) . . . . .	0.1	A0	18 34 13.789	2.0315	+0.177	+38 42 30.38	3.263	+0.280				
2 Aquilæ . . . . .	4.7	F0	18 37 53.677	+3.2365	+0.020	- 9 7 48.80	+3.268	-0.066				
φ Sagittarii . . . . .	3.3	B8	18 40 39.510	3.7485	+0.034	-27 4 27.23	3.331	-0.006				
110 Herculis . . . . .	4.3	F5	18 42 13.062	2.5804	-0.019	+20 28 7.49	3.328	-0.344				
6 Aquilæ . . . . .	4.5	G0	18 42 55.780	3.1828	-0.009	- 4 50 4.46	3.710	-0.028				
λ Pavonis . . . . .	4.4	B2	18 44 48.482	5.5616	-0.030	-62 16 51.46	3.872	-0.022				
β Lyræ . . . . .	var.	B2p	18 47 7.563	+3.3148	+0.004	+33 16 8.36	+4.068	-0.005				
50 Draconis . . . . .	5.4	A0	18 48 57.818	-1.9227	-0.032	+75 20 24.02	4.201	+0.061				
ο Draconis . . . . .	4.8	K0	18 50 1.394	+0.8379	+0.116	+59 17 24.83	4.364	+0.092				
θ Sagittarii . . . . .	2.1	B3	18 50 18.274	3.7198	-0.008	-26 23 50.81	4.290	-0.075				
ο Serpentis pr. . . . .	4.5	A5	18 52 14.528	2.9822	+0.027	+ 4 5 54.42	4.558	+0.028				
R Lyræ . . . . .	var.	Mb	18 52 54.066	+1.5200	+0.026	+43 50 24.18	+4.404	+0.078				
γ Lyræ . . . . .	3.3	A0	18 55 57.028	2.2485	-0.006	+32 34 44.24	4.840	-0.006				
ε Aquilæ . . . . .	4.2	K0	18 55 59.468	2.7231	-0.042	+14 57 31.02	4.767	-0.081				
ζ Sagittarii . . . . .	2.7	A2	18 57 31.336	3.8175	-0.024	-29 59 45.41	4.959	-0.019				
ξ Aquilæ . . . . .	3.0	A0	19 1 43.968	2.7569	-0.006	+13 44 36.81	5.235	-0.099				
λ Aquilæ . . . . .	3.6	A0	19 2 0.201	+3.2334	-0.020	- 5 0 12.40	+5.274	-0.063				
α Coronæ Australis . . . . .	4.1	A2	19 4 1.805	4.0625	+0.051	-38 1 50.13	5.410	-0.118				
ε Lyræ . . . . .	5.1	B5	19 4 26.844	2.1413	+0.005	+35 58 26.22	5.566	-0.006				
ν Sagittarii . . . . .	3.0	F2	19 5 0.419	3.5696	-0.005	-21 9 6.92	5.574	-0.036				
φ Sagittarii . . . . .	4.9	F5	19 10 38.168	3.6798	+0.025	-25 23 44.84	6.046	-0.035				
δ Draconis . . . . .	3.2	K0	19 12 32.479	+0.0211	+0.175	+67 31 14.83	+6.327	+0.088				
d Sagittarii . . . . .	5.0	K0	19 12 57.290	+3.5106	-0.015	-19 5 47.13	+6.257	-0.017				

φ Draconis, star 6=1, 30'.4 n. l.  
70 Ophiuchi, comp. 6=, 5'.5 n. l.

β Lyræ, var., 124.9, 3=4=1, star  
7=, 46' n. l.  
ο Draconis, star 7=6, 32'.1 n. pr.

ο Serpentis, star 5=4, 23'.2 n. l.  
R Lyræ, var., 464.4, 4=0=7  
ξ Sag., binary, 3=4, 3=5, 0'.5

# 228 MEAN PLACES OF TEN-DAY STARS, 1920.

FOR JANUARY 0<sup>d</sup>.943, WASHINGTON MEAN TIME.

Name of Star.	Magni- tude.	Spec- trum.	Right Ascension.			Annual Vari- ation.	Annual P. M.	Declination.			Annual Vari- ation.	Annual P. M.
			h	m	s	s	s	"	"	"	"	"
θ Lyrae . . . . .	4.5	K0	19 13 35.430	+2.0009	-.0015	+37 59 26.17	+ 6.333	+0.006				
ω Aquilæ . . . . .	5.1	A5	19 14 3.683	2.8168	-.0002	+11 27 0.61	6.380	+0.014				
κ Cygni . . . . .	4.0	K0	19 15 15.293	+1.3877	+0.0071	+53 13 13.26	6.586	+0.122				
τ Draconis . . . . .	4.6	K0	19 17 6.124	-1.1386	-.0312	+73 12 26.55	6.726	+0.109				
δ Aquilæ . . . . .	3.4	F0	19 21 27.893	+3.0043	+0.0108	+ 2 57 15.36	7.058	+0.081				
β Cygni . . . . .	3.2	K0p	19 27 29.683	+2.4189	-.0002	+27 47 26.76	+ 7.458	-0.010				
ε Cygni . . . . .	3.9	A2	19 27 41.375	1.5132	+0.0023	+51 33 31.75	7.612	+0.129				
μ Aquilæ . . . . .	4.6	K0	19 30 10.907	2.9311	+0.0145	+ 7 12 29.70	7.540	-0.146				
h Sagittarii . . . . .	4.7	B9	19 31 50.417	3.6326	+0.0045	-25 3 40.83	7.708	-0.037				
κ Aquilæ . . . . .	5.0	B0	19 32 35.324	3.2386	+0.0005	- 7 12 22.51	7.881	+0.002				
θ Cygni . . . . .	4.6	F5	19 34 17.790	+1.0063	-.0024	+50 2 6.85	+ 8.207	+0.250				
54 Sagittarii . . . . .	5.4	K0	19 36 8.432	3.4384	+0.0045	-16 28 39.98	8.118	-0.047				
β Sagittæ . . . . .	4.4	K0	19 37 27.325	2.6839	+0.0001	+17 17 23.37	8.237	-0.032				
15 Cygni . . . . .	5.0	K0	19 41 23.528	2.1041	+0.0083	+37 9 37.86	8.622	+0.040				
f Sagittarii . . . . .	5.1	K0	19 41 41.799	3.5010	-.0099	-19 57 16.03	8.517	-0.063				
γ Aquilæ . . . . .	2.8	K2	19 42 27.373	+2.8419	+0.0007	+10 25 2.46	+ 8.602	-0.003				
δ Cygni . . . . .	3.0	A0	19 42 28.525	1.8760	+0.0055	+44 56 5.36	8.711	+0.044				
δ Sagittæ . . . . .	3.8	Map	19 43 49.239	2.6749	+0.0004	+18 20 9.97	8.790	+0.017				
α Aquilæ (Altair) . . . . .	0.9	A5	19 46 52.805	3.9270	+0.0060	+ 8 39 21.75	9.392	+0.379				
η Aquilæ . . . . .	var.	G0	19 48 23.889	+3.0666	+0.0005	+ 0 47 57.70	9.123	-0.003				
ε Draconis . . . . .	4.0	K0	19 48 27.183	-0.1898	+0.0170	+70 3 50.89	+ 9.103	+0.027				
ε Sagittarii . . . . .	4.2	K0	19 49 44.639	+4.1419	-.0017	-42 4 46.87	9.281	+0.045				
ε Pavonis . . . . .	4.1	A0	19 51 21.652	6.9789	+0.0119	-73 7 23.98	9.241	-0.120				
β Aquilæ . . . . .	3.9	K0	19 51 23.015	2.9467	+0.0025	+ 6 12 21.71	8.832	-0.481				
γ Sagittæ . . . . .	3.7	K5	19 55 11.933	2.6073	+0.0041	+19 16 26.48	9.062	+0.035				
c Sagittarii . . . . .	4.6	Mb	19 57 44.434	+3.6021	+0.0023	-27 56 0.07	+ 9.804	+0.013				
τ Aquilæ . . . . .	5.6	K0	20 0 13.928	2.9307	+0.0010	+ 7 3 5.56	10.070	+0.020				
θ Aquilæ . . . . .	3.4	A0	20 7 10.659	3.0253	+0.0020	- 1 3 34.79	10.567	+0.006				
ο Cygni seq. . . . .	4.0	K0p	20 11 6.802	+1.8002	+0.0014	+46 29 53.27	10.857	+0.005				
κ Cephei . . . . .	4.4	B9	20 11 36.617	-1.9783	+0.0024	+77 28 15.93	10.914	+0.026				
24 Vulpeculæ . . . . .	5.4	K0	20 13 21.710	+2.5674	+0.0017	+24 25 26.01	+11.005	-0.012				
α <sup>2</sup> Capricorni . . . . .	3.8	K0	20 13 37.036	3.3300	+0.0040	-12 47 37.43	11.044	+0.008				
β Capricorni . . . . .	3.2	G0p	20 16 31.119	3.3728	+0.0030	-15 2 5.75	11.263	+0.007				
α Pavonis . . . . .	2.1	B3	20 19 19.625	4.7613	-.0000	-56 59 33.82	11.357	-0.002				
γ Cygni . . . . .	2.8	F8p	20 19 21.406	2.1527	+0.0004	+39 59 59.81	11.452	+0.001				
π Capricorni . . . . .	5.2	B8	20 22 44.622	+3.4357	+0.0004	-18 28 29.23	+11.601	-0.002				
ρ Capricorni . . . . .	5.0	F0	20 24 17.963	3.4260	-.0013	-18 4 44.68	11.783	-0.020				
41 Cygni . . . . .	4.1	F5	20 26 7.653	2.4516	+0.0014	+30 6 3.26	11.930	-0.002				
θ Cephei . . . . .	4.3	A5	20 28 14.549	1.0110	+0.0066	+62 43 29.43	12.063	-0.013				
ε Delphini . . . . .	4.0	B5	20 29 23.476	+2.8663	+0.0007	+11 1 49.79	12.135	-0.025				
Groombridge 3241 . . . . .	6.4	K2	20 30 21.800	-0.2421	-.0047	+72 15 38.62	+12.200	-0.918				
α Indi . . . . .	3.2	K0	20 31 56.645	+4.2287	+0.0027	-47 34 18.09	12.390	+0.003				
β Delphini . . . . .	3.7	F5	20 33 47.895	2.8133	+0.0082	+14 18 57.72	12.430	-0.635				
v Capricorni . . . . .	5.3	Ma	20 35 29.853	3.4175	-.0018	-18 25 15.75	12.574	-0.007				
α Delphini . . . . .	3.9	B8	20 35 55.348	2.7983	+0.0047	+15 37 45.48	12.696	+0.017				
β Pavonis . . . . .	3.6	A5	20 37 45.998	+5.4374	-.0079	-66 29 31.73	+12.731	-0.003				
α Cygni (Deneb) . . . . .	1.3	A2p	20 38 42.253	3.0448	+0.0004	+44 59 37.77	12.795	-0.002				
δ Delphini . . . . .	4.5	A2	20 39 43.447	2.8008	-.0014	+14 47 12.02	12.817	-0.050				
ψ Capricorni . . . . .	4.3	F8	20 41 21.719	3.5558	-.0040	-25 33 32.72	12.828	-0.148				
γ Delphini seq. . . . .	4.5	G5	20 42 56.797	2.7822	-.0023	+15 50 6.83	12.865	-0.126				
ε Cygni . . . . .	2.6	K0	20 42 58.452	+2.4276	+0.0004	+33 40 11.70	+13.400	+0.327				
ε Aquarii . . . . .	3.8	A0	20 43 20.800	3.2489	+0.017	- 9 47 21.95	13.077	-0.080				
η Cephei . . . . .	3.6	K0	20 43 59.888	1.3228	+0.0131	+61 31 39.87	13.049	+0.320				
μ Aquarii . . . . .	4.3	A3	20 48 20.418	3.3373	+0.0025	- 9 17 4.00	13.396	-0.080				
β Indi . . . . .	3.7	K0	20 48 34.104	4.7079	+0.0013	-58 45 24.68	13.442	-0.003				
32 Vulpeculæ . . . . .	5.2	K2	20 51 9.007	+2.5564	-.0003	+27 45 9.76	+13.621	+0.004				

β Cygni, star 5<sup>m</sup>.4, 34<sup>m</sup>.7 n. l.  
 ε Cygni, comp. 8<sup>m</sup>.1, 1<sup>m</sup>.6 n. pr.  
 η Aquilæ, var., 7<sup>m</sup>.13, 3<sup>m</sup>.7-4<sup>m</sup>.4  
 ε Draconis, comp. 7<sup>m</sup>.6, 3<sup>m</sup>.1 n.

ο Cygni, star 5<sup>m</sup>.0 pr. 19<sup>m</sup>. 270<sup>m</sup> n.,  
 star 7<sup>m</sup>.8 l. 1<sup>m</sup>. 96<sup>m</sup> s.  
 κ Cephei, comp. 8<sup>m</sup>. 7<sup>m</sup>.5 s. l.  
 α<sup>2</sup> Capricorn., α<sup>1</sup> Capricorn., 4<sup>m</sup>.6 pr. 24<sup>m</sup>,  
 187<sup>m</sup> n.

β Capricorn., star 6<sup>m</sup>.2 pr. 14<sup>m</sup>. 10<sup>m</sup> s.  
 π Capricorn., comp. 9<sup>m</sup>. 3<sup>m</sup>.4 s. l.  
 ρ Capricorn., comp. 7<sup>m</sup>.6, 2<sup>m</sup>.3 s.  
 β Delphini, binary, 4<sup>m</sup>.1, 5<sup>m</sup>.4, 0<sup>m</sup>.5  
 γ Delphini, comp. 5<sup>m</sup>.5, 11<sup>m</sup>.2 pr.

# MEAN PLACES OF TEN-DAY STARS, 1920. 229

FOR JANUARY 0<sup>h</sup>.943, WASHINGTON MEAN TIME.

Name of Star.	Magni- tude.	Spec- trum.	Right Ascension.			Annual Vari- tion.	Annual P. M.	Declination.		Annual Vari- tion.	Annual P. M.
			h	m	s	"	"	"	"	"	"
220 H <sup>1</sup> Draconis . . . . .	5.6	K0	20 51 15.802			-2.6444	-0.0165	+80 15 11.15	+13.566		-0.025
γ Cygni . . . . .	4.0	A0	20 54 11.396			+2.2358	+0.0068	+40 51 30.54	13.792		-0.018
α Octantis . . . . .	5.2	F2	20 55 4.527			7.3650	-0.0068	-77 19 51.05	13.477		-0.289
γ Microscopii . . . . .	4.7	G5	20 56 23.317			3.6854	-0.004	-32 34 16.74	13.944		-0.004
ε Capricorni . . . . .	4.2	A0	21 1 27.126			3.3747	+0.061	-17 33 5.97	14.197		-0.066
ξ Cygni . . . . .	3.9	K5	21 2 1.219			+2.1815	+0.0099	+43 36 29.58	+14.207		+0.008
61 Cygni pr. . . . .	5.6	K5	21 3 18.522			3.6855	+2.406	+38 21 18.99	17.627		+3.250
61 Cygni seq. . . . .	6.3	K5	Δα +1.492					Δδ -16.13			
γ Aquarii . . . . .	4.5	K0	21 5 14.255			+3.2905	+0.067	-11 41 46.57	14.488		-0.006
Bradley 2777 . . . . .	5.9	A	21 7 7.757			-1.1804	+0.092	+77 48 8.03	14.438		+0.090
3 Piscis Australis . . . . .	5.6	K5	21 8 32.895			+3.5624	+0.075	-27 56 47.10	+14.487		-0.106
γ Cygni . . . . .	3.4	K0	21 9 31.832			2.5623	-0.002	+29 53 53.09	14.690		-0.061
γ Cygni . . . . .	3.8	F0	21 11 35.818			2.3943	+0.041	+37 42 12.02	15.307		+0.434
α Equulei . . . . .	4.1	F8p	21 11 49.503			2.9091	+0.024	+ 4 54 58.99	14.801		-0.085
σ Cygni . . . . .	4.3	A0p	21 14 16.366			2.3650	-0.001	+39 3 32.21	15.031		+0.003
μ Microscopii . . . . .	4.9	A2p	21 15 38.818			+3.8430	+0.028	-41 8 54.72	+15.113		+0.005
ε Cephei . . . . .	2.6	A5	21 16 40.327			1.4846	+0.024	+62 14 46.57	15.216		+0.060
ε Capricorni . . . . .	4.3	K0	21 17 47.682			3.3435	+0.023	-17 10 33.63	15.234		+0.004
1 Pegasi . . . . .	4.2	K0	21 18 23.186			2.7743	+0.075	+19 27 41.67	15.238		+0.094
γ Pavonis . . . . .	4.3	F8	21 19 50.860			4.0946	+0.043	-65 43 45.89	16.121		+0.784
γ Capricorni . . . . .	3.9	G5p	21 22 6.182			+3.4298	+0.004	-22 45 30.94	+15.498		+0.020
g Cygni . . . . .	5.3	K0	21 26 29.780			2.2120	+0.060	+46 11 14.57	15.819		+0.105
β Aquarii . . . . .	3.1	G0	21 27 20.921			3.1506	+0.012	- 5 55 25.88	15.750		-0.011
β Cephei . . . . .	3.3	B1	21 27 38.086			0.7843	+0.026	+70 12 33.56	15.781		+0.006
ξ Aquarii . . . . .	4.8	A5	21 33 29.676			3.1953	+0.075	- 8 12 49.11	16.064		-0.023
74 Cygni . . . . .	5.1	A5	21 33 44.502			+2.4037	+0.003	+40 3 12.82	+16.199		+0.009
γ Capricorni . . . . .	3.8	F0p	21 35 39.657			3.3266	+0.019	-17 1 27.36	16.182		-0.017
ε Pegasi . . . . .	2.5	K0	21 40 15.391			2.9461	+0.016	+ 9 30 27.27	16.432		0.000
11 Cephei . . . . .	4.8	K0	21 40 45.276			0.9864	+0.021	+70 56 34.15	16.551		+0.093
δ Capricorni . . . . .	3.0	A5	21 42 37.639			3.3135	+0.076	-16 29 27.52	16.254		-0.297
π <sup>2</sup> Cygni . . . . .	4.3	B3	21 43 50.184			+2.2150	+0.009	+48 56 20.25	+16.809		-0.001
μ Capricorni . . . . .	5.2	F0	21 48 56.159			3.2726	+0.004	-13 55 44.87	16.857		+0.001
γ Gruis . . . . .	3.2	B8	21 49 5.335			3.6396	+0.077	-37 44 30.67	16.842		-0.021
16 Pegasi . . . . .	5.0	B3	21 49 25.268			2.7387	+0.005	+25 32 53.85	16.884		+0.006
79 Draconis . . . . .	6.6	A0	21 51 51.398			0.7164	+0.010	+73 19 25.01	17.008		+0.016
20 Pegasi . . . . .	5.7	F2	21 57 11.482			+2.9223	+0.068	+12 44 10.08	+17.182		-0.054
ε Indi . . . . .	4.7	K5	21 57 14.925			4.0658	+4.783	-57 6 55.62	14.667		-2.571
α Aquarii . . . . .	3.2	G0	22 1 40.541			3.0618	+0.010	- 0 42 32.33	17.430		-0.002
α Aquarii . . . . .	4.4	B8	22 2 7.089			3.2420	+0.022	-14 15 30.24	17.390		-0.063
20 Cephei . . . . .	5.4	K5	22 2 34.590			1.8330	+0.082	+62 23 41.75	17.523		+0.051
α Gruis . . . . .	2.2	B5	22 3 11.852			+3.7914	+0.010	-47 20 57.47	+17.323		-0.174
α Pegasi . . . . .	4.0	F5	22 3 17.152			2.7918	+0.022	+24 57 13.75	17.522		+0.021
θ Pegasi . . . . .	3.7	A0	22 6 9.885			3.0867	+0.017	+ 5 48 13.81	17.550		+0.086
π Pegasi . . . . .	4.4	F5	22 6 25.985			2.6431	-0.003	+32 47 6.70	17.616		-0.018
ξ Cephei . . . . .	3.6	K0	22 8 4.601			2.0786	+0.048	+57 48 23.78	17.712		+0.010
24 Cephei . . . . .	5.0	G5	22 8 16.356			+1.1566	+0.044	+71 56 48.75	+17.713		+0.004
θ Aquarii . . . . .	4.3	K0	22 12 36.796			3.1668	+0.074	- 8 10 55.54	17.866		-0.018
α Tucanae . . . . .	2.9	K2	22 13 1.891			4.1806	-0.018	-60 39 31.46	17.866		-0.036
γ Aquarii . . . . .	4.0	A0	22 17 31.482			3.0889	+0.061	- 1 47 26.96	18.090		+0.015
31 Pegasi . . . . .	4.9	B3p	22 17 34.819			2.9631	+0.010	+11 48 5.75	18.083		+0.007
3 Lacerta . . . . .	4.6	K0	22 20 24.704			+2.3664	-0.007	+51 49 40.34	+17.994		-0.188
π Aquarii . . . . .	4.6	B1	22 21 11.482			3.0636	+0.004	+ 0 58 15.32	18.210		-0.001
σ Aquarii . . . . .	4.9	A0	22 26 24.921			3.1767	0.000	-11 5 15.76	18.272		-0.026
α Lacertae . . . . .	3.8	A0	22 27 59.606			2.4689	+0.017	+49 52 14.82	18.465		+0.014
ν Aquarii . . . . .	5.3	F5	22 30 19.153			3.2843	+0.048	-21 7 6.97	18.276		-0.184
226 B. Cephei . . . . .	5.7	A0	22 30 52.423			+2.0630	-0.062	+75 48 50.66	+18.548		0.000

γ Cygni, comp. 2<sup>nd</sup>, 0'.3

γ Cygni, star 6 = 7 L 10<sup>s</sup>, 420' a.

β Cephei, star 8 = 13' 3 a. pr.

# 230 MEAN PLACES OF TEN-DAY STARS, 1920.

FOR JANUARY 0-943, WASHINGTON MEAN TIME.

Name of Star.	Magni- tude.	Spec- trum.	Right Ascension.	Annual Vari- ation.	Annual P. M.	Declination.	Annual Vari- ation.	Annual P. M.
			h m s	s	s	° ' "	"	"
γ Aquarii	4.1	B8	22 31 14.763	+3.0830	+0.0087	- 0 31 48.78	+18.308	-0.083
10 Lacertæ	4.9	Oe5	22 35 40.171	2.6807	+0.0041	+38 38 0.52	18.682	-0.011
ε Piscis Australis	4.2	B8	22 36 14.012	3.3318	+0.0088	-27 27 41.38	18.710	-0.011
ζ Pegasi	3.6	B8	22 37 28.300	2.9015	+0.0064	+10 24 47.90	18.768	-0.014
β Gruis	2.2	Mb	22 37 53.823	3.5035	+0.0133	-47 18 12.74	18.768	-0.026
γ Pegasi	3.1	G0	22 39 14.994	+2.9007	+0.0011	+29 48 8.38	+18.776	-0.087
λ Pegasi	4.1	K0	22 42 40.544	2.8074	+0.0087	+23 8 39.49	18.906	-0.080
ε Gruis	3.7	A2	22 43 43.744	3.6956	+0.0093	-51 44 16.12	18.987	-0.080
τ Aquarii	4.2	K5	22 45 21.493	3.1756	-0.0068	-14 0 54.55	18.993	-0.083
μ Pegasi	3.7	K0	22 46 8.430	2.8037	+0.0110	+24 10 43.74	18.971	-0.043
α Cephei	3.7	K0	22 46 49.006	+2.1303	-0.0111	+65 46 45.60	+18.908	-0.126
λ Aquarii	3.8	Ma	22 48 26.505	3.1306	+0.0062	- 8 0 20.37	19.111	+0.088
ρ Indi	6.1	G5	22 49 6.582	4.2063	-0.0133	-70 30 5.59	19.147	+0.088
δ Aquarii	3.5	A2	22 50 24.365	3.1837	-0.0084	-16 14 47.80	19.102	-0.088
α Pisc. Aust. (Fomalhaut)	1.3	A3	22 53 14.010	3.3190	+0.0252	-30 2 47.90	19.039	-0.171
α Andromedæ	3.6	B5p	22 58 14.181	+2.7855	+0.0020	+41 53 44.63	+19.312	-0.010
β Pegasi	var.	Ma	22 59 53.625	2.9038	+0.0146	+27 38 54.71	19.404	+0.135
α Pegasi (Markab)	2.6	A0	23 0 46.462	2.9067	+0.0040	+14 46 28.43	19.360	-0.030
55 Pegasi	4.7	Ma	23 2 58.405	3.0910	+0.0093	+ 8 58 37.21	19.416	-0.012
ε <sup>2</sup> Aquarii	3.8	K0	23 5 10.961	3.3013	+0.0082	-21 36 25.10	19.516	+0.041
τ Cephei	4.6	G5	23 5 20.935	+1.9007	+0.0023	+74 57 17.41	+19.446	-0.082
ε Gruis	4.1	K0	23 5 50.140	3.4062	+0.0121	-45 40 49.33	19.456	-0.081
59 Pegasi	5.2	A3	23 7 41.804	3.0379	-0.0077	+ 8 17 7.76	19.530	+0.004
5 H. Cassiopeie	5.6	K2	23 9 25.587	2.8006	+0.0287	+56 43 35.56	19.838	+0.200
φ Aquarii	4.4	Ma	23 10 10.771	3.1070	+0.0045	- 6 28 49.93	19.379	-0.194
ψ Aquarii	4.5	K0	23 11 42.100	+3.1446	+0.0250	- 9 31 25.20	+19.808	-0.008
γ Tucanæ	4.1	F2	23 12 46.103	3.5164	-0.0057	-58 40 29.72	19.661	+0.080
γ Piscium	3.8	K0	23 13 1.059	3.1094	+0.0022	+ 2 50 41.88	19.646	+0.021
γ Sculptoris	4.5	K0	23 14 30.417	3.2438	+0.0022	-32 58 5.13	19.866	-0.088
ο Cephei	4.9	G5	23 15 20.030	3.4338	+0.0113	+67 40 25.11	19.683	+0.013
τ Pegasi	4.6	A5	23 16 40.484	+2.9003	+0.0018	+23 18 7.89	+19.076	-0.012
b <sup>1</sup> Aquarii	4.2	K0	23 18 46.219	3.1324	-0.0099	-20 32 15.17	19.632	-0.089
4 Cassiopeie	5.2	K5	23 21 16.548	2.6524	-0.0044	+61 50 36.44	19.750	-0.010
v Pegasi	4.6	G0	23 21 23.040	2.9011	+0.0134	+22 57 48.30	19.702	+0.030
κ Piscium	4.9	A2p	23 22 49.884	3.0752	+0.0066	+ 0 49 3.13	19.600	-0.083
θ Piscium	4.4	G5	23 23 54.544	+3.0421	-0.0083	+ 5 56 22.01	+19.786	-0.041
70 Pegasi	4.7	K0	23 25 6.435	3.0024	+0.0040	+12 19 8.64	19.840	+0.085
ρ Sculptoris	4.5	B9	23 28 41.127	3.2034	+0.0071	-38 15 39.81	19.864	+0.086
72 Pegasi (mean)	5.2	K2	23 29 58.843	2.9718	+0.0085	+30 53 1.45	19.864	-0.009
λ Andromedæ	4.0	K0	23 33 38.616	2.9206	+0.0156	+46 1 28.69	19.408	-0.430
ε Andromedæ	4.3	B8	23 34 12.475	+3.9061	+0.0025	+42 49 30.32	+19.918	0.000
ε Piscium	4.3	G0	23 35 50.079	3.0046	+0.0246	+ 5 11 33.27	19.408	-0.436
γ Cephei	3.4	K0	23 36 3.183	2.4426	-0.0173	+77 11 9.10	20.008	+0.157
κ Andromedæ	4.2	A0	23 36 27.779	2.9457	+0.0078	+43 53 26.88	19.915	-0.024
ω <sup>2</sup> Aquarii	4.6	A0	23 38 34.481	3.1124	+0.0063	-14 59 14.08	19.806	-0.083
ι <sup>1</sup> Aquarii	5.3	B8	23 40 3.239	+3.1140	+0.0019	-18 43 16.03	+19.964	-0.008
ψ Andromedæ	5.1	K0	23 42 3.861	2.9651	+0.0065	+45 58 83.52	19.976	-0.008
41 H. Cephei	5.0	A0	23 44 4.526	2.8626	+0.0024	+67 21 43.85	19.987	-0.010
δ Sculptoris	4.6	A0	23 44 45.622	3.1370	+0.0080	-28 34 23.28	19.808	-0.133
φ Pegasi	5.2	Ma	23 48 24.926	3.0480	-0.0013	+18 40 33.34	19.800	-0.080
ρ Cassiopeie	4.8	F8p	23 50 22.661	+2.9839	-0.0023	+57 3 15.57	+20.020	+0.002
Groombridge 4163	6.6	B9	23 50 55.114	2.8845	-0.0040	+73 57 54.30	20.025	-0.005
ω Piscium	4.0	F5	23 55 12.136	3.0798	+0.0102	+ 6 25 13.72	19.983	-0.108
ε Tucanæ	4.7	B9	23 55 46.152	2.1257	+0.0076	-66 1 18.92	20.034	-0.007
80 Piscium	4.7	Mb	23 57 51.445	3.0771	+0.0080	- 6 27 31.18	20.007	-0.087
2 Ceti	4.6	A0	23 59 38.564	+3.0748	+0.0015	-17 46 53.12	+20.002	-0.082

β Pegasi, var. irreg., 2<sup>m</sup> 2-2<sup>m</sup> 7  
τ Cephei, comp. 7<sup>m</sup>, 0<sup>m</sup>.9 L.

φ Aquarii, star 8<sup>m</sup> 5, 69<sup>m</sup>.4 n. pr.  
ε Cephei, comp. 8<sup>m</sup>, 2<sup>m</sup>.9 a. pr.

72 Pegasi, binary, 0<sup>m</sup>.0, 0<sup>m</sup>.0, 0<sup>m</sup>.4

# MEAN PLACES OF CIRCUMPOLAR STARS, 1920. 231

FOR JANUARY 0<sup>d</sup>.943, WASHINGTON MEAN TIME.

Name of Star.	Magni- tude.	Spec- trum.	Right Ascension.			Annual Vari- ation.		Declination.			Annual Vari- ation.	
			h	m	s	"	"	"	'	"	"	"
43 H. Cephei	4.5	K0	0 57	32.323	+ 7.0661	+0.7733	+85	49	43.55	+19.412	-0.004	
$\alpha$ Ursæ Min. ( <i>Polaris</i> )	2.1	F8	1 31	41.366	+29.7858	+1.1493	+88	52	39.02	+18.464	+0.002	
4 G. Octantis	5.6	K0	1 41	51.117	- 3.7338	+0.0066	-85	10	27.09	+18.126	+0.028	
Groombridge 750	6.7	F8	4 10	55.493	+17.6708	+0.1130	+85	20	38.12	+ 9.226	+0.042	
Groombridge 944	6.4	K0	5 36	9.111	+18.7823	+0.1130	+85	9	36.60	+ 2.078	-0.004	
31 G. Mensæ	6.2	A0	5 45	39.719	-11.6761	-0.1211	-84	49	42.94	+ 1.340	+0.067	
$\zeta$ Mensæ	5.6	A2	6 46	43.704	- 4.9403	-0.0034	-80	43	50.12	- 3.977	+0.033	
51 H. Cephei	5.3	Ma	7 9	31.434	+29.0633	-0.0890	+87	10	38.36	- 5.520	-0.034	
25 H. Camelopardalis	5.1	Mb	7 14	20.713	+12.7963	+0.1132	+82	34	10.90	- 6.426	-0.047	
7 G. Octantis	6.4	F5	7 15	19.352	-20.3419	-0.1148	-86	54	26.23	- 6.445	+0.008	
Groombridge 1119	7.0	A0	8 18	46.642	+58.9356	-0.0093	+88	52	26.44	-11.392	+0.017	
$\zeta$ Octantis	5.4	A3	9 8	33.397	- 8.2658	-0.1150	-85	20	41.44	-14.680	+0.043	
1 H. Draconis	4.6	K0	9 25	48.041	+ 8.7629	-0.0069	+81	40	54.43	-15.704	-0.027	
$\zeta$ Chamæleontis	5.2	B3	9 36	17.360	- 1.6667	-0.1121	-80	34	55.47	-16.213	+0.019	
30 H. Camelopardalis	5.3	F5	10 21	27.495	+ 7.5416	-0.0461	+82	57	59.46	-18.212	+0.009	
$\eta$ Octantis	6.3	A0	10 59	54.174	- 0.3738	-0.0576	-84	9	48.70	-19.365	-0.008	
Bradley 1672	6.3	F0	12 14	29.583	+ 0.3963	-0.0711	+88	8	36.24	-19.947	+0.068	
$\epsilon$ Octantis	5.4	K0	12 46	25.116	+ 6.0612	+0.0267	-84	41	21.18	-19.611	+0.024	
32 H. Camelop. seq.	5.3	A2	12 48	31.755	+ 0.4488	-0.1184	+83	50	51.72	-19.561	+0.016	
$\kappa$ Octantis	5.6	A2	13 27	42.050	+ 9.1672	-0.0766	-85	22	38.10	-18.619	-0.024	
$\delta$ Octantis	4.1	K2	14 13	55.644	+ 9.3002	-0.0619	-83	18	11.26	-16.783	-0.014	
Groombridge 2233	7.2	K0	15 2	43.277	-19.2005	-0.0683	+87	32	28.69	-13.974	+0.031	
$\rho$ Octantis	5.7	A2	15 24	36.751	+13.4071	+0.0842	-84	12	7.93	-12.492	+0.060	
$\epsilon$ Ursæ Minoris	4.4	G5	16 54	6.748	- 6.2417	+0.0057	+82	10	15.74	- 5.684	-0.001	
59 G. Apollis	5.9	Mb	17 16	28.406	+11.1733	+0.0087	-80	47	18.10	- 3.828	-0.069	
$\delta$ Ursæ Minoris	4.4	A0	17 58	2.814	-19.4967	+0.1172	+86	36	50.93	- 0.123	+0.048	
$\chi$ Octantis	5.2	K0	18 7	59.062	+35.7160	-0.0653	-87	39	50.34	+ 0.571	-0.127	
$\lambda$ Ursæ Minoris	6.6	Mb	18 59	2.477	-72.7102	-1.1112	+89	1	17.96	+ 5.113	+0.006	
$\sigma$ Octantis	5.5	F0	19 32	24.283	+93.2389	+1.076	-89	13	5.55	+ 7.864	-0.001	
76 Draconis	5.7	A0	20 48	27.964	- 4.1843	+0.1131	+82	14	10.29	+13.468	+0.026	
$\lambda$ Octantis	5.4	G0p	21 38	48.035	+ 9.4818	+0.0388	-83	5	17.98	+16.347	-0.012	
$\nu$ Octantis	5.7	K0	22 16	45.446	+12.2188	-0.0400	-86	22	32.81	+18.120	+0.074	
$\beta$ Octantis	4.3	F0	22 37	57.920	+ 6.2922	-0.0002	-81	48	6.08	+18.777	+0.002	
39 H. Cephei	5.6	F0	23 27	43.285	- 0.2395	+0.0642	+86	51	58.49	+19.867	+0.020	
$\gamma^1$ Octantis	5.1	G5	23 47	27.240	+ 3.6007	-0.0247	-82	27	48.42	+20.003	-0.012	

$\alpha$  Ursæ Min., star 9<sup>m</sup>, 18<sup>s</sup> s. pr.

| 32 H. Camelop., star 8<sup>m</sup>-8, 21<sup>s</sup>.6 n. pr. |

$\lambda$  Octantis, binary, 5<sup>m</sup>-5, 8<sup>s</sup>-0, 3<sup>s</sup>.2 n. f.

CIRCUMPOLAR STARS.

FOR THE UPPER TRANSIT AT WASHINGTON.

43 H. Cephei. Mag. 4.5			$\alpha$ Ursae Minoris. (Polaris.) Mag. 2.1			4 G. Octantis. Mag. 5.6			Groombridge 780. Mag. 6.7			Groombridge 944. Mag. 6.4		
Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.
Jan.	h m ° ' "	° ' "	Jan.	h m ° ' "	° ' "	Jan.	h m ° ' "	° ' "	Jan.	h m ° ' "	° ' "	Jan.	h m ° ' "	° ' "
	0 57	+85 50		1 81	+88 53		1 41	-85 10		4 11	+85 20		5 36	+85 9
0.3	41.70	7.56	0.3	86.29	1.49	0.3	50.43	44.31	0.4	16.29	47.01	0.5	30.43	36.10
1.3	41.55	7.64	1.3	85.41	1.62	1.3	50.13	44.35	1.4	16.20	47.28	1.5	30.43	36.37
2.3	41.31	7.73	2.3	84.54	1.75	2.3	49.83	44.37	2.4	16.12	47.54	2.5	30.44	36.66
3.3	41.06	7.83	3.3	83.63	1.89	3.3	49.54	44.38	3.4	16.04	47.82	3.4	30.46	36.96
4.3	40.79	7.93	4.3	82.67	2.04	4.3	49.26	44.35	4.4	15.96	48.11	4.4	30.48	37.27
5.3	40.50	8.03	5.3	81.62	2.20	5.3	48.99	44.31	5.4	15.86	48.42	5.4	30.49	37.60
6.2	40.20	8.12	6.3	80.53	2.34	6.3	48.75	44.28	6.4	15.74	48.73	6.4	30.47	37.94
7.2	39.89	8.17	7.3	79.37	2.45	7.3	48.50	44.25	7.4	15.61	49.02	7.4	30.44	38.28
8.2	39.56	8.21	8.3	78.17	2.55	8.3	48.25	44.24	8.4	15.44	49.31	8.4	30.38	38.62
9.2	39.24	8.22	9.3	76.99	2.61	9.3	47.99	44.23	9.4	15.27	49.56	9.4	30.29	38.93
10.2	38.93	8.21	10.3	75.84	2.67	10.3	47.73	44.23	10.4	15.08	49.80	10.4	30.20	39.22
11.2	38.65	8.18	11.3	74.75	2.71	11.3	47.45	44.23	11.4	14.90	50.03	11.4	30.11	39.51
12.2	38.37	8.15	12.3	73.71	2.74	12.3	47.17	44.24	12.4	14.72	50.23	12.4	30.01	39.78
13.2	38.10	8.12	13.3	72.69	2.77	13.3	46.88	44.23	13.4	14.57	50.44	13.4	29.93	40.03
14.2	37.84	8.11	14.2	71.71	2.79	14.3	46.58	44.20	14.4	14.42	50.64	14.4	29.85	40.29
15.2	37.58	8.10	15.2	70.73	2.82	15.3	46.28	44.16	15.4	14.26	50.85	15.4	29.77	40.55
16.2	37.33	8.08	16.2	69.72	2.87	16.2	45.99	44.09	16.4	14.11	51.07	16.4	29.69	40.83
17.2	37.07	8.06	17.2	68.69	2.91	17.2	45.70	44.01	17.4	13.94	51.29	17.4	29.62	41.10
18.2	36.79	8.05	18.2	67.63	2.95	18.2	45.43	43.92	18.3	13.78	51.52	18.4	29.54	41.39
19.2	36.49	8.04	19.2	66.52	3.00	19.2	45.16	43.81	19.3	13.61	51.75	19.4	29.46	41.70
20.2	36.20	8.01	20.2	65.38	3.03	20.2	44.90	43.71	20.3	13.43	51.99	20.4	29.37	42.01
21.2	35.88	7.98	21.2	64.21	3.04	21.2	44.65	43.60	21.3	13.24	52.22	21.4	29.27	42.32
22.2	35.57	7.93	22.2	63.00	3.05	22.2	44.41	43.50	22.3	13.02	52.45	22.4	29.14	42.61
23.2	35.26	7.85	23.2	61.79	3.02	23.2	44.16	43.40	23.3	12.79	52.64	23.4	29.00	42.91
24.2	34.95	7.76	24.2	60.61	2.99	24.2	43.90	43.30	24.3	12.56	52.83	24.4	28.85	43.20
25.2	34.66	7.65	25.2	59.46	2.94	25.2	43.64	43.22	25.3	12.33	52.99	25.4	28.69	43.45
26.2	34.38	7.54	26.2	58.36	2.88	26.2	43.37	43.14	26.3	12.10	53.13	26.4	28.53	43.69
27.2	34.11	7.42	27.2	57.34	2.81	27.2	43.09	43.05	27.3	11.88	53.26	27.4	28.37	43.89
28.2	33.88	7.32	28.2	56.39	2.75	28.2	42.80	42.93	28.3	11.68	53.38	28.4	28.23	44.10
29.2	33.65	7.22	29.2	55.45	2.69	29.2	42.50	42.81	29.3	11.48	53.51	29.4	28.10	44.31
30.2	33.42	7.12	30.2	54.53	2.65	30.2	42.21	42.65	30.3	11.30	53.65	30.4	27.99	44.53
31.2	33.18	7.04	31.2	53.56	2.62	31.2	41.93	42.47	31.3	11.12	53.81	31.4	27.87	44.77
13.77	+13.73		51.35	+51.34		11.90	-11.86		12.33	+12.29		11.86	+11.81	
0 <sup>h</sup> 57 <sup>m</sup>	32 <sup>s</sup> .323		1 <sup>h</sup> 31 <sup>m</sup>	41 <sup>s</sup> .366		1 <sup>h</sup> 41 <sup>m</sup>	51 <sup>s</sup> .117		4 <sup>h</sup> 10 <sup>m</sup>	55 <sup>s</sup> .493		5 <sup>h</sup> 36 <sup>m</sup>	9 <sup>s</sup> .111	
+85° 49'	43'' .55		+88° 52'	39'' .02		-85° 10'	27'' .09		+85° 20'	38'' .12		+85° 9'	36'' .60	

CIRCUMPOLAR STARS.

FOR THE UPPER TRANSIT AT WASHINGTON.

31 G. Mensa. Mag. 6.2			5 Mensa. Mag. 5.6			51 H. Cephei. Mag. 5.3			25 H. Camelopard. Mag. 5.1			7 G. Octantis. Mag. 6.4		
Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.
Jan.	h m 5 45	° ' -84 49	Jan.	h m 6 46	° ' -80 43	Jan.	h m 7 4	° ' +87 16	Jan.	h m 7 14	° ' +82 83	Jan.	h m 7 15	° ' -86 54
	s "	"		s "	"		s "	"		s "	"		s "	"
0.5	50.98	53.15	0.5	51.29	56.41	0.5	4.66	28.33	0.5	33.63	59.64	0.5	41.02	30.33
1.5	50.86	53.52	1.5	51.27	56.83	1.5	4.79	28.58	1.5	33.70	59.89	1.5	41.02	30.73
2.5	50.73	53.88	2.5	51.24	57.24	2.5	4.96	28.85	2.5	33.78	60.16	2.5	40.98	31.13
3.5	50.60	54.22	3.5	51.21	57.62	3.5	5.12	29.13	3.5	33.86	60.42	3.5	40.91	31.52
4.5	50.46	54.55	4.5	51.18	58.00	4.5	5.31	29.44	4.5	33.95	60.71	4.5	40.83	31.90
5.5	50.32	54.85	5.5	51.15	58.35	5.5	5.49	29.75	5.5	34.03	61.02	5.5	40.74	32.26
6.4	50.19	55.12	6.5	51.11	58.68	6.5	5.63	30.08	6.5	34.09	61.83	6.5	40.65	32.59
7.4	50.05	55.40	7.5	51.07	59.00	7.5	5.74	30.44	7.5	34.15	61.66	7.5	40.57	32.91
8.4	49.93	55.68	8.5	51.04	59.32	8.5	5.81	30.80	8.5	34.20	62.00	8.5	40.49	33.23
9.4	49.81	55.97	9.5	51.02	59.65	9.5	5.85	31.14	9.5	34.23	62.33	9.5	40.43	33.55
10.4	49.69	56.28	10.5	50.98	60.01	10.5	5.86	31.47	10.5	34.24	62.65	10.5	40.38	33.90
11.4	49.57	56.60	11.5	50.95	60.36	11.5	5.86	31.78	11.5	34.25	62.96	11.5	40.33	34.26
12.4	49.44	56.92	12.5	50.92	60.73	12.5	5.86	32.09	12.5	34.26	63.24	12.5	40.28	34.63
13.4	49.30	57.25	13.5	50.88	61.12	13.5	5.85	32.37	13.5	34.27	63.52	13.5	40.20	35.00
14.4	49.14	57.58	14.5	50.83	61.50	14.5	5.86	32.65	14.5	34.28	63.79	14.5	40.11	35.39
15.4	48.97	57.90	15.5	50.78	61.88	15.5	5.83	32.93	15.5	34.31	64.06	15.5	39.99	35.78
16.4	48.79	58.21	16.5	50.72	62.25	16.5	5.90	33.24	16.5	34.34	64.33	16.5	39.85	36.16
17.4	48.61	58.50	17.5	50.66	62.61	17.5	5.92	33.54	17.5	34.36	64.61	17.5	39.68	36.53
18.4	48.42	58.78	18.5	50.59	62.95	18.5	5.94	33.85	18.5	34.38	64.92	18.5	39.52	36.87
19.4	48.24	59.05	19.5	50.53	63.28	19.5	5.96	34.18	19.5	34.40	65.24	19.5	39.34	37.21
20.4	48.05	59.29	20.5	50.46	63.60	20.5	5.96	34.51	20.5	34.41	65.56	20.5	39.16	37.54
21.4	47.87	59.53	21.4	50.40	63.91	21.5	5.93	34.85	21.5	34.42	65.89	21.5	38.98	37.86
22.4	47.69	59.77	22.4	50.32	64.21	22.5	5.88	35.19	22.5	34.41	66.22	22.5	38.80	38.17
23.4	47.51	60.00	23.4	50.25	64.51	23.5	5.80	35.53	23.5	34.40	66.56	23.5	38.63	38.48
24.4	47.33	60.24	24.4	50.19	64.81	24.5	5.71	35.86	24.5	34.37	66.88	24.5	38.48	38.80
25.4	47.15	60.50	25.4	50.13	65.13	25.4	5.58	36.18	25.5	34.34	67.19	25.5	38.33	39.13
26.4	46.97	60.77	26.4	50.05	65.46	26.4	5.45	36.47	26.5	34.29	67.48	26.5	38.16	39.48
27.4	46.78	61.06	27.4	49.98	65.82	27.4	5.32	36.76	27.5	34.25	67.76	27.5	37.98	39.84
28.4	46.58	61.34	28.4	49.90	66.18	28.4	5.20	37.03	28.4	34.21	68.00	28.4	37.79	40.21
29.4	46.34	61.61	29.4	49.82	66.52	29.4	5.10	37.29	29.4	34.19	68.25	29.4	37.58	40.58
30.4	46.11	61.87	30.4	49.73	66.86	30.4	5.02	37.55	30.4	34.16	68.51	30.4	37.30	40.95
31.4	45.88	62.11	31.4	49.63	67.19	31.4	4.97	37.83	31.4	34.17	68.78	31.4	37.08	41.29
11.10	-11.06		6.21	-6.13		20.30	+20.27		7.73	+7.67		18.55	-18.52	
5 <sup>h</sup> 45 <sup>m</sup>	39°.719		6 <sup>h</sup> 46 <sup>m</sup>	43°.704		7 <sup>h</sup> 3 <sup>m</sup>	31°.434		7 <sup>h</sup> 14 <sup>m</sup>	20°.713		7 <sup>h</sup> 15 <sup>m</sup>	19°.852	
-84° 49'	42''.94		-80° 43'	50''.12		+87° 10'	38''.36		+82° 84'	10''.90		-86° 54'	26''.23	

CIRCUMPOLAR STARS.

FOR THE UPPER TRANSIT AT WASHINGTON.

Greenwich 1119. Mag. 7.0			♄ Octantis. Mag. 5.4			♁ H. Deneb. Mag. 4.6			♃ Chamæleonis. Mag. 6.2			♁ H. Camelopard. Mag. 5.3		
Wash. Mean Time.	Right Ascension.	Declination.	Wash. Mean Time.	Right Ascension.	Declination.	Wash. Mean Time.	Right Ascension.	Declination.	Wash. Mean Time.	Right Ascension.	Declination.	Wash. Mean Time.	Right Ascension.	Declination.
h m	"	"	h m	"	"	h m	"	"	h m	"	"	h m	"	"
Jan. 8 19	+86 52		Jan. 9 8	-85 28		Jan. 9 25	+81 46		Jan. 9 36	-80 34		Jan. 10 21	+82 57	
0.6	53.19	9.22	0.6	47.99	37.17	0.6	55.29	32.36	0.6	24.76	49.49	0.7	32.72	34.76
1.6	53.81	9.46	1.6	48.15	37.53	1.6	55.33	32.50	1.6	24.86	49.84	1.7	32.85	34.85
2.6	54.48	9.69	2.6	48.29	37.91	2.6	55.46	32.64	2.6	24.95	50.22	2.6	33.05	34.92
3.6	55.20	9.93	3.6	48.41	38.30	3.6	55.59	32.79	3.6	25.04	50.60	3.6	33.23	35.01
4.6	55.95	10.18	4.6	48.51	38.67	4.6	55.74	32.95	4.6	25.19	50.96	4.6	33.42	35.10
5.6	56.70	10.45	5.6	48.60	39.03	5.6	55.90	33.13	5.6	25.17	51.30	5.6	33.62	35.23
6.6	57.41	10.73	6.6	48.68	39.37	6.6	56.04	33.33	6.6	25.24	51.64	6.6	33.81	35.36
7.6	58.05	11.04	7.6	48.76	39.70	7.6	56.18	33.56	7.6	25.31	51.97	7.6	33.99	35.53
8.5	58.60	11.36	8.6	48.84	40.02	8.6	56.29	33.80	8.6	25.37	52.28	8.6	34.16	35.70
9.5	59.07	11.68	9.6	48.94	40.33	9.6	56.40	34.04	9.6	25.43	52.59	9.6	34.31	35.89
10.5	59.45	12.00	10.6	49.04	40.66	10.6	56.49	34.29	10.6	25.51	52.91	10.6	34.45	36.06
11.5	59.79	12.32	11.6	49.15	41.00	11.6	56.57	34.53	11.6	25.59	53.24	11.6	34.58	36.28
12.5	60.11	12.61	12.6	49.25	41.37	12.6	56.66	34.77	12.6	25.65	53.60	12.6	34.72	36.47
13.5	60.42	12.89	13.6	49.36	41.75	13.6	56.75	35.00	13.6	25.72	53.96	13.6	34.85	36.65
14.5	60.74	13.16	14.6	49.45	42.13	14.6	56.84	35.21	14.6	25.79	54.33	14.6	34.98	36.82
15.5	61.09	13.43	15.6	49.53	42.51	15.6	56.93	35.43	15.6	25.86	54.71	15.6	35.12	36.99
16.5	61.45	13.70	16.6	49.59	42.90	16.6	57.02	35.65	16.6	25.91	55.11	16.6	35.26	37.17
17.5	61.83	13.98	17.6	49.65	43.29	17.6	57.12	35.88	17.6	25.96	55.49	17.6	35.40	37.35
18.5	62.21	14.29	18.6	49.70	43.68	18.6	57.22	36.10	18.6	26.01	55.87	18.6	35.54	37.54
19.5	62.60	14.60	19.6	49.73	44.05	19.6	57.32	36.36	19.6	26.06	56.25	19.6	35.68	37.74
20.5	62.95	14.92	20.5	49.76	44.42	20.6	57.42	36.63	20.6	26.09	56.62	20.6	35.83	37.95
21.5	63.27	15.25	21.5	49.77	44.78	21.6	57.51	36.91	21.6	26.13	56.98	21.6	35.98	38.17
22.5	63.58	15.59	22.5	49.78	45.12	22.6	57.60	37.19	22.6	26.16	57.34	22.6	36.12	38.41
23.5	63.73	15.94	23.5	49.80	45.46	23.6	57.67	37.49	23.6	26.19	57.68	23.6	36.26	38.66
24.5	63.84	16.28	24.5	49.83	45.82	24.6	57.73	37.79	24.6	26.22	58.02	24.6	36.37	38.93
25.5	63.89	16.61	25.5	49.87	46.18	25.5	57.79	38.09	25.6	26.25	58.38	25.6	36.47	39.19
26.5	63.90	16.93	26.5	49.91	46.54	26.5	57.84	38.37	26.6	26.29	58.76	26.6	36.56	39.44
27.5	63.90	17.23	27.5	49.95	46.93	27.5	57.89	38.63	27.5	26.33	59.15	27.5	36.65	39.69
28.5	63.91	17.52	28.5	49.98	47.34	28.5	57.94	38.89	28.5	26.37	59.56	28.6	36.74	39.92
29.5	63.97	17.80	29.5	49.99	47.76	29.5	57.99	39.13	29.5	26.40	59.98	29.6	36.84	40.14
30.5	64.08	18.06	30.5	49.99	48.19	30.5	58.04	39.38	30.5	26.43	60.41	30.6	36.94	40.35
31.5	64.22	18.37	31.5	49.96	48.61	31.5	58.11	39.63	31.5	26.44	60.84	31.6	37.05	40.57
50.72	+80.71		12.32	-12.28		6.91	+6.84		6.11	-6.03		8.16	+8.10	
8 <sup>h</sup> 18 <sup>m</sup>	49°.642		9 <sup>h</sup> 8 <sup>m</sup>	33°.397		9 <sup>h</sup> 25 <sup>m</sup>	48°.041		9 <sup>h</sup> 36 <sup>m</sup>	17°.360		10 <sup>h</sup> 21 <sup>m</sup>	27°.495	
+86° 52'	29''.44		-85° 20'	41''.44		+81° 40'	54''.43		-80° 34'	55''.47		+82° 57'	59''.46	



CIRCUMPOLAR STARS.

FOR THE UPPER TRANSIT AT WASHINGTON.

γ Octantis. Mag. 6.3			Bradley 1672. Mag. 6.3			ε Octantis. Mag. 5.4			38 H. Camelop. seq. Mag. 5.3			κ Octantis. Mag. 5.6		
Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.
Jan.	h m 11 0	° -84 9	Jan.	h m 12 14	° +88 8	Jan.	h m 12 46	° -84 41	Jan.	h m 12 46	° +83 50	Jan.	h m 18 27	° -85 22
	s "	"		s "	"		s "	"		s "	"		s "	"
0.7	3.39	37.24	0.7	21.04	10.67	0.8	30.42	5.21	0.8	27.48	27.14	0.8	45.54	21.27
1.7	3.61	37.48	1.7	21.64	10.64	1.8	30.71	5.30	1.8	27.67	27.05	1.8	45.88	21.27
2.7	3.81	37.75	2.7	22.27	10.60	2.7	31.00	5.41	2.8	27.86	26.93	2.8	46.22	21.31
3.7	4.01	38.03	3.7	22.92	10.55	3.7	31.29	5.54	3.7	28.06	26.82	3.8	46.56	21.36
4.7	4.20	38.31	4.7	23.62	10.49	4.7	31.56	5.68	4.7	28.28	26.71	4.8	46.88	21.45
5.7	4.38	38.59	5.7	24.35	10.45	5.7	31.80	5.83	5.7	28.51	26.61	5.8	47.18	21.54
6.7	4.53	38.86	6.7	25.10	10.44	6.7	32.04	5.97	6.7	28.74	26.52	6.8	47.47	21.62
7.7	4.68	39.11	7.7	25.87	10.44	7.7	32.28	6.10	7.7	28.98	26.46	7.8	47.75	21.68
8.7	4.84	39.35	8.7	26.61	10.48	8.7	32.50	6.20	8.7	29.21	26.42	8.8	48.01	21.73
9.7	5.01	39.58	9.7	27.32	10.53	9.7	32.73	6.31	9.7	29.43	26.41	9.8	48.28	21.77
10.7	5.18	39.82	10.7	27.99	10.60	10.7	32.96	6.41	10.7	29.64	26.42	10.8	48.57	21.81
11.7	5.36	40.08	11.7	28.63	10.66	11.7	33.24	6.52	11.7	29.84	26.43	11.8	48.88	21.85
12.6	5.54	40.34	12.7	29.24	10.72	12.7	33.49	6.63	12.7	30.04	26.44	12.8	49.19	21.90
13.6	5.73	40.62	13.7	29.84	10.78	13.7	33.76	6.77	13.7	30.23	26.45	13.7	49.51	21.96
14.6	5.91	40.91	14.7	30.43	10.84	14.7	34.04	6.91	14.7	30.42	26.46	14.7	49.83	22.04
15.6	6.09	41.22	15.7	31.03	10.89	15.7	34.31	7.06	15.7	30.61	26.47	15.7	50.16	22.14
16.6	6.26	41.54	16.7	31.64	10.95	16.7	34.58	7.26	16.7	30.81	26.47	16.7	50.48	22.26
17.6	6.41	41.87	17.7	32.29	11.01	17.7	34.83	7.45	17.7	31.03	26.47	17.7	50.79	22.39
18.6	6.56	42.20	18.7	32.95	11.07	18.7	35.07	7.65	18.7	31.24	26.46	18.7	51.10	22.53
19.6	6.70	42.52	19.7	33.63	11.15	19.7	35.30	7.85	19.7	31.46	26.47	19.7	51.39	22.68
20.6	6.84	42.85	20.7	34.32	11.23	20.7	35.53	8.06	20.7	31.67	26.50	20.7	51.67	22.83
21.6	6.96	43.17	21.7	35.01	11.32	21.7	35.75	8.26	21.7	31.89	26.53	21.7	51.94	22.97
22.6	7.08	43.47	22.7	35.71	11.44	22.7	35.97	8.46	22.7	32.12	26.58	22.7	52.21	23.11
23.6	7.20	43.77	23.7	36.39	11.57	23.7	36.18	8.64	23.7	32.35	26.67	23.7	52.48	23.24
24.6	7.32	44.07	24.7	37.04	11.72	24.7	36.39	8.82	24.7	32.55	26.75	24.7	52.74	23.36
25.6	7.45	44.37	25.7	37.64	11.89	25.7	36.61	9.00	25.7	32.74	26.85	25.7	53.02	23.49
26.6	7.59	44.68	26.7	38.20	12.05	26.7	36.85	9.19	26.7	32.93	26.96	26.7	53.31	23.62
27.6	7.73	45.01	27.7	38.73	12.20	27.7	37.09	9.41	27.7	33.11	27.07	27.7	53.62	23.76
28.6	7.88	45.33	28.7	39.24	12.34	28.7	37.36	9.63	28.7	33.29	27.17	28.7	53.94	23.93
29.6	8.02	45.76	29.7	39.75	12.47	29.7	37.61	9.89	29.7	33.47	27.26	29.7	54.27	24.12
30.6	8.15	46.14	30.7	40.29	12.59	30.7	37.85	10.16	30.7	33.64	27.33	30.7	54.59	24.33
31.6	8.25	46.53	31.6	40.86	12.71	31.7	38.09	10.45	31.7	33.83	27.40	31.7	54.88	24.56
9.88	-9.78		30.75	+30.73		10.80	-10.75		9.32	+9.27		12.40	-12.35	
10 <sup>h</sup> 59 <sup>m</sup>	54 <sup>s</sup> .174		12 <sup>h</sup> 14 <sup>m</sup>	29 <sup>s</sup> .583		12 <sup>h</sup> 46 <sup>m</sup>	25 <sup>s</sup> .116		12 <sup>h</sup> 48 <sup>m</sup>	31 <sup>s</sup> .755		13 <sup>h</sup> 27 <sup>m</sup>	42 <sup>s</sup> .050	
-84° 9'	48".70		+88° 8'	36".24		-84° 41'	21".18		+83° 50'	51".72		-85° 22'	88".10	

CIRCUMPOLAR STARS.

FOR THE UPPER TRANSIT AT WASHINGTON.

δ Octantis. Mag. 4.1			Greenwich 2833. Mag. 7.2			ρ Octantis. Mag. 5.7			ε Ursa Minoris. Mag. 4.4			50 G. Apollis. Mag. 5.9		
Wash. Mean Time.	Right Ascension.	Declination.	Wash. Mean Time.	Right Ascension.	Declination.	Wash. Mean Time.	Right Ascension.	Declination.	Wash. Mean Time.	Right Ascension.	Declination.	Wash. Mean Time.	Right Ascension.	Declination.
Jan.	h m	°	Jan.	h m	°	Jan.	h m	°	Jan.	h m	°	Jan.	h m	°
	14 13	-83 17		15 2	+87 32		15 24	-84 11		16 58	+82 10		17 16	-80 46
	s	"		s	"		s	"		s	"		s	"
0.8	56.23	54.21	0.8	12.39	12.71	0.9	33.96	51.70	0.9	55.15	11.14	0.9	24.01	66.44
1.8	56.56	54.16	1.8	12.70	12.49	1.9	34.20	51.53	1.9	55.20	10.83	1.9	24.11	66.14
2.8	56.89	54.13	2.8	13.01	12.26	2.9	34.45	51.38	2.9	55.25	10.52	2.9	24.23	65.86
3.8	57.03	54.12	3.8	13.33	12.00	3.9	34.71	51.24	3.9	55.29	10.19	3.9	24.35	65.58
4.8	57.26	54.12	4.8	13.68	11.74	4.9	34.96	51.13	4.9	55.34	9.83	4.9	24.48	65.34
5.8	57.48	54.14	5.8	14.06	11.48	5.9	35.19	51.04	5.9	55.39	9.46	5.9	24.59	65.11
6.8	57.66	54.16	6.8	14.47	11.22	6.8	35.42	50.96	6.9	55.47	9.09	6.9	24.70	64.91
7.8	57.86	54.17	7.8	14.92	10.96	7.8	35.64	50.87	7.9	55.54	8.74	7.9	24.79	64.69
8.8	58.07	54.17	8.8	15.38	10.75	8.8	35.84	50.77	8.9	55.63	8.41	8.9	24.89	64.47
9.8	58.26	54.15	9.8	15.84	10.56	9.8	36.04	50.65	9.9	55.72	8.09	9.9	24.99	64.23
10.8	58.46	54.12	10.8	16.30	10.38	10.8	36.26	50.52	10.9	55.81	7.80	10.9	25.06	63.99
11.8	58.66	54.09	11.8	16.73	10.23	11.8	36.47	50.39	11.9	55.90	7.51	11.9	25.17	63.72
12.8	58.89	54.06	12.8	17.16	10.08	12.8	36.71	50.26	12.9	56.00	7.24	12.9	25.28	63.45
13.8	59.12	54.06	13.8	17.57	9.94	13.8	36.95	50.14	13.9	56.09	6.97	13.9	25.38	63.19
14.8	59.35	54.06	14.8	17.98	9.79	14.8	37.21	50.03	14.9	56.18	6.71	14.9	25.51	62.94
15.8	59.59	54.10	15.8	18.38	9.62	15.8	37.47	49.93	15.9	56.26	6.45	15.9	25.64	62.69
16.8	59.82	54.14	16.8	18.80	9.46	16.8	37.73	49.84	16.9	56.35	6.18	16.9	25.77	62.46
17.8	60.06	54.19	17.8	19.22	9.30	17.8	37.99	49.79	17.9	56.44	5.90	17.9	25.90	62.25
18.8	60.28	54.27	18.8	19.67	9.13	18.8	38.24	49.74	18.9	56.53	5.61	18.9	26.04	62.06
19.8	60.49	54.35	19.8	20.13	8.97	19.8	38.49	49.70	19.9	56.63	5.32	19.9	26.18	61.86
20.8	60.69	54.44	20.8	20.62	8.81	20.8	38.74	49.69	20.9	56.74	5.02	20.9	26.32	61.69
21.8	60.90	54.53	21.8	21.12	8.66	21.8	38.98	49.67	21.9	56.84	4.73	21.9	26.45	61.52
22.8	61.10	54.61	22.8	21.63	8.52	22.8	39.21	49.64	22.9	56.96	4.44	22.9	26.56	61.35
23.8	61.30	54.67	23.8	22.15	8.40	23.8	39.43	49.61	23.9	57.10	4.17	23.9	26.67	61.17
24.8	61.49	54.73	24.8	22.67	8.30	24.8	39.66	49.57	24.9	57.24	3.93	24.9	26.80	60.99
25.7	61.68	54.79	25.8	23.18	8.23	25.8	39.89	49.51	25.9	57.37	3.69	25.9	26.92	60.79
26.7	61.91	54.84	26.8	23.66	8.17	26.8	40.15	49.45	26.9	57.49	3.49	26.9	27.05	60.58
27.7	62.14	54.92	27.8	24.13	8.11	27.8	40.41	49.40	27.9	57.62	3.29	27.9	27.18	60.36
28.7	62.36	55.01	28.8	24.56	8.05	28.8	40.66	49.36	28.9	57.72	3.10	28.9	27.33	60.16
29.7	62.62	55.13	29.8	24.99	7.97	29.8	40.96	49.36	29.8	57.83	2.88	29.9	27.50	59.96
30.7	62.86	55.27	30.8	25.44	7.89	30.8	41.25	49.33	30.8	57.95	2.67	30.9	27.67	59.80
31.7	63.10	55.43	31.8	25.90	7.79	31.8	41.54	49.41	31.8	58.07	2.44	31.9	27.85	59.65
8.57	-8.61		23.26	+23.24		9.89	-9.84		7.84	+7.27		6.24	-6.16	
14 <sup>h</sup> 13 <sup>m</sup> 55 <sup>s</sup> .644			15 <sup>h</sup> 2 <sup>m</sup> 43 <sup>s</sup> .277			15 <sup>h</sup> 24 <sup>m</sup> 36 <sup>s</sup> .751			16 <sup>h</sup> 54 <sup>m</sup> 6 <sup>s</sup> .748			17 <sup>h</sup> 16 <sup>m</sup> 28 <sup>s</sup> .406		
-83° 18' 11".26			+87° 32' 28".69			-84° 12' 7".93			+82° 10' 15".74			-80° 47' 18".10		

CIRCUMPOLAR STARS.

FOR THE UPPER TRANSIT AT WASHINGTON.

δ Ursa Minoris. Mag. 4.4			χ Octantis. Mag. 5.2			λ Ursa Minoris. Mag. 6.6			σ Octantis. Mag. 5.5			76 Draconis. Mag. 5.7		
Wash. Mean Time.	Right Ascension.	Declination.	Wash. Mean Time.	Right Ascension.	Declination.	Wash. Mean Time.	Right Ascension.	Declination.	Wash. Mean Time.	Right Ascension.	Declination.	Wash. Mean Time.	Right Ascension.	Declination.
Jan.	h m s	° ' "	Jan.	h m s	° ' "	Jan.	h m s	° ' "	Jan.	h m s	° ' "	Jan.	h m s	° ' "
	17 57	+86 36		18 7	-87 39		18 57	+89 1		19 31	-89 12		20 48	+82 14
0.9	34.58	53.51	0.9	35.57	41.48	1.0	28.75	27.25	1.0	1.66	62.53	1.1	20.34	29.38
1.9	34.58	53.20	1.9	35.82	41.11	2.0	28.39	26.97	2.0	1.69	62.15	2.1	20.24	29.17
2.9	34.57	52.89	2.9	36.11	40.77	3.0	27.98	26.66	3.0	1.87	61.76	3.1	20.14	28.95
3.9	34.55	52.57	3.9	36.43	40.45	4.0	27.55	26.35	4.0	2.15	61.38	4.1	20.05	28.71
4.9	34.53	52.21	4.9	36.76	40.14	5.0	27.12	26.02	5.0	2.48	61.03	5.1	19.95	28.45
5.9	34.52	51.85	5.9	37.08	39.85	5.9	26.76	25.68	6.0	2.83	60.69	6.1	19.84	28.18
6.9	34.56	51.48	6.9	37.37	39.57	6.9	26.46	25.31	7.0	3.14	60.36	7.1	19.73	27.89
7.9	34.62	51.11	7.9	37.64	39.29	7.9	26.28	24.96	8.0	3.40	60.05	8.1	19.64	27.57
8.9	34.71	50.76	8.9	37.88	39.01	8.9	26.19	24.60	9.0	3.54	59.73	9.1	19.55	27.25
9.9	34.81	50.42	9.9	38.12	38.72	9.9	26.18	24.25	10.0	3.65	59.41	10.1	19.49	26.93
10.9	34.92	50.09	10.9	38.36	38.40	10.9	26.23	23.92	11.0	3.75	59.05	11.1	19.43	26.62
11.9	35.03	49.78	11.9	38.61	38.07	11.9	26.29	23.59	12.0	3.88	58.69	12.1	19.37	26.33
12.9	35.15	49.49	12.9	38.88	37.75	12.9	26.38	23.30	13.0	4.06	58.32	13.1	19.32	26.04
13.9	35.28	49.20	13.9	39.19	37.42	13.9	26.44	23.00	14.0	4.32	57.95	14.1	19.26	25.76
14.9	35.36	48.91	14.9	39.52	37.10	14.9	26.48	22.71	14.9	4.67	57.57	15.1	19.20	25.48
15.9	35.46	48.62	15.9	39.89	36.77	15.9	26.50	22.41	15.9	5.11	57.19	16.0	19.15	25.20
16.9	35.56	48.33	16.9	40.27	36.47	16.9	26.51	22.10	16.9	5.62	56.82	17.0	19.09	24.91
17.9	35.67	48.01	17.9	40.68	36.18	17.9	26.53	21.78	17.9	6.21	56.46	18.0	19.04	24.62
18.9	35.78	47.70	18.9	41.09	35.89	18.9	26.56	21.46	18.9	6.85	56.10	19.0	18.98	24.31
19.9	35.91	47.37	19.9	41.51	35.62	19.9	26.62	21.12	19.9	7.52	55.76	20.0	18.92	24.00
20.9	36.05	47.04	20.9	41.91	35.38	20.9	26.73	20.77	20.9	8.19	55.43	21.0	18.85	23.67
21.9	36.20	46.71	21.9	42.30	35.13	21.9	26.90	20.42	21.9	8.84	55.11	22.0	18.80	23.33
22.9	36.38	46.38	22.9	42.68	34.89	22.9	27.15	20.07	22.9	9.45	54.80	23.0	18.76	22.98
23.9	36.57	46.05	23.9	43.05	34.65	23.9	27.46	19.72	23.9	10.03	54.48	24.0	18.72	22.63
24.9	36.77	45.76	24.9	43.41	34.38	24.9	27.86	19.39	24.9	10.56	54.16	25.0	18.69	22.28
25.9	37.00	45.48	25.9	43.78	34.10	25.9	28.28	19.07	25.9	11.08	53.83	26.0	18.68	21.93
26.9	37.20	45.21	26.9	44.16	33.82	26.9	28.73	18.79	26.9	11.65	53.47	27.0	18.66	21.61
27.9	37.40	44.97	27.9	44.58	33.52	27.9	29.16	18.51	27.9	12.28	53.11	28.0	18.66	21.31
28.9	37.60	44.73	28.9	45.05	33.23	28.9	29.54	18.24	28.9	13.04	52.74	29.0	18.65	21.02
29.9	37.79	44.49	29.9	45.55	32.95	29.9	29.96	17.96	29.9	13.93	52.36	30.0	18.63	20.73
30.9	37.96	44.23	30.9	46.09	32.69	30.9	30.13	17.69	30.9	14.94	52.00	31.0	18.61	20.44
31.9	38.13	43.96	31.9	46.64	32.45	31.9	30.40	17.38	31.9	16.04	51.66	32.0	18.59	20.13
16.93	+16.90		24.50	-24.47		58.65	+58.64		73.06	-73.07		7.41	+7.34	
17 <sup>h</sup> 58 <sup>m</sup> 2 <sup>s</sup> .814			18 <sup>h</sup> 7 <sup>m</sup> 59 <sup>s</sup> .062			18 <sup>h</sup> 58 <sup>m</sup> 2 <sup>s</sup> .477			19 <sup>h</sup> 32 <sup>m</sup> 24 <sup>s</sup> .263			20 <sup>h</sup> 48 <sup>m</sup> 27 <sup>s</sup> .964		
+86° 36' 50".93			-87° 30' 50".34			+89° 1' 17".96			-89° 13' 5".55			+82° 14' 10".29		

## CIRCUMPOLAR STARS.

FOR THE UPPER TRANSIT AT WASHINGTON.

λ Octantis. Mag. 5.4			ν Octantis. Mag. 5.7			β Octantis. Mag. 4.3			39 H. Cephei. Mag. 5.6			γ <sup>2</sup> Octantis. Mag. 5.1		
Wash. Mean Time.	Right Ascension.	Declination.	Wash. Mean Time.	Right Ascension.	Declination.	Wash. Mean Time.	Right Ascension.	Declination.	Wash. Mean Time.	Right Ascension.	Declination.	Wash. Mean Time.	Right Ascension.	Declination.
Jan.	h m s	° '	Jan.	h m s	° '	Jan.	h m s	° '	Jan.	h m s	° '	Jan.	h m s	° '
	21 38	-83 5		22 16	-86 22		22 37	-81 48		23 27	+86 52		23 47	-82 27
1.1	39.95	24.46	1.2	30.63	41.83	1.2	52.26	16.35	1.2	43.16	24.29	1.2	22.90	62.44
2.1	39.85	24.13	2.1	30.37	41.53	2.2	52.14	16.08	2.2	42.80	24.25	2.2	22.73	62.27
3.1	39.78	23.80	3.1	30.14	41.22	3.2	52.04	15.80	3.2	42.44	24.24	3.2	22.58	62.09
4.1	39.71	23.47	4.1	29.94	40.90	4.2	51.94	15.58	4.2	42.07	24.23	4.2	22.44	61.90
5.1	39.65	23.15	5.1	29.74	40.61	5.2	51.85	15.27	5.2	41.67	24.20	5.2	22.31	61.71
6.1	39.60	22.85	6.1	29.57	40.33	6.2	51.78	15.02	6.2	41.25	24.15	6.2	22.18	61.51
7.1	39.55	22.56	7.1	29.41	40.06	7.1	51.70	14.78	7.2	40.82	24.07	7.2	22.05	61.33
8.1	39.48	22.28	8.1	29.23	39.79	8.1	51.61	14.55	8.2	40.40	23.97	8.2	21.93	61.16
9.1	39.40	22.00	9.1	29.05	39.55	9.1	51.52	14.33	9.2	40.00	23.84	9.2	21.79	61.02
10.1	39.32	21.72	10.1	28.84	39.29	10.1	51.43	14.10	10.2	39.62	23.71	10.2	21.65	60.87
11.1	39.23	21.44	11.1	28.62	39.03	11.1	51.32	13.87	11.2	39.25	23.56	11.2	21.50	60.72
12.1	39.15	21.13	12.1	28.39	38.75	12.1	51.21	13.61	12.2	38.92	23.42	12.2	21.35	60.55
13.1	39.06	20.81	13.1	28.16	38.44	13.1	51.10	13.35	13.2	38.60	23.28	13.2	21.19	60.37
14.1	38.98	20.48	14.1	27.94	38.13	14.1	50.99	13.07	14.2	38.28	23.15	14.2	21.04	60.18
15.1	38.92	20.15	15.1	27.75	37.80	15.1	50.89	12.78	15.2	37.97	23.02	15.2	20.88	59.96
16.1	38.87	19.79	16.1	27.56	37.47	16.1	50.80	12.47	16.2	37.65	22.90	16.2	20.74	59.74
17.1	38.82	19.43	17.1	27.41	37.13	17.1	50.72	12.15	17.2	37.32	22.78	17.2	20.61	59.50
18.1	38.78	19.09	18.1	27.26	36.79	18.1	50.65	11.84	18.2	36.98	22.65	18.2	20.48	59.26
19.1	38.74	18.75	19.1	27.12	36.46	19.1	50.59	11.54	19.2	36.62	22.51	19.2	20.36	59.01
20.1	38.72	18.40	20.1	27.00	36.12	20.1	50.53	11.23	20.1	36.25	22.37	20.2	20.26	58.76
21.1	38.70	18.07	21.1	26.90	35.79	21.1	50.48	10.93	21.1	35.89	22.19	21.2	20.15	58.51
22.1	38.67	17.74	22.1	26.79	35.48	22.1	50.42	10.64	22.1	35.62	22.02	22.2	20.04	58.27
23.1	38.65	17.42	23.1	26.67	35.17	23.1	50.36	10.36	23.1	35.16	21.82	23.2	19.92	58.03
24.1	38.62	17.10	24.1	26.55	34.86	24.1	50.28	10.08	24.1	34.82	21.60	24.2	19.80	57.81
25.1	38.58	16.78	25.1	26.42	34.55	25.1	50.20	9.79	25.1	34.50	21.37	25.1	19.68	57.59
26.1	38.54	16.46	26.1	26.27	34.22	26.1	50.13	9.50	26.1	34.21	21.14	26.1	19.56	57.36
27.1	38.49	16.11	27.1	26.12	33.87	27.1	50.05	9.19	27.1	33.95	20.92	27.1	19.43	57.10
28.1	38.45	15.75	28.1	25.97	33.51	28.1	49.97	8.86	28.1	33.71	20.73	28.1	19.30	56.84
29.0	38.42	15.36	29.1	25.83	33.14	29.1	49.91	8.50	29.1	33.45	20.54	29.1	19.17	56.56
30.0	38.41	14.96	30.1	25.73	32.76	30.1	49.86	8.13	30.1	33.19	20.36	30.1	19.04	56.24
31.0	38.42	14.56	31.1	25.65	32.36	31.1	49.81	7.74	31.1	32.92	20.18	31.1	18.94	55.92
32.0	38.45	14.17	32.1	25.60	31.96	32.1	49.77	7.36	32.1	32.64	20.00	32.1	18.86	55.59
8.31	-8.25		15.33	-15.79		7.01	-6.94		13.33	+13.30		7.63	-7.56	
21 <sup>h</sup> 38 <sup>m</sup> 48 <sup>s</sup> .085			22 <sup>h</sup> 16 <sup>m</sup> 45 <sup>s</sup> .446			22 <sup>h</sup> 37 <sup>m</sup> 57 <sup>s</sup> .920			23 <sup>h</sup> 27 <sup>m</sup> 43 <sup>s</sup> .285			23 <sup>h</sup> 47 <sup>m</sup> 27 <sup>s</sup> .240		
-83° 5' 17".98			-86° 22' 32".81			-81° 48' 6".08			+86° 51' 58".49			-82° 27' 48".42		

CIRCUMPOLAR STARS.

FOR THE UPPER TRANSIT AT WASHINGTON.

48 H. Cephei. Mag. 4.5			α Ursae Minoris. (Polaris). Mag. 2.1			4 G. Octantis. Mag. 5.6			Groombridge 750. Mag. 6.7			Groombridge 944. Mag. 6.4		
Wash. Mean Time.	Right Ascension.	Declination.	Wash. Mean Time.	Right Ascension.	Declination.	Wash. Mean Time.	Right Ascension.	Declination.	Wash. Mean Time.	Right Ascension.	Declination.	Wash. Mean Time.	Right Ascension.	Declination.
Feb.	h m 0 57	' '' +85 50	Feb.	h m 1 31	' '' +88 52	Feb.	h m 1 41	' '' -85 10	Feb.	h m 4 11	' '' +85 20	Feb.	h m 5 36	' '' +85 9
0.2	33.18	7.04	0.2	53.56	62.62	0.2	41.93	42.47	0.3	11.12	53.81	0.4	27.87	44.77
1.2	32.91	6.97	1.2	52.52	62.60	1.2	41.68	42.28	1.3	10.93	53.98	1.4	27.75	45.01
2.2	32.63	6.89	2.2	51.42	62.57	2.2	41.43	42.07	2.3	10.71	54.15	2.4	27.62	45.28
3.2	32.35	6.79	3.2	50.27	62.52	3.2	41.19	41.87	3.3	10.48	54.31	3.4	27.46	45.54
4.2	32.06	6.65	4.2	49.09	62.44	4.2	40.96	41.68	4.3	10.22	54.46	4.4	27.29	45.79
5.2	31.76	6.50	5.2	47.92	62.35	5.2	40.74	41.50	5.3	9.96	54.60	5.4	27.10	46.04
6.2	31.47	6.32	6.2	46.79	62.22	6.2	40.51	41.38	6.3	9.70	54.71	6.4	26.88	46.26
7.2	31.21	6.14	7.2	45.73	62.08	7.2	40.26	41.18	7.3	9.43	54.80	7.4	26.67	46.46
8.2	30.97	5.95	8.2	44.72	61.93	8.2	40.00	41.03	8.3	9.18	54.86	8.4	26.47	46.64
9.2	30.73	5.75	9.2	43.77	61.78	9.2	39.74	40.86	9.3	8.93	54.92	9.3	26.26	46.81
10.1	30.50	5.55	10.2	42.85	61.63	10.2	39.47	40.69	10.3	8.69	54.98	10.3	26.06	46.96
11.1	30.29	5.36	11.2	41.96	61.49	11.2	39.20	40.51	11.3	8.45	55.03	11.3	25.87	47.11
12.1	30.09	5.19	12.2	41.07	61.35	12.2	38.95	40.29	12.3	8.22	55.09	12.3	25.68	47.26
13.1	29.87	5.01	13.2	40.15	61.21	13.2	38.70	40.06	13.3	7.99	55.15	13.3	25.49	47.43
14.1	29.65	4.83	14.2	39.23	61.08	14.2	38.45	39.83	14.3	7.76	55.23	14.3	25.31	47.60
15.1	29.43	4.65	15.2	38.28	60.96	15.2	38.22	39.57	15.3	7.53	55.31	15.3	25.12	47.77
16.1	29.20	4.48	16.2	37.31	60.82	16.2	37.99	39.32	16.3	7.29	55.37	16.3	24.93	47.95
17.1	28.96	4.29	17.2	36.30	60.67	17.2	37.77	39.06	17.3	7.03	55.43	17.3	24.73	48.14
18.1	28.71	4.08	18.2	35.27	60.51	18.2	37.57	38.81	18.3	6.77	55.50	18.3	24.51	48.32
19.1	28.47	3.85	19.2	34.24	60.33	19.2	37.38	38.57	19.3	6.49	55.56	19.3	24.27	48.50
20.1	28.23	3.63	20.1	33.24	60.14	20.2	37.18	38.32	20.3	6.21	55.56	20.3	24.03	48.65
21.1	28.00	3.37	21.1	32.27	59.92	21.2	36.97	38.09	21.3	5.92	55.59	21.3	23.78	48.78
22.1	27.80	3.10	22.1	31.37	59.70	22.1	36.75	37.86	22.3	5.63	55.58	22.3	23.53	48.88
23.1	27.61	2.83	23.1	30.56	59.46	23.1	36.53	37.64	23.3	5.36	55.55	23.3	23.28	48.97
24.1	27.44	2.56	24.1	29.80	59.23	24.1	36.29	37.41	24.2	5.11	55.51	24.3	23.04	49.05
25.1	27.30	2.31	25.1	29.12	59.02	25.1	36.06	37.14	25.2	4.87	55.47	25.3	22.82	49.11
26.1	27.16	2.07	26.1	28.45	58.82	26.1	35.81	36.87	26.2	4.64	55.44	26.3	22.62	49.19
27.1	27.01	1.85	27.1	27.76	58.63	27.1	35.58	36.56	27.2	4.42	55.43	27.3	22.42	49.28
28.1	26.84	1.63	28.1	27.09	58.45	28.1	35.38	36.24	28.2	4.20	55.43	28.3	22.22	49.38
29.1	26.67	1.42	29.1	26.25	58.26	29.1	35.18	35.91	29.2	3.98	55.43	29.3	22.00	49.50
30.1	26.48	1.20	30.1	25.41	58.06	30.1	35.00	35.58	30.2	3.72	55.43	30.3	21.78	49.62
31.1	26.29	0.94	31.1	24.55	57.84	31.1	34.84	35.27	31.2	3.46	55.43	31.3	21.53	49.73

13.77 +13.73      51.33 +51.32      11.90 -11.85      12.33 +12.29      11.86 +11.82  
 0<sup>h</sup> 57<sup>m</sup> 32<sup>s</sup>.323      1<sup>h</sup> 31<sup>m</sup> 41<sup>s</sup>.366      1<sup>h</sup> 41<sup>m</sup> 51<sup>s</sup>.117      4<sup>h</sup> 10<sup>m</sup> 55<sup>s</sup>.493      5<sup>h</sup> 36<sup>m</sup> 9<sup>s</sup>.111  
 +85° 49' 43".55      +88° 52' 39".02      -85° 10' 27".09      +85° 20' 38".12      +85° 9' 36".60

CIRCUMPOLAR STARS.

FOR THE UPPER TRANSIT AT WASHINGTON.

31 G. Menasse. Mag. 6.2			5 Menasse. Mag. 5.6			51 H. Cephei. Mag. 5.3			25 H. Camelop. Mag. 5.1			7 G. Octantis. Mag. 6.4		
Wash. Mean Time.	Right Ascension.	Declination.	Wash. Mean Time.	Right Ascension.	Declination.	Wash. Mean Time.	Right Ascension.	Declination.	Wash. Mean Time.	Right Ascension.	Declination.	Wash. Mean Time.	Right Ascension.	Declination.
h m	° '		h m	° '		h m	° '		h m	° '		h m	° '	
Feb. 5 45	-84 50		Feb. 6 46	-90 44		Feb. 7 3	+87 10		Feb. 7 14	+82 34		Feb. 7 15	-86 54	
0.4	45.88	2.11	0.4	49.63	7.10	0.4	64.97	37.83	0.4	34.17	8.78	0.4	37.03	41.29
1.4	45.63	2.32	1.4	49.52	7.48	1.4	64.89	38.14	1.4	34.16	9.08	1.4	36.74	41.61
2.4	45.39	2.51	2.4	49.42	7.76	2.4	64.80	38.46	2.4	34.14	9.39	2.4	36.44	41.90
3.4	45.15	2.69	3.4	49.32	8.02	3.4	64.69	38.78	3.4	34.11	9.71	3.4	36.16	42.19
4.4	44.93	2.86	4.4	49.22	8.27	4.4	64.53	39.11	4.4	34.06	10.04	4.4	35.89	42.47
5.4	44.71	3.04	5.4	49.12	8.53	5.4	64.34	39.44	5.4	34.01	10.36	5.4	35.63	42.75
6.4	44.50	3.22	6.4	49.02	8.80	6.4	64.11	39.74	6.4	33.93	10.65	6.4	35.39	43.04
7.4	44.29	3.42	7.4	48.92	9.08	7.4	63.88	40.02	7.4	33.85	10.94	7.4	35.15	43.35
8.4	44.07	3.64	8.4	48.82	9.37	8.4	63.64	40.29	8.4	33.77	11.21	8.4	34.91	43.67
9.4	43.84	3.86	9.4	48.73	9.66	9.4	63.40	40.53	9.4	33.68	11.45	9.4	34.64	43.99
10.4	43.60	4.07	10.4	48.64	9.96	10.4	63.16	40.77	10.4	33.60	11.69	10.4	34.36	44.31
11.3	43.34	4.27	11.4	48.53	10.26	11.4	62.94	41.01	11.4	33.53	11.93	11.4	34.07	44.63
12.3	43.08	4.47	12.4	48.41	10.55	12.4	62.71	41.26	12.4	33.46	12.18	12.4	33.76	44.95
13.3	42.82	4.65	13.4	48.29	10.83	13.4	62.51	41.50	13.4	33.39	12.42	13.4	33.43	45.26
14.3	42.56	4.82	14.4	48.18	11.08	14.4	62.31	41.76	14.4	33.32	12.67	14.4	33.09	45.54
15.3	42.30	4.96	15.4	48.05	11.32	15.4	62.10	42.02	15.4	33.25	12.93	15.4	32.74	45.82
16.3	42.04	5.10	16.4	47.92	11.55	16.4	61.88	42.30	16.4	33.18	13.20	16.4	32.38	46.06
17.3	41.77	5.23	17.4	47.80	11.77	17.4	61.65	42.58	17.4	33.10	13.47	17.4	32.03	46.32
18.3	41.51	5.35	18.4	47.68	11.97	18.4	61.38	42.86	18.4	33.01	13.74	18.4	31.67	46.56
19.3	41.27	5.45	19.4	47.55	12.17	19.4	61.10	43.13	19.4	32.91	14.01	19.4	31.34	46.79
20.3	41.02	5.57	20.4	47.42	12.37	20.4	60.78	43.40	20.4	32.79	14.28	20.4	31.01	47.02
21.3	40.78	5.69	21.4	47.31	12.59	21.4	60.45	43.64	21.4	32.67	14.52	21.4	30.69	47.27
22.3	40.53	5.82	22.4	47.20	12.81	22.4	60.10	43.87	22.4	32.55	14.75	22.4	30.37	47.53
23.3	40.27	5.97	23.4	47.08	13.05	23.4	59.76	44.06	23.4	32.43	14.96	23.4	30.04	47.80
24.3	40.00	6.12	24.4	46.95	13.29	24.4	59.42	44.24	24.4	32.31	15.15	24.4	29.69	48.06
25.3	39.73	6.26	25.4	46.82	13.54	25.4	59.10	44.41	25.4	32.20	15.33	25.4	29.33	48.36
26.3	39.44	6.38	26.3	46.69	13.78	26.4	58.81	44.58	26.4	32.10	15.51	26.4	28.94	48.63
27.3	39.15	6.50	27.3	46.54	14.01	27.4	58.54	44.75	27.4	32.00	15.69	27.4	28.53	48.86
28.3	38.84	6.59	28.3	46.39	14.20	28.4	58.27	44.94	28.4	31.91	15.89	28.4	28.10	49.12
29.3	38.55	6.65	29.3	46.25	14.38	29.4	57.99	45.15	29.4	31.82	16.11	29.4	27.66	49.33
30.3	38.26	6.70	30.3	46.11	14.52	30.4	57.69	45.37	30.4	31.71	16.34	30.4	27.23	49.52
31.3	37.99	6.74	31.3	45.96	14.66	31.3	57.37	45.60	31.4	31.59	16.56	31.4	26.81	49.70
11.11	-11.06		6.21	-6.13		20.31	+20.29		7.78	+7.67		18.57	-18.54	
5 <sup>h</sup> 45 <sup>m</sup>	39° 71'		6 <sup>h</sup> 46 <sup>m</sup>	43° 70'		7 <sup>h</sup> 3 <sup>m</sup>	31° 43'		7 <sup>h</sup> 14 <sup>m</sup>	20° 71'		7 <sup>h</sup> 15 <sup>m</sup>	19° 35'	
-84° 49'	42'' .94		-80° 43'	50'' .12		+87° 10'	38'' .36		+82° 34'	10'' .90		-86° 54'	26'' .23	

CIRCUMPOLAR STARS.

FOR THE UPPER TRANSIT AT WASHINGTON.

Greenwich 1119. Mag. 7.0			♄ Ophiuchus. Mag. 5.4			♁ H. Draconis. Mag. 4.6			♆ Chamaeleontis. Mag. 5.2			♄ H. Camelopardalis. Mag. 5.3		
Wash. Mean Time.	Right Ascension.	Declination.	Wash. Mean Time.	Right Ascension.	Declination.	Wash. Mean Time.	Right Ascension.	Declination.	Wash. Mean Time.	Right Ascension.	Declination.	Wash. Mean Time.	Right Ascension.	Declination.
h m	° ' "	° ' "	h m	° ' "	° ' "	h m	° ' "	° ' "	h m	° ' "	° ' "	h m	° ' "	° ' "
Feb. 8 19	+88 52		Feb. 9 8	-85 20		Feb. 9 25	+81 40		Feb. 9 36	-80 35		Feb. 10 21	+82 57	
0.5	64.22	18.37	0.5	49.96	48.61	0.5	58.11	39.63	0.5	26.44	0.84	0.6	37.05	40.57
1.5	64.38	18.69	1.5	49.93	49.00	1.5	58.19	39.90	1.5	26.45	1.25	1.6	37.16	40.79
2.5	64.50	19.02	2.5	49.87	49.38	2.5	58.26	40.18	2.5	26.46	1.64	2.6	37.29	41.03
3.5	64.55	19.36	3.5	49.82	49.75	3.5	58.32	40.46	3.5	26.45	2.02	3.6	37.40	41.31
4.5	64.57	19.71	4.5	49.77	50.09	4.5	58.37	40.82	4.5	26.45	2.40	4.6	37.51	41.60
5.5	64.46	20.05	5.5	49.73	50.45	5.5	58.42	41.15	5.5	26.44	2.76	5.6	37.59	41.90
6.5	64.28	20.40	6.5	49.69	50.81	6.5	58.43	41.47	6.5	26.44	3.12	6.6	37.65	42.21
7.5	64.02	20.73	7.5	49.67	51.17	7.5	58.44	41.80	7.5	26.44	3.48	7.6	37.71	42.52
8.5	63.74	21.05	8.5	49.64	51.54	8.5	58.45	42.09	8.5	26.45	3.85	8.5	37.76	42.81
9.5	63.45	21.34	9.5	49.62	51.93	9.5	58.45	42.39	9.5	26.45	4.25	9.5	37.81	43.11
10.5	63.17	21.63	10.5	49.58	52.32	10.5	58.46	42.69	10.5	26.47	4.66	10.5	37.86	43.40
11.5	62.90	21.91	11.5	49.54	52.73	11.5	58.47	42.97	11.5	26.47	5.07	11.5	37.90	43.68
12.5	62.66	22.19	12.5	49.49	53.14	12.5	58.49	43.25	12.5	26.46	5.48	12.5	37.96	43.96
13.4	62.42	22.48	13.5	49.41	53.52	13.5	58.50	43.54	13.5	26.45	5.89	13.5	38.01	44.23
14.4	62.20	22.78	14.5	49.33	53.91	14.5	58.52	43.83	14.5	26.44	6.30	14.5	38.07	44.51
15.4	61.97	23.09	15.5	49.24	54.30	15.5	58.54	44.11	15.5	26.41	6.69	15.5	38.13	44.80
16.4	61.73	23.41	16.5	49.14	54.68	16.5	58.55	44.42	16.5	26.38	7.07	16.5	38.19	45.11
17.4	61.47	23.73	17.5	49.03	55.04	17.5	58.57	44.74	17.5	26.35	7.46	17.5	38.25	45.42
18.4	61.16	24.05	18.5	48.92	55.38	18.5	58.58	45.07	18.5	26.32	7.82	18.5	38.31	45.74
19.4	60.77	24.38	18.5	48.81	55.72	19.5	58.57	45.40	19.5	26.28	8.18	19.5	38.35	46.07
20.4	60.32	24.71	20.5	48.70	56.04	20.5	58.56	45.73	20.5	26.25	8.52	20.5	38.38	46.41
21.4	59.79	25.02	21.5	48.61	56.38	21.5	58.53	46.07	21.5	26.22	8.88	21.5	38.39	46.75
22.4	59.21	25.31	22.5	48.52	56.74	22.5	58.50	46.40	22.5	26.19	9.24	22.5	38.39	47.09
23.4	58.62	25.59	23.5	48.44	57.10	23.5	58.46	46.69	23.5	26.18	9.62	23.5	38.39	47.41
24.4	58.04	25.84	24.5	48.34	57.48	24.5	58.42	46.98	24.5	26.15	10.02	24.5	38.39	47.70
25.4	57.48	26.09	25.5	48.24	57.87	25.5	58.38	47.26	25.5	26.12	10.43	25.5	38.39	47.98
26.4	56.97	26.33	26.4	48.12	58.27	26.5	58.35	47.52	26.5	26.09	10.85	26.5	38.39	48.25
27.4	56.51	26.56	27.4	47.98	58.66	27.5	58.34	47.78	27.5	26.05	11.26	27.5	38.39	48.52
28.4	56.09	26.84	28.4	47.82	59.04	28.5	58.33	48.05	28.5	26.00	11.65	28.5	38.42	48.80
29.4	55.65	27.11	29.4	47.64	59.39	29.5	58.32	48.34	29.5	25.94	12.03	29.5	38.45	49.09
30.4	55.17	27.39	30.4	47.47	59.73	30.4	58.29	48.66	30.5	25.88	12.39	30.5	38.46	49.40
31.4	54.63	27.68	31.4	47.30	60.05	31.4	58.26	48.97	31.5	25.81	12.73	31.5	38.47	49.73
50.84	+50.83		12.33	-12.29		6.01	+6.84		6.11	-6.03		8.16	+8.10	
8 <sup>h</sup> 18 <sup>m</sup> 46 <sup>s</sup> .642			9 <sup>h</sup> 8 <sup>m</sup> 33 <sup>s</sup> .837			9 <sup>h</sup> 25 <sup>m</sup> 48 <sup>s</sup> .041			9 <sup>h</sup> 36 <sup>m</sup> 17 <sup>s</sup> .360			10 <sup>h</sup> 21 <sup>m</sup> 27 <sup>s</sup> .495		
+88° 52' 26".44			-85° 20' 41".44			+81° 40' 54".43			-80° 34' 55".47			+82° 57' 59".46		

CIRCUMPOLAR STARS.

FOR THE UPPER TRANSIT AT WASHINGTON.

γ Octantis. Mag. 6.3			Bradley 1673. Mag. 6.3			δ Octantis. Mag. 5.4			33 H. Camelop. seq. Mag. 5.3			κ Octantis. Mag. 5.6		
Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.
Feb.	h m	° '	Feb.	h m	° '	Feb.	h m	° '	Feb.	h m	° '	Feb.	h m	° '
	11 0	-84 9		12 14	+88 8		12 46	-84 41		12 48	+83 50		13 27	-85 22
	s	"		s	"		s	"		s	"		s	"
0.6	8.25	46.53	0.6	40.86	12.71	0.7	38.09	10.45	0.7	33.83	27.40	0.7	54.88	24.56
1.6	8.35	46.92	1.6	41.46	12.83	1.7	38.31	10.74	1.7	34.03	27.47	1.7	55.17	24.79
2.6	8.44	47.29	2.6	42.06	12.97	2.7	38.51	11.03	2.7	34.25	27.55	2.7	55.44	25.03
3.6	8.52	47.65	3.6	42.71	13.14	3.7	38.70	11.31	3.7	34.46	27.66	3.7	55.67	25.26
4.6	8.60	48.00	4.6	43.33	13.32	4.7	38.88	11.57	4.7	34.66	27.79	4.7	55.91	25.48
5.6	8.67	48.34	5.6	43.93	13.54	5.7	39.06	11.82	5.7	34.86	27.94	5.7	56.15	25.67
6.6	8.75	48.68	6.6	44.48	13.76	6.7	39.24	12.06	6.7	35.05	28.11	6.7	56.39	25.86
7.6	8.84	49.02	7.6	44.98	13.99	7.7	39.44	12.30	7.7	35.23	28.29	7.7	56.66	26.05
8.6	8.93	49.37	8.6	45.43	14.22	8.6	39.65	12.56	8.6	35.38	28.49	8.7	56.94	26.24
9.6	9.03	49.73	9.6	45.86	14.45	9.6	39.85	12.82	9.6	35.53	28.68	9.7	57.21	26.45
10.6	9.13	50.10	10.6	46.29	14.67	10.6	40.07	13.09	10.6	35.69	28.87	10.7	57.49	26.68
11.6	9.22	50.49	11.6	46.71	14.89	11.6	40.28	13.37	11.6	35.84	29.05	11.7	57.78	26.91
12.6	9.31	50.89	12.6	47.15	15.10	12.6	40.48	13.69	12.6	36.01	29.22	12.7	58.06	27.15
13.6	9.38	51.29	13.6	47.60	15.31	13.6	40.68	14.01	13.6	36.17	29.39	13.7	58.33	27.42
14.6	9.44	51.69	14.6	48.06	15.52	14.6	40.88	14.33	14.6	36.33	29.55	14.7	58.58	27.69
15.6	9.49	52.09	15.6	48.53	15.74	15.6	41.06	14.66	15.6	36.50	29.72	15.7	58.82	27.96
16.6	9.53	52.47	16.6	49.00	15.96	16.6	41.23	14.99	16.6	36.67	29.90	16.7	59.05	28.27
17.6	9.56	52.86	17.6	49.49	16.19	17.6	41.37	15.32	17.6	36.83	30.09	17.7	59.27	28.56
18.5	9.59	53.23	18.6	49.98	16.45	18.6	41.52	15.64	18.6	37.00	30.31	18.6	59.47	28.84
19.5	9.63	53.60	19.6	50.44	16.72	19.6	41.66	15.95	19.6	37.17	30.54	19.6	59.67	29.11
20.5	9.66	53.96	20.6	50.86	17.00	20.6	41.80	16.25	20.6	37.32	30.77	20.6	59.89	29.37
21.5	9.69	54.31	21.6	51.24	17.29	21.6	41.95	16.55	21.6	37.47	31.03	21.6	60.10	29.63
22.5	9.74	54.67	22.6	51.58	17.58	22.6	42.12	16.85	22.6	37.60	31.31	22.6	60.32	29.88
23.5	9.79	55.04	23.6	51.87	17.87	23.6	42.28	17.15	23.6	37.72	31.57	23.6	60.55	30.14
24.5	9.84	55.44	24.6	52.14	18.15	24.6	42.45	17.46	24.6	37.83	31.82	24.6	60.80	30.41
25.5	9.88	55.85	25.6	52.40	18.42	25.6	42.63	17.81	25.6	37.94	32.06	25.6	61.06	30.71
26.5	9.92	56.28	26.6	52.67	18.67	26.6	42.81	18.17	26.6	38.05	32.29	26.6	61.30	31.02
27.5	9.94	56.71	27.6	52.95	18.91	27.6	42.96	18.55	27.6	38.17	32.50	27.6	61.54	31.35
28.5	9.95	57.14	28.6	53.27	19.16	28.6	43.11	18.93	28.6	38.30	32.71	28.6	61.76	31.71
29.5	9.94	57.56	29.6	53.62	19.42	29.6	43.25	19.32	29.6	38.43	32.93	29.6	61.95	32.06
30.5	9.92	57.96	30.6	53.98	19.69	30.6	43.35	19.70	30.6	38.56	33.16	30.6	62.13	32.40
31.5	9.89	58.34	31.6	54.33	19.99	31.6	43.45	20.06	31.6	38.70	33.43	31.6	62.30	32.73
9.84	-9.78		30.77	+30.76		10.80	-10.75		9.32	+9.27		12.40	-12.36	
10 <sup>h</sup> 59 <sup>m</sup>	54°. 174		12 <sup>h</sup> 14 <sup>m</sup>	29°. 583		12 <sup>h</sup> 46 <sup>m</sup>	25°. 116		12 <sup>h</sup> 48 <sup>m</sup>	31°. 755		13 <sup>h</sup> 27 <sup>m</sup>	42°. 060	
-84° 9'	48''. 70		+88° 8'	36''. 24		-84° 41'	21''. 18		+83° 50'	51''. 72		-85° 22'	38''. 10	



CIRCUMPOLAR STARS.

FOR THE UPPER TRANSIT AT WASHINGTON.

δ Octantis. Mag. 4.1			Greenbridge 2233. Mag. 7.2			ρ Octantis. Mag. 5.7			ε Ursa Minoris. Mag. 4.4			80 G. Apodis. Mag. 5.9		
Wash. Mean Time.	Right Ascension.	Declination.	Wash. Mean Time.	Right Ascension.	Declination.	Wash. Mean Time.	Right Ascension.	Declination.	Wash. Mean Time.	Right Ascension.	Declination.	Wash. Mean Time.	Right Ascension.	Declination.
Feb.	h m °	'	Feb.	h m °	'	Feb.	h m °	'	Feb.	h m °	'	Feb.	h m °	'
	14 14	-83 17		15 2	+87 32		15 24	-84 11		16 53	+82 8		17 16	-80 46
	s	"		s	"		s	"		s	"		s	"
0.7	3.10	56.43	0.8	25.90	7.79	0.8	41.54	49.41	0.8	58.07	62.44	0.9	27.85	59.65
1.7	3.31	56.60	1.8	26.37	7.69	1.8	41.81	49.46	1.8	58.19	62.20	1.9	28.00	59.51
2.7	3.51	56.77	2.8	26.88	7.60	2.8	42.06	49.53	2.8	58.32	61.96	2.9	28.16	59.41
3.7	3.71	56.95	3.8	27.42	7.51	3.8	42.31	49.59	3.8	58.46	61.72	3.8	28.31	59.30
4.7	3.90	56.10	4.9	27.97	7.46	4.8	42.55	49.64	4.8	58.61	61.50	4.8	28.45	59.18
5.7	4.09	56.25	5.8	28.52	7.42	5.8	42.78	49.67	5.8	58.76	61.30	5.8	28.59	59.06
6.7	4.28	56.38	6.7	29.06	7.41	6.8	43.01	49.69	6.8	58.91	61.12	6.8	28.72	58.94
7.7	4.47	56.50	7.7	29.59	7.43	7.8	43.25	49.70	7.8	59.06	60.97	7.8	28.85	58.80
8.7	4.69	56.62	8.7	30.10	7.46	8.8	43.49	49.73	8.8	59.21	60.83	8.8	28.99	58.65
9.7	4.90	56.76	9.7	30.59	7.49	9.8	43.76	49.76	9.8	59.36	60.70	9.8	29.14	58.49
10.7	5.11	56.93	10.7	31.06	7.50	10.8	44.03	49.79	10.8	59.51	60.57	10.8	29.30	58.35
11.7	5.34	57.10	11.7	31.53	7.52	11.8	44.30	49.84	11.8	59.65	60.45	11.8	29.47	58.22
12.7	5.56	57.28	12.7	32.00	7.54	12.7	44.58	49.92	12.8	59.79	60.32	12.8	29.64	58.11
13.7	5.76	57.47	13.7	32.47	7.55	13.7	44.85	50.00	13.8	59.93	60.19	13.8	29.81	58.00
14.7	5.97	57.66	14.7	32.95	7.56	14.7	45.11	50.09	14.8	60.07	60.05	14.8	29.98	57.90
15.7	6.17	57.92	15.7	33.45	7.57	15.7	45.38	50.21	15.8	60.22	59.90	15.8	30.15	57.84
16.7	6.37	58.14	16.7	33.96	7.60	16.7	45.63	50.34	16.8	60.38	59.75	16.8	30.32	57.78
17.7	6.55	58.37	17.7	34.48	7.62	17.7	45.88	50.46	17.8	60.53	59.61	17.8	30.47	57.73
18.7	6.72	58.60	18.7	35.03	7.65	18.7	46.11	50.58	18.8	60.70	59.47	18.8	30.62	57.68
19.7	6.89	58.83	19.7	35.57	7.69	19.7	46.34	50.69	19.8	60.87	59.36	19.8	30.78	57.63
20.7	7.06	59.08	20.7	36.16	7.77	20.7	46.56	50.80	20.8	61.04	59.25	20.8	30.93	57.57
21.7	7.23	59.22	21.7	36.62	7.86	21.7	46.79	50.90	21.8	61.21	59.18	21.8	31.07	57.50
22.7	7.41	59.41	22.7	37.11	7.99	22.7	47.02	50.99	22.8	61.38	59.12	22.8	31.22	57.42
23.7	7.60	59.62	23.7	37.59	8.11	23.7	47.28	51.07	23.8	61.53	59.06	23.8	31.39	57.33
24.7	7.79	59.84	24.7	38.08	8.22	24.7	47.54	51.17	24.8	61.69	59.05	24.8	31.55	57.24
25.7	8.00	60.07	25.7	38.46	8.33	25.7	47.82	51.29	25.8	61.84	59.02	25.8	31.73	57.18
26.7	8.21	60.33	26.7	38.88	8.43	26.7	48.10	51.43	26.8	61.99	58.97	26.8	31.91	57.12
27.7	8.41	60.60	27.7	39.30	8.52	27.7	48.37	51.60	27.8	62.14	58.92	27.8	32.11	57.10
28.7	8.61	60.89	28.7	39.75	8.59	28.7	48.64	51.78	28.8	62.29	58.85	28.8	32.29	57.00
29.7	8.79	61.19	29.7	40.20	8.66	29.7	48.88	52.00	29.8	62.44	58.77	29.8	32.48	57.00
30.6	8.94	61.49	30.7	40.69	8.75	30.7	49.11	52.20	30.8	62.61	58.71	30.8	32.65	57.11
31.6	9.09	61.77	31.7	41.20	8.87	31.7	49.33	52.40	31.8	62.79	58.65	31.8	32.80	57.13
8.57	-8.51		23.25	+23.23		9.39	-9.84		7.34	+7.27		6.24	-6.16	
14 <sup>h</sup> 13 <sup>m</sup>	55°.644		15 <sup>h</sup> 2 <sup>m</sup>	43°.277		15 <sup>h</sup> 24 <sup>m</sup>	36°.751		16 <sup>h</sup> 54 <sup>m</sup>	6°.748		17 <sup>h</sup> 16 <sup>m</sup>	28°.406	
-83° 18'	11".96		+87° 32'	28".69		-84° 12'	7".93		+82° 10'	15".74		-80° 47'	18".10	

CIRCUMPOLAR STARS.

FOR THE UPPER TRANSIT AT WASHINGTON.

δ Ursae Minoris. Mag. 4.4			χ Octantis. Mag. 5.2			λ Ursae Minoris. Mag. 6.6			σ Octantis. Mag. 5.5			76 Draconis. Mag. 5.7		
Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.
Feb.	h m	° ' "	Feb.	h m	° ' "	Feb.	h m	° ' "	Feb.	h m	° ' "	Feb.	h m	° ' "
	17 57	+86 36	Feb.	18 7	-87 39	Feb.	18 57	+89 1	Feb.	19 31	-89 12	Feb.	20 48	+82 14
0.9	38.13	43.96	0.9	46.64	32.45	0.9	30.40	17.38	0.9	16.04	51.66	1.0	18.59	20.13
1.9	38.81	43.68	1.9	47.18	32.24	1.9	30.71	17.07	1.9	17.16	51.33	2.0	18.56	19.81
2.9	38.53	43.39	2.9	47.71	32.04	2.9	31.08	16.74	2.9	18.26	51.03	2.9	18.53	19.47
3.9	38.75	43.09	3.9	48.22	31.85	3.9	31.53	16.40	3.9	19.31	50.74	3.9	18.52	19.11
4.9	39.00	42.80	4.9	48.69	31.66	4.9	32.06	16.08	4.9	20.27	50.45	4.9	18.51	18.75
5.9	39.27	42.53	5.9	49.14	31.46	5.9	32.73	15.77	5.9	21.17	50.16	5.9	18.51	18.38
6.9	39.55	42.29	6.9	49.59	31.24	6.9	33.44	15.48	6.9	22.02	49.86	6.9	18.53	18.02
7.9	39.84	42.06	7.9	50.04	31.01	7.9	34.18	15.20	7.9	22.89	49.55	7.9	18.55	17.68
8.9	40.13	41.86	8.9	50.51	30.78	8.9	34.92	14.93	8.9	23.79	49.23	8.9	18.58	17.35
9.9	40.42	41.66	9.9	51.01	30.54	9.9	35.66	14.69	9.9	24.75	48.90	9.9	18.62	17.03
10.9	40.69	41.46	10.9	51.53	30.31	10.9	36.37	14.44	10.9	25.79	48.56	10.9	18.65	16.73
11.9	40.96	41.27	11.9	52.09	30.08	11.9	37.07	14.20	11.9	26.90	48.23	11.9	18.68	16.44
12.9	41.22	41.07	12.9	52.66	29.88	12.9	37.74	13.95	12.9	28.10	47.91	12.9	18.71	16.15
13.9	41.48	40.87	13.9	53.25	29.68	13.9	38.41	13.70	13.9	29.36	47.60	13.9	18.74	15.83
14.8	41.75	40.67	14.9	53.84	29.49	14.9	39.09	13.45	14.9	30.67	47.30	14.9	18.76	15.51
15.8	42.03	40.44	15.9	54.44	29.34	15.9	39.78	13.18	15.9	32.02	47.01	15.9	18.79	15.19
16.8	42.32	40.23	16.8	55.02	29.18	16.9	40.50	12.91	16.9	33.38	46.73	16.9	18.82	14.86
17.8	42.63	40.01	17.8	55.59	29.04	17.9	41.26	12.63	17.9	34.71	46.49	17.9	18.85	14.52
18.8	42.94	39.81	18.8	56.15	28.90	18.9	42.09	12.36	18.9	36.03	46.24	18.9	18.88	14.18
19.8	43.27	39.60	19.8	56.68	28.77	19.9	43.01	12.09	19.9	37.28	45.99	19.9	18.92	13.82
20.8	43.61	39.42	20.8	57.21	28.62	20.9	43.96	11.85	20.9	38.49	45.74	20.9	18.97	13.48
21.8	43.96	39.27	21.8	57.73	28.47	21.9	44.99	11.61	21.9	39.65	45.47	21.9	19.03	13.14
22.8	44.31	39.12	22.8	58.27	28.30	22.9	46.01	11.41	22.9	40.83	45.20	22.9	19.09	12.82
23.8	44.66	39.01	23.8	58.82	28.12	23.9	47.03	11.21	23.9	42.06	44.92	23.9	19.18	12.53
24.8	44.99	38.90	24.8	59.41	27.94	24.9	48.01	11.04	24.9	43.38	44.62	24.9	19.25	12.25
25.8	45.31	38.80	25.8	60.05	27.76	25.9	48.93	10.87	25.9	44.81	44.32	25.9	19.33	11.99
26.8	45.60	38.67	26.8	60.71	27.62	26.9	49.80	10.69	26.9	46.36	44.03	26.9	19.39	11.73
27.8	45.90	38.55	27.8	61.38	27.48	27.9	50.64	10.51	27.9	48.00	43.76	27.9	19.45	11.46
28.8	46.21	38.42	28.8	62.06	27.36	28.9	51.47	10.31	28.9	49.69	43.52	28.9	19.51	11.19
29.8	46.52	38.27	29.8	62.73	27.29	29.9	52.35	10.09	29.9	51.37	43.29	29.9	19.58	10.90
30.8	46.85	38.12	30.8	63.36	27.23	30.8	53.31	9.87	30.9	52.99	43.09	30.9	19.64	10.58
31.8	47.21	37.97	31.8	63.96	27.17	31.8	54.35	9.65	31.9	54.52	42.89	31.9	19.71	10.27
16.92	+16.89		24.47	-24.45		58.49	+58.48		72.82	-72.81		7.40	+7.34	
17 <sup>h</sup> 58 <sup>m</sup>	2 <sup>s</sup> .814		18 <sup>h</sup> 7 <sup>m</sup>	59 <sup>s</sup> .062		18 <sup>h</sup> 59 <sup>m</sup>	2 <sup>s</sup> .477		19 <sup>h</sup> 32 <sup>m</sup>	24 <sup>s</sup> .283		20 <sup>h</sup> 48 <sup>m</sup>	27 <sup>s</sup> .944	
+86° 36'	50'' .93		-87° 39'	50'' .34		+89° 1'	17'' .96		-89° 13'	5'' .55		+82° 14'	10'' .29	

CIRCUMPOLAR STARS.

FOR THE UPPER TRANSIT AT WASHINGTON.

λ Octantis. Mag. 5.4			ν Octantis. Mag. 5.7			β Octantis. Mag. 4.3			39 H. Cephei. Mag. 5.6			γ <sup>1</sup> Octantis. Mag. 5.1		
Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.
Feb.	h m	° ' "	Feb.	h m	° ' "	Feb.	h m	° ' "	Feb.	h m	° ' "	Feb.	h m	° ' "
	21 38	-83 5		23 16	-86 22		22 37	-81 47		23 27	+86 52		23 47	-82 27
	s	"		s	"		s	"		s	"		s	"
1.0	38.45	14.17	1.1	25.60	31.96	1.1	49.77	67.36	1.1	32.64	20.00	1.1	18.86	55.59
2.0	38.48	18.79	2.1	25.57	31.58	2.1	49.75	66.99	2.1	32.33	19.80	2.1	18.78	55.26
3.0	38.51	13.43	3.1	25.55	31.21	3.1	49.74	66.65	3.1	32.01	19.58	3.1	18.70	54.94
4.0	38.53	13.09	4.1	25.52	30.87	4.1	49.71	66.31	4.1	31.70	19.34	4.1	18.62	54.64
5.0	38.54	12.77	5.1	25.49	30.53	5.1	49.68	65.98	5.1	31.41	19.07	5.1	18.54	54.35
6.0	38.54	12.45	6.1	25.45	30.20	6.1	49.64	65.67	6.1	31.14	18.79	6.1	18.45	54.07
7.0	38.54	12.09	7.0	25.39	29.86	7.1	49.60	65.36	7.1	30.90	18.51	7.1	18.36	53.79
8.0	38.53	11.74	8.0	25.31	29.50	8.1	49.56	65.03	8.1	30.67	18.23	8.1	18.26	53.51
9.0	38.52	11.39	9.0	25.23	29.13	9.1	49.51	64.67	9.1	30.48	17.95	9.1	18.15	53.20
10.0	38.52	11.01	10.0	25.16	28.75	10.1	49.46	64.32	10.1	30.30	17.68	10.1	18.04	52.90
11.0	38.52	10.62	11.0	25.10	28.37	11.1	49.42	63.96	11.1	30.12	17.41	11.1	17.95	52.58
12.0	38.56	10.22	12.0	25.06	27.97	12.0	49.39	63.58	12.1	29.95	17.16	12.1	17.86	52.25
13.0	38.59	9.84	13.0	25.04	27.57	13.0	49.38	63.20	13.1	29.76	16.90	13.1	17.77	51.89
14.0	38.62	9.46	14.0	25.03	27.18	14.0	49.37	62.81	14.1	29.57	16.64	14.1	17.70	51.54
15.0	38.67	9.08	15.0	25.05	26.78	15.0	49.37	62.42	15.1	29.37	16.38	15.1	17.64	51.18
15.9	38.73	8.71	16.0	25.06	26.39	16.0	49.36	62.04	16.1	29.15	16.11	16.1	17.58	50.82
16.9	38.79	8.34	17.0	25.12	26.01	17.0	49.37	61.67	17.1	28.94	15.83	17.1	17.53	50.46
17.9	38.85	7.98	18.0	25.16	25.65	18.0	49.37	61.31	18.1	28.73	15.58	18.1	17.48	50.13
18.9	38.91	7.64	19.0	25.21	25.29	19.0	49.38	60.97	19.1	28.53	15.22	19.1	17.43	49.79
19.9	38.96	7.30	20.0	25.24	24.94	20.0	49.38	60.63	20.1	28.34	14.90	20.1	17.38	49.46
20.9	39.00	6.97	21.0	25.26	24.59	21.0	49.38	60.29	21.1	28.19	14.57	21.1	17.32	49.14
21.9	39.04	6.62	22.0	25.27	24.24	22.0	49.37	59.93	22.1	28.05	14.24	22.1	17.25	48.82
22.9	39.08	6.26	23.0	25.27	23.88	23.0	49.36	59.57	23.1	27.94	13.92	23.1	17.19	48.49
23.9	39.12	5.90	24.0	25.28	23.50	24.0	49.34	59.20	24.1	27.85	13.62	24.1	17.12	48.14
24.9	39.16	5.52	24.9	25.30	23.09	25.0	49.33	58.80	25.0	27.79	13.33	25.1	17.05	47.78
25.9	39.23	5.11	25.9	25.34	22.68	26.0	49.33	58.39	26.0	27.72	13.05	26.1	16.98	47.39
26.9	39.31	4.71	26.9	25.41	22.26	27.0	49.35	57.98	27.0	27.64	12.78	27.1	16.92	46.96
27.9	39.40	4.32	27.9	25.50	21.84	28.0	49.39	57.57	28.0	27.54	12.51	28.1	16.89	46.56
28.9	39.49	3.94	28.9	25.60	21.43	29.0	49.43	57.16	29.0	27.42	12.23	29.1	16.87	46.15
29.9	39.60	3.58	29.9	25.74	21.04	30.0	49.47	56.77	30.0	27.30	11.93	30.0	16.86	45.77
30.9	39.71	3.23	30.9	25.87	20.66	30.9	49.51	56.39	31.0	27.17	11.61	31.0	16.85	45.39
31.9	39.81	2.91	31.9	25.98	20.32	31.9	49.55	56.05	32.0	27.06	11.27	32.0	16.84	45.03
8.31	-8.25		15.81	-15.78		7.01	-6.94		18.32	+18.29		7.63	-7.56	
21 <sup>h</sup> 38 <sup>m</sup>	48°.035		22 <sup>h</sup> 16 <sup>m</sup>	45°.446		22 <sup>h</sup> 37 <sup>m</sup>	57°.920		23 <sup>h</sup> 27 <sup>m</sup>	43°.285		23 <sup>h</sup> 47 <sup>m</sup>	27°.240	
-83° 5'	17".98		-86° 22'	32".81		-81° 48'	6".03		+86° 51'	58".49		-82° 27'	48".42	

CIRCUMPOLAR STARS.

FOR THE UPPER TRANSIT AT WASHINGTON.

43 H. Cephei. Mag. 4.5			α Ursæ Minoris. (Polaris.) Mag. 2.1			4 G. Octantis. Mag. 5.6			Groombridge 750. Mag. 6.7			Groombridge 944. Mag. 6.4		
Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.
Mar.	h m	° ' "	Mar.	h m	° ' "	Mar.	h m	° ' "	Mar.	h m	° ' "	Mar.	h m	° ' "
	0 57	+85 49		1 31	+88 52		1 41	-85 10		4 10	+85 20		5 36	+85 9
	s	"		s	"		s	"		s	"		s	"
0.1	26.67	61.42	0.1	26.25	58.26	0.1	35.18	35.91	0.2	63.98	55.43	0.3	22.00	49.50
1.1	26.48	61.20	1.1	25.41	58.06	1.1	35.00	35.58	1.2	63.72	55.43	1.3	21.78	49.62
2.1	26.29	60.94	2.1	24.55	57.84	2.1	34.84	35.27	2.2	63.46	55.43	2.3	21.53	49.73
3.1	26.09	60.67	3.1	23.69	57.61	3.1	34.68	34.98	3.2	63.18	55.40	3.3	21.28	49.83
4.1	25.91	60.38	4.1	22.87	57.35	4.1	34.51	34.69	4.2	62.89	55.35	4.3	21.01	49.90
5.1	25.74	60.07	5.1	22.12	57.07	5.1	34.34	34.42	5.2	62.60	55.27	5.3	20.74	49.96
6.1	25.60	59.76	6.1	21.44	56.78	6.1	34.16	34.15	6.2	62.32	55.18	6.3	20.46	50.00
7.1	25.49	59.44	7.1	20.82	56.49	7.1	33.97	33.87	7.2	62.07	55.08	7.3	20.19	50.01
8.1	25.38	59.13	8.1	20.26	56.20	8.1	33.78	33.59	8.2	61.82	54.96	8.3	19.95	50.02
9.1	25.29	58.84	9.1	19.75	55.93	9.1	33.59	33.29	9.2	61.58	54.84	9.3	19.71	50.01
10.1	25.20	58.55	10.1	19.24	55.66	10.1	33.40	32.97	10.2	61.35	54.73	10.3	19.47	50.01
11.1	25.10	58.27	11.1	18.73	55.39	11.1	33.21	32.64	11.2	61.12	54.62	11.3	19.24	50.01
12.1	25.01	57.98	12.1	18.22	55.13	12.1	33.04	32.30	12.2	60.90	54.53	12.3	19.01	50.03
13.1	24.91	57.70	13.1	17.69	54.88	13.1	32.89	31.94	13.2	60.68	54.43	13.3	18.78	50.04
14.1	24.80	57.42	14.1	17.14	54.63	14.1	32.75	31.59	14.2	60.45	54.34	14.3	18.54	50.05
15.1	24.68	57.13	15.1	16.57	54.37	15.1	32.61	31.24	15.2	60.21	54.24	15.3	18.30	50.07
16.1	24.57	56.85	16.1	15.99	54.10	16.1	32.48	30.90	16.2	59.96	54.14	16.2	18.06	50.09
17.1	24.46	56.54	17.1	15.41	53.82	17.1	32.36	30.56	17.2	59.70	54.03	17.2	17.79	50.10
18.1	24.35	56.21	18.1	14.84	53.51	18.1	32.24	30.22	18.2	59.44	53.90	18.2	17.52	50.11
19.0	24.25	55.87	19.1	14.31	53.20	19.1	32.12	29.90	19.2	59.18	53.76	19.2	17.24	50.08
20.0	24.17	55.53	20.1	13.86	52.87	20.1	32.00	29.58	20.2	58.93	53.59	20.2	16.97	50.04
21.0	24.12	55.20	21.1	13.49	52.53	21.1	31.87	29.26	21.2	58.68	53.41	21.2	16.71	49.97
22.0	24.08	54.88	22.1	13.19	52.20	22.1	31.72	28.94	22.2	58.46	53.21	22.2	16.44	49.89
23.0	24.07	54.55	23.1	12.97	51.88	23.1	31.57	28.60	23.2	58.26	53.02	23.2	16.20	49.80
24.0	24.07	54.26	24.1	12.79	51.59	24.1	31.42	28.24	24.2	58.07	52.83	24.2	15.98	49.70
25.0	24.07	53.97	25.1	12.62	51.31	25.1	31.27	27.87	25.2	57.89	52.66	25.2	15.78	49.61
26.0	24.06	53.68	26.1	12.40	51.04	26.1	31.16	27.48	26.2	57.72	52.51	26.2	15.58	49.55
27.0	24.03	53.40	27.1	12.14	50.77	27.1	31.05	27.08	27.2	57.54	52.35	27.2	15.36	49.49
28.0	24.00	53.13	28.0	11.84	50.50	28.1	30.96	26.69	28.2	57.34	52.19	28.2	15.15	49.44
29.0	23.95	52.84	29.0	11.51	50.22	29.1	30.90	26.30	29.2	57.13	52.03	29.2	14.92	49.39
30.0	23.90	52.52	30.0	11.17	49.91	30.0	30.83	25.93	30.2	56.91	51.86	30.2	14.68	49.34
31.0	23.87	52.19	31.0	10.86	49.58	31.0	30.76	25.56	31.1	56.68	51.68	31.2	14.41	49.25
13.76	+13.72		51.25	+51.24		11.89	-11.85		12.33	+12.29		11.86	+11.82	
0 <sup>h</sup> 57 <sup>m</sup> 32 <sup>s</sup> .323			1 <sup>h</sup> 31 <sup>m</sup> 41 <sup>s</sup> .366			1 <sup>h</sup> 41 <sup>m</sup> 51 <sup>s</sup> .117			4 <sup>h</sup> 10 <sup>m</sup> 55 <sup>s</sup> .493			5 <sup>h</sup> 36 <sup>m</sup> 9 <sup>s</sup> .111		
+85° 49' 43".55			+88° 52' 39".02			-85° 10' 27".09			+85° 20' 38".12			+85° 9' 36".60		

CIRCUMPOLAR STARS.

FOR THE UPPER TRANSIT AT WASHINGTON.

31 G. Menasse. Mag. 6.2			5 Menasse. Mag. 5.6			51 H. Cephei. Mag. 5.3			25 H. Canopus. Mag. 5.1			7 G. Ootantis. Mag. 6.4		
Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.
Mar.	h m 5 45	° -84 50	Mar.	h m 6 46	° -80 44	Mar.	h m 7 3	° +87 10	Mar.	h m 7 14	° +82 34	Mar.	h m 7 15	° -86 54
	s "	"		s "	"		s "	"		s "	"		s "	"
0.3	38.55	6.65	0.3	46.25	14.38	0.4	57.99	45.15	0.4	31.82	16.11	0.4	27.66	49.33
1.3	38.26	6.70	1.3	46.11	14.52	1.4	57.69	45.37	1.4	31.71	16.34	1.4	27.23	49.52
2.3	37.99	6.74	2.3	45.96	14.66	2.3	57.37	45.60	2.4	31.59	16.56	2.4	26.81	49.70
3.3	37.73	6.78	3.3	45.82	14.79	3.3	57.01	45.82	3.4	31.47	16.79	3.4	26.42	49.87
4.3	37.46	6.83	4.3	45.69	14.93	4.3	56.61	46.03	4.4	31.33	16.99	4.4	26.04	50.05
5.3	37.20	6.89	5.3	45.56	15.06	5.3	56.21	46.21	5.3	31.18	17.18	5.3	25.67	50.24
6.3	36.94	6.97	6.3	45.43	15.25	6.3	55.79	46.36	6.3	31.02	17.35	6.3	25.30	50.46
7.3	36.67	7.04	7.3	45.30	15.42	7.3	55.37	46.50	7.3	30.87	17.49	7.3	24.92	50.67
8.3	36.40	7.12	8.3	45.16	15.59	8.3	54.96	46.64	8.3	30.72	17.64	8.3	24.51	50.88
9.3	36.12	7.20	9.3	45.01	15.77	9.3	54.57	46.76	9.3	30.57	17.78	9.3	24.11	51.10
10.3	35.84	7.26	10.3	44.87	15.94	10.3	54.19	46.86	10.3	30.43	17.89	10.3	23.70	51.30
11.3	35.54	7.31	11.3	44.72	16.09	11.3	53.82	46.98	11.3	30.30	18.02	11.3	23.26	51.50
12.3	35.24	7.34	12.3	44.57	16.23	12.3	53.46	47.10	12.3	30.17	18.15	12.3	22.81	51.69
13.3	34.95	7.35	13.3	44.41	16.34	13.3	53.11	47.23	13.3	30.03	18.28	13.3	22.36	51.86
14.3	34.66	7.36	14.3	44.26	16.44	14.3	52.74	47.36	14.3	29.91	18.42	14.3	21.90	52.00
15.3	34.36	7.34	15.3	44.10	16.53	15.3	52.36	47.49	15.3	29.78	18.56	15.3	21.45	52.14
16.3	34.06	7.31	16.3	43.95	16.59	16.3	51.97	47.63	16.3	29.64	18.71	16.3	20.99	52.26
17.3	33.81	7.27	17.3	43.80	16.65	17.3	51.56	47.77	17.3	29.49	18.85	17.3	20.54	52.38
18.3	33.54	7.23	18.3	43.65	16.73	18.3	51.13	47.90	18.3	29.32	18.99	18.3	20.12	52.49
19.2	33.28	7.22	19.3	43.50	16.80	19.3	50.68	48.00	19.3	29.16	19.12	19.3	19.69	52.61
20.2	33.02	7.21	20.3	43.36	16.89	20.3	50.22	48.09	20.3	28.99	19.22	20.3	19.28	52.73
21.2	32.74	7.21	21.3	43.22	16.99	21.3	49.75	48.15	21.3	28.82	19.31	21.3	18.88	52.87
22.2	32.47	7.22	22.3	43.06	17.09	22.3	49.29	48.20	22.3	28.64	19.37	22.3	18.46	53.02
23.2	32.19	7.22	23.3	42.93	17.19	23.3	48.87	48.23	23.3	28.48	19.41	23.3	18.02	53.17
24.2	31.90	7.22	24.3	42.78	17.30	24.3	48.46	48.25	24.3	28.34	19.45	24.3	17.57	53.32
25.2	31.59	7.20	25.3	42.61	17.39	25.3	48.06	48.27	25.3	28.21	19.49	25.3	17.10	53.47
26.2	31.29	7.17	26.3	42.45	17.46	26.3	47.72	48.30	26.3	28.08	19.53	26.3	16.59	53.59
27.2	31.00	7.16	27.3	42.29	17.51	27.3	47.36	48.34	27.3	27.95	19.59	27.3	16.08	53.68
28.2	30.70	7.01	28.3	42.13	17.52	28.3	46.98	48.40	28.3	27.82	19.67	28.3	15.60	53.75
29.2	30.41	6.91	29.3	41.98	17.52	29.3	46.58	48.46	29.3	27.67	19.75	29.3	15.12	53.81
30.2	30.15	6.80	30.3	41.81	17.51	30.3	46.17	48.53	30.3	27.50	19.83	30.3	14.65	53.85
31.2	29.89	6.70	31.3	41.66	17.51	31.3	45.72	48.59	31.3	27.33	19.89	31.3	14.20	53.89
11.11	-11.06		6.21	-6.13		20.32	+20.30		7.73	+7.67		18.58	-18.55	
5 <sup>h</sup> 45 <sup>m</sup> 39 <sup>s</sup> .719			6 <sup>h</sup> 46 <sup>m</sup> 43 <sup>s</sup> .704			7 <sup>h</sup> 3 <sup>m</sup> 31 <sup>s</sup> .434			7 <sup>h</sup> 14 <sup>m</sup> 20 <sup>s</sup> .713			7 <sup>h</sup> 15 <sup>m</sup> 19 <sup>s</sup> .352		
-84° 49' 42".94			-80° 43' 50".12			+87° 10' 38".36			+82° 34' 10".96			-86° 54' 26".23		

CIRCUMPOLAR STARS.

FOR THE UPPER TRANSIT AT WASHINGTON.

Greenwich 1119. Mag. 7.0			♄ Octantis. Mag. 5.4			♁ H. Draconis. Mag. 4.6			♃ Chamaeleontis. Mag. 5.2			♏ H. Camelopardalis. Mag. 5.3		
Wash. Mean Time.	Right Ascension.	Declination.	Wash. Mean Time.	Right Ascension.	Declination.	Wash. Mean Time.	Right Ascension.	Declination.	Wash. Mean Time.	Right Ascension.	Declination.	Wash. Mean Time.	Right Ascension.	Declination.
Mar.	h m s	° ' "	Mar.	h m s	° ' "	Mar.	h m s	° ' "	Mar.	h m s	° ' "	Mar.	h m s	° ' "
	8 19	+88 52		9 8	-85 20		9 25	+81 40		9 36	-80 35		10 21	+82 57
0.4	55.65	27.11	0.4	47.64	59.39	0.5	58.32	48.34	0.5	25.94	12.03	0.5	38.45	49.09
1.4	55.17	27.39	1.4	47.47	59.73	1.4	58.29	48.66	1.5	25.88	12.39	1.5	38.46	49.40
2.4	54.63	27.68	2.4	47.30	60.05	2.4	58.26	48.97	2.5	25.81	12.73	2.5	38.47	49.73
3.4	53.99	27.98	3.4	47.14	60.36	3.4	58.23	49.29	3.5	25.75	13.06	3.5	38.47	50.07
4.4	53.28	28.26	4.4	46.99	60.67	4.4	58.18	49.61	4.4	25.69	13.38	4.5	38.43	50.42
5.4	52.50	28.51	5.4	46.85	60.98	5.4	58.12	49.93	5.4	25.63	13.71	5.5	38.40	50.76
6.4	51.68	28.75	6.4	46.71	61.30	6.4	58.04	50.22	6.4	25.58	14.04	6.5	38.36	51.10
7.4	50.85	28.99	7.4	46.57	61.63	7.4	57.96	50.50	7.4	25.53	14.40	7.5	38.31	51.42
8.4	50.04	29.22	8.4	46.43	61.97	8.4	57.88	50.76	8.4	25.47	14.76	8.5	38.28	51.71
9.4	49.24	29.42	9.4	46.28	62.32	9.4	57.81	51.02	9.4	25.42	15.13	9.5	38.22	52.01
10.4	48.45	29.62	10.4	46.10	62.66	10.4	57.74	51.28	10.4	25.36	15.50	10.5	38.17	52.29
11.4	47.70	29.82	11.4	45.92	63.01	11.4	57.68	51.54	11.4	25.29	15.87	11.5	38.13	52.56
12.4	46.96	30.02	12.4	45.74	63.35	12.4	57.62	51.80	12.4	25.22	16.23	12.5	38.09	52.85
13.4	46.24	30.25	13.4	45.55	63.66	13.4	57.56	52.04	13.4	25.14	16.57	13.5	38.05	53.14
14.4	45.52	30.46	14.4	45.34	63.97	14.4	57.51	52.30	14.4	25.06	16.91	14.5	38.02	53.43
15.4	44.77	30.69	15.4	45.13	64.26	15.4	57.45	52.57	15.4	24.97	17.23	15.4	37.99	53.73
16.4	43.99	30.91	16.4	44.92	64.54	16.4	57.38	52.85	16.4	24.88	17.54	16.4	37.94	54.04
17.4	43.16	31.18	17.4	44.71	64.82	17.4	57.30	53.14	17.4	24.79	17.83	17.4	37.89	54.35
18.4	42.27	31.35	18.4	44.50	65.09	18.4	57.21	53.42	18.4	24.71	18.12	18.4	37.84	54.67
19.4	41.31	31.55	19.4	44.31	65.36	19.4	57.11	53.70	19.4	24.63	18.41	19.4	37.77	54.99
20.4	40.31	31.75	20.4	44.11	65.63	20.4	57.01	53.95	20.4	24.54	18.70	20.4	37.68	55.31
21.3	39.28	31.93	21.4	43.92	65.91	21.4	56.90	54.19	21.4	24.47	19.01	21.4	37.59	55.60
22.3	38.25	32.07	22.4	43.74	66.20	22.4	56.79	54.42	22.4	24.39	19.33	22.4	37.49	55.88
23.3	37.27	32.21	23.4	43.54	66.52	23.4	56.69	54.63	23.4	24.31	19.67	23.4	37.39	56.13
24.3	36.34	32.33	24.4	43.34	66.83	24.4	56.58	54.82	24.4	24.23	20.01	24.4	37.30	56.38
25.3	35.46	32.44	25.4	43.11	67.15	25.4	56.49	55.01	25.4	24.15	20.35	25.4	37.22	56.62
26.3	34.63	32.57	26.4	42.87	67.44	26.4	56.41	55.19	26.4	24.05	20.68	26.4	37.16	56.85
27.3	33.80	32.70	27.4	42.63	67.71	27.4	56.33	55.39	27.4	23.95	20.98	27.4	37.09	57.09
28.3	32.95	32.85	28.4	42.36	67.96	28.4	56.25	55.61	28.4	23.88	21.26	28.4	37.03	57.36
29.3	32.06	33.02	29.4	42.11	68.19	29.4	56.17	55.84	29.4	23.72	21.51	29.4	36.94	57.63
30.3	31.11	33.17	30.4	41.86	68.40	30.4	56.07	56.08	30.4	23.61	21.76	30.4	36.86	57.92
31.3	30.07	33.32	31.4	41.62	68.60	31.4	55.94	56.32	31.4	23.50	22.00	31.4	36.76	58.21
50.94 +50.93			12.34 -12.30			6.91 +6.84			6.12 -6.08			8.16 +8.10		
8 <sup>h</sup> 18 <sup>m</sup> 46 <sup>s</sup> .642			9 <sup>h</sup> 8 <sup>m</sup> 33 <sup>s</sup> .397			9 <sup>h</sup> 25 <sup>m</sup> 48 <sup>s</sup> .041			9 <sup>h</sup> 36 <sup>m</sup> 17 <sup>s</sup> .360			10 <sup>h</sup> 21 <sup>m</sup> 27 <sup>s</sup> .495		
+88° 52' 26".44			-85° 20' 41".44			+81° 40' 54".43			-80° 34' 55".47			+82° 57' 59".46		

CIRCUMPOLAR STARS.

FOR THE UPPER TRANSIT AT WASHINGTON.

γ Octantis. Mag. 6.3			Bradley 1873. Mag. 6.3			ι Octantis. Mag. 5.4			36 H. Camelopard. seq. Mag. 5.3			κ Octantis. Mag. 5.6		
Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.
Mar.	h m 11 0	° ' " -84	Mar.	h m 12 14	° ' " +88	Mar.	h m 12 46	° ' " -84.41	Mar.	h m 12 48	° ' " +83.50	Mar.	h m 13 28	° ' " -85.22
0.5	9.94	57.56	0.6	58.02	19.42	0.6	48.26	19.82	0.6	38.43	32.93	0.6	1.95	32.06
1.5	9.92	57.96	1.6	58.98	19.69	1.6	43.35	19.70	1.6	38.56	33.16	1.6	2.18	82.40
2.5	9.89	58.34	2.6	54.33	19.90	2.6	43.46	20.06	2.6	38.70	33.43	2.6	2.30	82.73
3.5	9.88	58.70	3.6	54.66	20.30	3.6	43.55	20.39	3.6	38.83	33.71	3.6	2.46	83.04
4.5	9.87	59.06	4.6	54.93	20.63	4.6	43.65	20.73	4.6	38.93	34.01	4.6	2.62	83.33
5.5	9.86	59.42	5.6	55.15	20.97	5.6	43.77	21.06	5.6	39.03	34.32	5.6	2.79	83.62
6.5	9.86	59.78	6.6	55.33	21.30	6.6	43.89	21.39	6.6	39.12	34.63	6.6	2.97	83.90
7.5	9.87	60.16	7.6	55.47	21.62	7.6	44.01	21.72	7.6	39.19	34.94	7.6	3.16	84.21
8.5	9.87	60.55	8.5	55.59	21.94	8.6	44.14	22.07	8.6	39.26	35.25	8.6	3.35	84.52
9.5	9.87	60.95	9.5	55.70	22.25	9.6	44.27	22.43	9.6	39.33	35.54	9.6	3.55	84.84
10.5	9.86	61.35	10.5	55.82	22.55	10.6	44.39	22.80	10.6	39.40	35.82	10.6	3.74	85.18
11.5	9.84	61.76	11.5	55.95	22.84	11.6	44.50	23.17	11.6	39.47	36.10	11.6	3.93	85.54
12.5	9.81	62.16	12.5	56.08	23.13	12.6	44.60	23.56	12.6	39.54	36.38	12.6	4.10	85.90
13.5	9.78	62.57	13.5	56.22	23.42	13.6	44.69	23.95	13.6	39.61	36.66	13.6	4.25	86.27
14.5	9.78	62.95	14.5	56.39	23.72	14.6	44.77	24.34	14.6	39.69	36.94	14.6	4.40	86.63
15.5	9.67	63.34	15.5	56.55	24.03	15.6	44.83	24.73	15.6	39.78	37.22	15.6	4.54	86.99
16.5	9.61	63.72	16.5	56.70	24.34	16.5	44.89	25.12	16.5	39.86	37.53	16.6	4.64	87.35
17.5	9.54	64.08	17.5	56.84	24.68	17.5	44.94	25.49	17.5	39.94	37.84	17.6	4.75	87.71
18.5	9.48	64.43	18.5	56.94	25.02	18.5	44.99	25.85	18.5	39.99	38.17	18.6	4.87	88.04
19.5	9.43	64.77	19.5	57.00	25.33	19.5	45.04	26.19	19.5	40.04	38.50	19.6	4.99	88.38
20.5	9.37	65.11	20.5	57.02	25.73	20.5	45.11	26.52	20.5	40.08	38.84	20.6	5.11	88.70
21.5	9.32	65.47	21.5	56.99	26.07	21.5	45.19	26.87	21.5	40.11	39.19	21.6	5.25	89.02
22.5	9.28	65.84	22.5	56.92	26.40	22.5	45.27	27.23	22.5	40.12	39.52	22.6	5.39	89.35
23.5	9.25	66.22	23.5	56.84	26.72	23.5	45.36	27.61	23.5	40.12	39.84	23.6	5.54	89.71
24.5	9.20	66.63	24.5	56.76	27.01	24.5	45.44	28.01	24.5	40.13	40.15	24.6	5.69	40.08
25.4	9.14	67.04	25.5	56.71	27.29	25.5	45.51	28.42	25.5	40.15	40.43	25.6	5.83	40.46
26.4	9.06	67.44	26.5	56.67	27.57	26.5	45.56	28.84	26.5	40.18	40.71	26.5	5.96	40.87
27.4	8.98	67.82	27.5	56.66	27.85	27.5	45.60	29.26	27.5	40.21	40.99	27.5	6.06	41.27
28.4	8.88	68.20	28.5	56.67	28.16	28.5	45.62	29.67	28.5	40.24	41.28	28.5	6.15	41.67
29.4	8.77	68.55	29.5	56.66	28.47	29.5	45.63	30.05	29.5	40.28	41.59	29.5	6.21	42.05
30.4	8.66	68.88	30.5	56.66	28.80	30.5	45.63	30.43	30.5	40.30	41.91	30.5	6.27	42.41
31.4	8.56	69.20	31.5	56.60	29.14	31.5	45.63	30.79	31.5	40.31	42.25	31.5	6.33	42.75
9.34 -9.79			30.81 +30.79			10.61 -10.76			9.32 +9.37			12.41 -12.37		
10 <sup>h</sup> 59 <sup>m</sup> 54 <sup>s</sup> .174			12 <sup>h</sup> 14 <sup>m</sup> 29 <sup>s</sup> .583			12 <sup>h</sup> 46 <sup>m</sup> 25 <sup>s</sup> .116			12 <sup>h</sup> 48 <sup>m</sup> 31 <sup>s</sup> .755			13 <sup>h</sup> 27 <sup>m</sup> 42 <sup>s</sup> .060		
-84° 9' 48".70			+88° 8' 36".24			-84° 41' 21".18			+83° 50' 51".72			-85° 22' 38".10		

## CIRCUMPOLAR STARS.

FOR THE UPPER TRANSIT AT WASHINGTON.

δ Octantis. Mag. 4.1			Groombridge 2333. Mag. 7.2			ρ Octantis. Mag. 5.7			ε Ursæ Minoris. Mag. 4.4			56 G. Apedis. Mag. 5.9		
Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.
Mar.	h m °	'	Mar.	h m °	'	Mar.	h m °	'	Mar.	h m °	'	Mar.	h m °	'
	14 14	-83 18		15 2	+87 32		15 24	-84 11		16 54	+82 8		17 16	-80 46
	s	"		s	"		s	"		s	"		s	"
0.7	8.79	1.19	0.7	40.20	8.66	0.7	48.88	52.00	0.8	2.44	58.77	0.8	32.48	57.09
1.6	8.94	1.49	1.7	40.69	8.75	1.7	49.11	52.20	1.8	2.61	58.71	1.8	32.65	57.11
2.6	9.09	1.77	2.7	41.20	8.87	2.7	49.33	52.40	2.8	2.79	58.65	2.8	32.80	57.13
3.6	9.23	2.04	3.7	41.70	9.00	3.7	49.54	52.58	3.8	2.96	58.62	3.8	32.96	57.15
4.6	9.37	2.29	4.7	42.19	9.14	4.7	49.74	52.73	4.8	3.13	58.61	4.8	33.10	57.15
5.6	9.52	2.53	5.7	42.66	9.32	5.7	49.96	52.89	5.7	3.31	58.62	5.8	33.24	57.14
6.6	9.69	2.77	6.7	43.10	9.52	6.7	50.19	53.04	6.7	3.48	58.66	6.8	33.40	57.10
7.6	9.85	3.03	7.7	43.53	9.72	7.7	50.42	53.18	7.7	3.63	58.70	7.8	33.56	57.09
8.6	10.02	3.29	8.7	43.93	9.92	8.7	50.65	53.35	8.7	3.79	58.76	8.8	33.73	57.07
9.6	10.20	3.56	9.7	44.32	10.11	9.7	50.89	53.52	9.7	3.94	58.81	9.8	33.90	57.06
10.6	10.37	3.84	10.7	44.70	10.30	10.7	51.14	53.70	10.7	4.10	58.85	10.8	34.06	57.06
11.6	10.52	4.15	11.7	45.08	10.48	11.7	51.39	53.91	11.7	4.26	58.90	11.7	34.26	57.06
12.6	10.68	4.46	12.7	45.46	10.66	12.7	51.63	54.13	12.7	4.41	58.94	12.7	34.44	57.11
13.6	10.84	4.78	13.6	45.86	10.83	13.7	51.86	54.36	13.7	4.56	58.98	13.7	34.62	57.15
14.6	10.98	5.11	14.6	46.27	11.00	14.7	52.08	54.59	14.7	4.73	59.01	14.7	34.80	57.23
15.6	11.11	5.44	15.6	46.68	11.17	15.7	52.29	54.84	15.7	4.89	59.04	15.7	34.96	57.30
16.6	11.24	5.77	16.6	47.09	11.36	16.7	52.49	55.08	16.7	5.06	59.08	16.7	35.11	57.38
17.6	11.35	6.08	17.6	47.50	11.55	17.7	52.68	55.33	17.7	5.23	59.14	17.7	35.26	57.45
18.6	11.45	6.38	18.6	47.92	11.78	18.7	52.86	55.56	18.7	5.38	59.22	18.7	35.42	57.52
19.6	11.57	6.67	19.6	48.31	12.01	19.6	53.05	55.78	19.7	5.54	59.31	19.7	35.56	57.58
20.6	11.70	6.96	20.6	48.69	12.28	20.6	53.24	55.98	20.7	5.71	59.42	20.7	35.72	57.64
21.6	11.83	7.25	21.6	49.08	12.54	21.6	53.44	56.19	21.7	5.87	59.55	21.7	35.87	57.68
22.6	11.97	7.55	22.6	49.35	12.81	22.6	53.66	56.39	22.7	6.02	59.69	22.7	36.03	57.71
23.6	12.11	7.86	23.6	49.63	13.08	23.6	53.88	56.61	23.7	6.16	59.84	23.7	36.20	57.75
24.6	12.26	8.20	24.6	49.90	13.33	24.6	54.11	56.85	24.7	6.30	59.99	24.7	36.38	57.81
25.6	12.41	8.54	25.6	50.16	13.57	25.6	54.34	57.12	25.7	6.43	60.13	25.7	36.56	57.89
26.6	12.54	8.89	26.6	50.43	13.79	26.6	54.56	57.39	26.7	6.57	60.24	26.7	36.74	57.99
27.6	12.65	9.26	27.6	50.73	14.02	27.6	54.76	57.69	27.7	6.70	60.34	27.7	36.92	58.12
28.6	12.76	9.63	28.6	51.04	14.24	28.6	54.95	57.99	28.7	6.85	60.43	28.7	37.09	58.26
29.6	12.86	9.99	29.6	51.37	14.46	29.6	55.13	58.29	29.7	7.00	60.55	29.7	37.24	58.40
30.6	12.95	10.33	30.6	51.70	14.72	30.6	55.27	58.58	30.7	7.15	60.68	30.7	37.39	58.54
31.6	13.02	10.66	31.6	52.02	14.99	31.6	55.42	58.85	31.7	7.30	60.82	31.7	37.53	58.66
8.57	-8.51		23.26	+23.24		9.69	-9.84		7.94	+7.27		6.24	-6.16	
14 <sup>h</sup> 13 <sup>m</sup>	55°.644		15 <sup>h</sup> 2 <sup>m</sup>	43°.277		15 <sup>h</sup> 24 <sup>m</sup>	36°.751		16 <sup>h</sup> 54 <sup>m</sup>	6°.748		17 <sup>h</sup> 16 <sup>m</sup>	23°.406	
-83° 18'	11''.26		+87° 32'	28''.69		-84° 12'	7''.93		+82° 10'	15''.74		-80° 47'	18''.10	



CIRCUMPOLAR STARS:

FOR THE UPPER TRANSIT AT WASHINGTON.

δ Ursa Minoris. Mag. 4.4			χ Octantis. Mag. 5.2			λ Ursa Minoris. Mag. 6.6			σ Octantis. Mag. 5.5			76 Draconis. Mag. 5.7		
Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.
Mar.	h m s	° '	Mar.	h m s	° '	Mar.	h m s	° '	Mar.	h m s	° '	Mar.	h m s	° '
	17 57	+86 36		18 8	-87 39		18 57	+89 1		19 31	-89 12		20 48	+82 14
0.8	46.52	38.27	0.8	2.73	27.29	0.9	52.35	10.09	0.9	51.37	48.29	0.9	19.58	10.90
1.8	46.85	38.12	1.8	3.36	27.23	1.8	53.31	9.87	1.9	52.99	48.09	1.9	19.64	10.58
2.8	47.21	37.97	2.8	3.96	27.17	2.8	54.35	9.65	2.9	54.52	42.89	2.9	19.71	10.27
3.8	47.58	37.85	3.8	4.53	27.09	3.8	55.46	9.45	3.9	55.98	42.70	3.9	19.79	9.96
4.8	47.97	37.75	4.8	5.10	27.00	4.8	56.64	9.26	4.9	57.38	42.50	4.9	19.86	9.65
5.8	48.37	37.66	5.8	5.66	26.91	5.8	57.86	9.11	5.9	58.75	42.28	5.9	19.98	9.36
6.8	48.75	37.61	6.8	6.23	26.80	6.8	59.09	8.96	6.9	60.14	42.05	6.9	20.10	9.08
7.8	49.12	37.56	7.8	6.82	26.69	7.8	60.30	8.83	7.9	61.57	41.82	7.9	20.20	8.83
8.8	49.48	37.52	8.8	7.43	26.58	8.8	61.47	8.72	8.9	63.08	41.59	8.9	20.31	8.59
9.8	49.84	37.49	9.8	8.06	26.48	9.8	62.60	8.61	9.8	64.66	41.35	9.9	20.42	8.35
10.8	50.18	37.46	10.8	8.71	26.38	10.8	63.72	8.49	10.8	66.29	41.13	10.9	20.58	8.13
11.8	50.52	37.42	11.8	9.38	26.32	11.8	64.81	8.38	11.8	68.00	40.92	11.9	20.68	7.90
12.8	50.87	37.38	12.8	10.05	26.26	12.8	65.89	8.26	12.8	69.73	40.72	12.9	20.73	7.66
13.8	51.22	37.33	13.8	10.71	26.22	13.8	66.97	8.13	13.8	71.50	40.53	13.9	20.83	7.43
14.8	51.56	37.28	14.8	11.38	26.19	14.8	68.07	8.00	14.8	73.28	40.36	14.9	20.93	7.19
15.8	51.92	37.23	15.8	12.03	26.18	15.8	69.21	7.87	15.8	75.04	40.21	15.9	21.03	6.94
16.8	52.29	37.18	16.8	12.66	26.17	16.8	70.37	7.74	16.8	76.77	40.06	16.9	21.14	6.69
17.8	52.68	37.14	17.8	13.28	26.16	17.8	71.61	7.62	17.8	78.45	39.92	17.9	21.25	6.44
18.8	53.07	37.13	18.8	13.87	26.15	18.8	72.90	7.51	18.8	80.06	39.78	18.9	21.38	6.19
19.8	53.48	37.12	19.8	14.45	26.12	19.8	74.22	7.42	19.8	81.64	39.64	19.9	21.51	5.95
20.8	53.87	37.15	20.8	15.02	26.09	20.8	75.57	7.36	20.8	83.18	39.47	20.9	21.65	5.74
21.7	54.25	37.20	21.8	15.62	26.04	21.8	76.89	7.31	21.8	84.75	39.30	21.9	21.79	5.54
22.7	54.63	37.25	22.8	16.23	26.00	22.8	78.18	7.28	22.8	86.38	39.12	22.9	21.94	5.36
23.7	54.98	37.32	23.8	16.88	25.95	23.8	79.41	7.27	23.8	88.11	38.95	23.9	22.08	5.22
24.7	55.32	37.38	24.7	17.58	25.92	24.8	80.56	7.26	24.8	89.94	38.77	24.9	22.21	5.06
25.7	55.64	37.44	25.7	18.29	25.91	25.8	81.66	7.25	25.8	91.85	38.61	25.9	22.34	4.92
26.7	55.97	37.48	26.7	18.99	25.92	26.8	82.74	7.21	26.8	93.83	38.47	26.9	22.47	4.77
27.7	56.29	37.51	27.7	19.68	25.96	27.8	83.84	7.17	27.8	95.82	38.35	27.9	22.58	4.60
28.7	56.63	37.53	28.7	20.35	26.02	28.8	84.98	7.11	28.8	97.75	38.25	28.8	22.70	4.42
29.7	56.99	37.56	29.7	20.98	26.08	29.8	86.20	7.05	29.8	99.59	38.17	29.8	22.83	4.23
30.7	57.36	37.60	30.7	21.57	26.14	30.8	87.49	7.00	30.8	101.34	38.11	30.8	22.96	4.04
31.7	57.75	37.66	31.7	22.14	26.19	31.8	88.84	6.96	31.8	103.00	38.03	31.8	23.10	3.86
16.91	+16.88		24.46	-24.44		58.40	+58.39		72.64	-72.63		7.40	+7.33	
17 <sup>h</sup> 58 <sup>m</sup>	2 <sup>s</sup> .814		18 <sup>h</sup> 7 <sup>m</sup>	59 <sup>s</sup> .062		18 <sup>h</sup> 59 <sup>m</sup>	2 <sup>s</sup> .477		19 <sup>h</sup> 32 <sup>m</sup>	24 <sup>s</sup> .283		20 <sup>h</sup> 49 <sup>m</sup>	27 <sup>s</sup> .964	
+86° 36'	50'' .93		-87° 39'	50'' .34		+89° 1'	17'' .96		-89° 13'	5'' .55		+82° 14'	10'' .29	

CIRCUMPOLAR STARS.

FOR THE UPPER TRANSIT AT WASHINGTON.

λ Octantis. Mag. 5.4			ν Octantis. Mag. 5.7			β Octantis. Mag. 4.3			39 H. Cephei. Mag. 5.6			γ <sup>1</sup> Octantis. Mag. 5.1		
Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.
Mar.	h m	° ' "	Mar.	h m	° ' "	Mar.	h m	° ' "	Mar.	h m	° ' "	Mar.	h m	° ' "
	21 38	-83 4		22 16	-86 22		22 37	-81 47		23 27	+86 52		23 47	-83 27
0.9	39.60	63.58	0.9	25.74	21.04	1.0	49.47	56.77	1.0	27.30	11.93	1.0	16.86	45.77
1.9	39.71	63.23	1.9	25.87	20.66	1.9	49.51	56.39	2.0	27.17	11.61	2.0	16.85	45.39
2.9	39.81	62.91	2.9	25.98	20.32	2.9	49.55	56.05	3.0	27.06	11.27	3.0	16.84	45.03
3.9	39.90	62.60	3.9	26.08	19.99	3.9	49.59	55.72	4.0	26.97	10.92	4.0	16.81	44.69
4.9	39.98	62.29	4.9	26.17	19.65	4.9	49.61	55.38	5.0	26.92	10.56	5.0	16.78	44.35
5.9	40.05	61.96	5.9	26.25	19.29	5.9	49.62	55.02	6.0	26.88	10.21	6.0	16.75	44.01
6.9	40.12	61.61	6.9	26.32	18.94	6.9	49.64	54.65	7.0	26.88	9.88	7.0	16.70	43.65
7.9	40.19	61.25	7.9	26.39	18.57	7.9	49.67	54.28	8.0	26.88	9.56	8.0	16.66	43.28
8.9	40.27	60.90	8.9	26.48	18.19	8.9	49.70	53.91	9.0	26.90	9.25	9.0	16.62	42.90
9.9	40.36	60.54	9.9	26.58	17.80	9.9	49.73	53.51	10.0	26.92	8.94	10.0	16.60	42.51
10.9	40.46	60.17	10.9	26.71	17.41	10.9	49.76	53.11	11.0	26.94	8.63	11.0	16.59	42.12
11.9	40.56	59.81	11.9	26.84	17.02	11.9	49.80	52.73	12.0	26.95	8.32	12.0	16.58	41.72
12.9	40.69	59.45	12.9	27.00	16.64	12.9	49.86	52.34	13.0	26.96	8.01	13.0	16.58	41.32
13.9	40.82	59.11	13.9	27.17	16.26	13.9	49.92	51.96	13.9	26.96	7.70	14.0	16.59	40.92
14.9	40.95	58.78	14.9	27.35	15.89	14.9	49.98	51.58	14.9	26.95	7.38	15.0	16.60	40.52
15.9	41.08	58.47	15.9	27.53	15.55	15.9	50.06	51.21	15.9	26.95	7.07	16.0	16.62	40.12
16.9	41.21	58.18	16.9	27.72	15.21	16.9	50.18	50.87	16.9	26.95	6.75	17.0	16.63	39.74
17.9	41.34	57.89	17.9	27.90	14.87	17.9	50.19	50.53	17.9	26.97	6.41	18.0	16.64	39.38
18.9	41.46	57.59	18.9	28.07	14.54	18.9	50.25	50.19	18.9	27.00	6.08	18.9	16.66	39.02
19.9	41.56	57.30	19.9	28.22	14.22	19.9	50.30	49.87	19.9	27.07	5.74	19.9	16.66	38.67
20.9	41.67	56.99	20.9	28.37	13.89	20.9	50.36	49.54	20.9	27.15	5.39	20.9	16.67	38.31
21.9	41.77	56.68	21.9	28.51	13.54	21.9	50.41	49.18	21.9	27.27	5.05	21.9	16.66	37.94
22.9	41.89	56.35	22.9	28.66	13.20	22.9	50.46	48.81	22.9	27.40	4.74	22.9	16.66	37.57
23.9	42.02	56.01	23.9	28.83	12.83	23.9	50.52	48.42	23.9	27.54	4.46	23.9	16.67	37.17
24.9	42.15	55.67	24.9	29.02	12.44	24.9	50.60	48.03	24.9	27.68	4.17	24.9	16.69	36.76
25.9	42.29	55.33	25.9	29.24	12.05	25.9	50.68	47.64	25.9	27.79	3.90	25.9	16.72	36.34
26.9	42.46	55.00	26.9	29.47	11.68	26.9	50.78	47.26	26.9	27.89	3.63	26.9	16.76	35.92
27.9	42.63	54.68	27.9	29.74	11.34	27.9	50.88	46.89	27.9	27.98	3.36	27.9	16.81	35.50
28.9	42.80	54.40	28.9	30.00	11.01	28.9	50.98	46.55	28.9	28.06	3.06	28.9	16.87	35.11
29.9	42.95	54.13	29.9	30.24	10.70	29.9	51.08	46.22	29.9	28.15	2.75	29.9	16.92	34.73
30.9	43.10	53.87	30.9	30.48	10.42	30.9	51.18	45.91	30.9	28.26	2.44	30.9	16.98	34.37
31.9	43.24	53.63	31.9	30.70	10.14	31.9	51.27	45.61	31.9	28.39	2.12	31.9	17.02	34.03
8.30	-8.24		15.80	-15.77		7.01	-6.94		18.31	+16.28		7.62	-7.56	
21 <sup>h</sup> 38 <sup>m</sup>	48 <sup>s</sup> .035		22 <sup>h</sup> 16 <sup>m</sup>	45 <sup>s</sup> .446		22 <sup>h</sup> 37 <sup>m</sup>	57 <sup>s</sup> .920		23 <sup>h</sup> 27 <sup>m</sup>	43 <sup>s</sup> .285		23 <sup>h</sup> 47 <sup>m</sup>	27 <sup>s</sup> .240	
-83° 5' 17".98			-86° 22' 32".81			-81° 48' 6".68			+86° 51' 53".49			-82° 27' 48".42		

CIRCUMPOLAR STARS.

FOR THE UPPER TRANSIT AT WASHINGTON.

48 H. Cephei. Mag. 4.5			$\alpha$ Ursae Minoris. (Polaris.) Mag. 2.1			4 G. Octantis. Mag. 5.6			Greenbridge 750. Mag. 6.7			Greenbridge 944. Mag. 6.4		
Wash. Mean Time.	Right Ascen- sion.	Declina- tion.	Wash. Mean Time.	Right Ascen- sion.	Declina- tion.	Wash. Mean Time.	Right Ascen- sion.	Declina- tion.	Wash. Mean Time.	Right Ascen- sion.	Declina- tion.	Wash. Mean Time.	Right Ascen- sion.	Declina- tion.
Apr.	h m ° ' "	° ' "	Apr.	h m ° ' "	° ' "	Apr.	h m ° ' "	° ' "	Apr.	h m ° ' "	° ' "	Apr.	h m ° ' "	° ' "
0.0	0 57	+85 49	0.0	1 31	+88 52	0.0	1 41	-86 10	0.1	4 10	+85 20	0.2	5 36	+85 9
1.0	23.87	52.19	1.0	10.86	49.58	1.0	30.76	25.56	1.1	56.68	51.68	1.2	14.41	49.25
2.0	23.85	51.83	2.0	10.60	49.24	2.0	30.68	25.23	2.1	56.46	51.46	2.2	14.15	49.15
3.0	23.85	51.48	3.0	10.43	48.90	3.0	30.60	24.90	3.1	56.24	51.23	3.2	13.88	49.02
4.0	23.88	51.12	4.0	10.32	48.54	4.0	30.51	24.57	4.1	56.04	50.97	4.2	13.63	48.88
5.0	23.92	50.79	5.0	10.30	48.30	5.0	30.41	24.23	5.1	55.86	50.72	5.2	13.89	48.72
6.0	23.96	50.47	6.0	10.30	47.86	6.0	30.32	23.87	6.1	55.68	50.47	6.2	13.17	48.55
7.0	24.02	50.17	7.0	10.34	47.54	7.0	30.23	23.51	7.1	55.54	50.22	7.2	12.96	48.40
8.0	24.08	49.85	8.0	10.39	47.23	8.0	30.14	23.14	8.1	55.39	49.97	8.2	12.76	48.25
9.0	24.14	49.56	9.0	10.44	46.92	9.0	30.07	22.76	9.1	55.24	49.74	9.2	12.56	48.10
10.0	24.20	49.27	10.0	10.48	46.62	10.0	30.01	22.37	10.1	55.10	49.50	10.2	12.36	47.95
11.0	24.25	48.98	11.0	10.49	46.33	11.0	29.96	21.97	11.1	54.96	49.28	11.2	12.17	47.81
12.0	24.30	48.69	12.0	10.50	46.03	12.0	29.92	21.58	12.1	54.79	49.07	12.2	11.97	47.67
13.0	24.34	48.39	13.0	10.49	45.72	13.0	29.89	21.19	13.1	54.64	48.86	13.2	11.76	47.54
14.0	24.38	48.09	14.0	10.48	45.41	14.0	29.88	20.81	14.1	54.47	48.63	14.2	11.55	47.40
15.0	24.42	47.78	15.0	10.47	45.10	15.0	29.87	20.44	15.1	54.31	48.39	15.2	11.33	47.26
16.0	24.47	47.46	16.0	10.50	44.77	16.0	29.86	20.08	16.1	54.14	48.13	16.2	11.11	47.09
17.0	24.54	47.14	17.0	10.58	44.44	17.0	29.83	19.73	17.1	53.99	47.86	17.2	10.88	46.91
18.0	24.63	46.81	18.0	10.74	44.09	18.0	29.81	19.38	18.1	53.83	47.55	18.2	10.66	46.70
19.0	24.75	46.48	19.0	10.98	43.75	19.0	29.78	19.03	19.1	53.69	47.25	19.2	10.46	46.48
20.0	24.88	46.16	20.0	11.29	43.42	20.0	29.74	18.67	20.1	53.59	46.94	20.2	10.27	46.24
21.0	25.08	45.86	21.0	11.67	43.10	21.0	29.70	18.31	21.1	53.50	46.65	21.2	10.09	46.00
22.0	25.18	45.61	22.0	12.07	42.81	22.0	29.66	17.93	22.1	53.44	46.36	22.2	9.95	45.77
23.0	25.33	45.35	23.0	12.45	42.54	23.0	29.64	17.53	23.1	53.37	46.09	23.2	9.81	45.56
24.0	25.46	45.11	24.0	12.79	42.28	24.0	29.63	17.12	24.1	53.29	45.85	24.2	9.68	45.36
25.0	25.59	44.87	25.0	13.08	42.02	25.0	29.63	16.70	25.1	53.21	45.60	25.2	9.54	45.18
26.0	25.69	44.62	26.0	13.32	41.75	26.0	29.67	16.29	26.1	53.12	45.34	26.2	9.40	45.00
27.0	25.80	44.36	27.0	13.55	41.46	27.0	29.71	15.91	27.1	53.02	45.08	27.2	9.23	44.82
28.0	25.90	44.09	28.0	13.78	41.16	28.0	29.75	15.54	28.1	52.92	44.81	28.2	9.05	44.61
29.0	26.02	43.80	29.0	14.07	40.85	29.0	29.79	15.19	29.1	52.81	44.58	29.2	8.86	44.39
30.0	26.15	43.48	30.0	14.42	40.53	30.0	29.82	14.86	30.1	52.71	44.22	30.2	8.68	44.15
31.0	26.32	43.19	31.0	14.85	40.21	31.0	29.85	14.53	31.1	52.61	43.90	31.2	8.50	43.88
32.0	26.49	42.90	32.0	15.34	39.89	32.0	29.86	14.19	32.1	52.55	43.56	32.2	8.35	43.61
13.75	+12.72	51.12	+51.11	11.86	-11.84	12.33	+12.29	11.86	+11.82					
0 <sup>h</sup> 57 <sup>m</sup>	32 <sup>s</sup> .323	1 <sup>h</sup> 31 <sup>m</sup>	41 <sup>s</sup> .366	1 <sup>h</sup> 41 <sup>m</sup>	51 <sup>s</sup> .117	4 <sup>h</sup> 10 <sup>m</sup>	55 <sup>s</sup> .493	5 <sup>h</sup> 36 <sup>m</sup>	9 <sup>s</sup> .111					
+85° 49'	43'' .55	+88° 52'	39'' .02	-85° 10'	27'' .00	+85° 20'	33'' .12	+85° 9'	36'' .00					

CIRCUMPOLAR STARS.

FOR THE UPPER TRANSIT AT WASHINGTON.

31 G. Mensse. Mag. 6.2			5 Mensse. Mag. 5.6			51 H. Cephei. Mag. 5.3			25 H. Camelop. Mag. 5.1			7 G. Octantis. Mag. 6.4		
Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.
Apr.	h m 5 45	° ' -84 50	Apr.	h m 6 46	° ' -80 44	Apr.	h m 7 3	° ' +87 10	Apr.	h m 7 14	° ' +82 34	Apr.	h m 7 15	° ' -86 54
	s "	"		s "	"		s "	"		s "	"		s "	"
0.2	29.89	6.70	0.3	41.66	17.51	0.3	45.72	48.59	0.3	27.38	19.89	0.3	14.20	53.89
1.2	29.65	6.61	1.3	41.51	17.51	1.3	45.24	48.61	1.3	27.15	19.94	1.3	13.78	53.94
2.2	29.40	6.54	2.3	41.37	17.54	2.3	44.75	48.62	2.3	26.97	19.96	2.3	13.35	54.01
3.2	29.14	6.47	3.2	41.23	17.57	3.3	44.27	48.60	3.3	26.79	19.97	3.3	12.93	54.09
4.2	28.88	6.41	4.2	41.09	17.61	4.3	43.81	48.57	4.3	26.61	19.96	4.3	12.50	54.17
5.2	28.61	6.35	5.2	40.94	17.64	5.3	43.36	48.53	5.3	26.44	19.94	5.3	12.05	54.24
6.2	28.34	6.27	6.2	40.79	17.66	6.3	42.94	48.48	6.3	26.29	19.91	6.3	11.60	54.32
7.2	28.07	6.20	7.2	40.64	17.67	7.3	42.53	48.43	7.3	26.14	19.88	7.3	11.13	54.38
8.2	27.80	6.10	8.2	40.49	17.68	8.2	42.13	48.38	8.3	25.99	19.85	8.3	10.66	54.44
9.2	27.53	5.98	9.2	40.34	17.65	9.2	41.75	48.35	9.3	25.84	19.83	9.3	10.18	54.47
10.2	27.26	5.85	10.2	40.17	17.62	10.2	41.36	48.32	10.2	25.70	19.81	10.2	9.69	54.49
11.2	26.99	5.71	11.2	40.02	17.57	11.2	40.96	48.29	11.2	25.56	19.80	11.2	9.21	54.50
12.2	26.73	5.54	12.2	39.87	17.52	12.2	40.56	48.26	12.2	25.42	19.79	12.2	8.74	54.49
13.2	26.49	5.38	13.2	39.72	17.44	13.2	40.15	48.23	13.2	25.25	19.78	13.2	8.27	54.47
14.2	26.25	5.21	14.2	39.57	17.37	14.2	39.72	48.19	14.2	25.08	19.75	14.2	7.82	54.45
15.2	26.01	5.05	15.2	39.42	17.30	15.2	39.27	48.15	15.2	24.92	19.73	15.2	7.40	54.43
16.2	25.78	4.90	16.2	39.28	17.24	16.2	38.82	48.07	16.2	24.75	19.68	16.2	6.97	54.41
17.2	25.55	4.76	17.2	39.15	17.19	17.2	38.36	47.99	17.2	24.57	19.61	17.2	6.54	54.40
18.2	25.31	4.64	18.2	39.02	17.15	18.2	37.92	47.87	18.2	24.39	19.52	18.2	6.11	54.41
19.2	25.07	4.52	19.2	38.87	17.11	19.2	37.50	47.74	19.2	24.24	19.42	19.2	5.67	54.43
20.2	24.81	4.40	20.2	38.72	17.08	20.2	37.11	47.60	20.2	24.10	19.29	20.2	5.22	54.45
21.2	24.55	4.26	21.2	38.58	17.04	21.2	36.74	47.47	21.2	23.97	19.17	21.2	4.76	54.45
22.2	24.29	4.09	22.2	38.43	16.97	22.2	36.42	47.34	22.2	23.84	19.05	22.2	4.28	54.45
23.2	24.03	3.90	23.2	38.27	16.87	23.2	36.10	47.21	23.2	23.72	18.95	23.2	3.78	54.41
24.1	23.79	3.68	24.2	38.12	16.75	24.2	35.77	47.11	24.2	23.59	18.86	24.2	3.30	54.36
25.1	23.55	3.46	25.2	37.97	16.62	25.2	35.42	47.01	25.2	23.47	18.78	25.2	2.83	54.27
26.1	23.32	3.24	26.2	37.83	16.48	26.2	35.05	46.92	26.2	23.34	18.71	26.2	2.37	54.17
27.1	23.12	3.02	27.2	37.69	16.33	27.2	34.65	46.82	27.2	23.19	18.63	27.2	1.94	54.09
28.1	22.92	2.80	28.2	37.57	16.20	28.2	34.24	46.69	28.2	23.02	18.53	28.2	1.52	54.00
29.1	22.72	2.61	29.2	37.44	16.07	29.2	33.82	46.55	29.2	22.87	18.41	29.2	1.12	53.91
30.1	22.52	2.42	30.2	37.31	15.97	30.2	33.41	46.39	30.2	22.72	18.28	30.2	0.74	53.85
31.1	22.32	2.24	31.2	37.19	15.86	31.2	33.00	46.21	31.2	22.56	18.11	31.2	0.34	53.79
11.11	-11.06		6.21	-6.13		20.33	+20.30		7.73	+7.67		18.58	-18.55	
5 <sup>h</sup> 45 <sup>m</sup>	39° 71' 9"		6 <sup>h</sup> 46 <sup>m</sup>	43° 70' 4"		7 <sup>h</sup> 3 <sup>m</sup>	31° 43' 4"		7 <sup>h</sup> 14 <sup>m</sup>	20° 71' 3"		7 <sup>h</sup> 15 <sup>m</sup>	19° 35' 2"	
-84° 49'	42'' 94		-80° 43'	50'' 12		+87° 10'	88'' 36		+82° 34'	16'' 90		-86° 54'	26'' 23	

CIRCUMPOLAR STARS.

FOR THE UPPER TRANSIT AT WASHINGTON.

Groombridge 1119. Mag. 7.6			ζ Octantis. Mag. 5.4			1 H. Draconis. Mag. 4.6			ζ Ophiocentauris. Mag. 5.2			30 H. Camelop. Mag. 5.3		
Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.
Apr.	h m	° '	Apr.	h m	° '	Apr.	h m	° '	Apr.	h m	° '	Apr.	h m	° '
	8 18	+88 52		9 8	-85 21		9 25	+81 40		9 86	-80 35		10 21	+82 57
0.3	90.07	33.32	0.4	41.62	8.60	0.4	55.94	56.32	0.4	23.50	22.00	0.4	36.76	58.21
1.3	88.97	33.47	1.4	41.39	8.82	1.4	55.82	56.55	1.4	23.40	22.24	1.4	36.63	58.49
2.3	87.82	33.58	2.4	41.17	9.04	2.4	55.69	56.76	2.4	23.31	22.48	2.4	36.50	58.76
3.3	86.68	33.68	3.3	40.95	9.27	3.4	55.55	56.96	3.4	23.21	22.73	3.4	36.37	59.01
4.3	85.55	33.76	4.3	40.74	9.51	4.4	55.41	57.13	4.4	23.11	23.00	4.4	36.24	59.25
5.3	84.44	33.82	5.3	40.51	9.75	5.4	55.28	57.28	5.4	23.02	23.27	5.4	36.11	59.47
6.3	83.37	33.89	6.3	40.27	9.99	6.4	55.15	57.43	6.4	22.93	23.54	6.4	35.99	59.67
7.3	82.34	33.94	7.3	40.03	10.23	7.3	55.04	57.57	7.4	22.82	23.81	7.4	35.87	59.88
8.3	81.33	33.99	8.3	39.78	10.46	8.3	54.93	57.71	8.4	22.71	24.07	8.4	35.76	60.06
9.3	80.35	34.06	9.3	39.51	10.66	9.3	54.82	57.84	9.4	22.60	24.32	9.4	35.65	60.28
10.3	79.37	34.12	10.3	39.25	10.87	10.3	54.71	57.99	10.3	22.48	24.55	10.4	35.54	60.48
11.3	78.40	34.18	11.3	38.97	11.06	11.3	54.59	58.14	11.3	22.35	24.78	11.4	35.43	60.70
12.3	77.41	34.25	12.3	38.69	11.23	12.3	54.48	58.30	12.3	22.22	24.98	12.4	35.32	60.92
13.3	76.39	34.31	13.3	38.41	11.39	13.3	54.35	58.46	13.3	22.10	25.18	13.4	35.19	61.14
14.3	75.32	34.38	14.3	38.14	11.54	14.3	54.22	58.62	14.3	21.98	25.36	14.4	35.07	61.36
15.3	74.20	34.44	15.3	37.88	11.69	15.3	54.09	58.78	15.3	21.86	25.54	15.4	34.93	61.58
16.3	73.04	34.49	16.3	37.63	11.83	16.3	53.95	58.93	16.3	21.74	25.71	16.4	34.79	61.79
17.3	71.86	34.50	17.3	37.39	12.00	17.3	53.80	59.04	17.3	21.63	25.89	17.4	34.63	61.99
18.3	70.67	34.50	18.3	37.15	12.17	18.3	53.65	59.15	18.3	21.52	26.06	18.4	34.47	62.17
19.3	69.52	34.47	19.3	36.90	12.35	19.3	53.49	59.22	19.3	21.42	26.29	19.4	34.31	62.32
20.3	68.42	34.44	20.3	36.65	12.53	20.3	53.34	59.28	20.3	21.31	26.51	20.4	34.15	62.46
21.3	67.39	34.39	21.3	36.38	12.72	21.3	53.22	59.32	21.3	21.20	26.73	21.3	34.00	62.57
22.3	66.45	34.35	22.3	36.10	12.90	22.3	53.10	59.37	22.3	21.07	26.93	22.3	33.87	62.66
23.3	65.53	34.31	23.3	35.81	13.06	23.3	52.99	59.43	23.3	20.94	27.13	23.3	33.74	62.80
24.3	64.61	34.30	24.3	35.51	13.20	24.3	52.88	59.51	24.3	20.81	27.30	24.3	33.62	62.93
25.3	63.66	34.29	25.3	35.20	13.30	25.3	52.77	59.59	25.3	20.66	27.45	25.3	33.49	63.07
26.3	62.66	34.28	26.3	34.90	13.39	26.3	52.64	59.68	26.3	20.52	27.58	26.3	33.36	63.23
27.2	61.59	34.27	27.3	34.62	13.47	27.3	52.51	59.77	27.3	20.39	27.69	27.3	33.22	63.40
28.2	60.49	34.24	28.3	34.35	13.55	28.3	52.36	59.87	28.3	20.27	27.79	28.3	33.06	63.56
29.2	59.32	34.21	29.3	34.09	13.63	29.3	52.21	59.94	29.3	20.14	27.91	29.3	32.88	63.71
30.2	58.14	34.15	30.3	33.84	13.72	30.3	52.06	60.00	30.3	20.03	28.04	30.3	32.70	63.84
31.2	56.98	34.07	31.3	33.60	13.82	31.3	51.90	60.04	31.3	19.92	28.16	31.3	32.53	63.95
50.99	+50.98	12.34	-12.30	6.91	+6.84	6.12	-6.03	8.17	+8.11					
9 <sup>h</sup> 18 <sup>m</sup>	46 <sup>s</sup> .642	9 <sup>h</sup> 8 <sup>m</sup>	33 <sup>s</sup> .397	9 <sup>h</sup> 25 <sup>m</sup>	48 <sup>s</sup> .041	9 <sup>h</sup> 36 <sup>m</sup>	17 <sup>s</sup> .360	10 <sup>h</sup> 21 <sup>m</sup>	27 <sup>s</sup> .495					
+88° 52'	26'' .44	-85° 20'	41'' .44	+81° 40'	54'' .43	-80° 34'	55'' .47	+82° 57'	59'' .46					

CIRCUMPOLAR STARS.

FOR THE UPPER TRANSIT AT WASHINGTON.

γ Octantis. Mag. 6.3			Bradley 1878. Mag. 6.3			ι Octantis. Mag. 5.4			33 H. Camelopard. seq. Mag. 5.3			κ Octantis. Mag. 5.6			
Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	
Apr.	h m 11 0	° -84 10	Apr.	h m 12 14	° +88 8	Apr.	h m 12 46	° -84 41	Apr.	h m 12 48	° +83 50	Apr.	h m 13 28	° -85 22	
	s 8.56	" 9.20		s 56.60	" 29.14		s 45.63	" 30.79		s 40.31	" 42.25		s 6.33	" 42.75	
	1.4	8.46	9.51	1.5	56.50	29.48	1.5	45.65	31.12	1.5	40.31	42.61	1.5	6.39	43.09
	2.4	8.37	9.83	2.5	56.34	29.83	2.5	45.68	31.45	2.5	40.30	42.96	2.5	6.47	43.43
	3.4	8.29	10.15	3.5	56.15	30.17	3.5	45.70	31.81	3.5	40.27	43.31	3.5	6.54	43.77
	4.4	8.21	10.49	4.5	55.93	30.49	4.5	45.73	32.17	4.5	40.24	43.65	4.5	6.63	44.11
	5.4	8.13	10.82	5.5	55.70	30.80	5.5	45.76	32.54	5.5	40.20	43.98	5.5	6.72	44.47
	6.4	8.04	11.16	6.5	55.47	31.09	6.5	45.79	32.92	6.5	40.16	44.29	6.5	6.81	44.84
	7.4	7.94	11.52	7.5	55.24	31.38	7.5	45.80	33.31	7.5	40.13	44.59	7.5	6.89	45.22
	8.4	7.83	11.88	8.5	55.03	31.67	8.5	45.81	33.70	8.5	40.10	44.88	8.5	6.96	45.60
	9.4	7.71	12.22	9.5	54.83	31.95	9.5	45.82	34.09	9.5	40.07	45.17	9.5	7.02	45.99
	10.4	7.59	12.55	10.5	54.64	32.23	10.5	45.80	34.48	10.5	40.04	45.47	10.5	7.06	46.37
	11.4	7.46	12.87	11.5	54.46	32.52	11.5	45.77	34.86	11.5	40.01	45.78	11.5	7.08	46.76
	12.4	7.32	13.18	12.5	54.28	32.82	12.5	45.74	35.24	12.5	39.99	46.09	12.5	7.10	47.15
	13.4	7.18	13.46	13.4	54.07	33.12	13.5	45.70	35.61	13.5	39.96	46.40	13.5	7.10	47.51
	14.4	7.03	13.75	14.4	53.85	33.43	14.5	45.65	35.97	14.5	39.93	46.72	14.5	7.10	47.87
	15.4	6.89	14.03	15.4	53.60	33.75	15.5	45.61	36.30	15.5	39.89	47.05	15.5	7.11	48.21
	16.4	6.76	14.30	16.4	53.31	34.07	16.5	45.57	36.63	16.5	39.84	47.39	16.5	7.11	48.55
	17.4	6.64	14.58	17.4	52.97	34.37	17.5	45.56	36.96	17.5	39.76	47.72	17.5	7.14	48.88
	18.4	6.54	14.87	18.4	52.59	34.66	18.5	45.55	37.30	18.5	39.68	48.05	18.5	7.18	49.21
	19.4	6.42	15.18	19.4	52.18	34.93	19.5	45.53	37.66	19.5	39.58	48.35	19.5	7.22	49.58
	20.4	6.30	15.50	20.4	51.76	35.17	20.5	45.52	38.03	20.5	39.49	48.63	20.5	7.27	49.94
	21.4	6.17	15.82	21.4	51.38	35.41	21.4	45.50	38.40	21.5	39.39	48.90	21.5	7.30	50.32
	22.4	6.04	16.14	22.4	51.01	35.64	22.4	45.47	38.80	22.4	39.31	49.14	22.5	7.32	50.73
	23.4	5.88	16.45	23.4	50.67	35.86	23.4	45.43	39.20	23.4	39.25	49.39	23.5	7.32	51.13
	24.4	5.71	16.73	24.4	50.35	36.09	24.4	45.36	39.58	24.4	39.19	49.65	24.5	7.29	51.53
	25.4	5.53	16.99	25.4	50.04	36.35	25.4	45.27	39.94	25.4	39.12	49.92	25.5	7.26	51.91
	26.4	5.36	17.23	26.4	49.73	36.61	26.4	45.18	40.27	26.4	39.04	50.19	26.5	7.21	52.28
	27.4	5.19	17.46	27.4	49.38	36.88	27.4	45.10	40.59	27.4	38.97	50.49	27.5	7.16	52.61
	28.4	5.03	17.69	28.4	48.99	37.15	28.4	45.01	40.91	28.4	38.89	50.80	28.5	7.11	52.94
	29.4	4.88	17.91	29.4	48.56	37.42	29.4	44.93	41.19	29.4	38.79	51.11	29.5	7.06	53.26
	30.4	4.73	18.13	30.4	48.09	37.69	30.4	44.87	41.48	30.4	38.67	51.41	30.5	7.03	53.56
	31.3	4.59	18.36	31.4	47.58	37.93	31.4	44.81	41.79	31.4	38.54	51.69	31.5	7.01	53.88
	9.85	-9.79		30.85	+30.84		10.81	-10.77		9.33	+9.27		12.42	-12.87	
	10 <sup>h</sup> 59 <sup>m</sup> 54 <sup>s</sup> .174			12 <sup>h</sup> 14 <sup>m</sup> 29 <sup>s</sup> .583			12 <sup>h</sup> 46 <sup>m</sup> 25 <sup>s</sup> .116			12 <sup>h</sup> 48 <sup>m</sup> 31 <sup>s</sup> .755		13 <sup>h</sup> 27 <sup>m</sup> 42 <sup>s</sup> .050			
	-84° 9' 48".70			+88° 8' 36".24			-84° 41' 21".18			+83° 50' 51".72		-85° 22' 38".10			

CIRCUMPOLAR STARS.

FOR THE UPPER TRANSIT AT WASHINGTON.

δ Octantis. Mag. 4.1			Greenwich 2833. Mag. 7.2			ρ Octantis. Mag. 5.7			ε Ursae Minoris. Mag. 4.4			20 G. Apsidis. Mag. 5.9		
Wash. Mean Time.	Right Ascension.	Declination.	Wash. Mean Time.	Right Ascension.	Declination.	Wash. Mean Time.	Right Ascension.	Declination.	Wash. Mean Time.	Right Ascension.	Declination.	Wash. Mean Time.	Right Ascension.	Declination.
Apr. 14 14	-83 18		Apr. 15 2	+87 32		Apr. 15 24	-84 11		Apr. 16 54	+82 10		Apr. 17 16	-80 46	
0.6	13.02	10.66	0.6	52.02	14.99	0.6	55.42	58.85	0.7	7.30	0.82	0.7	87.53	58.66
1.6	13.10	10.96	1.6	52.32	15.28	1.6	55.59	59.09	1.7	7.46	1.00	1.7	87.66	58.76
2.6	13.19	11.29	2.6	52.59	15.59	2.6	55.75	59.34	2.7	7.60	1.19	2.7	87.79	58.88
3.6	13.28	11.60	3.6	52.83	15.91	3.6	55.91	59.59	3.7	7.74	1.42	3.7	87.94	58.98
4.6	13.38	11.91	4.6	53.04	16.22	4.6	56.09	59.83	4.7	7.88	1.63	4.7	88.09	59.07
5.6	13.48	12.23	5.6	53.24	16.53	5.6	56.27	60.10	5.7	8.01	1.86	5.7	88.24	59.17
6.6	13.59	12.56	6.6	53.42	16.82	6.6	56.46	60.38	6.7	8.13	2.06	6.7	88.41	59.29
7.5	13.69	12.92	7.6	53.60	17.12	7.6	56.64	60.66	7.7	8.24	2.27	7.7	88.57	59.42
8.5	13.78	13.28	8.6	53.77	17.40	8.6	56.82	60.96	8.7	8.36	2.47	8.7	88.73	59.55
9.5	13.87	13.64	9.6	53.96	17.68	9.6	56.98	61.28	9.7	8.48	2.67	9.7	88.89	59.71
10.5	13.94	14.00	10.6	54.14	17.96	10.6	57.14	61.59	10.7	8.61	2.86	10.7	89.04	59.88
11.5	14.00	14.37	11.6	54.33	18.23	11.6	57.29	61.92	11.6	8.73	3.06	11.7	89.19	60.07
12.5	14.06	14.74	12.6	54.53	18.51	12.6	57.48	62.24	12.6	8.85	3.25	12.7	89.34	60.26
13.5	14.11	15.11	13.6	54.73	18.80	13.6	57.65	62.56	13.6	8.98	3.45	13.7	89.48	60.45
14.5	14.16	15.45	14.6	54.93	19.11	14.6	57.86	62.87	14.6	9.11	3.67	14.7	89.61	60.63
15.5	14.20	15.78	15.6	55.12	19.43	15.6	57.77	63.16	15.6	9.23	3.90	15.7	89.73	60.81
16.5	14.25	16.11	16.6	55.27	19.76	16.6	57.99	63.44	16.6	9.35	4.16	16.6	89.85	60.96
17.5	14.31	16.43	17.6	55.41	20.10	17.6	58.02	63.72	17.6	9.46	4.42	17.6	89.98	61.13
18.5	14.37	16.75	18.6	55.50	20.44	18.6	58.15	63.99	18.6	9.57	4.71	18.6	40.12	61.27
19.5	14.44	17.06	19.5	55.56	20.79	19.6	58.30	64.27	19.6	9.66	5.00	19.6	40.25	61.41
20.5	14.52	17.48	20.5	55.59	21.11	20.6	58.45	64.57	20.6	9.75	5.29	20.6	40.39	61.57
21.5	14.58	17.80	21.5	55.61	21.41	21.6	58.61	64.89	21.6	9.84	5.56	21.6	40.55	61.74
22.5	14.65	18.18	22.5	55.63	21.70	22.6	58.76	65.23	22.6	9.91	5.80	22.6	40.71	61.93
23.5	14.70	18.56	23.5	55.67	21.98	23.6	58.91	65.59	23.6	10.00	6.05	23.6	40.86	62.16
24.5	14.74	18.97	24.5	55.74	22.26	24.6	59.02	65.95	24.6	10.10	6.28	24.6	41.00	62.40
25.5	14.75	19.35	25.5	55.82	22.54	25.5	59.12	66.31	25.6	10.19	6.51	25.6	41.14	62.64
26.5	14.76	19.72	26.5	55.91	22.85	26.5	59.21	66.65	26.6	10.29	6.72	26.6	41.25	62.87
27.5	14.76	20.06	27.5	55.99	23.16	27.5	59.27	66.98	27.6	10.39	7.08	27.6	41.35	63.10
28.5	14.77	20.39	28.5	56.05	23.49	28.5	59.35	67.29	28.6	10.48	7.31	28.6	41.45	63.32
29.5	14.77	20.70	29.5	56.10	23.85	29.5	59.43	67.56	29.6	10.57	7.62	29.6	41.56	63.52
30.5	14.80	21.00	30.5	56.11	24.21	30.5	59.52	67.87	30.6	10.66	7.94	30.6	41.67	63.72
31.5	14.83	21.31	31.5	56.08	24.55	31.5	59.61	68.16	31.6	10.73	8.27	31.6	41.79	63.91
8.56	-6.52	23.22	+23.25	2.99	-9.85	7.34	+7.37	6.24	-6.16					
14 <sup>h</sup> 13 <sup>m</sup> 55 <sup>s</sup> .44	15 <sup>h</sup> 2 <sup>m</sup> 49 <sup>s</sup> .277	15 <sup>h</sup> 24 <sup>m</sup> 30 <sup>s</sup> .751	16 <sup>h</sup> 54 <sup>m</sup> 0 <sup>s</sup> .748	17 <sup>h</sup> 16 <sup>m</sup> 28 <sup>s</sup> .406										
-83° 18' 11".28	+87° 32' 28".60	-84° 12' 7".98	+82° 10' 15".74	-80° 47' 18".19										

CIRCUMPOLAR STARS.

FOR THE UPPER TRANSIT AT WASHINGTON.

δ Ursa Minoris. Mag. 4.4			χ Octantis. Mag. 5.2			λ Ursa Minoris. Mag. 6.6			σ Octantis. Mag. 5.5			76 Draconis. Mag. 5.7		
Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.
Apr. 17 57	+86 36		Apr. 18 8	-87 39		Apr. 18 58	+89 1		Apr. 19 32	-89 12		Apr. 20 48	+82 14	
	h m	° ' "		h m	° ' "		h m	° ' "		h m	° ' "		h m	° ' "
0.7	57.75	87.66	0.7	22.14	26.19	0.8	28.84	6.96	0.8	43.00	38.03	0.8	23.10	3.86
1.7	58.14	87.74	1.7	22.70	26.24	1.8	30.21	6.96	1.8	44.62	37.94	1.8	23.26	3.69
2.7	58.52	87.84	2.7	23.26	26.27	2.8	31.59	6.97	2.8	46.23	37.84	2.8	23.43	3.54
3.7	58.89	87.97	3.7	23.85	26.28	3.8	32.95	7.01	3.8	47.85	37.73	3.8	23.60	3.42
4.7	59.25	88.10	4.7	24.45	26.31	4.8	34.26	7.06	4.8	49.53	37.62	4.8	23.75	3.32
5.7	59.60	88.24	5.7	25.06	26.34	5.8	35.52	7.11	5.8	51.29	37.52	5.8	23.91	3.23
6.7	59.93	88.38	6.7	25.70	26.38	6.8	36.74	7.16	6.8	53.10	37.41	6.8	24.07	3.15
7.7	60.25	88.52	7.7	26.34	26.43	7.7	37.92	7.22	7.8	54.96	37.32	7.8	24.22	3.06
8.7	60.57	88.66	8.7	26.99	26.49	8.7	39.09	7.28	8.8	56.86	37.25	8.8	24.37	2.97
9.7	60.88	88.79	9.7	27.64	26.57	9.7	40.24	7.33	9.8	58.77	37.19	9.8	24.52	2.88
10.7	61.19	88.90	10.7	28.27	26.67	10.7	41.39	7.37	10.8	60.70	37.14	10.8	24.66	2.80
11.7	61.51	89.01	11.7	28.89	26.78	11.7	42.54	7.40	11.8	62.59	37.10	11.8	24.81	2.71
12.7	61.84	89.14	12.7	29.50	26.91	12.7	43.73	7.44	12.8	64.47	37.08	12.8	24.96	2.61
13.7	62.16	89.26	13.7	30.07	27.03	13.7	44.94	7.48	13.8	66.27	37.07	13.8	25.11	2.51
14.7	62.50	89.40	14.7	30.62	27.14	14.7	46.21	7.54	14.7	68.01	37.06	14.8	25.27	2.41
15.7	62.84	89.55	15.7	31.16	27.25	15.7	47.51	7.60	15.7	69.69	37.05	15.8	25.44	2.32
16.7	63.18	89.73	16.7	31.69	27.35	16.7	48.82	7.66	16.7	71.33	37.03	16.8	25.61	2.26
17.7	63.52	89.92	17.7	32.23	27.44	17.7	50.13	7.81	17.7	72.97	36.99	17.8	25.78	2.21
18.7	63.84	40.14	18.7	32.78	27.52	18.7	51.38	7.94	18.7	74.65	36.95	18.8	25.95	2.20
19.7	64.13	40.37	19.7	33.37	27.60	19.7	52.56	8.09	19.7	76.40	36.90	19.8	26.12	2.20
20.7	64.41	40.59	20.7	33.96	27.69	20.7	53.65	8.23	20.7	78.24	36.85	20.8	26.29	2.22
21.7	64.65	40.79	21.7	34.63	27.80	21.7	54.68	8.38	21.7	80.17	36.81	21.8	26.44	2.24
22.7	64.90	41.00	22.7	35.27	27.93	22.7	55.67	8.52	22.7	82.16	36.81	22.8	26.59	2.26
23.7	65.14	41.19	23.7	35.89	28.07	23.7	56.63	8.65	23.7	84.15	36.81	23.8	26.75	2.27
24.7	65.39	41.37	24.7	36.49	28.25	24.7	57.63	8.76	24.7	86.11	36.84	24.8	26.89	2.27
25.7	65.66	41.54	25.7	37.05	28.43	25.7	58.67	8.86	25.7	87.99	36.89	25.8	27.04	2.24
26.7	65.94	41.72	26.7	37.58	28.62	26.7	59.78	8.97	26.7	89.76	36.94	26.8	27.19	2.21
27.6	66.23	41.91	27.7	38.07	28.80	27.7	60.94	9.10	27.7	91.42	37.00	27.8	27.37	2.20
28.6	66.52	42.14	28.7	38.55	28.97	28.7	62.15	9.24	28.7	93.02	37.05	28.8	27.53	2.19
29.6	66.82	42.37	29.6	39.02	29.12	29.7	63.34	9.41	29.7	94.57	37.09	29.8	27.70	2.21
30.6	67.10	42.63	30.6	39.49	29.27	30.7	64.52	9.59	30.7	96.13	37.13	30.8	27.87	2.25
31.6	67.36	42.90	31.6	39.98	29.40	31.7	65.64	9.79	31.7	97.71	37.14	31.8	28.06	2.30
16.92	+16.89		24.47	-24.45		58.40	+56.39		72.55	-73.55		7.40	+7.33	
17 <sup>h</sup> 59 <sup>m</sup> 2 <sup>s</sup> .814			18 <sup>h</sup> 7 <sup>m</sup> 59 <sup>s</sup> .062			18 <sup>h</sup> 59 <sup>m</sup> 2 <sup>s</sup> .477			19 <sup>h</sup> 32 <sup>m</sup> 24 <sup>s</sup> .283			20 <sup>h</sup> 48 <sup>m</sup> 27 <sup>s</sup> .944		
+86° 36' 50".93			-87° 39' 50".84			+89° 1' 17".86			-89° 13' 5".55			+82° 14' 10".29		



CIRCUMPOLAR STARS.

FOR THE UPPER TRANSIT AT WASHINGTON.

λ Octantis. Mag. 5.4			ν Octantis. Mag. 5.7			β Octantis. Mag. 4.8			39 H. Cephei. Mag. 5.6			γ <sup>1</sup> Octantis. Mag. 5.1		
Wash. Mean Time.	Right Ascension.	Declination.	Wash. Mean Time.	Right Ascension.	Declination.	Wash. Mean Time.	Right Ascension.	Declination.	Wash. Mean Time.	Right Ascension.	Declination.	Wash. Mean Time.	Right Ascension.	Declination.
Apr.	h m	° ' "	Apr.	h m	° ' "	Apr.	h m	° ' "	Apr.	h m	° ' "	Apr.	h m	° ' "
	21 38	-83 4		22 16	-86 22		22 37	-81 47		23 27	+86 51		23 47	-82 27
	s	"		s	"		s	"		s	"		s	"
0.9	43.24	58.63	0.9	30.70	10.14	0.9	51.27	45.61	0.9	28.39	62.12	0.9	17.02	34.03
1.9	43.38	58.37	1.9	30.90	9.85	1.9	51.35	45.30	1.9	28.55	61.79	1.9	17.05	33.70
2.9	43.52	58.11	2.9	31.10	9.54	2.9	51.42	44.99	2.9	28.78	61.47	2.9	17.06	33.34
3.9	43.65	52.85	3.9	31.30	9.23	3.9	51.50	44.67	3.9	28.95	61.16	3.9	17.11	32.99
4.9	43.78	52.57	4.9	31.50	8.92	4.9	51.57	44.34	4.9	29.17	60.88	4.9	17.14	32.63
5.9	43.92	52.29	5.9	31.72	8.60	5.9	51.66	43.99	5.9	29.39	60.60	5.9	17.17	32.26
6.9	44.06	52.00	6.9	31.95	8.28	6.9	51.75	43.64	6.9	29.60	60.34	6.9	17.21	31.88
7.9	44.25	51.72	7.9	32.21	7.96	7.9	51.85	43.30	7.9	29.82	60.10	7.9	17.27	31.50
8.9	44.42	51.44	8.9	32.47	7.64	8.9	51.97	42.96	8.9	30.02	59.85	8.9	17.33	31.12
9.9	44.59	51.18	9.9	32.75	7.35	9.9	52.09	42.64	9.9	30.22	59.60	9.9	17.40	30.73
10.8	44.76	50.94	10.9	33.04	7.06	10.9	52.21	42.32	10.9	30.42	59.34	10.9	17.48	30.36
11.8	44.95	50.70	11.9	33.34	6.77	11.9	52.34	42.00	11.9	30.60	59.08	11.9	17.57	29.99
12.8	45.14	50.48	12.9	33.64	6.50	12.9	52.46	41.71	12.9	30.79	58.82	12.9	17.66	29.63
13.8	45.32	50.28	13.9	33.93	6.25	13.9	52.58	41.43	13.9	30.99	58.56	13.9	17.74	29.30
14.8	45.49	50.08	14.9	34.22	6.01	14.9	52.69	41.16	14.9	31.21	58.28	14.9	17.82	28.96
15.8	45.65	49.88	15.9	34.49	5.77	15.9	52.80	40.90	15.9	31.44	58.00	15.9	17.90	28.64
16.8	45.80	49.69	16.9	34.75	5.52	16.9	52.90	40.64	16.9	31.71	57.73	16.9	17.96	28.32
17.8	45.95	49.47	17.9	34.99	5.28	17.9	53.00	40.36	17.9	31.99	57.48	17.9	18.02	27.99
18.8	46.11	49.24	18.9	35.25	5.01	18.9	53.10	40.07	18.9	32.30	57.25	18.9	18.06	27.65
19.8	46.28	49.00	19.8	35.51	4.73	19.9	53.21	39.76	19.9	32.62	57.03	19.9	18.15	27.29
20.8	46.45	48.75	20.8	35.78	4.44	20.9	53.33	39.45	20.9	32.93	56.84	20.9	18.23	26.93
21.8	46.63	48.51	21.8	36.09	4.14	21.9	53.46	39.13	21.9	33.22	56.66	21.9	18.32	26.55
22.8	46.83	48.28	22.8	36.41	3.86	22.9	53.59	38.82	22.9	33.50	56.48	22.9	18.41	26.18
23.8	47.05	48.08	23.8	36.76	3.59	23.9	53.74	38.53	23.9	33.77	56.31	23.9	18.51	25.82
24.8	47.26	47.88	24.8	37.12	3.36	24.9	53.90	38.26	24.9	34.03	56.12	24.9	18.64	25.47
25.8	47.46	47.71	25.8	37.48	3.14	25.8	54.05	38.01	25.9	34.28	55.91	25.9	18.76	25.14
26.8	47.66	47.57	26.8	37.81	2.94	26.8	54.19	37.77	26.9	34.55	55.69	26.9	18.87	24.83
27.8	47.84	47.44	27.8	38.12	2.75	27.8	54.33	37.55	27.9	34.83	55.48	27.9	18.98	24.55
28.8	48.01	47.30	28.8	38.43	2.57	28.8	54.45	37.34	28.9	35.14	55.26	28.9	19.08	24.26
29.8	48.18	47.16	29.8	38.71	2.39	29.8	54.58	37.13	29.9	35.47	55.04	29.9	19.18	23.99
30.8	48.34	47.01	30.8	38.99	2.19	30.8	54.69	36.91	30.9	35.83	54.85	30.9	19.27	23.71
31.8	48.51	46.86	31.8	39.27	2.00	31.8	54.81	36.69	31.9	36.19	54.67	31.9	19.36	23.41
3.30	-8.24	15.79	-15.75	7.01	-6.98	18.29	+18.27	7.62	-7.55					
21 <sup>a</sup> 39 <sup>m</sup>	48 <sup>s</sup> .095	22 <sup>a</sup> 16 <sup>m</sup>	45 <sup>s</sup> .446	22 <sup>a</sup> 37 <sup>m</sup>	57 <sup>s</sup> .920	23 <sup>a</sup> 27 <sup>m</sup>	43 <sup>s</sup> .285	23 <sup>a</sup> 47 <sup>m</sup>	27 <sup>s</sup> .240					
-83° 5'	17'' .98	-86° 22'	32'' .81	-81° 48'	6'' .03	+86° 51'	58'' .40	-82° 27'	48'' .42					

## CIRCUMPOLAR STARS.

FOR THE UPPER TRANSIT AT WASHINGTON.

48 H. Cephei. Mag. 4.5			$\alpha$ Ursa Minoris. (Polaris.) Mag. 2.1			4 G. Octantis. Mag. 5.6			Greenwich 750. Mag. 6.7			Greenwich 944. Mag. 6.4		
Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.
May	h m 0 57	° +85 49	May	h m 1 31	° +88 52	May	h m 1 41	° -85 10	May	h m 4 10	° +85 20	May	h m 5 36	° +85 9
	s "	"		s "	"		s "	"		s "	"		s "	"
0.9	26.49	42.90	0.9	15.34	39.89	0.9	29.86	14.19	1.1	52.55	43.56	1.1	8.35	43.61
1.9	26.69	42.62	1.9	15.89	39.58	1.9	29.88	13.86	2.1	52.49	43.23	2.1	8.20	43.32
2.9	26.89	42.36	2.9	16.48	39.29	2.9	29.90	13.52	3.1	52.45	42.90	3.1	8.06	43.04
3.9	27.10	42.12	3.9	17.07	39.00	3.9	29.93	13.16	4.1	52.42	42.58	4.1	7.95	42.77
4.9	27.30	41.88	4.9	17.67	38.72	4.9	29.96	12.79	5.1	52.41	42.29	5.1	7.84	42.50
5.9	27.49	41.66	5.9	18.24	38.48	5.9	30.00	12.41	6.1	52.39	41.99	6.1	7.74	42.24
6.9	27.68	41.44	6.9	18.81	38.23	6.9	30.05	12.03	7.0	52.38	41.71	7.1	7.64	41.99
7.9	27.87	41.23	7.9	19.36	38.00	7.9	30.13	11.66	8.0	52.35	41.44	8.1	7.53	41.75
8.9	28.05	41.03	8.9	19.88	37.76	8.9	30.20	11.29	9.0	52.32	41.17	9.1	7.43	41.51
9.9	28.22	40.82	9.9	20.38	37.51	9.9	30.29	10.93	10.0	52.28	40.89	10.1	7.32	41.27
10.9	28.40	40.60	10.9	20.89	37.25	10.9	30.39	10.59	11.0	52.24	40.58	11.1	7.20	41.03
11.9	28.58	40.36	11.9	21.42	36.99	11.9	30.49	10.24	12.0	52.20	40.28	12.1	7.07	40.77
12.9	28.77	40.13	12.9	21.99	36.71	12.9	30.59	9.91	13.0	52.16	39.98	13.1	6.95	40.50
13.9	28.99	39.89	13.9	22.62	36.43	13.9	30.67	9.60	14.0	52.15	39.66	14.1	6.84	40.21
14.9	29.21	39.66	14.9	23.33	36.16	14.9	30.75	9.29	15.0	52.14	39.34	15.1	6.74	39.90
15.9	29.47	39.43	15.9	24.12	35.91	15.9	30.81	8.98	16.0	52.13	39.00	16.1	6.65	39.59
16.9	29.73	39.24	16.9	24.98	35.67	16.9	30.87	8.66	17.0	52.20	38.67	17.1	6.60	39.26
17.9	30.00	39.06	17.9	25.86	35.44	17.9	30.95	8.33	18.0	52.25	38.35	18.1	6.55	38.94
18.9	30.28	38.91	18.9	26.75	35.24	18.9	31.02	7.97	19.0	52.31	38.05	19.1	6.53	38.63
19.9	30.54	38.77	19.9	27.59	35.06	19.9	31.12	7.60	20.0	52.38	37.76	20.1	6.52	38.34
20.9	30.78	38.64	20.9	28.38	34.89	20.9	31.24	7.23	21.0	52.44	37.48	21.1	6.49	38.07
21.9	31.02	38.51	21.9	29.12	34.72	21.9	31.36	6.88	22.0	52.50	37.21	22.1	6.46	37.82
22.9	31.24	38.37	22.9	29.81	34.54	22.9	31.51	6.54	23.0	52.55	36.95	23.1	6.42	37.56
23.9	31.45	38.21	23.9	30.50	34.34	23.9	31.66	6.21	24.0	52.58	36.68	24.1	6.37	37.30
24.9	31.67	38.04	24.9	31.21	34.12	24.9	31.81	5.91	24.9	52.60	36.40	25.1	6.29	37.02
25.9	31.90	37.86	25.9	31.97	33.89	25.9	31.95	5.62	25.9	52.63	36.09	26.1	6.23	36.72
26.9	32.16	37.67	26.9	32.79	33.66	26.9	32.06	5.34	26.9	52.67	35.77	27.1	6.17	36.41
27.9	32.43	37.50	27.9	33.70	33.43	27.9	32.21	5.08	27.9	52.72	35.44	28.0	6.11	36.08
28.9	32.72	37.33	28.9	34.66	33.23	28.9	32.31	4.81	28.9	52.79	35.10	29.0	6.07	35.74
29.9	33.02	37.19	29.9	35.64	33.04	29.9	32.43	4.54	29.9	52.88	34.78	30.0	6.06	35.41
30.8	33.32	37.05	30.9	36.65	32.85	30.9	32.55	4.28	30.9	52.97	34.47	31.0	6.06	35.07
31.8	33.62	36.95	31.9	37.65	32.70	31.9	32.68	3.96	31.9	53.08	34.17	32.0	6.07	34.74
13.74	+18.71		31.01	+51.00		11.87	-11.83		12.32	+12.28		11.85	+11.81	
0 <sup>h</sup> 57 <sup>m</sup>	32 <sup>s</sup> .323		1 <sup>h</sup> 31 <sup>m</sup>	41 <sup>s</sup> .366		1 <sup>h</sup> 41 <sup>m</sup>	51 <sup>s</sup> .117		4 <sup>h</sup> 10 <sup>m</sup>	55 <sup>s</sup> .493		5 <sup>h</sup> 36 <sup>m</sup>	9 <sup>s</sup> .111	
+85° 49'	43'' .55		+88° 52'	39'' .02		-85° 10'	27'' .09		+85° 20'	38'' .12		+85° 9'	36'' .60	

CIRCUMPOLAR STARS.

FOR THE UPPER TRANSIT AT WASHINGTON.

31 G. Minors. Mag. 6.2			5 Minors. Mag. 5.6			51 H. Cephei. Mag. 5.3			25 H. Comae. Mag. 5.1			7 G. Octantis. Mag. 6.4		
Wash. Mean Time.	Right Ascension.	Declination.	Wash. Mean Time.	Right Ascension.	Declination.	Wash. Mean Time.	Right Ascension.	Declination.	Wash. Mean Time.	Right Ascension.	Declination.	Wash. Mean Time.	Right Ascension.	Declination.
May	h m 5 45	° ' " -84 49	May	h m 6 46	° ' " -80 44	May	h m 7 3	° ' " +87 10	May	h m 7 14	° ' " +82 34	May	h m 7 14	° ' " -86 54
	s "	"		s "	"		s "	"		s "	"		s "	"
1.1	22.32	62.24	1.2	37.19	15.86	1.2	33.00	46.21	1.2	22.56	18.11	1.2	60.34	53.79
2.1	22.12	62.06	2.2	37.07	15.76	2.2	32.62	46.02	2.2	22.41	17.94	2.2	59.84	53.74
3.1	21.90	61.87	3.2	36.94	15.66	3.2	32.26	45.82	3.2	22.27	17.76	3.2	59.54	53.69
4.1	21.68	61.68	4.2	36.81	15.54	4.2	31.93	45.62	4.2	22.14	17.58	4.2	59.12	53.62
5.1	21.47	61.47	5.2	36.67	15.41	5.2	31.61	45.42	5.2	22.02	17.41	5.2	58.67	53.54
6.1	21.27	61.25	6.2	36.54	15.26	6.2	31.30	45.23	6.2	21.92	17.24	6.2	58.24	53.45
7.1	21.07	61.02	7.2	36.41	15.09	7.2	31.01	45.04	7.2	21.80	17.07	7.2	57.81	53.35
8.1	20.87	60.76	8.2	36.28	14.92	8.2	30.72	44.86	8.2	21.68	16.92	8.2	57.38	53.22
9.1	20.68	60.49	9.2	36.15	14.73	9.2	30.41	44.69	9.2	21.58	16.77	9.2	56.96	53.08
10.1	20.49	60.22	10.1	36.02	14.53	10.2	30.11	44.52	10.2	21.46	16.62	10.2	56.54	52.93
11.1	20.32	59.95	11.1	35.90	14.32	11.2	29.80	44.34	11.2	21.34	16.45	11.2	56.15	52.78
12.1	20.15	59.68	12.1	35.78	14.11	12.2	29.48	44.16	12.2	21.21	16.29	12.2	55.77	52.62
13.1	19.99	59.42	13.1	35.68	13.91	13.2	29.14	43.96	13.2	21.08	16.12	13.2	55.41	52.47
14.1	19.83	59.18	14.1	35.56	13.73	14.1	28.80	43.74	14.2	20.95	15.92	14.2	55.05	52.33
15.1	19.67	58.94	15.1	35.46	13.56	15.1	28.47	43.51	15.2	20.82	15.70	15.2	54.70	52.20
16.1	19.50	58.72	16.1	35.36	13.40	16.1	28.16	43.24	16.2	20.70	15.46	16.2	54.35	52.08
17.1	19.34	58.50	17.1	35.25	13.24	17.1	27.88	42.97	17.1	20.60	15.22	17.1	53.98	51.96
18.1	19.17	58.27	18.1	35.13	13.07	18.1	27.64	42.70	18.1	20.51	14.97	18.1	53.60	51.84
19.1	18.99	58.01	19.1	35.01	12.89	19.1	27.43	42.43	19.1	20.43	14.72	19.1	53.19	51.71
20.1	18.81	57.74	20.1	34.90	12.68	20.1	27.24	42.19	20.1	20.38	14.48	20.1	52.78	51.57
21.1	18.64	57.45	21.1	34.78	12.46	21.1	27.06	41.96	21.1	20.30	14.26	21.1	52.37	51.39
22.1	18.48	57.14	22.1	34.66	12.22	22.1	26.88	41.73	22.1	20.23	14.06	22.1	51.99	51.20
23.1	18.34	56.82	23.1	34.56	11.96	23.1	26.66	41.51	23.1	20.15	13.86	23.1	51.61	50.98
24.1	18.21	56.50	24.1	34.46	11.69	24.1	26.43	41.29	24.1	20.06	13.67	24.1	51.26	50.76
25.1	18.08	56.19	25.1	34.37	11.43	25.1	26.17	41.06	25.1	19.96	13.45	25.1	50.93	50.54
26.1	17.98	55.90	26.1	34.27	11.19	26.1	25.90	40.81	26.1	19.85	13.23	26.1	50.62	50.34
27.1	17.87	55.62	27.1	34.19	10.95	27.1	25.64	40.54	27.1	19.74	12.97	27.1	50.33	50.15
28.1	17.77	55.35	28.1	34.11	10.73	28.1	25.40	40.26	28.1	19.64	12.71	28.1	50.04	49.97
29.1	17.65	55.09	29.1	34.03	10.51	29.1	25.16	39.96	29.1	19.55	12.44	29.1	49.75	49.79
30.0	17.53	54.83	30.1	33.94	10.29	30.1	24.96	39.65	30.1	19.47	12.15	30.1	49.44	49.62
31.0	17.42	54.56	31.1	33.85	10.07	31.1	24.78	39.34	31.1	19.41	11.86	31.1	49.13	49.44
32.0	17.30	54.28	32.1	33.76	9.84	32.1	24.63	39.04	32.1	19.35	11.58	32.1	48.82	49.25
11.10	-11.06		6.21	-6.13		20.32	+20.29		7.73	+7.67		18.58	-18.55	
5 <sup>h</sup> 45 <sup>m</sup>	39 <sup>o</sup> .719		6 <sup>h</sup> 46 <sup>m</sup>	43 <sup>o</sup> .704		7 <sup>h</sup> 3 <sup>m</sup>	31 <sup>o</sup> .434		7 <sup>h</sup> 14 <sup>m</sup>	20 <sup>o</sup> .713		7 <sup>h</sup> 15 <sup>m</sup>	19 <sup>o</sup> .362	
-84 <sup>o</sup> 49'	42'' .94		-80 <sup>o</sup> 43'	50'' .12		+87 <sup>o</sup> 10'	38'' .36		+82 <sup>o</sup> 34'	10'' .90		-86 <sup>o</sup> 54'	28'' .23	



CIRCUMPOLAR STARS.

FOR THE UPPER TRANSIT AT WASHINGTON.

γ Octantis. Mag. 6.3			Bradley 1072. Mag. 6.3			ε Octantis. Mag. 5.4			33 H. Camelopard. seq. Mag. 5.3			κ Octantis. Mag. 5.6		
Wash. Mean Time.	Right Ascension.	Declination.	Wash. Mean Time.	Right Ascension.	Declination.	Wash. Mean Time.	Right Ascension.	Declination.	Wash. Mean Time.	Right Ascension.	Declination.	Wash. Mean Time.	Right Ascension.	Declination.
May	h m	° ' "	May	h m	° ' "	May	h m	° ' "	May	h m	° ' "	May	h m	° ' "
	10 59	-84 10		12 14	+88 8		12 46	-84 41		12 48	+83 50		13 28	-85 28
	s	"		s	"		s	"		s	"		s	"
1.3	64.59	18.36	1.4	47.58	37.93	1.4	44.81	41.79	1.4	38.54	51.09	1.5	7.01	58.88
2.3	64.45	18.59	2.4	47.06	38.16	2.4	44.75	42.11	2.4	38.41	51.96	2.4	6.99	54.21
3.3	64.30	18.84	3.4	46.54	38.39	3.4	44.69	42.42	3.4	38.28	52.23	3.4	6.96	54.54
4.3	64.14	19.00	4.4	46.02	38.59	4.4	44.62	42.75	4.4	38.16	52.47	4.4	6.93	54.88
5.3	63.98	19.33	5.4	45.53	38.78	5.4	44.54	43.09	5.4	38.03	52.70	5.4	6.90	55.24
6.3	63.81	19.57	6.4	45.05	38.97	6.4	44.46	43.43	6.4	37.90	52.93	6.4	6.87	55.59
7.3	63.64	19.81	7.4	44.58	39.15	7.4	44.36	43.76	7.4	37.78	53.16	7.4	6.81	55.96
8.3	63.46	20.02	8.4	44.13	39.34	8.4	44.24	44.09	8.4	37.68	53.38	8.4	6.73	56.32
9.3	63.26	20.22	9.4	43.69	39.53	9.4	44.12	44.41	9.4	37.57	53.61	9.4	6.64	56.66
10.3	63.06	20.41	10.4	43.24	39.73	10.4	44.00	44.70	10.4	37.46	53.84	10.4	6.54	57.00
11.3	62.87	20.59	11.4	42.78	39.93	11.4	43.86	44.99	11.4	37.34	54.06	11.4	6.43	57.32
12.3	62.68	20.75	12.4	42.28	40.13	12.4	43.73	45.27	12.4	37.22	54.32	12.4	6.33	57.62
13.3	62.50	20.90	13.4	41.76	40.34	13.4	43.61	45.53	13.4	37.09	54.57	13.4	6.23	57.91
14.3	62.32	21.05	14.4	41.19	40.54	14.4	43.51	45.79	14.4	36.94	54.82	14.4	6.13	58.19
15.3	62.15	21.22	15.4	40.59	40.73	15.4	43.40	46.05	15.4	36.77	55.05	15.4	6.05	58.47
16.3	61.99	21.39	16.4	39.96	40.90	16.4	43.30	46.31	16.4	36.60	55.28	16.4	5.99	58.77
17.3	61.84	21.57	17.4	39.32	41.04	17.4	43.21	46.59	17.4	36.43	55.47	17.4	5.93	59.08
18.3	61.67	21.76	18.4	38.70	41.16	18.4	43.11	46.90	18.4	36.26	55.65	18.4	5.86	59.40
19.3	61.49	21.95	19.3	38.09	41.26	19.4	42.99	47.21	19.4	36.11	55.80	19.4	5.78	59.73
20.3	61.30	22.14	20.3	37.53	41.35	20.4	42.87	47.53	20.4	35.96	55.94	20.4	5.69	60.07
21.3	61.10	22.32	21.3	37.01	41.45	21.4	42.73	47.82	21.4	35.82	56.08	21.4	5.57	60.41
22.3	60.88	22.47	22.3	36.49	41.57	22.4	42.57	48.11	22.4	35.68	56.22	22.4	5.43	60.74
23.3	60.66	22.60	23.3	35.98	41.69	23.4	42.40	48.37	23.4	35.55	56.39	23.4	5.28	61.05
24.3	60.45	22.70	24.3	35.44	41.82	24.4	42.23	48.61	24.4	35.41	56.57	24.4	5.13	61.33
25.3	60.25	22.80	25.3	34.87	41.96	25.4	42.06	48.83	25.4	35.26	56.76	25.4	4.97	61.59
26.3	60.06	22.88	26.3	34.29	42.10	26.4	41.89	49.02	26.4	35.09	56.95	26.4	4.82	61.83
27.3	59.87	22.97	27.3	33.64	42.23	27.4	41.75	49.22	27.4	34.91	57.14	27.4	4.68	62.06
28.3	59.69	23.06	28.3	32.97	42.36	28.3	41.61	49.44	28.3	34.73	57.32	28.4	4.55	62.29
29.3	59.51	23.15	29.3	32.28	42.46	29.3	41.48	49.65	29.3	34.54	57.50	29.4	4.43	62.55
30.3	59.33	23.26	30.3	31.59	42.55	30.3	41.35	49.87	30.3	34.35	57.64	30.4	4.31	62.81
31.3	59.16	23.36	31.3	30.92	42.61	31.3	41.21	50.10	31.3	34.16	57.76	31.4	4.19	63.07
32.3	58.98	23.46	32.3	30.26	42.67	32.3	41.07	50.34	32.3	33.97	57.86	32.4	4.06	63.34
9.85	-9.80		30.89	+30.87		10.82	-10.77		9.33	+9.28		12.42	-12.38	
10 <sup>h</sup> 50 <sup>m</sup>	54 <sup>s</sup> .174		12 <sup>h</sup> 14 <sup>m</sup>	29 <sup>s</sup> .563		12 <sup>h</sup> 46 <sup>m</sup>	25 <sup>s</sup> .116		12 <sup>h</sup> 48 <sup>m</sup>	31 <sup>s</sup> .755		13 <sup>h</sup> 27 <sup>m</sup>	42 <sup>s</sup> .050	
-84° 9'	48'' .70		+88° 8'	36'' .24		-84° 41'	21'' .18		+83° 50'	51'' .72		-85° 22'	38'' .10	



CIRCUMPOLAR STARS:

FOR THE UPPER TRANSIT AT WASHINGTON.

δ Ursae Minoris. Mag. 4.4			χ Octantis. Mag. 5.2			λ Ursae Minoris. Mag. 6.6			σ Octantis. Mag. 5.5			70 Draconis. Mag. 5.7		
Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.
May	h m 17 58	° +86 36	May	h m 18 8	° -87 39	May	h m 18 59	° +89 1	May	h m 19 33	° -89 12	May	h m 20 48	° +82 14
	s 7.30	" 42.90		s 39.98	" 29.40		s 5.64	" 9.79		s 37.71	" 37.14		s 1.8	" 28.06
1.6	7.60	43.18	1.6	40.49	29.58	1.7	6.71	10.60	1.7	39.87	37.17	1.8	28.23	2.38
2.6	7.84	43.46	2.6	41.01	29.69	2.7	7.72	10.21	2.7	41.07	37.21	2.8	28.40	2.46
3.6	8.05	43.73	3.6	41.53	29.86	3.7	8.68	10.41	3.7	42.81	37.25	3.8	28.56	2.54
4.6	8.25	44.00	4.6	42.06	30.03	4.7	9.60	10.62	4.7	44.58	37.29	4.7	28.72	2.63
5.6	8.44	44.25	5.6	42.59	30.21	5.7	10.49	10.82	5.7	46.37	37.35	5.7	28.87	2.71
6.6	8.63	44.50	6.6	43.12	30.41	6.7	11.37	11.02	6.7	48.15	37.43	6.7	29.02	2.79
7.6	8.83	44.75	7.6	43.63	30.63	7.7	12.24	11.21	7.7	49.93	37.53	7.7	29.17	2.88
8.6	9.03	44.99	8.6	44.11	30.86	8.7	13.12	11.39	8.7	51.64	37.63	8.7	29.32	2.96
9.6	9.23	45.23	9.6	44.57	31.09	9.7	14.03	11.57	9.7	53.31	37.74	9.7	29.47	3.02
10.6	9.45	45.48	10.6	44.99	31.33	10.7	14.96	11.76	10.7	54.91	37.87	10.7	29.63	3.08
11.6	9.67	45.75	11.6	45.40	31.56	11.7	15.93	11.95	11.7	56.42	38.00	11.7	29.79	3.17
12.6	9.87	46.02	12.6	45.79	31.77	12.7	16.91	12.17	12.7	57.88	38.11	12.7	29.94	3.26
13.6	10.07	46.32	13.6	46.18	31.97	13.6	17.88	12.40	13.6	59.32	38.21	13.6	30.12	3.38
14.6	10.26	46.63	14.6	46.59	32.16	14.6	18.80	12.67	14.6	60.76	38.30	14.6	30.29	3.52
15.6	10.41	46.97	15.6	47.01	32.34	15.6	19.65	12.95	15.6	62.27	38.39	15.6	30.44	3.69
16.6	10.56	47.29	16.6	47.47	32.52	16.6	20.42	13.23	16.6	63.84	38.47	16.6	30.60	3.87
17.6	10.67	47.61	17.6	47.94	32.72	17.6	21.09	13.52	17.6	65.50	38.57	17.6	30.75	4.05
18.6	10.78	47.93	18.6	48.43	32.95	18.6	21.69	13.80	18.6	67.22	38.67	18.6	30.90	4.24
19.6	10.88	48.22	19.6	48.91	33.20	19.6	22.26	14.07	19.6	68.97	38.80	19.6	31.04	4.41
20.6	10.98	48.50	20.6	49.38	33.47	20.6	22.82	14.31	20.6	70.69	38.95	20.6	31.17	4.56
21.6	11.09	48.76	21.6	49.80	33.74	21.6	23.42	14.54	21.6	72.33	39.12	21.6	31.30	4.72
22.6	11.22	49.08	22.6	50.18	34.03	22.6	24.08	14.77	22.6	73.85	39.30	22.6	31.43	4.86
23.6	11.34	49.30	23.6	50.51	34.32	23.6	24.80	15.00	23.6	75.27	39.49	23.6	31.56	5.00
24.6	11.48	49.60	24.6	50.81	34.57	24.6	25.55	15.24	24.6	76.59	39.67	24.6	31.70	5.14
25.6	11.61	49.92	25.6	51.10	34.82	25.6	26.31	15.51	25.6	77.82	39.84	25.6	31.85	5.31
26.6	11.74	50.25	26.6	51.39	35.05	26.6	27.06	15.80	26.6	79.04	39.99	26.6	32.01	5.49
27.6	11.85	50.59	27.6	51.70	35.28	27.6	27.77	16.11	27.6	80.29	40.14	27.6	32.16	5.69
28.6	11.94	50.94	28.6	52.02	35.51	28.6	28.39	16.42	28.6	81.57	40.29	28.6	32.30	5.92
29.6	12.00	51.29	29.6	52.35	35.75	29.6	28.95	16.73	29.6	82.88	40.44	29.6	32.45	6.14
30.6	12.06	51.63	30.6	52.69	35.99	30.6	29.44	17.04	30.6	84.24	40.59	30.6	32.59	6.37
31.6	12.10	51.98	31.6	53.03	36.24	31.6	29.88	17.35	31.6	85.63	40.76	31.6	32.72	6.61
32.6	12.10	51.98	32.6	53.03	36.24	32.6	29.88	17.35	32.6	85.63	40.76	32.6	32.72	6.61
16.93	+16.90		24.48	-24.46		58.48	+58.47		72.59	-72.58		7.40	+7.33	
17 <sup>h</sup> 58 <sup>m</sup>	2 <sup>s</sup> 814		18 <sup>h</sup> 7 <sup>m</sup> 59 <sup>s</sup> .062			18 <sup>h</sup> 59 <sup>m</sup> 2 <sup>s</sup> .477			19 <sup>h</sup> 32 <sup>m</sup> 24 <sup>s</sup> .283			20 <sup>h</sup> 48 <sup>m</sup> 27 <sup>s</sup> .964		
+86° 36'	50'' .93		-87° 39'	50'' .34		+89° 1'	17'' .96		-89° 13'	5'' .55		+82° 14'	10'' .29	

CIRCUMPOLAR STARS.

FOR THE UPPER TRANSIT AT WASHINGTON.

λ Octantis. Mag. 5.4			ν Octantis. Mag. 5.7			β Octantis. Mag. 4.3			39 E. Cephei. Mag. 5.6			γ <sup>1</sup> Octantis. Mag. 5.1		
Wash. Mean Time.	Right Ascension.	Declination.	Wash. Mean Time.	Right Ascension.	Declination.	Wash. Mean Time.	Right Ascension.	Declination.	Wash. Mean Time.	Right Ascension.	Declination.	Wash. Mean Time.	Right Ascension.	Declination.
May	h m 21 38	° ' -83 4	May	h m 22 16	° ' -86 21	May	h m 22 37	° ' -81 47	May	h m 23 27	° ' +86 51	May	h m 23 47	° ' -82 27
	s "	"		s "	"		s "	"		s "	"		s "	"
1.8	48.51	46.86	1.8	39.27	62.00	1.8	54.81	36.69	1.9	36.19	54.67	1.9	19.36	23.41
2.8	48.69	46.69	2.8	39.57	61.78	2.8	54.93	36.43	2.9	36.56	54.50	2.9	19.45	23.10
3.8	48.87	46.52	3.8	39.87	61.57	3.8	55.06	36.20	3.9	36.93	54.36	3.9	19.56	22.79
4.8	49.06	46.35	4.8	40.19	61.37	4.8	55.20	35.96	4.9	37.29	54.22	4.9	19.66	22.47
5.8	49.25	46.20	5.8	40.52	61.17	5.8	55.36	35.72	5.9	37.63	54.09	5.9	19.79	22.16
6.8	49.45	46.06	6.8	40.88	60.97	6.8	55.51	35.49	6.9	37.96	53.97	6.9	19.92	21.85
7.8	49.65	45.92	7.8	41.25	60.79	7.8	55.67	35.27	7.8	38.30	53.85	7.9	20.05	21.56
8.8	49.87	45.80	8.8	41.61	60.62	8.8	55.82	35.06	8.8	38.62	53.73	8.9	20.18	21.27
9.8	50.09	45.70	9.8	41.98	60.48	9.8	55.98	34.88	9.8	38.94	53.59	9.9	20.33	20.99
10.8	50.29	45.62	10.8	42.34	60.34	10.8	56.13	34.71	10.8	39.26	53.45	10.9	20.46	20.73
11.8	50.48	45.54	11.8	42.68	60.21	11.8	56.29	34.55	11.8	39.59	53.31	11.9	20.60	20.49
12.8	50.67	45.47	12.8	43.02	60.09	12.8	56.44	34.39	12.8	39.94	53.16	12.9	20.73	20.24
13.8	50.86	45.40	13.8	43.36	59.97	13.8	56.58	34.23	13.8	40.31	53.03	13.8	20.86	20.01
14.8	51.04	45.32	14.8	43.67	59.85	14.8	56.71	34.07	14.8	40.71	52.91	14.8	20.98	19.78
15.8	51.20	45.23	15.8	43.98	59.71	15.8	56.84	33.91	15.8	41.11	52.80	15.8	21.08	19.55
16.8	51.37	45.13	16.8	44.28	59.56	16.8	56.98	33.73	16.8	41.53	52.71	16.8	21.20	19.29
17.7	51.56	45.02	17.8	44.61	59.41	17.8	57.13	33.54	17.8	41.96	52.65	17.8	21.32	19.03
18.7	51.78	44.91	18.8	44.96	59.25	18.8	57.29	33.34	18.8	42.37	52.61	18.8	21.45	18.76
19.7	51.99	44.81	19.8	45.32	59.10	19.8	57.46	33.15	19.8	42.75	52.58	19.8	21.60	18.48
20.7	52.20	44.72	20.8	45.70	58.96	20.8	57.63	32.97	20.8	43.12	52.55	20.8	21.76	18.21
21.7	52.43	44.66	21.8	46.11	58.85	21.8	57.81	32.82	21.8	43.47	52.52	21.8	21.93	17.94
22.7	52.65	44.62	22.8	46.50	58.75	22.8	57.98	32.69	22.8	43.80	52.48	22.8	22.11	17.71
23.7	52.85	44.60	23.8	46.88	58.69	23.8	58.15	32.58	23.8	44.14	52.43	23.8	22.26	17.50
24.7	53.05	44.59	24.8	47.25	58.63	24.8	58.32	32.48	24.8	44.50	52.36	24.8	22.41	17.31
25.7	53.24	44.60	25.8	47.60	58.58	25.8	58.47	32.40	25.8	44.87	52.28	25.8	22.56	17.13
26.7	53.41	44.60	26.7	47.93	58.53	26.8	58.62	32.31	26.8	45.27	52.22	26.8	22.70	16.97
27.7	53.59	44.59	27.7	48.24	58.48	27.8	58.76	32.22	27.8	45.68	52.16	27.8	22.84	16.80
28.7	53.76	44.57	28.7	48.55	58.42	28.8	58.90	32.12	28.8	46.11	52.12	28.8	22.97	16.63
29.7	53.93	44.54	29.7	48.87	58.36	29.8	59.04	32.02	29.8	46.55	52.12	29.8	23.10	16.45
30.7	54.11	44.51	30.7	49.20	58.30	30.8	59.19	31.91	30.8	46.98	52.12	30.8	23.23	16.26
31.7	54.30	44.49	31.7	49.53	58.23	31.7	59.34	31.80	31.8	47.41	52.14	31.8	23.38	16.07
32.7	54.49	44.48	32.7	49.90	58.17	32.7	59.51	31.70	32.8	47.82	52.17	32.8	23.53	15.87
8.30	-8.24		15.78	-15.75		7.00	-6.93		18.28	+18.26		7.62	-7.55	
21 <sup>h</sup> 38 <sup>m</sup>	48°.035		22 <sup>h</sup> 16 <sup>m</sup>	45°.446		22 <sup>h</sup> 37 <sup>m</sup>	57°.920		23 <sup>h</sup> 27 <sup>m</sup>	43°.285		23 <sup>h</sup> 47 <sup>m</sup>	27°.240	
-83°	5' 17".98		-86°	22' 32".81		-81°	48' 6".03		+86°	51' 58".49		-82°	27' 48".42	



CIRCUMPOLAR STARS.

FOR THE UPPER TRANSIT AT WASHINGTON.

48 H. Cephei. Mag. 4.5			α Ursae Minoris. (Polaris). Mag. 2.1			4 G. Octantis. Mag. 5.6			Greenwich 750. Mag. 6.7			Greenwich 944. Mag. 6.4		
Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.
h m	° '	° '	h m	° '	° '	h m	° '	° '	h m	° '	° '	h m	° '	° '
June 0 57	+85 49		June 1 31	+88 52		June 1 41	-85 9		June 4 10	+85 20		June 5 36	+85 9	
0.8 33.62	36.95	0.9 37.65	0.9 37.65	32.70	0.9 32.68	63.96	0.9 53.08	34.17	1.0 6.07	34.74		1.0 6.07	34.74	
1.8 33.92	36.86	1.9 38.64	1.9 38.64	32.55	1.9 32.82	63.65	1.9 53.20	33.88	2.0 6.09	34.45		2.0 6.09	34.45	
2.8 34.21	36.77	2.9 39.59	2.9 39.59	32.41	2.9 32.97	63.36	2.9 53.32	33.60	3.0 6.11	34.16		3.0 6.11	34.16	
3.8 34.48	36.69	3.9 40.53	3.9 40.53	32.28	3.9 33.14	63.06	3.9 53.44	33.33	4.0 6.13	33.86		4.0 6.13	33.86	
4.8 34.75	36.61	4.9 41.44	4.9 41.44	32.15	4.9 33.31	62.77	4.9 53.54	33.09	5.0 6.15	33.57		5.0 6.15	33.57	
5.8 35.01	36.52	5.9 42.33	5.9 42.33	32.02	5.9 33.49	62.48	5.9 53.64	32.84	6.0 6.17	33.30		6.0 6.17	33.30	
6.8 35.27	36.43	6.9 43.20	6.9 43.20	31.89	6.9 33.68	62.21	6.9 53.74	32.58	7.0 6.18	33.02		7.0 6.18	33.02	
7.8 35.53	36.34	7.9 44.08	7.9 44.08	31.76	7.9 33.87	61.96	7.9 53.84	32.32	8.0 6.19	32.74		8.0 6.19	32.74	
8.8 35.79	36.24	8.8 44.99	8.8 44.99	31.61	8.9 34.06	61.71	8.9 53.93	32.04	9.0 6.19	32.46		9.0 6.19	32.46	
9.8 36.07	36.14	9.8 45.93	9.8 45.93	31.46	9.9 34.26	61.48	9.9 54.03	31.75	10.0 6.20	32.14		10.0 6.20	32.14	
10.8 36.36	36.03	10.8 46.94	10.8 46.94	31.31	10.8 34.44	61.26	10.9 54.14	31.46	11.0 6.22	31.81		11.0 6.22	31.81	
11.8 36.67	35.94	11.8 48.04	11.8 48.04	31.17	11.8 34.61	61.04	11.9 54.27	31.15	12.0 6.25	31.48		12.0 6.25	31.48	
12.8 37.00	35.89	12.8 49.19	12.8 49.19	31.04	12.8 34.78	60.82	12.9 54.43	30.85	13.0 6.30	31.15		13.0 6.30	31.15	
13.8 37.34	35.84	13.8 50.36	13.8 50.36	30.94	13.8 34.93	60.59	13.9 54.61	30.56	14.0 6.38	30.80		14.0 6.38	30.80	
14.8 37.68	35.83	14.8 51.55	14.8 51.55	30.85	14.8 35.10	60.35	14.9 54.80	30.29	15.0 6.47	30.47		15.0 6.47	30.47	
15.8 38.01	35.82	15.8 52.73	15.8 52.73	30.80	15.8 35.27	60.08	15.9 54.99	30.05	15.0 6.57	30.17		15.0 6.57	30.17	
16.8 38.33	35.83	16.8 53.83	16.8 53.83	30.75	16.8 35.45	59.81	16.9 55.19	29.82	16.9 6.68	29.88		16.9 6.68	29.88	
17.8 38.62	35.84	17.8 54.87	17.8 54.87	30.72	17.8 35.66	59.54	17.9 55.37	29.62	17.9 6.78	29.61		17.9 6.78	29.61	
18.8 38.90	35.86	18.8 55.85	18.8 55.85	30.68	18.8 35.88	59.29	18.9 55.55	29.41	18.9 6.88	29.35		18.9 6.88	29.35	
19.8 39.17	35.87	19.8 56.81	19.8 56.81	30.63	19.8 36.11	59.06	19.9 55.70	29.19	19.9 6.96	29.09		19.9 6.96	29.09	
20.8 39.44	35.86	20.8 57.77	20.8 57.77	30.55	20.8 36.34	58.86	20.9 55.84	28.97	20.9 7.02	28.82		20.9 7.02	28.82	
21.8 39.71	35.83	21.8 58.76	21.8 58.76	30.47	21.8 36.56	58.67	21.9 55.99	28.73	21.9 7.08	28.54		21.9 7.08	28.54	
22.8 40.02	35.80	22.8 59.81	22.8 59.81	30.39	22.8 36.78	58.51	22.9 56.14	28.47	22.9 7.14	28.23		22.9 7.14	28.23	
23.8 40.33	35.77	23.8 60.92	23.8 60.92	30.31	23.8 36.98	58.36	23.9 56.31	28.21	23.9 7.22	27.91		23.9 7.22	27.91	
24.8 40.65	35.76	24.8 62.09	24.8 62.09	30.25	24.8 37.17	58.20	24.9 56.49	27.95	24.9 7.29	27.59		24.9 7.29	27.59	
25.8 40.99	35.76	25.8 63.30	25.8 63.30	30.19	25.8 37.36	58.05	25.9 56.69	27.68	25.9 7.39	27.27		25.9 7.39	27.27	
26.8 41.33	35.77	26.8 64.52	26.8 64.52	30.14	26.8 37.56	57.88	26.9 56.91	27.44	26.9 7.52	26.95		26.9 7.52	26.95	
27.8 41.66	35.81	27.8 65.73	27.8 65.73	30.12	27.8 37.76	57.72	27.9 57.13	27.20	27.9 7.64	26.65		27.9 7.64	26.65	
28.8 41.99	35.85	28.8 66.92	28.8 66.92	30.11	28.8 37.97	57.54	28.9 57.36	26.99	28.9 7.78	26.36		28.9 7.78	26.36	
29.8 42.31	35.91	29.8 68.08	29.8 68.08	30.11	29.8 38.19	57.36	29.9 57.59	26.79	29.9 7.92	26.07		29.9 7.92	26.07	
30.8 42.63	35.97	30.8 69.20	30.8 69.20	30.12	30.8 38.42	57.18	30.9 57.81	26.60	30.9 8.07	25.80		30.9 8.07	25.80	
31.8 42.92	36.05	31.8 70.29	31.8 70.29	30.13	31.8 38.66	57.01	31.9 58.03	26.42	31.9 8.21	25.54		31.9 8.21	25.54	
13.74	+13.71	50.95	+50.94	11.87	-11.83	12.31	+12.27	11.85	+11.81					
0 <sup>h</sup> 57 <sup>m</sup>	32 <sup>s</sup> .323	1 <sup>h</sup> 31 <sup>m</sup>	41 <sup>s</sup> .866	1 <sup>h</sup> 41 <sup>m</sup>	51 <sup>s</sup> .117	4 <sup>h</sup> 10 <sup>m</sup>	55 <sup>s</sup> .493	5 <sup>h</sup> 36 <sup>m</sup>	9 <sup>s</sup> .111					
+85° 49'	43'' .55	+88° 52'	39'' .02	-85° 10'	27'' .09	+85° 20'	38'' .12	+85° 9'	36'' .60					

CIRCUMPOLAR STARS.

FOR THE UPPER TRANSIT AT WASHINGTON.

51 G. Mensse. Mag. 6.2			5 Mensse. Mag. 5.6			51 H. Cephei. Mag. 5.3			25 H. Camelop. Mag. 5.1			7 G. Octantis. Mag. 6.4		
Wash. Mean Time.	Right Ascension.	Declination.	Wash. Mean Time.	Right Ascension.	Declination.	Wash. Mean Time.	Right Ascension.	Declination.	Wash. Mean Time.	Right Ascension.	Declination.	Wash. Mean Time.	Right Ascension.	Declination.
June	h m	° ' "	June	h m	° ' "	June	h m	° ' "	June	h m	° ' "	June	h m	° ' "
	5 45	-84 49		6 46	-80 44		7 3	+87 10		7 14	+82 34		7 14	-86 54
1.0	17.30	54.28	1.1	33.76	9.84	1.1	24.63	39.04	1.1	19.35	11.58	1.1	48.82	49.25
2.0	17.18	53.98	2.1	33.68	9.59	2.1	24.49	38.75	2.1	19.30	11.29	2.1	48.60	49.04
3.0	17.08	53.66	3.1	33.59	9.32	3.1	24.36	38.46	3.1	19.26	11.02	3.1	48.18	48.82
4.0	16.97	53.35	4.1	33.51	9.05	4.1	24.24	38.18	4.1	19.21	10.76	4.1	47.86	48.58
5.0	16.87	53.03	5.1	33.42	8.77	5.1	24.13	37.91	5.1	19.16	10.52	5.1	47.55	48.32
6.0	16.78	52.69	6.1	33.35	8.48	6.1	24.06	37.64	6.1	19.12	10.28	6.1	47.27	48.06
7.0	16.71	52.35	7.1	33.28	8.18	7.1	23.87	37.37	7.1	19.07	10.04	7.1	46.98	47.80
8.0	16.65	52.01	8.1	33.22	7.88	8.1	23.72	37.11	8.1	19.01	9.78	8.1	46.73	47.53
9.0	16.59	51.68	9.1	33.16	7.59	9.1	23.57	36.84	9.1	18.94	9.52	9.1	46.50	47.27
10.0	16.54	51.37	10.1	33.09	7.30	10.1	23.41	36.55	10.1	18.88	9.26	10.1	46.27	47.02
11.0	16.49	51.08	11.1	33.03	7.03	11.1	23.26	36.24	11.1	18.82	8.96	11.1	46.06	46.78
12.0	16.44	50.80	12.1	32.98	6.77	12.1	23.12	35.92	12.1	18.76	8.65	12.1	45.83	46.56
13.0	16.38	50.53	13.1	32.92	6.53	13.1	23.02	35.58	13.1	18.71	8.32	13.1	45.61	46.34
14.0	16.30	50.25	14.1	32.86	6.28	14.1	22.96	35.22	14.1	18.70	7.99	14.1	45.37	46.12
15.0	16.23	49.94	15.0	32.80	6.02	15.1	22.94	34.88	15.1	18.69	7.65	15.1	45.11	45.90
16.0	16.15	49.63	16.0	32.74	5.74	16.1	22.94	34.55	16.1	18.69	7.33	16.1	44.85	45.67
17.0	16.09	49.30	17.0	32.67	5.43	17.1	22.96	34.24	17.1	18.70	7.04	17.1	44.58	45.41
17.9	16.03	48.94	18.0	32.61	5.11	18.1	22.98	33.95	18.1	18.71	6.75	18.1	44.33	45.13
18.9	15.98	48.58	19.0	32.55	4.78	19.1	22.98	33.66	19.1	18.71	6.48	19.1	44.09	44.82
19.9	15.95	48.22	20.0	32.51	4.44	20.0	22.94	33.38	20.1	18.70	6.22	20.1	43.87	44.51
20.9	15.94	47.88	21.0	32.47	4.10	21.0	22.90	33.10	21.1	18.67	5.96	21.1	43.69	44.19
21.9	15.94	47.55	22.0	32.44	3.78	22.0	22.84	32.80	22.0	18.64	5.69	22.1	43.53	43.90
22.9	15.94	47.23	23.0	32.41	3.47	23.0	22.78	32.49	23.0	18.61	5.39	23.0	43.39	43.62
23.9	15.95	46.94	24.0	32.38	3.18	24.0	22.72	32.16	24.0	18.59	5.07	24.0	43.26	43.36
24.9	15.95	46.65	25.0	32.35	2.89	25.0	22.68	31.82	25.0	18.58	4.73	25.0	43.12	43.09
25.9	15.95	46.36	26.0	32.32	2.61	26.0	22.67	31.46	26.0	18.57	4.39	26.0	42.99	42.83
26.9	15.95	46.07	27.0	32.29	2.32	27.0	22.69	31.11	27.0	18.57	4.05	27.0	42.85	42.57
27.9	15.94	45.76	28.0	32.26	2.04	28.0	22.72	30.77	28.0	18.58	3.72	28.0	42.69	42.31
28.9	15.94	45.45	29.0	32.23	1.74	29.0	22.79	30.43	29.0	18.60	3.39	29.0	42.54	42.04
29.9	15.93	45.14	30.0	32.21	1.42	30.0	22.87	30.11	30.0	18.62	3.08	30.0	42.39	41.74
30.9	15.93	44.81	31.0	32.18	1.11	31.0	22.95	29.79	31.0	18.67	2.77	31.0	42.24	41.45
31.9	15.94	44.47	32.0	32.16	0.77	32.0	23.04	29.49	32.0	18.70	2.49	32.0	42.10	41.13

11.10	-11.05	6.21	-6.18	20.30	+20.27	7.73	+7.67	18.57	-18.54
5 <sup>h</sup> 45 <sup>m</sup>	30 <sup>°</sup> 7'19"	6 <sup>h</sup> 46 <sup>m</sup>	43 <sup>°</sup> 7'04"	7 <sup>h</sup> 3 <sup>m</sup>	31 <sup>°</sup> 4'34"	7 <sup>h</sup> 14 <sup>m</sup>	20 <sup>°</sup> 7'13"	7 <sup>h</sup> 15 <sup>m</sup>	19 <sup>°</sup> 35'2"
-84° 40'	42'' .94	-80° 43'	50'' .12	+87° 10'	38'' .36	+82° 34'	16'' .90	-86° 54'	26'' .23

CIRCUMPOLAR STARS.

FOR THE UPPER TRANSIT AT WASHINGTON.

Greenwich 1119. Mag. 7.0			♄ Centauris. Mag. 5.4			♈ H. Draconis. Mag. 4.6			♄ Charaetentis. Mag. 5.2			♈ H. Camelop. Mag. 5.3		
Wash. Mean Time.	Right Ascension.	Declination.	Wash. Mean Time.	Right Ascension.	Declination.	Wash. Mean Time.	Right Ascension.	Declination.	Wash. Mean Time.	Right Ascension.	Declination.	Wash. Mean Time.	Right Ascension.	Declination.
June	h m	° ' "	June	h m	° ' "	June	h m	° ' "	June	h m	° ' "	June	h m	° ' "
	8 18	+88 52		9 8	-85 21		9 25	+81 40		9 36	-80 35		10 21	+82 57
	"	"		"	"		"	"		"	"		"	"
1.2	28.74	29.26	1.2	25.23	14.23	1.2	47.80	58.27	1.2	15.97	29.53	1.2	27.50	64.43
2.1	28.07	29.01	2.2	24.96	14.17	2.2	47.09	58.11	2.2	15.85	29.50	2.2	27.35	64.34
3.1	27.43	28.78	3.2	24.71	14.09	3.2	47.58	57.95	3.2	15.73	29.47	3.2	27.21	64.24
4.1	26.82	28.55	4.2	24.44	14.00	4.2	47.48	57.79	4.2	15.60	29.41	4.2	27.06	64.14
5.1	26.21	28.32	5.2	24.17	13.90	5.2	47.30	57.64	5.2	15.47	29.33	5.2	26.92	64.05
6.1	25.60	28.09	6.2	23.90	13.77	6.2	47.20	57.50	6.2	15.34	29.24	6.2	26.79	63.96
7.1	24.97	27.87	7.2	23.65	13.64	7.2	47.19	57.36	7.2	15.21	29.15	7.2	26.65	63.88
8.1	24.33	27.65	8.2	23.40	13.50	8.2	47.06	57.22	8.2	15.08	29.04	8.2	26.50	63.81
9.1	23.65	27.41	9.2	23.16	13.36	9.2	46.97	57.07	9.2	14.96	28.93	9.2	26.35	63.73
10.1	22.94	27.16	10.2	22.93	13.21	10.2	46.84	56.92	10.2	14.85	28.81	10.2	26.18	63.65
11.1	22.23	26.90	11.2	22.73	13.08	11.2	46.71	56.74	11.2	14.74	28.70	11.2	26.01	63.55
12.1	21.54	26.62	12.2	22.51	12.97	12.2	46.59	56.54	12.2	14.64	28.60	12.2	25.86	63.42
13.1	20.91	26.32	13.2	22.29	12.87	13.2	46.48	56.32	13.2	14.54	28.52	13.2	25.70	63.28
14.1	20.37	26.01	14.2	22.07	12.78	14.2	46.38	56.09	14.2	14.43	28.45	14.2	25.54	63.10
15.1	19.91	25.69	15.1	21.85	12.68	15.2	46.29	55.85	15.2	14.32	28.39	15.2	25.40	62.92
16.1	19.53	25.38	16.1	21.61	12.58	16.2	46.21	55.61	16.2	14.21	28.31	16.2	25.27	62.73
17.1	19.20	25.09	17.1	21.36	12.44	17.2	46.15	55.38	17.2	14.06	28.22	17.2	25.16	62.54
18.1	18.83	24.80	18.1	21.10	12.30	18.2	46.08	55.15	18.2	13.96	28.09	18.2	25.05	62.36
19.1	18.54	24.53	19.1	20.85	12.12	19.1	46.01	54.95	19.2	13.83	27.95	19.2	24.94	62.21
20.1	18.15	24.27	20.1	20.62	11.93	20.1	45.93	54.76	20.2	13.71	27.78	20.2	24.82	62.07
21.1	17.71	24.01	21.1	20.40	11.73	21.1	45.84	54.57	21.2	13.60	27.61	21.2	24.69	61.92
22.1	17.24	23.74	22.1	20.20	11.53	22.1	45.75	54.37	22.1	13.50	27.43	22.2	24.55	61.77
23.1	16.73	23.45	23.1	20.01	11.32	23.1	45.65	54.15	23.1	13.39	27.25	23.2	24.41	61.62
24.1	16.22	23.16	24.1	19.83	11.13	24.1	45.55	53.92	24.1	13.30	27.08	24.2	24.26	61.44
25.1	15.75	22.84	25.1	19.66	10.94	25.1	45.45	53.68	25.1	13.21	26.93	25.2	24.11	61.26
26.1	15.33	22.51	26.1	19.48	10.77	26.1	45.36	53.42	26.1	13.13	26.77	26.2	23.97	61.04
27.1	14.93	22.17	27.1	19.30	10.60	27.1	45.27	53.15	27.1	13.04	26.62	27.2	23.83	60.82
28.1	14.67	21.83	28.1	19.12	10.42	28.1	45.21	52.88	28.1	12.94	26.47	28.2	23.70	60.59
29.1	14.42	21.49	29.1	18.93	10.25	29.1	45.14	52.60	29.1	12.84	26.30	29.2	23.59	60.35
30.1	14.23	21.16	30.1	18.74	10.07	30.1	45.08	52.32	30.1	12.75	26.13	30.2	23.48	60.12
31.1	14.06	20.84	31.1	18.54	9.87	31.1	45.02	52.05	31.1	12.65	25.95	31.2	23.37	59.90
32.1	13.91	20.54	32.1	18.34	9.64	32.1	44.98	51.78	32.1	12.55	25.76	32.2	23.26	59.68
50.83	+50.87	12.34	-12.30	6.01	+6.84	6.12	-6.03	18.17	+8.11					
8 <sup>h</sup> 18 <sup>m</sup>	48 <sup>s</sup> .642	9 <sup>h</sup> 8 <sup>m</sup>	33 <sup>s</sup> .397	9 <sup>h</sup> 25 <sup>m</sup>	48 <sup>s</sup> .041	9 <sup>h</sup> 36 <sup>m</sup>	17 <sup>s</sup> .360	10 <sup>h</sup> 21 <sup>m</sup>	27 <sup>s</sup> .405					
+88° 52'	28''.44	-85° 20'	41''.44	+81° 40'	54''.43	-80° 34'	55''.47	+82° 57'	59''.46					

CIRCUMPOLAR STARS.

FOR THE UPPER TRANSIT AT WASHINGTON.

η Octantis. Mag. 6.3			Bradley 1678. Mag. 6.3			ι Octantis. Mag. 5.4			32 H. Camelop. seq. Mag. 5.3			κ Octantis. Mag. 5.6		
Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.
June	h m	° ' "	June	h m	° ' "	June	h m	° ' "	June	h m	° ' "	June	h m	° ' "
	10 59	-84 10		12 14	+88 8		12 46	-84 41		12 48	+83 50		13 27	-85 23
	s	"		s	"		s	"		s	"		s	"
1.3	58.98	23.46	1.3	30.26	42.67	1.3	41.07	50.34	1.3	33.97	57.86	1.4	64.06	3.34
2.3	58.78	23.57	2.3	29.62	42.72	2.3	40.92	50.57	2.3	33.80	57.96	2.4	63.92	3.61
3.3	58.58	23.66	3.3	29.01	42.76	3.3	40.75	50.80	3.3	33.63	58.06	3.4	63.78	3.89
4.3	58.37	23.72	4.3	28.41	42.81	4.3	40.57	51.02	4.3	33.46	58.15	4.4	63.61	4.15
5.3	58.15	23.78	5.3	27.82	42.85	5.3	40.39	51.22	5.3	33.29	58.25	5.4	63.43	4.39
6.3	57.94	23.84	6.3	27.24	42.90	6.3	40.20	51.42	6.3	33.13	58.35	6.4	63.25	4.64
7.2	57.72	23.88	7.3	26.66	42.95	7.3	40.00	51.60	7.3	32.96	58.45	7.3	63.06	4.87
8.2	57.50	23.89	8.3	26.06	43.01	8.3	39.80	51.77	8.3	32.79	58.56	8.3	62.85	5.09
9.2	57.30	23.90	9.3	25.44	43.07	9.3	39.60	51.91	9.3	32.62	58.67	9.3	62.65	5.28
10.2	57.10	23.91	10.3	24.79	43.12	10.3	39.41	52.05	10.3	32.43	58.78	10.3	62.46	5.47
11.2	56.91	23.91	11.3	24.10	43.17	11.3	39.24	52.19	11.3	32.23	58.88	11.3	62.28	5.65
12.2	56.74	23.94	12.3	23.37	43.18	12.3	39.06	52.33	12.3	32.03	58.97	12.3	62.13	5.83
13.2	56.57	23.97	13.3	22.64	43.18	13.3	38.92	52.50	13.3	31.83	59.03	13.3	61.96	6.02
14.2	56.39	24.01	14.3	21.92	43.16	14.3	38.76	52.66	14.3	31.62	59.08	14.3	61.83	6.24
15.2	56.21	24.06	15.3	21.22	43.13	15.3	38.60	52.84	15.3	31.41	59.09	15.3	61.66	6.46
16.2	56.01	24.11	16.3	20.57	43.08	16.3	38.43	53.02	16.3	31.22	59.10	16.3	61.50	6.69
17.2	55.80	24.14	17.3	19.96	43.02	17.3	38.24	53.19	17.3	31.04	59.10	17.3	61.32	6.93
18.2	55.58	24.15	18.3	19.37	42.96	18.3	38.03	53.36	18.3	30.87	59.10	18.3	61.10	7.15
19.2	55.36	24.13	19.3	18.81	42.91	19.3	37.81	53.50	19.3	30.70	59.11	19.3	60.87	7.35
20.2	55.15	24.10	20.3	18.22	42.88	20.3	37.59	53.63	20.3	30.53	59.13	20.3	60.64	7.53
21.2	54.94	24.04	21.3	17.63	42.87	21.3	37.38	53.73	21.3	30.36	59.16	21.3	60.41	7.67
22.2	54.74	23.96	22.3	16.99	42.86	22.3	37.16	53.81	22.3	30.18	59.20	22.3	60.18	7.80
23.2	54.55	23.89	23.3	16.31	42.84	23.3	36.96	53.88	23.3	29.96	59.24	23.3	59.96	7.92
24.2	54.36	23.83	24.3	15.62	42.81	24.3	36.77	53.94	24.3	29.76	59.28	24.3	59.76	8.02
25.2	54.19	23.77	25.2	14.91	42.77	25.3	36.58	54.01	25.3	29.54	59.30	25.3	59.56	8.14
26.2	54.03	23.72	26.2	14.19	42.70	26.3	36.40	54.09	26.3	29.33	59.30	26.3	59.36	8.26
27.2	53.86	23.67	27.2	13.49	42.62	27.3	36.23	54.17	27.3	29.13	59.28	27.3	59.17	8.39
28.2	53.68	23.63	28.2	12.79	42.52	28.3	36.05	54.27	28.3	28.93	59.24	28.3	58.97	8.53
29.2	53.49	23.56	29.2	12.14	42.42	29.3	35.86	54.36	29.3	28.73	59.19	29.3	58.77	8.66
30.2	53.30	23.54	30.2	11.51	42.31	30.3	35.64	54.45	30.3	28.54	59.14	30.3	58.55	8.83
31.2	53.10	23.46	31.2	10.90	42.21	31.3	35.43	54.52	31.3	28.36	59.08	31.3	58.33	8.97
32.2	52.91	23.38	32.2	10.32	42.10	32.3	35.22	54.58	32.3	28.18	59.03	32.3	58.10	9.09
9.85    -9.80			30.90    +30.88			10.82    -10.78			9.33    +9.28			12.43    -12.39		
10 <sup>h</sup> 59 <sup>m</sup> 54 <sup>s</sup> .174			12 <sup>h</sup> 14 <sup>m</sup> 29 <sup>s</sup> .583			12 <sup>h</sup> 46 <sup>m</sup> 25 <sup>s</sup> .116			12 <sup>h</sup> 48 <sup>m</sup> 31 <sup>s</sup> .755			13 <sup>h</sup> 27 <sup>m</sup> 42 <sup>s</sup> .050		
-84° 9' 48".70			+88° 8' 36".24			-84° 41' 21".18			+83° 50' 51".72			-85° 22' 38".10		

CIRCUMPOLAR STARS.

FOR THE UPPER TRANSIT AT WASHINGTON.

δ Octantis. Mag. 4.1			Greenbridge 2333. Mag. 7.2			ρ Octantis. Mag. 5.7			ε Ursæ Minoris. Mag. 4.4			59 G. Apodis. Mag. 5.9		
Wash. Mean Time.	Right Ascension.	Declination.	Wash. Mean Time.	Right Ascension.	Declination.	Wash. Mean Time.	Right Ascension.	Declination.	Wash. Mean Time.	Right Ascension.	Declination.	Wash. Mean Time.	Right Ascension.	Declination.
h m	° '		h m	° '		h m	° '		h m	° '		h m	° '	
June 14 14	-83 18		June 15 2	+87 32		June 15 24	-84 12		June 16 54	+82 10		June 17 16	-80 47	
s	"		s	"		s	"		s	"		s	"	
1.4	14.02	31.18	1.4	51.28	33.86	1.4	60.78	18.16	1.5	11.68	18.26	1.5	44.57	11.79
2.4	13.96	31.47	2.4	50.97	34.10	2.4	60.78	18.47	2.5	11.66	18.59	2.5	44.64	12.07
3.4	13.90	31.77	3.4	50.68	34.34	3.4	60.77	18.80	3.5	11.65	18.90	3.5	44.71	12.37
4.4	13.82	32.06	4.4	50.40	34.56	4.4	60.73	19.13	4.5	11.63	19.21	4.5	44.76	12.68
5.4	13.73	32.35	5.4	50.12	34.78	5.4	60.70	19.47	5.5	11.61	19.50	5.5	44.81	13.00
6.4	13.64	32.63	6.4	49.84	35.01	6.4	60.65	19.80	6.5	11.60	19.80	6.5	44.86	13.31
7.4	13.54	32.90	7.4	49.56	35.25	7.4	60.60	20.11	7.5	11.58	20.11	7.5	44.90	13.61
8.4	13.43	33.15	8.4	49.29	35.49	8.4	60.54	20.40	8.5	11.56	20.42	8.5	44.93	13.92
9.4	13.32	33.39	9.4	48.99	35.75	9.4	60.47	20.69	9.5	11.53	20.74	9.5	44.94	14.21
10.4	13.21	33.61	10.4	48.67	36.00	10.4	60.40	20.96	10.5	11.50	21.07	10.5	44.97	14.49
11.4	13.12	33.83	11.4	48.32	36.26	11.4	60.34	21.22	11.5	11.46	21.42	11.5	45.00	14.74
12.4	13.03	34.04	12.4	47.96	36.51	12.4	60.30	21.46	12.5	11.42	21.78	12.5	45.03	14.99
13.4	12.95	34.26	13.4	47.55	36.76	13.4	60.27	21.74	13.5	11.38	22.12	13.5	45.07	15.25
14.4	12.86	34.50	14.4	47.13	36.99	14.4	60.24	22.01	14.5	11.32	22.46	14.5	45.11	15.51
15.4	12.81	34.77	15.4	46.70	37.19	15.4	60.21	22.30	15.5	11.25	22.79	15.5	45.16	15.79
16.4	12.73	35.03	16.4	46.26	37.37	16.4	60.17	22.61	16.5	11.18	23.06	16.5	45.22	16.10
17.4	12.65	35.30	17.4	45.87	37.58	17.4	60.12	22.93	17.5	11.12	23.36	17.5	45.26	16.41
18.4	12.53	35.55	18.4	45.48	37.68	18.4	60.06	23.24	18.5	11.06	23.63	18.5	45.29	16.73
19.3	12.40	35.82	19.4	45.10	37.85	19.4	59.98	23.54	19.5	11.00	23.90	19.5	45.31	17.06
20.3	12.26	36.05	20.4	44.75	38.02	20.4	59.89	23.83	20.5	10.95	24.17	20.5	45.31	17.38
21.3	12.12	36.25	21.4	44.39	38.21	21.4	59.76	24.10	21.5	10.90	24.45	21.5	45.30	17.68
22.3	11.99	36.43	22.4	44.03	38.41	22.4	59.65	24.34	22.5	10.84	24.76	22.5	45.29	17.96
23.3	11.86	36.58	23.4	43.62	38.62	23.4	59.54	24.58	23.4	10.78	25.08	23.5	45.28	18.23
24.3	11.74	36.73	24.4	43.20	38.83	24.4	59.44	24.80	24.4	10.71	25.41	24.5	45.28	18.48
25.3	11.62	36.90	25.4	42.75	39.03	25.4	59.35	25.01	25.4	10.63	25.75	25.5	45.28	18.72
26.3	11.51	37.06	26.4	42.29	39.22	26.4	59.26	25.24	26.4	10.55	26.07	26.5	45.28	18.99
27.3	11.41	37.23	27.4	41.81	39.40	27.4	59.18	25.48	27.4	10.47	26.38	27.5	45.29	19.26
28.3	11.29	37.42	28.4	41.34	39.55	28.4	59.10	25.71	28.4	10.38	26.67	28.5	45.29	19.53
29.3	11.17	37.60	29.4	40.86	39.69	29.4	59.02	25.95	29.4	10.29	26.95	29.4	45.29	19.80
30.3	11.05	37.79	30.4	40.39	39.83	30.4	58.92	26.21	30.4	10.19	27.22	30.4	45.30	20.09
31.3	10.92	37.97	31.3	39.93	39.94	31.4	58.81	26.47	31.4	10.10	27.47	31.4	45.30	20.39
32.3	10.78	38.15	32.3	39.49	40.05	32.4	58.70	26.72	32.4	10.01	27.72	32.4	45.30	20.70
8.58	-8.52		23.33	+23.31		9.91	-9.86		7.34	+7.27		6.25	-6.17	
14 <sup>h</sup> 13 <sup>m</sup>	55°.644		15 <sup>h</sup> 2 <sup>m</sup>	43°.277		15 <sup>h</sup> 24 <sup>m</sup>	86°.751		16 <sup>h</sup> 54 <sup>m</sup>	6°.748		17 <sup>h</sup> 16 <sup>m</sup>	28°.406	
-83° 18'	11°.26		+87° 32'	28°.80		-84° 12'	7''.93		+82° 10'	15''.74		-80° 47'	18''.10	

CIRCUMPOLAR STARS.

FOR THE UPPER TRANSIT AT WASHINGTON.

δ Ursa Minoris Mag. 4.2			γ Columbae Mag. 5.2			λ Ursa Minoris Mag. 4.4			ε Columbae Mag. 5.5			78 Draconis Mag. 5.7		
Wash. Mean Time	Right Ascen- sion	Declin- ation	Wash. Mean Time	Right Ascen- sion	Declin- ation	Wash. Mean Time	Right Ascen- sion	Declin- ation	Wash. Mean Time	Right Ascen- sion	Declin- ation	Wash. Mean Time	Right Ascen- sion	Declin- ation
June 17 58	17 58	-64.34	June 18 6	18 6	-67.38	June 19 36	19 36	-69	June 19 34	19 34	-69 15	June 20 48	20 48	+62 14
1.6	18.25	57.96	1.6	58.63	36.24	1.6	19.08	17.35	1.6	25.63	40.76	1.7	32.72	6.61
2.6	18.24	57.90	2.6	58.26	36.51	2.6	19.31	17.65	2.6	27.03	40.94	2.7	32.85	6.85
3.5	18.27	57.62	3.6	58.71	36.79	3.6	19.60	17.94	3.6	28.43	41.13	3.7	32.97	7.00
4.5	18.27	57.71	4.6	59.03	37.08	4.6	19.86	18.23	4.6	29.80	41.35	4.7	33.09	7.31
5.5	18.24	58.21	5.5	59.37	37.38	5.6	21.44	18.52	5.6	32.13	41.57	5.7	33.20	7.52
6.5	18.27	58.50	6.5	59.57	37.69	6.6	21.83	18.79	6.6	32.38	41.80	6.7	33.31	7.74
7.5	18.29	58.81	7.5	59.81	38.00	7.6	22.34	19.06	7.6	32.57	42.03	7.7	33.42	7.96
8.5	18.25	59.11	8.5	59.91	38.29	8.6	22.67	19.34	8.6	34.08	42.27	8.7	33.55	8.17
9.5	18.29	59.43	9.5	59.20	38.59	9.6	23.13	19.63	9.6	35.71	42.50	9.6	33.67	8.39
10.5	18.43	59.76	10.5	59.38	38.87	10.6	23.56	19.95	10.6	36.08	42.73	10.6	33.79	8.63
11.5	18.44	59.10	11.5	59.56	39.14	11.6	23.97	20.28	11.6	37.65	42.93	11.6	33.91	8.90
12.5	18.44	59.47	12.5	59.76	39.38	12.6	24.32	20.62	12.6	38.64	43.13	12.6	34.04	9.18
13.5	18.42	59.84	13.5	59.96	39.63	13.6	24.58	20.96	13.6	39.05	43.32	13.6	34.15	9.49
14.5	18.46	59.21	14.5	59.24	39.90	14.6	24.75	21.34	14.6	40.82	43.51	14.6	34.26	9.80
15.5	18.50	59.55	15.5	59.51	40.17	15.6	24.82	21.68	15.6	42.02	43.70	15.6	34.37	10.12
16.5	18.22	59.87	16.5	59.76	40.46	16.6	24.83	22.01	16.6	42.26	43.93	16.6	34.46	10.42
17.5	18.14	57.16	17.5	57.01	40.77	17.6	24.83	22.33	17.6	44.49	44.17	17.6	34.55	10.71
18.5	18.07	57.46	18.5	57.23	41.10	18.6	24.85	22.63	18.6	45.65	44.44	18.6	34.63	11.00
19.5	18.01	57.75	19.5	57.39	41.44	19.5	24.91	22.92	19.6	46.71	44.71	19.6	34.71	11.27
20.5	17.96	56.04	20.5	57.53	41.77	20.5	25.02	23.20	20.6	47.64	44.99	20.6	34.79	11.53
21.5	17.91	56.36	21.5	57.62	42.09	21.5	25.18	23.49	21.6	48.44	45.27	21.6	34.88	11.79
22.5	17.87	56.67	22.5	57.68	42.39	22.5	25.36	23.81	22.6	49.15	45.56	22.6	34.96	12.06
23.5	17.86	59.00	23.5	57.74	42.68	23.5	25.52	24.14	23.6	49.81	45.82	23.6	35.06	12.34
24.5	17.78	59.34	24.5	57.80	42.96	24.5	25.67	24.46	24.6	50.47	46.06	24.6	35.17	12.65
25.5	17.69	59.70	25.5	57.86	43.23	25.5	25.74	24.85	25.6	51.15	46.31	25.6	35.27	12.97
26.5	17.60	60.06	26.5	57.95	43.49	26.5	25.74	25.21	26.6	51.86	46.54	26.6	35.36	13.30
27.5	17.48	60.40	27.5	58.04	43.76	27.5	25.67	25.57	27.5	52.61	46.77	27.6	35.44	13.64
28.5	17.35	60.73	28.5	58.15	44.04	28.5	25.55	25.91	28.5	53.39	47.02	28.6	35.50	13.99
29.5	17.21	61.05	29.5	58.25	44.33	29.5	25.38	26.26	29.5	54.18	47.29	29.6	35.57	14.33
30.5	17.07	61.37	30.5	58.35	44.64	30.5	25.19	26.59	30.5	54.97	47.56	30.6	35.64	14.66
31.5	16.92	61.66	31.5	58.41	44.96	31.5	24.97	26.91	31.5	55.72	47.83	31.6	35.70	14.98
32.5	16.78	61.95	32.5	58.47	45.28	32.5	24.75	27.22	32.5	56.44	48.14	32.6	35.76	15.30
16.94	-16.91		24.50	-24.48		58.63	+58.62		72.72	-72.72		7.40	+7.33	
17 <sup>h</sup> 58 <sup>m</sup> 2 <sup>s</sup> .814			18 <sup>h</sup> 7 <sup>m</sup> 59 <sup>s</sup> .062			19 <sup>h</sup> 59 <sup>m</sup> 2 <sup>s</sup> .477			19 <sup>h</sup> 23 <sup>m</sup> 24 <sup>s</sup> .283			20 <sup>h</sup> 48 <sup>m</sup> 27 <sup>s</sup> .904		
+46° 26' 50".93			-67° 39' 50".34			+80° 1' 17".96			-80° 13' 5".25			+62° 14' 10".29		

CIRCUMPOLAR STARS.

FOR THE UPPER TRANSIT AT WASHINGTON.

λ Octantis. Mag. 5.4			ν Octantis. Mag. 5.7			β Octantis. Mag. 4.3			89 H. Cephei. Mag. 5.6			γ <sup>1</sup> Octantis. Mag. 5.1		
Wash. Mean Time.	Right Ascension.	Declination.	Wash. Mean Time.	Right Ascension.	Declination.	Wash. Mean Time.	Right Ascension.	Declination.	Wash. Mean Time.	Right Ascension.	Declination.	Wash. Mean Time.	Right Ascension.	Declination.
June	h m 21 38	° ' " -83 4	June	h m 22 16	° ' " -86 21	June	h m 22 37	° ' " -81 47	June	h m 23 27	° ' " +86 51	June	h m 23 47	° ' " -82 27
	s "	"		s "	"		s "	"		s "	"		s "	"
1.7	54.49	44.48	1.7	49.90	58.17	1.7	59.51	31.70	1.8	47.82	52.17	1.8	23.53	15.87
2.7	54.69	44.47	2.7	50.27	58.10	2.7	59.67	31.60	2.8	48.22	52.20	2.8	23.70	15.68
3.7	54.89	44.46	3.7	50.64	58.05	3.7	59.84	31.51	3.8	48.60	52.23	3.8	23.87	15.50
4.7	55.10	44.49	4.7	51.01	58.02	4.7	60.01	31.43	4.8	48.97	52.26	4.8	24.05	15.33
5.7	55.31	44.53	5.7	51.39	58.01	5.7	60.19	31.38	5.8	49.33	52.29	5.8	24.23	15.18
6.7	55.50	44.58	6.7	51.77	58.01	6.7	60.36	31.33	6.8	49.69	52.31	6.8	24.40	15.03
7.7	55.68	44.64	7.7	52.14	58.03	7.7	60.53	31.31	7.8	50.05	52.33	7.8	24.57	14.90
8.7	55.87	44.71	8.7	52.48	58.06	8.7	60.69	31.30	8.8	50.43	52.35	8.8	24.73	14.80
9.7	56.05	44.78	9.7	52.82	58.09	9.7	60.84	31.30	9.8	50.83	52.37	9.8	24.88	14.71
10.7	56.21	44.85	10.7	53.14	58.12	10.7	60.98	31.29	10.8	51.23	52.39	10.8	25.03	14.61
11.7	56.37	44.90	11.7	53.45	58.13	11.7	61.12	31.28	11.8	51.65	52.43	11.8	25.18	14.51
12.7	56.53	44.95	12.7	53.75	58.14	12.7	61.26	31.23	12.8	52.09	52.51	12.8	25.33	14.39
13.7	56.69	44.98	13.7	54.07	58.13	13.7	61.41	31.19	13.7	52.53	52.59	13.8	25.48	14.27
14.7	56.87	45.01	14.7	54.40	58.12	14.7	61.58	31.15	14.7	52.96	52.71	14.8	25.63	14.13
15.7	57.06	45.05	15.7	54.76	58.11	15.7	61.74	31.09	15.7	53.37	52.83	15.8	25.80	13.99
16.7	57.26	45.10	16.7	55.12	58.11	16.7	61.91	31.05	16.7	53.75	52.96	16.8	25.98	13.84
17.7	57.47	45.18	17.7	55.50	58.14	17.7	62.09	31.03	17.7	54.12	53.10	17.8	26.17	13.71
18.7	57.67	45.27	18.7	55.88	58.18	18.7	62.27	31.03	18.7	54.45	53.22	18.7	26.36	13.62
19.7	57.86	45.39	19.7	56.25	58.25	19.7	62.44	31.07	19.7	54.79	53.32	19.7	26.55	13.53
20.7	58.05	45.51	20.7	56.61	58.33	20.7	62.61	31.11	20.7	55.13	53.42	20.7	26.72	13.48
21.7	58.22	45.64	21.7	56.94	58.42	21.7	62.75	31.17	21.7	55.49	53.51	21.7	26.89	13.44
22.6	58.36	45.78	22.7	57.26	58.52	22.7	62.90	31.23	22.7	55.86	53.59	22.7	27.06	13.41
23.6	58.51	45.92	23.7	57.55	58.62	23.7	63.04	31.29	23.7	56.26	53.69	23.7	27.20	13.38
24.6	58.64	46.05	24.7	57.83	58.71	24.7	63.17	31.34	24.7	56.67	53.81	24.7	27.35	13.36
25.6	58.78	46.17	25.7	58.11	58.80	25.7	63.30	31.38	25.7	57.09	53.95	25.7	27.50	13.33
26.6	58.93	46.27	26.7	58.39	58.88	26.7	63.44	31.42	26.7	57.50	54.09	26.7	27.65	13.29
27.6	59.08	46.37	27.7	58.70	58.96	27.7	63.58	31.47	27.7	57.91	54.26	27.7	27.80	13.25
28.6	59.25	46.50	28.7	59.00	59.04	28.7	63.73	31.51	28.7	58.29	54.43	28.7	27.97	13.21
29.6	59.42	46.62	29.7	59.32	59.13	29.7	63.88	31.56	29.7	58.67	54.61	29.7	28.14	13.17
30.6	59.58	46.76	30.7	59.65	59.22	30.7	64.03	31.61	30.7	59.01	54.79	30.7	28.32	13.13
31.6	59.73	46.90	31.7	59.99	59.35	31.7	64.19	31.69	31.7	59.35	54.97	31.7	28.50	13.11
32.6	59.91	47.07	32.6	60.32	59.47	32.7	64.34	31.77	32.7	59.68	55.16	32.7	28.68	13.10
8.30	-8.24		15.78	-15.75		7.00	-6.93		18.28	+18.26		7.62	-7.55	
21 <sup>h</sup> 38 <sup>m</sup>	48 <sup>°</sup> .035		22 <sup>h</sup> 16 <sup>m</sup>	45 <sup>°</sup> .446		22 <sup>h</sup> 37 <sup>m</sup>	57 <sup>°</sup> .920		23 <sup>h</sup> 27 <sup>m</sup>	43 <sup>°</sup> .285		23 <sup>h</sup> 47 <sup>m</sup>	27 <sup>°</sup> .240	
-83° 5'	17'' .98		-86° 22'	32'' .81		-81° 48'	6'' .03		+86° 51'	56'' .49		-82° 27'	48'' .42	

CIRCUMPOLAR STARS.

FOR THE UPPER TRANSIT AT WASHINGTON.

48 H. Cephei. Mag. 4.5			α Ursæ Minoris. (Polaris.) Mag. 2.1			4 G. Octantis. Mag. 5.6			Groombridge 750. Mag. 6.7			Groombridge 944. Mag. 6.4		
Wash. Mean Time.	Right Ascension.	Declination.	Wash. Mean Time.	Right Ascension.	Declination.	Wash. Mean Time.	Right Ascension.	Declination.	Wash. Mean Time.	Right Ascension.	Declination.	Wash. Mean Time.	Right Ascension.	Declination.
July	h m °	°	July	h m °	°	July	h m °	°	July	h m °	°	July	h m °	°
	0 57	+85 49		1 32	+88 52		1 41	-85 9		4 10	+85 26		5 36	+85 9
0.8	42.63	35.97	0.8	9.20	30.12	0.8	38.42	57.18	0.9	57.81	26.00	0.9	8.07	25.80
1.8	42.92	36.05	1.8	10.29	30.13	1.8	38.66	57.01	1.9	58.03	26.42	1.9	8.21	25.54
2.8	43.21	36.13	2.8	11.37	30.14	2.8	38.91	56.86	2.9	58.25	26.25	2.9	8.36	25.29
3.8	43.49	36.19	3.8	12.40	30.15	3.8	39.16	56.71	3.9	58.45	26.06	3.9	8.49	25.04
4.8	43.77	36.25	4.8	13.43	30.16	4.8	39.42	56.56	4.9	58.64	25.91	4.9	8.61	24.80
5.8	44.05	36.30	5.8	14.46	30.17	5.8	39.67	56.47	5.9	58.84	25.72	5.9	8.74	24.54
6.7	44.34	36.36	6.8	15.52	30.17	6.8	39.92	56.37	6.9	59.04	25.53	6.9	8.86	24.28
7.7	44.65	36.41	7.8	16.63	30.17	7.8	40.15	56.28	7.9	59.25	25.38	7.9	8.99	24.01
8.7	44.96	36.48	8.8	17.82	30.17	8.8	40.38	56.20	8.9	59.47	25.12	8.9	9.12	23.71
9.7	45.29	36.56	9.8	19.05	30.19	9.8	40.60	56.12	9.9	59.71	24.91	9.9	9.28	23.40
10.7	45.65	36.65	10.8	20.32	30.22	10.8	40.81	56.03	10.9	59.98	24.71	10.9	9.46	23.11
11.7	45.99	36.78	11.8	21.61	30.27	11.8	41.03	55.93	11.9	60.25	24.52	11.9	9.66	22.82
12.7	46.32	36.91	12.8	22.88	30.35	12.8	41.25	55.82	12.9	60.54	24.37	12.9	9.88	22.55
13.7	46.65	37.08	13.8	24.10	30.45	13.8	41.47	55.70	13.9	60.83	24.23	13.9	10.10	22.31
14.7	46.94	37.25	14.8	25.24	30.56	14.8	41.71	55.58	14.9	61.13	24.12	14.9	10.31	22.08
15.7	47.23	37.40	15.7	26.32	30.67	15.8	41.98	55.47	15.9	61.41	24.01	15.9	10.51	21.89
16.7	47.50	37.55	16.7	27.34	30.78	16.8	42.26	55.37	16.9	61.66	23.91	16.9	10.71	21.69
17.7	47.77	37.68	17.7	28.36	30.87	17.7	42.53	55.31	17.9	61.90	23.79	17.9	10.89	21.48
18.7	48.04	37.81	18.7	29.39	30.94	18.7	42.80	55.27	18.8	62.13	23.66	18.9	11.07	21.26
19.7	48.32	37.91	19.7	30.46	31.00	19.7	43.04	55.25	19.8	62.35	23.52	19.9	11.24	21.02
20.7	48.60	38.04	20.7	31.57	31.08	20.7	43.29	55.24	20.8	62.59	23.37	20.9	11.41	20.78
21.7	48.92	38.17	21.7	32.74	31.15	21.7	43.53	55.24	21.8	62.85	23.21	21.9	11.58	20.52
22.7	49.23	38.31	22.7	33.95	31.24	22.7	43.76	55.24	22.8	63.12	23.06	22.9	11.78	20.26
23.7	49.55	38.47	23.7	35.18	31.33	23.7	43.99	55.22	23.8	63.41	22.90	23.9	12.00	20.01
24.7	49.87	38.64	24.7	36.40	31.45	24.7	44.22	55.21	24.8	63.72	22.77	24.9	12.23	19.76
25.7	50.18	38.83	25.7	37.60	31.58	25.7	44.45	55.18	25.8	64.02	22.67	25.9	12.46	19.52
26.7	50.46	39.02	26.7	38.76	31.72	26.7	44.69	55.15	26.8	64.31	22.57	26.9	12.70	19.32
27.7	50.75	39.24	27.7	39.88	31.87	27.7	44.94	55.13	27.8	64.60	22.48	27.9	12.94	19.11
28.7	51.03	39.45	28.7	40.95	32.03	28.7	45.19	55.11	28.8	64.89	22.42	28.9	13.18	18.93
29.7	51.30	39.67	29.7	41.98	32.19	29.7	45.45	55.10	29.8	65.17	22.36	29.9	13.42	18.75
30.7	51.54	39.87	30.7	43.00	32.35	30.7	45.72	55.11	30.8	65.45	22.31	30.9	13.65	18.58
31.7	51.79	40.07	31.7	43.98	32.51	31.7	45.99	55.14	31.8	65.72	22.25	31.9	13.87	18.43
13.74	+13.71		50.94	+50.93		11.87	-11.82		12.31	+12.27		11.84	+11.80	
0 <sup>h</sup> 57 <sup>m</sup>	32°.323		1 <sup>h</sup> 31 <sup>m</sup>	41°.366		1 <sup>h</sup> 41 <sup>m</sup>	51°.117		4 <sup>h</sup> 10 <sup>m</sup>	55°.493		5 <sup>h</sup> 36 <sup>m</sup>	9°.111	
+86° 49'	43''.55		+88° 52'	39''.02		-85° 10'	27''.09		+85° 20'	88''.12		+85° 9'	36''.00	



CIRCUMPOLAR STARS.

FOR THE UPPER TRANSIT AT WASHINGTON.

31 G. Menace. Mag. 6.2			5 Menace. Mag. 5.6			51 H. Cephei. Mag. 5.3			25 H. Camelopard. Mag. 5.1			7 G. Octantis. Mag. 6.4		
Wash. Mean Time.	Right Ascension.	Declination.	Wash. Mean Time.	Right Ascension.	Declination.	Wash. Mean Time.	Right Ascension.	Declination.	Wash. Mean Time.	Right Ascension.	Declination.	Wash. Mean Time.	Right Ascension.	Declination.
July	h m	° ' "	July	h m	° ' "	July	h m	° ' "	July	h m	° ' "	July	h m	° ' "
	5 45	-84 49		6 46	-80 49		7 3	+87 10		7 14	+82 38		7 14	-86 54
	s	"		s	"		s	"		s	"		s	"
0.9	15.93	44.81	1.0	32.18	61.11	1.0	22.95	29.79	1.0	18.67	62.77	1.0	42.24	41.45
1.9	15.94	44.47	2.0	32.16	60.77	2.0	23.04	29.49	2.0	18.70	62.49	2.0	42.10	41.13
2.9	15.97	44.13	3.0	32.15	60.42	3.0	23.13	29.20	3.0	18.73	62.20	3.0	41.97	40.81
3.9	16.00	43.78	3.9	32.14	60.08	4.0	23.20	28.91	4.0	18.76	61.92	4.0	41.86	40.48
4.9	16.04	43.44	4.9	32.13	59.73	5.0	23.26	28.63	5.0	18.78	61.64	5.0	41.76	40.15
5.9	16.10	43.10	5.9	32.12	59.40	6.0	23.31	28.32	6.0	18.79	61.36	6.0	41.70	39.83
6.9	16.16	42.78	6.9	32.12	59.06	7.0	23.36	28.01	7.0	18.80	61.06	7.0	41.65	39.51
7.9	16.22	42.47	7.9	32.12	58.73	7.9	23.41	27.69	8.0	18.83	60.75	8.0	41.61	39.22
8.9	16.28	42.19	8.9	32.13	58.42	8.9	23.48	27.35	9.0	18.85	60.43	9.0	41.57	38.93
9.9	16.34	41.93	9.9	32.14	58.14	9.9	23.57	26.99	10.0	18.87	60.08	10.0	41.53	38.64
10.9	16.40	41.66	10.9	32.14	57.86	10.9	23.70	26.63	10.9	18.91	59.72	10.9	41.49	38.36
11.9	16.44	41.38	11.9	32.14	57.58	11.9	23.86	26.27	11.9	18.98	59.37	11.9	41.42	38.09
12.9	16.49	41.09	12.9	32.14	57.29	12.9	24.04	25.93	12.9	19.06	59.04	12.9	41.34	37.82
13.9	16.53	40.78	13.9	32.14	56.98	13.9	24.26	25.61	13.9	19.14	58.73	13.9	41.26	37.53
14.9	16.58	40.46	14.9	32.14	56.65	14.9	24.48	25.30	14.9	19.22	58.45	14.9	41.18	37.22
15.9	16.66	40.13	15.9	32.14	56.29	15.9	24.69	25.01	15.9	19.29	58.16	15.9	41.13	36.90
16.9	16.73	39.80	16.9	32.15	55.93	16.9	24.88	24.73	16.9	19.37	57.88	16.9	41.08	36.56
17.9	16.81	39.46	17.9	32.18	55.58	17.9	25.05	24.46	17.9	19.42	57.61	17.9	41.07	36.20
18.9	16.91	39.15	18.9	32.21	55.24	18.9	25.19	24.18	18.9	19.47	57.33	18.9	41.09	35.86
19.9	17.03	38.87	19.9	32.24	54.90	19.9	25.33	23.88	19.9	19.52	57.06	19.9	41.13	35.53
20.9	17.15	38.59	20.9	32.27	54.59	20.9	25.47	23.57	20.9	19.58	56.78	20.9	41.18	35.22
21.9	17.27	38.32	21.9	32.31	54.31	21.9	25.63	23.24	21.9	19.64	56.41	21.9	41.24	34.93
22.9	17.37	38.08	22.9	32.35	54.03	22.9	25.81	22.90	22.9	19.72	56.08	22.9	41.30	34.65
23.9	17.48	37.84	23.9	32.38	53.76	23.9	26.02	22.56	23.9	19.79	55.74	23.9	41.35	34.38
24.9	17.58	37.58	24.9	32.42	53.48	24.9	26.25	22.23	24.9	19.87	55.41	24.9	41.39	34.11
25.9	17.69	37.32	25.9	32.46	53.19	25.9	26.51	21.91	25.9	19.96	55.10	25.9	41.43	33.83
26.9	17.79	37.05	26.9	32.50	52.90	26.9	26.77	21.60	26.9	20.06	54.79	26.9	41.47	33.52
27.9	17.91	36.78	27.9	32.53	52.59	27.9	27.04	21.31	27.9	20.17	54.50	27.9	41.51	33.21
28.9	18.03	36.50	28.9	32.56	52.27	28.9	27.31	21.08	28.9	20.27	54.22	28.9	41.56	32.90
29.9	18.16	36.22	29.9	32.60	51.94	29.9	27.59	20.75	29.9	20.37	53.95	29.9	41.62	32.58
30.9	18.29	35.93	30.9	32.65	51.61	30.9	27.86	20.48	30.9	20.47	53.69	30.9	41.69	32.26
31.9	18.44	35.64	31.9	32.70	51.28	31.9	28.12	20.22	31.9	20.57	53.43	31.9	41.78	31.93
11.00	-11.05		6.21	-6.13		20.28	+20.26		7.73	+7.66		18.55	-18.53	
5 <sup>h</sup> 45 <sup>m</sup>	39 <sup>o</sup> .719		6 <sup>h</sup> 46 <sup>m</sup>	43 <sup>o</sup> .704		7 <sup>h</sup> 3 <sup>m</sup>	31 <sup>o</sup> .434		7 <sup>h</sup> 14 <sup>m</sup>	20 <sup>o</sup> .713		7 <sup>h</sup> 15 <sup>m</sup>	19 <sup>o</sup> .352	
-84° 49'	42'' .94		-80° 43'	50'' .12		+87° 10'	38'' .36		+82° 34'	10'' .90		-86° 54'	26'' .23	

CIRCUMPOLAR STARS.

FOR THE UPPER TRANSIT AT WASHINGTON.

Groombridge 1119. Mag. 7.0			ζ Octantis. Mag. 5.4			1 H. Draconis. Mag. 4.6			ζ Chamaeleontis. Mag. 5.2			30 H. Camelopard. Mag. 5.3		
Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.
July	h m 8 18	° ' " +83 52	July	h m 9 8	° ' " -85 21	July	h m 9 25	° ' " +81 40	July	h m 9 36	° ' " -80 35	July	h m 10 21	° ' " +82 57
	s "	"		s "	"		s "	"		s "	"		s "	"
1.1	14.06	20.84	1.1	18.54	9.87	1.1	45.02	52.05	1.1	12.65	25.95	1.2	23.37	59.90
2.1	13.91	20.54	2.1	18.34	9.64	2.1	44.98	51.78	2.1	12.55	25.76	2.2	23.28	59.68
3.1	13.76	20.23	3.1	18.14	9.41	3.1	44.93	51.53	3.1	12.45	25.54	3.1	23.19	59.46
4.1	13.60	19.94	4.1	17.96	9.16	4.1	44.88	51.29	4.1	12.35	25.31	4.1	23.09	59.25
5.1	13.43	19.64	5.1	17.78	8.89	5.1	44.82	51.05	5.1	12.25	25.08	5.1	22.99	59.05
6.1	13.21	19.35	6.1	17.63	8.64	6.1	44.75	50.80	6.1	12.17	24.84	6.1	22.89	58.84
7.1	12.98	19.05	7.1	17.48	8.39	7.1	44.68	50.54	7.1	12.09	24.60	7.1	22.77	58.62
8.1	12.74	18.72	8.1	17.34	8.13	8.1	44.61	50.27	8.1	12.00	24.36	8.1	22.64	58.40
9.0	12.49	18.38	9.1	17.20	7.89	9.1	44.54	49.98	9.1	11.94	24.13	9.1	22.51	58.16
10.0	12.30	18.02	10.1	17.08	7.66	10.1	44.48	49.67	10.1	11.88	23.92	10.1	22.40	57.88
11.0	12.20	17.65	11.1	16.95	7.44	11.1	44.42	49.34	11.1	11.81	23.72	11.1	22.29	57.60
12.0	12.18	17.28	12.1	16.82	7.24	12.1	44.38	49.01	12.1	11.73	23.52	12.1	22.19	57.29
13.0	12.24	16.90	13.1	16.67	7.02	13.1	44.35	48.68	13.1	11.65	23.32	13.1	22.11	56.96
14.0	12.37	16.56	14.1	16.52	6.79	14.1	44.34	48.35	14.1	11.57	23.12	14.1	22.05	56.67
15.0	12.55	16.23	15.1	16.36	6.54	15.1	44.33	48.02	15.1	11.49	22.89	15.1	21.99	56.38
16.0	12.70	15.90	16.1	16.20	6.27	16.1	44.31	47.70	16.1	11.41	22.63	16.1	21.94	56.09
17.0	12.82	15.59	17.1	16.05	5.99	17.1	44.29	47.41	17.1	11.32	22.36	17.1	21.88	55.82
18.0	12.90	15.28	18.1	15.91	5.69	18.1	44.26	47.13	18.1	11.26	22.07	18.1	21.80	55.57
19.0	12.93	14.97	19.1	15.81	5.39	19.1	44.22	46.86	19.1	11.20	21.78	19.1	21.72	55.32
20.0	12.93	14.65	20.1	15.71	5.09	20.1	44.18	46.58	20.1	11.13	21.49	20.1	21.64	55.05
21.0	12.92	14.31	21.0	15.62	4.79	21.1	44.14	46.27	21.1	11.08	21.20	21.1	21.54	54.78
22.0	12.92	13.95	22.0	15.55	4.51	22.1	44.10	45.95	22.1	11.03	20.93	22.1	21.45	54.50
23.0	12.96	13.59	23.0	15.47	4.25	23.1	44.07	45.62	23.1	10.98	20.67	23.1	21.36	54.19
24.0	13.07	13.23	24.0	15.40	3.98	24.1	44.04	45.28	24.1	10.94	20.42	24.1	21.27	53.88
25.0	13.24	12.85	25.0	15.32	3.71	25.0	44.03	44.92	25.1	10.90	20.17	25.1	21.20	53.56
26.0	13.46	12.49	26.0	15.24	3.45	26.0	44.02	44.58	26.1	10.85	19.92	26.1	21.14	53.22
26.9	13.73	12.15	27.0	15.16	3.18	27.0	44.02	44.24	27.1	10.80	19.65	27.1	21.09	52.89
27.9	14.04	11.80	28.0	15.07	2.89	28.0	44.02	43.90	28.0	10.75	19.38	28.1	21.05	52.57
28.9	14.37	11.46	29.0	14.98	2.59	29.0	44.02	43.57	29.0	10.69	19.10	29.1	21.01	52.26
29.9	14.71	11.14	30.0	14.89	2.28	30.0	44.04	43.24	30.0	10.64	18.79	30.1	20.98	51.94
30.9	15.05	10.82	31.0	14.81	1.96	31.0	44.05	42.92	31.0	10.59	18.48	31.1	20.94	51.63
31.9	15.38	10.51	32.0	14.75	1.63	32.0	44.05	42.63	32.0	10.54	18.18	32.1	20.90	51.33
50.76	+50.75	12.34	-12.30	6.91	+6.84	6.12	-6.03	8.17	+8.10					
8 <sup>h</sup> 18 <sup>m</sup>	46 <sup>s</sup> .642	9 <sup>h</sup> 8 <sup>m</sup>	33 <sup>s</sup> .397	9 <sup>h</sup> 25 <sup>m</sup>	48 <sup>s</sup> .041	9 <sup>h</sup> 36 <sup>m</sup>	17 <sup>s</sup> .360	10 <sup>h</sup> 21 <sup>m</sup>	27 <sup>s</sup> .495					
+88° 52' 26".44	-85° 20' 41".44	+81° 40' 54".43	-80° 34' 55".47	+82° 57' 59".46										

CIRCUMPOLAR STARS.

FOR THE UPPER TRANSIT AT WASHINGTON.

♄ Octantis. Mag. 6.3			Bradley 1672. Mag. 6.3			♃ Octantis. Mag. 5.4			39 H. Camelopard. ♂ Mag. 5.3			♋ Octantis. Mag. 5.6		
Wash. Mean Time.	Right Ascension.	Declination.	Wash. Mean Time.	Right Ascension.	Declination.	Wash. Mean Time.	Right Ascension.	Declination.	Wash. Mean Time.	Right Ascension.	Declination.	Wash. Mean Time.	Right Ascension.	Declination.
July	h m	° '	July	h m	° '	July	h m	° '	July	h m	° '	July	h m	° '
	10 59	-84 10		12 13	+88 8		12 46	-84 41		12 48	+83 50		13 27	-85 23
	s	"		s	"		s	"		s	"		s	"
1.2	58.10	23.46	1.2	70.90	42.21	1.3	35.43	54.52	1.3	28.36	59.08	1.3	58.33	8.97
2.2	52.91	23.38	2.2	70.32	42.10	2.3	35.22	54.58	2.3	28.18	59.03	2.3	58.10	9.09
3.2	52.70	23.29	3.2	69.75	41.98	3.3	35.00	54.64	3.3	28.00	58.97	3.3	57.86	9.19
4.2	52.50	23.17	4.2	69.18	41.88	4.2	34.76	54.69	4.2	27.83	58.92	4.3	57.59	9.29
5.2	52.31	23.05	5.2	68.60	41.78	5.2	34.53	54.71	5.2	27.65	58.88	5.3	57.33	9.38
6.2	52.12	22.91	6.2	68.01	41.68	6.2	34.30	54.71	6.2	27.47	58.84	6.3	57.07	9.45
7.2	51.93	22.76	7.2	67.39	41.58	7.2	34.07	54.71	7.2	27.29	58.80	7.3	56.82	9.50
8.2	51.76	22.61	8.2	66.74	41.49	8.2	33.87	54.69	8.2	27.09	58.75	8.3	56.59	9.54
9.2	51.61	22.47	9.2	66.06	41.37	9.2	33.67	54.68	9.2	26.87	58.70	9.3	56.37	9.58
10.2	51.46	22.34	10.2	65.36	41.24	10.2	33.49	54.68	10.2	26.66	58.62	10.3	56.16	9.63
11.2	51.30	22.23	11.2	64.69	41.07	11.2	33.31	54.70	11.2	26.45	58.53	11.3	55.96	9.68
12.2	51.15	22.13	12.2	64.02	40.89	12.2	33.13	54.73	12.2	26.25	58.40	12.3	55.76	9.75
13.1	50.98	22.02	13.2	63.40	40.69	13.2	32.95	54.76	13.2	26.05	58.26	13.3	55.55	9.83
14.1	50.81	21.90	14.2	62.82	40.48	14.2	32.75	54.79	14.2	25.86	58.10	14.2	55.33	9.91
15.1	50.62	21.78	15.2	62.29	40.27	15.2	32.53	54.80	15.2	25.70	57.95	15.2	55.09	10.00
16.1	50.44	21.64	16.2	61.78	40.06	16.2	32.30	54.80	16.2	25.53	57.80	16.2	54.82	10.06
17.1	50.25	21.47	17.2	61.28	39.87	17.2	32.06	54.77	17.2	25.38	57.67	17.2	54.55	10.10
18.1	50.07	21.28	18.2	60.77	39.70	18.2	31.82	54.73	18.2	25.21	57.54	18.2	54.28	10.11
19.1	49.91	21.07	19.2	60.22	39.55	19.2	31.59	54.67	19.2	25.03	57.44	19.2	54.00	10.11
20.1	49.76	20.85	20.2	59.64	39.39	20.2	31.37	54.58	20.2	24.85	57.33	20.2	53.76	10.08
21.1	49.61	20.65	21.2	59.04	39.22	21.2	31.17	54.49	21.2	24.66	57.21	21.2	53.52	10.05
22.1	49.48	20.45	22.2	58.42	39.04	22.2	30.96	54.40	22.2	24.46	57.09	22.2	53.29	10.02
23.1	49.35	20.24	23.2	57.80	38.84	23.2	30.80	54.33	23.2	24.26	56.94	23.2	53.07	9.98
24.1	49.22	20.07	24.2	57.19	38.63	24.2	30.62	54.26	24.2	24.06	56.78	24.2	52.85	9.96
25.1	49.06	19.88	25.2	56.60	38.39	25.2	30.43	54.20	25.2	23.88	56.60	25.2	52.64	9.95
26.1	48.95	19.69	26.2	56.04	38.15	26.2	30.24	54.14	26.2	23.69	56.41	26.2	52.42	9.94
27.1	48.81	19.50	27.2	55.51	37.90	27.2	30.05	54.07	27.2	23.51	56.21	27.2	52.18	9.93
28.1	48.67	19.31	28.2	55.00	37.65	28.2	29.85	53.99	28.2	23.34	56.01	28.2	51.94	9.91
29.1	48.53	19.09	29.2	54.53	37.41	29.2	29.63	53.91	29.2	23.19	55.82	29.2	51.69	9.88
30.1	48.38	18.87	30.2	54.06	37.16	30.2	29.42	53.82	30.2	23.04	55.62	30.2	51.42	9.85
31.1	48.23	18.65	31.2	53.63	36.92	31.2	29.21	53.70	31.2	22.89	55.43	31.2	51.16	9.80
32.1	48.06	18.40	32.1	53.17	36.68	32.2	28.98	53.57	32.2	22.74	55.23	32.2	50.90	9.73
9.85 -9.80			30.83 +30.87			10.82 -10.78			9.33 +9.28			12.48 -12.39		
10 <sup>h</sup> 59 <sup>m</sup> 54 <sup>s</sup> .174			12 <sup>h</sup> 14 <sup>m</sup> 29 <sup>s</sup> .583			12 <sup>h</sup> 46 <sup>m</sup> 25 <sup>s</sup> .116			12 <sup>h</sup> 48 <sup>m</sup> 31 <sup>s</sup> .755			13 <sup>h</sup> 27 <sup>m</sup> 42 <sup>s</sup> .060		
-84° 9' 48".70			+88° 8' 36".24			-84° 41' 21".18			+83° 50' 51".72			-85° 22' 38".10		

CIRCUMPOLAR STARS.

FOR THE UPPER TRANSIT AT WASHINGTON.

δ Octantis. Mag. 4.1			Groombridge 2333. Mag. 7.2			ρ Octantis. Mag. 5.7			ε Ursæ Minoris. Mag. 4.4			59 G. Apedis. Mag. 5.9		
Wash. Mean Time.	Right Ascension.	Declination.	Wash. Mean Time.	Right Ascension.	Declination.	Wash. Mean Time.	Right Ascension.	Declination.	Wash. Mean Time.	Right Ascension.	Declination.	Wash. Mean Time.	Right Ascension.	Declination.
July	h m	° '	July	h m	° '	July	h m	° '	July	h m	° '	July	h m	° '
	14 14	-83 18		15 2	+87 32		15 24	-84 12		16 54	+82 10		17 16	-80 47
	s	"		s	"		s	"		s	"		s	"
1.3	10.92	37.97	1.3	39.93	39.94	1.4	58.81	26.47	1.4	10.10	27.47	1.4	45.30	20.39
2.3	10.78	38.15	2.3	39.48	40.05	2.4	58.70	26.72	2.4	10.01	27.72	2.4	45.30	20.70
3.3	10.63	38.32	3.3	39.05	40.16	3.4	58.56	26.96	3.4	9.92	27.96	3.4	45.30	21.01
4.3	10.48	38.47	4.3	38.62	40.28	4.4	58.42	27.19	4.4	9.83	28.20	4.4	45.25	21.30
5.3	10.32	38.61	5.3	38.20	40.40	5.4	58.28	27.42	5.4	9.74	28.45	5.4	45.22	21.59
6.3	10.15	38.72	6.3	37.75	40.53	6.4	58.12	27.62	6.4	9.65	28.71	6.4	45.18	21.87
7.3	10.00	38.83	7.3	37.30	40.66	7.3	57.97	27.81	7.4	9.56	28.98	7.4	45.14	22.12
8.3	9.84	38.93	8.3	36.83	40.80	8.3	57.82	27.98	8.4	9.46	29.25	8.4	45.09	22.37
9.3	9.70	39.02	9.3	36.38	40.93	9.3	57.69	28.15	9.4	9.35	29.54	9.4	45.05	22.61
10.3	9.56	39.11	10.3	35.79	41.06	10.3	57.56	28.31	10.4	9.23	29.83	10.4	45.02	22.83
11.3	9.43	39.21	11.3	35.24	41.16	11.3	57.46	28.48	11.4	9.11	30.11	11.4	45.01	23.06
12.3	9.31	39.34	12.3	34.68	41.25	12.3	57.35	28.67	12.4	8.99	30.35	12.4	44.99	23.30
13.3	9.19	39.46	13.3	34.12	41.30	13.3	57.23	28.86	13.4	8.86	30.59	13.4	44.98	23.57
14.3	9.06	39.60	14.3	33.58	41.34	14.3	57.11	29.07	14.4	8.73	30.79	14.4	44.96	23.84
15.3	8.90	39.74	15.3	33.06	41.37	15.3	56.98	29.29	15.4	8.60	30.98	15.4	44.93	24.14
16.3	8.73	39.86	16.3	32.58	41.40	16.3	56.82	29.50	16.4	8.48	31.16	16.4	44.89	24.43
17.3	8.57	39.96	17.3	32.11	41.43	17.3	56.65	29.69	17.4	8.37	31.34	17.4	44.84	24.72
18.3	8.39	40.03	18.3	31.64	41.48	18.3	56.47	29.86	18.4	8.26	31.55	18.4	44.78	24.99
19.3	8.21	40.09	19.3	31.17	41.53	19.3	56.28	30.01	19.4	8.14	31.77	19.4	44.71	25.23
20.3	8.03	40.12	20.3	30.67	41.61	20.3	56.10	30.15	20.4	8.02	31.99	20.4	44.64	25.46
21.3	7.87	40.13	21.3	30.16	41.68	21.3	55.93	30.26	21.4	7.89	32.23	21.4	44.58	25.67
22.3	7.72	40.16	22.3	29.61	41.75	22.3	55.77	30.36	22.4	7.76	32.46	22.4	44.51	25.86
23.3	7.57	40.18	23.3	29.05	41.81	23.3	55.62	30.45	23.4	7.63	32.69	23.4	44.45	26.06
24.3	7.43	40.21	24.3	28.48	41.86	24.3	55.47	30.56	24.4	7.49	32.91	24.4	44.39	26.26
25.3	7.29	40.25	25.3	27.91	41.88	25.3	55.32	30.68	25.4	7.34	33.11	25.4	44.34	26.48
26.2	7.14	40.29	26.3	27.35	41.88	26.3	55.17	30.81	26.4	7.19	33.29	26.4	44.28	26.69
27.2	6.98	40.32	27.3	26.80	41.88	27.3	55.00	30.93	27.4	7.04	33.46	27.4	44.22	26.91
28.2	6.81	40.36	28.3	26.25	41.86	28.3	54.83	31.06	28.4	6.89	33.61	28.4	44.16	27.14
29.2	6.64	40.39	29.3	25.73	41.84	29.3	54.66	31.18	29.4	6.74	33.76	29.4	44.09	27.37
30.2	6.47	40.41	30.3	25.22	41.81	30.3	54.47	31.29	30.3	6.60	33.91	30.4	44.01	27.61
31.2	6.30	40.42	31.3	24.71	41.78	31.3	54.28	31.40	31.3	6.47	34.04	31.4	43.93	27.85
32.2	6.11	40.43	32.3	24.21	41.77	32.3	54.08	31.50	32.3	6.33	34.17	32.4	43.84	28.08
8.58	-8.53		23.34	+23.32		9.91	-9.86		7.35	+7.38		6.25	-6.17	
14 <sup>h</sup> 13 <sup>m</sup>	55 <sup>s</sup> .644		15 <sup>h</sup> 2 <sup>m</sup>	43 <sup>s</sup> .277		15 <sup>h</sup> 24 <sup>m</sup>	86 <sup>s</sup> .751		16 <sup>h</sup> 54 <sup>m</sup>	6 <sup>s</sup> .748		17 <sup>h</sup> 16 <sup>m</sup>	28 <sup>s</sup> .406	
-83° 18'	11'' .26		+87° 32'	28'' .69		-84° 12'	7'' .98		+82° 10'	15'' .74		-80° 47'	18'' .10	

CIRCUMPOLAR STARS.

FOR THE UPPER TRANSIT AT WASHINGTON.

δ Ursa Minoris. Mag. 4.4			χ Octantis. Mag. 5.2			λ Ursa Minoris. Mag. 6.6			σ Octantis. Mag. 5.5			76 Draconis. Mag. 5.7		
Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.
July	h m	°	July	h m	°	July	h m	°	July	h m	°	July	h m	°
	17 58	+86 37	July	18 8	-87 38	July	18 59	+89 1	July	19 34	-89 12	July	20 48	+82 14
	s	"		s	"		s	"		s	"		s	"
1.5	10.92	1.66	1.5	58.41	44.96	1.5	34.97	26.91	1.5	55.72	47.83	1.6	35.70	14.98
2.5	10.78	1.95	2.5	58.47	45.28	2.5	34.75	27.22	2.5	56.44	48.14	2.6	35.76	15.30
3.5	10.64	2.23	3.5	58.49	45.61	3.5	34.54	27.51	3.5	57.08	48.45	3.6	35.82	15.61
4.5	10.50	2.51	4.5	58.50	45.94	4.5	34.35	27.81	4.5	57.66	48.76	4.6	35.87	15.90
5.5	10.37	2.79	5.5	58.47	46.27	5.5	34.19	28.12	5.5	58.14	49.08	5.6	35.93	16.21
6.5	10.24	3.10	6.5	58.42	46.58	6.5	34.04	28.43	6.5	58.53	49.39	6.6	35.99	16.52
7.5	10.11	3.41	7.5	58.34	46.89	7.5	33.90	28.76	7.5	58.86	49.68	7.6	36.05	16.84
8.5	9.97	3.72	8.5	58.26	47.16	8.5	33.78	29.12	8.5	59.15	49.97	8.6	36.11	17.17
9.4	9.80	4.05	9.5	58.20	47.43	9.5	33.51	29.49	9.5	59.44	50.24	9.6	36.17	17.53
10.4	9.62	4.39	10.5	58.15	47.69	10.5	33.22	29.86	10.5	59.78	50.48	10.6	36.22	17.90
11.4	9.42	4.72	11.5	58.13	47.95	11.5	32.83	30.21	11.5	60.19	50.74	11.6	36.27	18.27
12.4	9.19	5.03	12.4	58.13	48.22	12.5	32.34	30.55	12.5	60.67	51.00	12.6	36.31	18.66
13.4	8.95	5.32	13.4	58.14	48.50	13.5	31.79	30.88	13.5	61.19	51.28	13.6	36.35	19.05
14.4	8.71	5.60	14.4	58.15	48.82	14.5	31.20	31.17	14.5	61.72	51.57	14.6	36.36	19.42
15.4	8.46	5.85	15.4	58.12	49.14	15.5	30.62	31.45	15.5	62.20	51.88	15.6	36.37	19.76
16.4	8.23	6.09	16.4	58.06	49.47	16.5	30.05	31.73	16.5	62.58	52.20	16.5	36.38	20.10
17.4	8.01	6.33	17.4	57.95	49.80	17.5	29.54	32.01	17.5	62.85	52.53	17.5	36.40	20.42
18.4	7.81	6.59	18.4	57.79	50.12	18.5	29.08	32.32	18.5	62.99	52.86	18.5	36.42	20.75
19.4	7.61	6.86	19.4	57.71	50.41	19.5	28.66	32.63	19.5	63.03	53.19	19.5	36.45	21.07
20.4	7.40	7.13	20.4	57.42	50.70	20.5	28.25	32.96	20.5	62.99	53.49	20.5	36.48	21.41
21.4	7.18	7.42	21.4	57.22	50.96	21.5	27.81	33.30	21.5	62.92	53.78	21.5	36.52	21.78
22.4	6.95	7.72	22.4	57.03	51.21	22.5	27.32	33.64	22.5	62.85	54.06	22.5	36.53	22.15
23.4	6.70	8.02	23.4	56.86	51.45	23.5	26.78	33.98	23.5	62.80	54.34	23.5	36.55	22.53
24.4	6.43	8.31	24.4	56.71	51.70	24.5	26.15	34.32	24.5	62.80	54.61	24.5	36.57	22.91
25.4	6.16	8.59	25.4	56.55	51.95	25.4	25.47	34.65	25.5	62.83	54.88	25.5	36.58	23.29
26.4	5.87	8.84	26.4	56.39	52.22	26.4	24.75	34.97	26.5	62.87	55.16	26.5	36.58	23.67
27.4	5.58	9.00	27.4	56.23	52.49	27.4	24.01	35.28	27.5	62.88	55.45	27.5	36.58	24.05
28.4	5.28	9.33	28.4	56.06	52.76	28.4	23.22	35.57	28.5	62.89	55.77	28.5	36.57	24.41
29.4	4.98	9.56	29.4	55.87	53.04	29.4	22.43	35.85	29.5	62.85	56.08	29.5	36.56	24.77
30.4	4.69	9.76	30.4	55.66	53.33	30.4	21.66	36.12	30.5	62.77	56.40	30.5	36.54	25.11
31.4	4.40	9.97	31.4	55.42	53.62	31.4	20.90	36.39	31.5	62.61	56.73	31.5	36.52	25.44
32.4	4.13	10.18	32.4	55.15	53.91	32.4	20.15	36.65	32.5	62.36	57.06	32.5	36.51	25.76
16.95	+16.92		24.53	-24.51		56.79	+56.73		72.96	-72.92		7.40	+7.34	
17 <sup>h</sup> 58 <sup>m</sup>	2 <sup>s</sup> 814		18 <sup>h</sup> 7 <sup>m</sup> 59 <sup>s</sup>	062		18 <sup>h</sup> 59 <sup>m</sup>	2 <sup>s</sup> 477		19 <sup>h</sup> 32 <sup>m</sup>	24 <sup>s</sup> 283		20 <sup>h</sup> 48 <sup>m</sup>	27 <sup>s</sup> 964	
+86° 36'	50 <sup>''</sup> 93		-87° 39'	50 <sup>''</sup> 34		+89° 1'	17 <sup>''</sup> 96		-89° 13'	5 <sup>''</sup> 55		+82° 14'	10 <sup>''</sup> 29	

CIRCUMPOLAR STARS.

FOR THE UPPER TRANSIT AT WASHINGTON.

λ Octantis. Mag. 5.4			ν Octantis. Mag. 5.7			β Octantis. Mag. 4.3			39 E. Cephei. Mag. 5.6			γ <sup>1</sup> Octantis. Mag. 5.1		
Wash. Mean Time.	Right Ascension.	Declination.	Wash. Mean Time.	Right Ascension.	Declination.	Wash. Mean Time.	Right Ascension.	Declination.	Wash. Mean Time.	Right Ascension.	Declination.	Wash. Mean Time.	Right Ascension.	Declination.
July	h m	° ' "	July	h m	° ' "	July	h m	° ' "	July	h m	° ' "	July	h m	° ' "
	21 38	-83 4		22 16	-86 21		22 38	-81 47		23 27	+86 51		23 47	-82 27
1.6	59.73	46.90	1.7	59.99	59.85	1.7	4.19	31.69	1.7	59.35	54.97	1.7	28.50	13.11
2.6	59.91	47.07	2.6	60.32	59.47	2.7	4.34	31.77	2.7	59.68	55.16	2.7	28.68	13.10
3.6	60.07	47.25	3.6	60.65	59.60	3.7	4.50	31.87	3.7	60.00	55.34	3.7	28.85	13.10
4.6	60.22	47.45	4.6	60.97	59.75	4.7	4.66	31.99	4.7	60.32	55.52	4.7	29.03	13.13
5.6	60.37	47.65	5.6	61.26	59.92	5.7	4.80	32.12	5.7	60.64	55.68	5.7	29.21	13.17
6.6	60.50	47.86	6.6	61.54	60.09	6.6	4.94	32.26	6.7	60.97	55.84	6.7	29.38	13.22
7.6	60.63	48.06	7.6	61.81	60.27	7.6	5.07	32.40	7.7	61.32	56.01	7.7	29.52	13.28
8.6	60.73	48.26	8.6	62.05	60.44	8.6	5.19	32.54	8.7	61.68	56.18	8.7	29.66	13.34
9.6	60.84	48.45	9.6	62.28	60.61	9.6	5.31	32.66	9.7	62.06	56.39	9.7	29.80	13.39
10.6	60.95	48.62	10.6	62.52	60.75	10.6	5.42	32.77	10.7	62.44	56.61	10.7	29.94	13.42
11.6	61.07	48.78	11.6	62.78	60.89	11.6	5.54	32.87	11.7	62.81	56.86	11.7	30.09	13.45
12.6	61.20	48.94	12.6	63.05	61.02	12.6	5.68	32.96	12.7	63.14	57.12	12.7	30.26	13.47
13.6	61.35	49.10	13.6	63.33	61.15	13.6	5.81	33.06	13.7	63.47	57.39	13.7	30.42	13.49
14.6	61.50	49.28	14.6	63.63	61.29	14.6	5.96	33.18	14.7	63.78	57.66	14.7	30.59	13.51
15.6	61.65	49.48	15.6	63.94	61.46	15.6	6.12	33.31	15.7	64.06	57.93	15.7	30.77	13.55
16.6	61.79	49.70	16.6	64.23	61.65	16.6	6.26	33.45	16.7	64.32	58.17	16.7	30.95	13.60
17.6	61.93	49.94	17.6	64.51	61.87	17.6	6.39	33.63	17.7	64.58	58.40	17.7	31.13	13.69
18.6	62.04	50.20	18.6	64.75	62.10	18.6	6.52	33.83	18.7	64.84	58.63	18.7	31.28	13.81
19.6	62.14	50.46	19.6	64.99	62.33	19.6	6.64	34.04	19.7	65.14	58.85	19.7	31.43	13.93
20.6	62.23	50.72	20.6	65.19	62.56	20.6	6.74	34.24	20.6	65.45	59.08	20.7	31.57	14.06
21.6	62.30	50.96	21.6	65.38	62.79	21.6	6.84	34.44	21.6	65.77	59.31	21.7	31.70	14.19
22.6	62.38	51.20	22.6	65.57	62.99	22.6	6.93	34.63	22.6	66.10	59.58	22.7	31.83	14.32
23.6	62.46	51.43	23.6	65.76	63.19	23.6	7.02	34.80	23.6	66.42	59.85	23.7	31.96	14.42
24.6	62.54	51.65	24.6	65.95	63.39	24.6	7.12	34.97	24.6	66.73	60.13	24.7	32.09	14.53
25.6	62.63	51.86	25.6	66.15	63.59	25.6	7.23	35.14	25.6	67.01	60.42	25.6	32.23	14.64
26.6	62.73	52.08	26.6	66.37	63.81	26.6	7.33	35.32	26.6	67.29	60.73	26.6	32.37	14.75
27.6	62.83	52.32	27.6	66.58	64.03	27.6	7.45	35.50	27.6	67.56	61.03	27.6	32.52	14.87
28.6	62.92	52.56	28.6	66.81	64.26	28.6	7.56	35.70	28.6	67.80	61.34	28.6	32.67	14.99
29.5	63.02	52.82	29.6	67.06	64.49	29.6	7.67	35.92	29.6	68.08	61.64	29.6	32.82	15.13
30.5	63.11	53.09	30.6	67.23	64.75	30.6	7.78	36.15	30.6	68.25	61.93	30.6	32.97	15.29
31.5	63.20	53.37	31.6	67.43	65.01	31.6	7.89	36.38	31.6	68.46	62.22	31.6	33.12	15.46
32.5	63.27	53.68	32.6	67.63	65.29	32.6	7.99	36.62	32.6	68.67	62.50	32.6	33.28	15.64
8.30	-8.24	15.78	-15.75	7.00	-6.83	13.29	+13.26	7.62	-7.55					
21 <sup>h</sup> 33 <sup>m</sup>	49 <sup>s</sup> .036	22 <sup>h</sup> 16 <sup>m</sup>	45 <sup>s</sup> .440	22 <sup>h</sup> 37 <sup>m</sup>	57 <sup>s</sup> .920	23 <sup>h</sup> 27 <sup>m</sup>	43 <sup>s</sup> .285	23 <sup>h</sup> 47 <sup>m</sup>	27 <sup>s</sup> .240					
-83° 5'	17''.98	-86° 22'	32''.81	-81° 48'	6''.03	+86° 51'	58''.49	-82° 27'	48''.42					

CIRCUMPOLAR STARS.

FOR THE UPPER TRANSIT AT WASHINGTON.

43 H. Cephei. Mag. 4.5			α Ursa Minoris. (Polaris.) Mag. 2.1			4 G. Octantis. Mag. 5.6			Greenbridge 750. Mag. 6.7			Greenbridge 844. Mag. 6.4		
Wash. Mean Time.	Right Ascension.	Declination.	Wash. Mean Time.	Right Ascension.	Declination.	Wash. Mean Time.	Right Ascension.	Declination.	Wash. Mean Time.	Right Ascension.	Declination.	Wash. Mean Time.	Right Ascension.	Declination.
Aug.	h m	° ' "	Aug.	h m	° ' "	Aug.	h m	° ' "	Aug.	h m	° ' "	Aug.	h m	° ' "
	0 57	+85 49		1 32	+88 52		1 41	-85 9		4 11	+85 20		5 36	+85 9
	s	"		s	"		s	"		s	"		s	"
0.7	51.79	40.07	0.7	43.98	32.51	0.7	45.99	55.14	0.8	5.72	22.25	0.9	18.87	18.43
1.7	52.03	40.27	1.7	44.96	32.66	1.7	46.25	55.18	1.8	5.99	22.19	1.9	14.09	18.26
2.7	52.28	40.45	2.7	45.95	32.80	2.7	46.52	55.23	2.8	6.26	22.11	2.9	14.29	18.09
3.7	52.53	40.64	3.7	46.97	32.94	3.7	46.76	55.31	3.8	6.52	22.04	3.9	14.51	17.91
4.7	52.80	40.83	4.7	48.04	33.08	4.7	47.00	55.38	4.8	6.79	21.95	4.9	14.73	17.71
5.7	53.06	41.03	5.7	49.17	33.24	5.7	47.22	55.46	5.8	7.09	21.87	5.9	14.96	17.50
6.7	53.33	41.25	6.7	50.34	33.41	6.7	47.44	55.54	6.8	7.40	21.78	6.9	15.22	17.29
7.7	53.63	41.49	7.7	51.52	33.59	7.7	47.65	55.59	7.8	7.72	21.72	7.9	15.48	17.08
8.7	53.93	41.76	8.7	52.69	33.80	8.7	47.87	55.65	8.8	8.06	21.67	8.9	15.76	16.89
9.7	54.25	42.04	9.7	53.82	34.03	9.7	48.09	55.70	9.8	8.40	21.65	9.8	16.06	16.73
10.7	54.50	42.34	10.7	54.87	34.27	10.7	48.31	55.74	10.8	8.73	21.66	10.8	16.36	16.58
11.7	54.74	42.63	11.7	55.87	34.51	11.7	48.57	55.79	11.8	9.05	21.68	11.8	16.65	16.47
12.6	54.97	42.92	12.7	56.80	34.75	12.7	48.84	55.84	12.8	9.34	21.70	12.8	16.93	16.36
13.6	55.17	43.19	13.7	57.68	34.98	13.7	49.09	55.93	13.8	9.63	21.71	13.8	17.20	16.25
14.6	55.38	43.43	14.7	58.55	35.19	14.7	49.34	56.03	14.8	9.91	21.72	14.8	17.44	16.13
15.6	55.60	43.68	15.7	59.45	35.39	15.7	49.58	56.17	15.8	10.19	21.71	15.8	17.68	16.00
16.6	55.83	43.93	16.7	60.41	35.59	16.7	49.81	56.31	16.8	10.46	21.69	16.8	17.92	15.86
17.6	56.06	44.17	17.7	61.40	35.79	17.7	50.04	56.46	17.8	10.75	21.66	17.8	18.18	15.71
18.6	56.31	44.43	18.7	62.43	36.00	18.7	50.24	56.63	18.8	11.06	21.62	18.8	18.45	15.55
19.6	56.56	44.69	19.7	63.48	36.22	19.7	50.44	56.78	19.8	11.38	21.61	19.8	18.73	15.40
20.6	56.82	44.96	20.6	64.55	36.45	20.7	50.63	56.93	20.8	11.71	21.61	20.8	19.02	15.25
21.6	57.07	45.27	21.6	65.57	36.72	21.7	50.83	57.07	21.8	12.04	21.63	21.8	19.32	15.12
22.6	57.31	45.57	22.6	66.56	36.98	22.7	51.04	57.21	22.8	12.36	21.66	22.8	19.63	15.01
23.6	57.53	45.88	23.6	67.50	37.25	23.6	51.25	57.34	23.6	12.69	21.70	23.8	19.92	14.91
24.6	57.72	46.20	24.6	68.39	37.53	24.6	51.47	57.48	24.7	13.01	21.76	24.8	20.22	14.82
25.6	57.93	46.52	25.6	69.24	37.81	25.6	51.69	57.62	25.7	13.32	21.82	25.8	20.52	14.76
26.6	58.15	46.84	26.6	70.05	38.10	26.6	51.92	57.77	26.7	13.63	21.90	26.8	20.81	14.70
27.6	58.27	47.16	27.6	70.82	38.38	27.6	52.14	57.94	27.7	13.92	21.98	27.8	21.09	14.64
28.6	58.44	47.47	28.6	71.57	38.65	28.6	52.36	58.12	28.7	14.19	22.04	28.8	21.36	14.58
29.6	58.61	47.77	29.6	72.32	38.92	29.6	52.58	58.32	29.7	14.47	22.11	29.8	21.63	14.51
30.6	58.78	48.06	30.6	73.10	39.17	30.6	52.79	58.55	30.7	14.75	22.16	30.8	21.90	14.44
31.6	58.96	48.35	31.6	73.92	39.43	31.6	52.96	58.77	31.7	15.04	22.20	31.8	22.16	14.86
13.75	+18.71		51.00	+50.99		11.87	-11.82		12.81	+12.87		11.84	+11.80	
0 <sup>h</sup> 57 <sup>m</sup>	32 <sup>s</sup> .323		1 <sup>h</sup> 31 <sup>m</sup>	41 <sup>s</sup> .366		1 <sup>h</sup> 41 <sup>m</sup>	51 <sup>s</sup> .117		4 <sup>h</sup> 10 <sup>m</sup>	55 <sup>s</sup> .493		5 <sup>h</sup> 36 <sup>m</sup>	9 <sup>s</sup> .111	
+85° 49'	43''.55		+88° 52'	39''.02		-85° 10'	27''.09		+85° 20'	38''.12		+85° 9'	36''.00	

CIRCUMPOLAR STARS.

FOR THE UPPER TRANSIT AT WASHINGTON.

31 G. Mensse. Mag. 6.2			5 Mensse. Mag. 5.6			51 H. Cephei. Mag. 5.3			25 H. Camelop. Mag. 5.1			7 G. Octantis. Mag. 6.4		
Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.
Aug.	h m . "		Aug.	h m . "		Aug.	h m . "		Aug.	h m . "		Aug.	h m . "	
	5 45	-84 49		6 46	-80 43		7 3	+87 10		7 14	+82 53		7 14	-86 54
	s "			s "			s "			s "			s "	
0.9	18.44	35.64	0.9	32.70	51.28	0.9	28.12	20.22	0.9	20.57	53.43	0.9	41.78	31.93
1.9	18.59	35.36	1.9	32.76	50.95	1.9	28.36	19.96	1.9	20.66	53.17	1.9	41.90	31.60
2.9	18.76	35.09	2.9	32.83	50.64	2.9	28.61	19.69	2.9	20.74	52.90	2.9	42.04	31.27
3.9	18.93	34.85	3.9	32.90	50.35	3.9	28.84	19.41	3.9	20.83	52.63	3.9	42.18	30.96
4.9	19.10	34.62	4.9	32.98	50.08	4.9	29.08	19.10	4.9	20.92	52.35	4.9	42.35	30.67
5.9	19.27	34.42	5.9	33.03	49.82	5.9	29.35	18.80	5.9	21.01	52.04	5.9	42.52	30.40
6.9	19.42	34.22	6.9	33.10	49.58	6.9	29.63	18.49	6.9	21.12	51.74	6.9	42.66	30.15
7.9	19.57	34.03	7.9	33.17	49.34	7.9	29.95	18.18	7.9	21.25	51.42	7.9	42.80	29.91
8.9	19.71	33.81	8.9	33.23	49.10	8.9	30.31	17.89	8.9	21.39	51.10	8.9	42.93	29.67
9.9	19.85	33.60	9.9	33.29	48.84	9.9	30.69	17.60	9.9	21.53	50.82	9.9	43.03	29.40
10.9	20.00	33.37	10.9	33.36	48.57	10.9	31.10	17.33	10.9	21.68	50.54	10.9	43.15	29.13
11.8	20.15	33.13	11.9	33.42	48.28	11.9	31.48	17.09	11.9	21.83	50.29	11.9	43.27	28.83
12.8	20.32	32.89	12.9	33.49	47.97	12.9	31.86	16.86	12.9	21.97	50.06	12.9	43.42	28.52
13.8	20.50	32.65	13.9	33.57	47.67	13.9	32.20	16.64	13.9	22.10	49.83	13.9	43.59	28.21
14.8	20.69	32.43	14.9	33.65	47.38	14.9	32.53	16.41	14.9	22.22	49.61	14.9	43.78	27.91
15.8	20.90	32.24	15.9	33.73	47.11	15.9	32.86	16.18	15.9	22.32	49.37	15.9	44.00	27.62
16.8	21.11	32.06	16.9	33.82	46.87	16.9	33.17	15.94	16.9	22.43	49.10	16.9	44.24	27.34
17.8	21.31	31.90	17.9	33.92	46.64	17.9	33.48	15.67	17.9	22.55	48.84	17.9	44.49	27.10
18.8	21.51	31.75	18.9	34.02	46.41	18.9	33.81	15.39	18.9	22.68	48.57	18.9	44.73	26.87
19.8	21.71	31.60	19.9	34.11	46.20	19.9	34.17	15.12	19.9	22.82	48.29	19.9	44.97	26.64
20.8	21.90	31.46	20.9	34.21	46.00	20.9	34.55	14.85	20.9	22.96	48.02	20.9	45.20	26.41
21.8	22.09	31.32	21.9	34.30	45.79	21.9	34.95	14.59	21.9	23.12	47.76	21.9	45.42	26.18
22.8	22.29	31.17	22.9	34.39	45.57	22.9	35.37	14.35	22.9	23.29	47.52	22.9	45.64	25.95
23.8	22.48	31.02	23.9	34.48	45.34	23.9	35.79	14.12	23.9	23.45	47.28	23.9	45.86	25.71
24.8	22.67	30.85	24.9	34.57	45.11	24.9	36.22	13.90	24.9	23.61	47.05	24.9	46.08	25.46
25.8	22.87	30.69	25.9	34.67	44.87	25.9	36.65	13.71	25.9	23.77	46.84	25.9	46.31	25.22
26.8	23.09	30.52	26.8	34.78	44.64	26.9	37.08	13.51	26.9	23.94	46.64	26.9	46.57	24.96
27.8	23.30	30.36	27.8	34.88	44.40	27.9	37.49	13.33	27.9	24.08	46.45	27.9	46.83	24.70
28.8	23.52	30.21	28.8	34.98	44.17	28.9	37.90	13.15	28.9	24.23	46.26	28.9	47.10	24.44
29.8	23.76	30.08	29.8	35.10	43.95	29.9	38.28	12.96	29.9	24.38	46.06	29.9	47.40	24.20
30.8	24.00	29.96	30.8	35.22	43.76	30.9	38.65	12.76	30.9	24.52	45.89	30.9	47.71	23.96
31.8	24.24	29.86	31.8	35.34	43.57	31.8	39.03	12.56	31.9	24.65	45.67	31.9	48.04	23.76

11.09	-11.04	0.21	-6.13	20.26	+20.24	7.73	+7.66	13.54	-13.51
5 <sup>h</sup> 45 <sup>m</sup>	39 <sup>°</sup> 719	6 <sup>h</sup> 46 <sup>m</sup>	43 <sup>°</sup> 704	7 <sup>h</sup> 3 <sup>m</sup>	31 <sup>°</sup> 494	7 <sup>h</sup> 14 <sup>m</sup>	20 <sup>°</sup> 713	7 <sup>h</sup> 15 <sup>m</sup>	19 <sup>°</sup> 852
-84 <sup>°</sup> 49'	42 <sup>''</sup> 94	-80 <sup>°</sup> 43'	50 <sup>''</sup> 12	+87 <sup>°</sup> 10'	68 <sup>''</sup> 86	+82 <sup>°</sup> 34'	10 <sup>''</sup> 90	-86 <sup>°</sup> 54'	26 <sup>''</sup> 23



CIRCUMPOLAR STARS.

FOR THE UPPER TRANSIT AT WASHINGTON.

Greenwich 1119. Mag. 7.0			♄ Octantis. Mag. 5.4			♃ H. Denebis. Mag. 4.6			♁ Chamaeleontis. Mag. 5.2			♄ H. Camelop. Mag. 5.3		
Wash. Mean Time.	Right Ascension.	Declination.	Wash. Mean Time.	Right Ascension.	Declination.	Wash. Mean Time.	Right Ascension.	Declination.	Wash. Mean Time.	Right Ascension.	Declination.	Wash. Mean Time.	Right Ascension.	Declination.
Aug.	h m	° "	Aug.	h m	° "	Aug.	h m	° "	Aug.	h m	° "	Aug.	h m	° "
	8 18	+88 52		9 8	-85 20		9 25	+61 40		9 36	-90 35		10 21	+82 57
0.9	15.38	10.51	1.0	14.75	61.63	1.0	44.05	42.63	1.0	10.54	18.16	1.1	20.90	51.33
1.9	15.67	10.20	2.0	14.70	61.30	2.0	44.05	42.34	2.0	10.50	17.84	2.1	20.85	51.04
2.9	15.93	9.88	3.0	14.65	60.97	3.0	44.04	42.02	3.0	10.47	17.51	3.1	20.81	50.75
3.9	16.17	9.55	4.0	14.61	60.64	4.0	44.03	41.70	4.0	10.44	17.19	4.1	20.76	50.44
4.9	16.42	9.22	5.0	14.61	60.34	5.0	44.02	41.38	5.0	10.43	16.89	5.1	20.71	50.13
5.9	16.69	8.88	6.0	14.61	60.05	6.0	44.01	41.04	6.0	10.41	16.60	6.1	20.65	49.80
6.9	17.02	8.51	7.0	14.60	59.76	7.0	44.00	40.67	7.0	10.40	16.31	7.1	20.60	49.43
7.9	17.44	8.14	8.0	14.60	59.49	8.0	44.01	40.29	8.0	10.39	16.04	8.1	20.56	49.06
8.9	17.94	7.76	8.9	14.57	59.23	9.0	44.05	39.91	9.0	10.38	15.77	9.0	20.54	48.68
9.9	18.53	7.41	9.9	14.53	58.96	10.0	44.09	39.53	10.0	10.36	15.50	10.0	20.53	48.30
10.9	19.14	7.07	10.9	14.49	58.65	11.0	44.14	39.16	11.0	10.32	15.22	11.0	20.53	47.92
11.9	19.79	6.75	11.9	14.45	58.34	12.0	44.19	38.83	12.0	10.28	14.91	12.0	20.54	47.55
12.9	20.41	6.44	12.9	14.42	58.02	12.9	44.24	38.49	13.0	10.25	14.59	13.0	20.54	47.22
13.9	20.98	6.13	13.9	14.41	57.69	13.9	44.28	38.17	14.0	10.24	14.25	14.0	20.54	46.89
14.9	21.50	5.84	14.9	14.41	57.35	14.9	44.33	37.85	15.0	10.23	13.90	15.0	20.54	46.57
15.9	21.97	5.54	15.9	14.44	57.01	15.9	44.34	37.54	15.9	10.23	13.55	16.0	20.52	46.25
16.9	22.42	5.23	16.9	14.48	56.68	16.9	44.35	37.22	16.9	10.23	13.22	17.0	20.51	45.93
17.9	22.88	4.91	17.9	14.52	56.36	17.9	44.37	36.89	17.9	10.24	12.91	18.0	20.48	45.59
18.9	23.38	4.58	18.9	14.57	56.07	18.9	44.40	36.53	18.9	10.26	12.61	19.0	20.45	45.22
19.9	23.92	4.24	19.9	14.62	55.78	19.9	44.43	36.17	19.9	10.28	12.32	20.0	20.44	44.87
20.9	24.53	3.89	20.9	14.68	55.49	20.9	44.48	35.80	20.9	10.29	12.04	21.0	20.43	44.49
21.9	25.18	3.56	21.9	14.73	55.21	21.9	44.52	35.44	21.9	10.30	11.74	22.0	20.43	44.11
22.9	25.89	3.23	22.9	14.77	54.92	22.9	44.57	35.07	22.9	10.31	11.44	23.0	20.44	43.73
23.9	26.64	2.91	23.9	14.81	54.63	23.9	44.63	34.72	23.9	10.32	11.15	24.0	20.47	43.35
24.9	27.42	2.60	24.9	14.86	54.32	24.9	44.71	34.38	24.9	10.34	10.83	25.0	20.50	42.97
25.9	28.20	2.31	25.9	14.90	54.01	25.9	44.77	34.03	25.9	10.35	10.51	26.0	20.54	42.62
26.9	28.98	2.02	26.9	14.94	53.68	26.9	44.83	33.71	26.9	10.36	10.18	26.9	20.56	42.28
27.9	29.74	1.74	27.9	15.00	53.36	27.9	44.90	33.39	27.9	10.37	9.85	27.9	20.60	41.94
28.9	30.48	1.47	28.9	15.07	53.03	28.9	44.96	33.06	28.9	10.38	9.52	28.9	20.64	41.60
29.9	31.19	1.20	29.9	15.15	52.70	29.9	45.03	32.77	29.9	10.42	9.18	29.9	20.65	41.27
30.9	31.88	0.93	30.9	15.24	52.37	30.9	45.09	32.46	30.9	10.45	8.84	30.9	20.68	40.94
31.9	32.54	0.65	31.9	15.35	52.08	31.9	45.14	32.14	31.9	10.48	8.52	31.9	20.69	40.61
50.63	+50.62	12.83	-12.29	6.91	+6.24	6.11	-6.03	8.16	+8.10					
8 <sup>h</sup> 18 <sup>m</sup>	46°.642'	9 <sup>h</sup> 8 <sup>m</sup>	33°.397'	9 <sup>h</sup> 25 <sup>m</sup>	48°.641'	9 <sup>h</sup> 36 <sup>m</sup>	17°.360'	10 <sup>h</sup> 21 <sup>m</sup>	27°.495'					
+88° 52'	26''.44	-85° 20'	41''.44	+81° 40'	54''.43	-80° 34'	55''.47	+82° 57'	59''.46					

CIRCUMPOLAR STARS.

FOR THE UPPER TRANSIT AT WASHINGTON.

γ Octantis. Mag. 6.3			Bradley 1673. Mag. 6.3			ι Octantis. Mag. 5.4			32 H. Camelop. seq. Mag. 5.3			κ Octantis. Mag. 5.6		
Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.
Aug.	h m	° '	Aug.	h m	° '	Aug.	h m	° '	Aug.	h m	° '	Aug.	h m	° '
	10 59	-84 10		12 13	+88 8		12 46	-84 41		12 48	+83 50		13 27	-85 23
1.1	48.08	18.40	1.1	53.17	36.68	1.2	28.98	53.57	1.2	22.74	55.23	1.2	50.90	9.73
2.1	47.94	18.13	2.1	52.72	36.46	2.2	28.76	53.43	2.2	22.58	55.05	2.2	50.63	9.65
3.1	47.81	17.85	3.1	52.25	36.23	3.2	28.56	53.26	3.2	22.41	54.87	3.2	50.39	9.55
4.1	47.70	17.58	4.1	51.75	36.01	4.2	28.36	53.10	4.2	22.24	54.70	4.2	50.14	9.44
5.1	47.60	17.31	5.1	51.28	35.78	5.2	28.18	52.93	5.2	22.07	54.51	5.2	49.90	9.33
6.1	47.51	17.06	6.1	50.68	35.51	6.2	28.01	52.78	6.2	21.89	54.30	6.2	49.68	9.21
7.1	47.42	16.82	7.1	50.15	35.23	7.2	27.85	52.63	7.2	21.70	54.08	7.2	49.49	9.11
8.1	47.33	16.60	8.1	49.63	34.93	8.2	27.69	52.49	8.2	21.52	53.83	8.2	49.30	9.01
9.1	47.25	16.38	9.1	49.15	34.61	9.1	27.53	52.37	9.2	21.37	53.56	9.2	49.10	8.94
10.1	47.15	16.16	10.1	48.72	34.29	10.1	27.36	52.25	10.1	21.22	53.27	10.2	48.88	8.87
11.1	47.04	15.92	11.1	48.32	33.96	11.1	27.18	52.14	11.1	21.06	52.98	11.2	48.65	8.79
12.1	46.91	15.66	12.1	47.96	33.64	12.1	26.99	52.01	12.1	20.95	52.70	12.2	48.41	8.71
13.1	46.79	15.39	13.1	47.63	33.33	13.1	26.80	51.84	13.1	20.83	52.43	13.2	48.17	8.59
14.1	46.69	15.11	14.1	47.30	33.05	14.1	26.60	51.66	14.1	20.70	52.17	14.2	47.92	8.47
15.1	46.60	14.80	15.1	46.93	32.77	15.1	26.40	51.45	15.1	20.58	51.93	15.2	47.67	8.32
16.1	46.51	14.49	16.1	46.54	32.50	16.1	26.23	51.23	16.1	20.44	51.70	16.2	47.43	8.15
17.1	46.44	14.18	17.1	46.13	32.22	17.1	26.06	51.01	17.1	20.29	51.46	17.2	47.20	7.97
18.1	46.38	13.89	18.1	45.70	31.93	18.1	25.91	50.78	18.1	20.14	51.21	18.2	47.00	7.79
19.0	46.33	13.60	19.1	45.27	31.63	19.1	25.77	50.56	19.1	19.98	50.95	19.1	46.81	7.60
20.0	46.28	13.32	20.1	44.84	31.33	20.1	25.63	50.33	20.1	19.82	50.69	20.1	46.62	7.42
21.0	46.24	13.04	21.1	44.42	31.00	21.1	25.49	50.13	21.1	19.67	50.41	21.1	46.44	7.25
22.0	46.19	12.77	22.1	44.04	30.66	22.1	25.36	49.93	22.1	19.53	50.09	22.1	46.25	7.09
23.0	46.13	12.49	23.1	43.69	30.30	23.1	25.23	49.73	23.1	19.40	49.78	23.1	46.07	6.92
24.0	46.07	12.21	24.1	43.36	29.95	24.1	25.07	49.51	24.1	19.27	49.47	24.1	45.87	6.76
25.0	46.01	11.93	25.1	43.06	29.61	25.1	24.93	49.30	25.1	19.17	49.15	25.1	45.66	6.59
26.0	45.95	11.62	26.1	42.82	29.27	26.1	24.78	49.09	26.1	19.06	48.84	26.1	45.44	6.42
27.0	45.89	11.32	27.1	42.58	28.93	27.1	24.61	48.85	27.1	18.96	48.63	27.1	45.23	6.24
28.0	45.83	10.99	28.1	42.35	28.59	28.1	24.44	48.61	28.1	18.86	48.22	28.1	45.02	6.05
29.0	45.77	10.66	29.1	42.12	28.27	29.1	24.30	48.35	29.1	18.76	47.83	29.1	44.82	5.82
30.0	45.73	10.32	30.1	41.86	27.96	30.1	24.15	48.07	30.1	18.66	47.64	30.1	44.62	5.59
31.0	45.70	9.98	31.1	41.59	27.64	31.1	24.01	47.79	31.1	18.56	47.35	31.1	44.42	5.34
32.0	45.69	9.65	32.1	41.29	27.32	32.1	23.89	47.50	32.1	18.43	47.07	32.1	44.23	5.06
9.85	-9.79		30.85	+30.83		10.82	-10.77		9.33	+9.28		12.48	-12.39	
10 <sup>h</sup> 59 <sup>m</sup>	54 <sup>s</sup> .174		12 <sup>h</sup> 14 <sup>m</sup>	29 <sup>s</sup> .583		12 <sup>h</sup> 46 <sup>m</sup>	25 <sup>s</sup> .116		12 <sup>h</sup> 48 <sup>m</sup>	31 <sup>s</sup> .755		13 <sup>h</sup> 27 <sup>m</sup>	42 <sup>s</sup> .050	
-84°	9' 48".70		+88°	8' 36".24		-84°	41' 21".18		+83°	50' 51".72		-85°	22' 38".10	

CIRCUMPOLAR STARS.

FOR THE UPPER TRANSIT AT WASHINGTON.

δ Octantis. Mag. 4.1			Greenwich 2833. Mag. 7.2			ρ Octantis. Mag. 5.7			ε Ursa Minoris. Mag. 4.4			50 G. Apodis. Mag. 5.9		
Wash. Mean Time.	Right Ascension.	Declination.	Wash. Mean Time.	Right Ascension.	Declination.	Wash. Mean Time.	Right Ascension.	Declination.	Wash. Mean Time.	Right Ascension.	Declination.	Wash. Mean Time.	Right Ascension.	Declination.
Aug.	h m 14 14	° ' " -83 18	Aug.	h m 15 2	° ' " +87 32	Aug.	h m 15 24	° ' " -84 12	Aug.	h m 16 54	° ' " +82 10	Aug.	h m 17 16	° ' " -80 47
	s "	"		s "	"		s "	"		s "	"		s "	"
1.2	6.11	40.43	1.3	24.21	41.77	1.3	54.08	31.50	1.3	6.33	34.17	1.4	43.84	28.08
2.2	5.92	40.41	2.3	23.72	41.75	2.3	53.87	31.58	2.3	6.19	34.32	2.4	43.75	28.28
3.2	5.74	40.38	3.3	23.22	41.74	3.3	53.66	31.64	3.3	6.05	34.49	3.4	43.65	28.47
4.2	5.56	40.33	4.3	22.70	41.73	4.3	53.46	31.68	4.3	5.90	34.66	4.3	43.55	28.64
5.2	5.39	40.26	5.3	22.15	41.73	5.3	53.26	31.72	5.3	5.75	34.82	5.3	43.45	28.79
6.2	5.24	40.20	6.3	21.59	41.73	6.3	53.06	31.75	6.3	5.59	34.99	6.3	43.35	28.93
7.2	5.10	40.14	7.2	20.99	41.69	7.3	52.91	31.78	7.3	5.42	35.14	7.3	43.27	29.08
8.2	4.96	40.10	8.2	20.40	41.65	8.3	52.76	31.82	8.3	5.25	35.30	8.3	43.20	29.23
9.2	4.82	40.07	9.2	19.80	41.57	9.3	52.60	31.87	9.3	5.08	35.48	9.3	43.13	29.40
10.2	4.67	40.06	10.2	19.22	41.48	10.3	52.43	31.94	10.3	4.91	35.53	10.3	43.06	29.58
11.2	4.52	40.03	11.2	18.65	41.37	11.3	52.26	32.01	11.3	4.74	35.61	11.3	42.98	29.76
12.2	4.35	40.00	12.2	18.13	41.25	12.3	52.07	32.08	12.3	4.57	35.68	12.3	42.89	29.96
13.2	4.17	39.96	13.2	17.61	41.14	13.2	51.87	32.13	13.3	4.42	35.74	13.3	42.79	30.15
14.2	3.98	39.88	14.2	17.13	41.04	14.2	51.65	32.17	14.3	4.26	35.82	14.3	42.68	30.34
15.2	3.79	39.79	15.2	16.63	40.95	15.2	51.43	32.18	15.3	4.10	35.89	15.3	42.57	30.50
16.2	3.61	39.67	16.2	16.12	40.87	16.2	51.22	32.18	16.3	3.94	35.98	16.3	42.45	30.64
17.2	3.44	39.54	17.2	15.60	40.80	17.2	51.01	32.14	17.3	3.78	36.07	17.3	42.32	30.75
18.2	3.29	39.41	18.2	15.06	40.72	18.2	50.81	32.10	18.3	3.61	36.19	18.3	42.22	30.85
19.2	3.14	39.27	19.2	14.50	40.65	19.2	50.62	32.05	19.3	3.44	36.30	19.3	42.11	30.93
20.2	3.00	39.14	20.2	13.93	40.56	20.2	50.44	32.00	20.3	3.28	36.40	20.3	42.00	31.01
21.2	2.87	39.04	21.2	13.35	40.44	21.2	50.26	31.97	21.3	3.08	36.50	21.3	41.91	31.10
22.2	2.73	38.92	22.2	12.78	40.32	22.2	50.09	31.94	22.3	2.90	36.56	22.3	41.81	31.20
23.2	2.58	38.81	23.2	12.23	40.18	23.2	49.90	31.91	23.3	2.72	36.62	23.3	41.71	31.32
24.2	2.43	38.70	24.2	11.70	40.03	24.2	49.72	31.88	24.3	2.55	36.65	24.3	41.61	31.44
25.2	2.28	38.58	25.2	11.18	39.86	25.2	49.53	31.85	25.3	2.37	36.66	25.3	41.50	31.55
26.2	2.11	38.46	26.2	10.66	39.69	26.2	49.34	31.83	26.3	2.19	36.68	26.3	41.38	31.66
27.2	1.95	38.32	27.2	10.18	39.52	27.2	49.12	31.79	27.3	2.02	36.68	27.3	41.26	31.78
28.2	1.79	38.18	28.2	9.70	39.37	28.2	48.91	31.75	28.3	1.86	36.68	28.3	41.13	31.88
29.2	1.62	38.00	29.2	9.23	39.21	29.2	48.68	31.68	29.3	1.69	36.68	29.3	41.00	31.97
30.2	1.45	37.83	30.2	8.75	39.06	30.2	48.48	31.60	30.3	1.52	36.70	30.3	40.86	32.04
31.2	1.30	37.64	31.2	8.26	38.91	31.2	48.27	31.50	31.3	1.35	36.73	31.3	40.72	32.09
32.1	1.15	37.44	32.2	7.76	38.77	32.2	48.06	31.37	32.3	1.18	36.76	32.3	40.59	32.13
8.58	-8.53	23.34	+23.32	9.91	-9.86	7.35	+7.28	6.25	-6.17					
14 <sup>h</sup> 13 <sup>m</sup>	55 <sup>s</sup> .644	15 <sup>h</sup> 2 <sup>m</sup>	43 <sup>s</sup> .277	15 <sup>h</sup> 24 <sup>m</sup>	36 <sup>s</sup> .751	16 <sup>h</sup> 54 <sup>m</sup>	6 <sup>s</sup> .748	17 <sup>h</sup> 16 <sup>m</sup>	28 <sup>s</sup> .406					
-83° 18'	11''.26	+87° 32'	23''.69	-84° 12'	7''.93	+82° 10'	15''.74	-80° 47'	18''.10					

## CIRCUMPOLAR STARS.

FOR THE UPPER TRANSIT AT WASHINGTON.

δ Ursa Minoris. Mag. 4.4			χ Octantis. Mag. 5.2			λ Ursa Minoris. Mag. 6.6			σ Octantis. Mag. 5.5			76 Draconis. Mag. 5.7		
Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.
Aug.	h m s	° '	Aug.	h m s	° '	Aug.	h m s	° '	Aug.	h m s	° '	Aug.	h m s	° '
	17 57	+86 37		18 8	-87 39		18 58	+89 1		19 34	-89 12		20 48	+82 14
1.4	64.13	10.18	1.4	55.15	53.91	1.4	80.15	36.65	1.5	62.36	57.06	1.5	36.51	25.76
2.4	63.86	10.40	2.4	54.84	54.19	2.4	79.44	36.92	2.4	62.02	57.39	2.5	36.49	26.09
3.4	63.59	10.62	3.4	54.53	54.44	3.4	78.74	37.17	3.4	61.61	57.70	3.5	36.47	26.43
4.4	63.31	10.86	4.4	54.21	54.68	4.4	78.04	37.48	4.4	61.14	57.99	4.5	36.46	26.79
5.4	63.02	11.11	5.4	53.89	54.90	5.4	77.31	37.79	5.4	60.65	58.27	5.5	36.44	27.16
6.4	62.70	11.36	6.4	53.59	55.10	6.4	76.51	38.10	6.4	60.18	58.53	6.5	36.43	27.54
7.4	62.38	11.61	7.4	53.31	55.30	7.4	75.64	38.42	7.4	59.78	58.78	7.5	36.40	27.93
8.4	62.02	11.85	8.4	53.06	55.51	8.4	74.66	38.72	8.4	59.43	59.03	8.5	36.37	28.34
9.4	61.65	12.08	9.4	52.83	55.73	9.4	73.61	39.01	9.4	59.16	59.30	9.5	36.34	28.73
10.4	61.28	12.27	10.4	52.59	55.96	10.4	72.51	39.29	10.4	58.91	59.58	10.5	36.30	29.12
11.4	60.90	12.45	11.4	52.33	56.21	11.4	71.39	39.54	11.4	58.64	59.87	11.5	36.25	29.47
12.4	60.53	12.60	12.4	52.05	56.46	12.4	70.31	39.78	12.4	58.29	60.18	12.5	36.19	29.81
13.4	60.19	12.75	13.4	51.72	56.72	13.4	69.27	40.00	13.4	57.83	60.49	13.5	36.13	30.14
14.4	59.85	12.90	14.4	51.35	56.97	14.4	68.29	40.22	14.4	57.25	60.80	14.5	36.07	30.46
15.3	59.54	13.07	15.4	50.96	57.20	15.4	67.36	40.46	15.4	56.54	61.09	15.5	36.02	30.79
16.3	59.21	13.24	16.4	50.55	57.40	16.4	66.44	40.71	16.4	55.76	61.38	16.5	35.98	31.11
17.3	58.88	13.42	17.3	50.13	57.59	17.4	65.51	40.98	17.4	54.93	61.65	17.5	35.93	31.47
18.3	58.54	13.62	18.3	49.71	57.77	18.4	64.55	41.25	18.4	54.09	61.89	18.5	35.89	31.83
19.3	58.17	13.81	19.3	49.33	57.92	19.4	63.54	41.52	19.4	53.29	62.14	19.5	35.85	32.20
20.3	57.80	14.00	20.3	48.95	58.08	20.4	62.47	41.79	20.4	52.52	62.38	20.5	35.80	32.57
21.3	57.42	14.19	21.3	48.58	58.23	21.4	61.33	42.06	21.4	51.77	62.61	21.5	35.74	32.94
22.3	57.01	14.35	22.3	48.21	58.40	22.4	60.16	42.30	22.4	51.04	62.85	22.4	35.67	33.31
23.3	56.61	14.50	23.3	47.85	58.57	23.4	58.95	42.53	23.4	50.33	63.12	23.4	35.60	33.67
24.3	56.20	14.64	24.3	47.48	58.75	24.4	57.72	42.76	24.4	49.60	63.37	24.4	35.52	34.01
25.3	55.82	14.76	25.3	47.10	58.94	25.4	56.49	42.95	25.4	48.85	63.62	25.4	35.43	34.34
26.3	55.43	14.87	26.3	46.69	59.12	26.4	55.26	43.15	26.4	48.04	63.89	26.4	35.35	34.67
27.3	55.04	14.97	27.3	46.26	59.31	27.4	54.04	43.33	27.4	47.18	64.16	27.4	35.26	34.96
28.3	54.66	15.07	28.3	45.80	59.49	28.4	52.86	43.51	28.4	46.23	64.43	28.4	35.17	35.27
29.3	54.29	15.17	29.3	45.32	59.65	29.4	51.72	43.70	29.4	45.19	64.70	29.4	35.09	35.56
30.3	53.93	15.28	30.3	44.82	59.80	30.4	50.59	43.88	30.4	44.09	64.94	30.4	35.01	35.87
31.3	53.56	15.40	31.3	44.31	59.94	31.3	49.47	44.07	31.4	42.92	65.18	31.4	34.93	36.19
32.3	53.19	15.53	32.3	43.81	60.04	32.3	48.33	44.29	32.4	41.73	65.40	32.4	34.85	36.52
16.96	+16.93		24.55	-24.53		58.94	+58.93		73.17	-73.16		7.41	+7.34	
17 <sup>h</sup> 58 <sup>m</sup> 2 <sup>s</sup> .814			18 <sup>h</sup> 7 <sup>m</sup> 59 <sup>s</sup> .062			18 <sup>h</sup> 59 <sup>m</sup> 2 <sup>s</sup> .477			19 <sup>h</sup> 32 <sup>m</sup> 24 <sup>s</sup> .283			20 <sup>h</sup> 48 <sup>m</sup> 27 <sup>s</sup> .964		
+86° 36' 50".93			-87° 39' 50".34			+89° 1' 17".96			-89° 13' 5".55			+82° 14' 10".29		

CIRCUMPOLAR STARS.

FOR THE UPPER TRANSIT AT WASHINGTON.

λ Octantis. Mag. 5.4			ν Octantis. Mag. 5.7			β Octantis. Mag. 4.3			39 H. Cephei. Mag. 5.6			γ <sup>1</sup> Octantis. Mag. 5.1		
Wash. Mean Time.	Right Ascension.	Declination.	Wash. Mean Time.	Right Ascension.	Declination.	Wash. Mean Time.	Right Ascension.	Declination.	Wash. Mean Time.	Right Ascension.	Declination.	Wash. Mean Time.	Right Ascension.	Declination.
Aug.	h m ° ' "		Aug.	h m ° ' "		Aug.	h m ° ' "		Aug.	h m ° ' "		Aug.	h m ° ' "	
	21 39 -83 4			22 17 -86 22			22 38 -81 47			23 28 +86 52			23 47 -82 27	
	s " "			s " "			s " "			s " "			s " "	
1.5	3.27 53.68	1.6	7.63 5.29	1.6	7.99 36.62	1.6	8.67 2.50	1.6	33.26 15.64					
2.5	3.38 53.99	2.6	7.80 5.57	2.6	8.08 36.89	2.6	8.89 2.77	2.6	33.39 15.83					
3.5	3.39 54.29	3.6	7.94 5.86	3.6	8.16 37.15	3.6	9.11 3.05	3.6	33.52 16.03					
4.5	3.48 54.58	4.6	8.07 6.15	4.6	8.23 37.41	4.6	9.35 3.33	4.6	33.63 16.23					
5.5	3.47 54.85	5.6	8.19 6.42	5.6	8.29 37.65	5.6	9.61 3.64	5.6	33.73 16.44					
6.5	3.51 55.11	6.6	8.29 6.66	6.6	8.35 37.89	6.6	9.88 3.95	6.6	33.83 16.63					
7.5	3.54 55.35	7.5	8.40 6.91	7.6	8.43 38.11	7.6	10.13 4.28	7.6	33.93 16.81					
8.5	3.59 55.59	8.5	8.54 7.14	8.6	8.51 38.33	8.6	10.87 4.64	8.6	34.05 16.98					
9.5	3.65 55.82	9.5	8.68 7.37	9.6	8.58 38.58	9.6	10.57 5.01	9.6	34.17 17.13					
10.5	3.71 56.06	10.5	8.85 7.60	10.6	8.66 38.75	10.6	10.76 5.38	10.6	34.30 17.29					
11.5	3.78 56.34	11.5	9.01 7.87	11.6	8.75 38.98	11.6	10.93 5.75	11.6	34.43 17.46					
12.5	3.85 56.63	12.5	9.18 8.14	12.6	8.85 39.24	12.6	11.07 6.11	12.6	34.57 17.65					
13.5	3.90 56.95	13.5	9.31 8.45	13.5	8.93 39.51	13.6	11.20 6.44	13.6	34.70 17.87					
14.5	3.94 57.27	14.5	9.43 8.76	14.5	8.99 39.79	14.6	11.34 6.76	14.6	34.81 18.10					
15.5	3.96 57.60	15.5	9.52 9.08	15.5	9.05 40.09	15.6	11.50 7.06	15.6	34.91 18.36					
16.5	3.96 57.92	16.5	9.60 9.40	16.5	9.10 40.39	16.6	11.67 7.39	16.6	35.01 18.62					
17.5	3.96 58.23	17.5	9.65 9.71	17.5	9.13 40.68	17.6	11.85 7.71	17.6	35.10 18.88					
18.5	3.96 58.52	18.5	9.69 10.00	18.5	9.16 40.97	18.6	12.03 8.03	18.6	35.18 19.14					
19.5	3.95 58.80	19.5	9.72 10.29	19.5	9.19 41.25	19.6	12.22 8.39	19.6	35.25 19.38					
20.5	3.95 59.08	20.5	9.76 10.57	20.5	9.23 41.52	20.6	12.40 8.74	20.6	35.33 19.61					
21.5	3.95 59.34	21.5	9.80 10.85	21.5	9.27 41.79	21.6	12.56 9.12	21.6	35.41 19.85					
22.5	3.95 59.61	22.5	9.85 11.11	22.5	9.31 42.05	22.6	12.70 9.50	22.6	35.50 20.08					
23.5	3.96 59.89	23.5	9.91 11.39	23.5	9.35 42.32	23.6	12.83 9.88	23.6	35.58 20.32					
24.5	3.97 60.18	24.5	9.97 11.67	24.5	9.40 42.59	24.6	12.93 10.26	24.6	35.67 20.56					
25.5	3.98 60.47	25.5	10.04 11.98	25.5	9.44 42.87	25.5	13.02 10.64	25.6	35.76 20.81					
26.5	3.99 60.78	26.5	10.10 12.28	26.5	9.49 43.16	26.5	13.10 11.01	26.6	35.85 21.07					
27.5	3.99 61.10	27.5	10.14 12.61	27.5	9.52 43.47	27.5	13.15 11.36	27.6	35.94 21.34					
28.5	3.99 61.42	28.5	10.18 12.93	28.5	9.55 43.78	28.5	13.22 11.71	28.6	36.02 21.62					
29.5	3.96 61.74	29.5	10.19 13.27	29.5	9.57 44.11	29.5	13.29 12.05	29.6	36.10 21.92					
30.5	3.98 62.06	30.5	10.18 13.60	30.5	9.58 44.44	30.5	13.37 12.39	30.5	36.16 22.23					
31.5	3.88 62.39	31.5	10.15 13.94	31.5	9.58 44.77	31.5	13.46 12.73	31.5	36.21 22.54					
32.5	3.83 62.69	32.5	10.10 14.26	32.5	9.57 45.09	32.5	13.56 13.08	32.5	36.25 22.85					
8.30	-8.24	15.79	-15.76	7.01	-6.93	18.31	+18.28	7.62	-7.55					
21 <sup>h</sup> 39 <sup>m</sup>	48°.085	22 <sup>h</sup> 16 <sup>m</sup>	45°.446	22 <sup>h</sup> 37 <sup>m</sup>	57°.920	23 <sup>h</sup> 27 <sup>m</sup>	43°.285	23 <sup>h</sup> 47 <sup>m</sup>	27°.240					
-83° 5' 17".96		-86° 22' 32".81		-81° 48' 6".03		+96° 51' 58".49		-82° 27' 48".42						

## CIRCUMPOLAR STARS.

FOR THE UPPER TRANSIT AT WASHINGTON.

43 H. Cephei. Mag. 4.5			$\alpha$ Ursae Minoris. (Polaris.) Mag. 2.1			4 G. Octantis. Mag. 5.6			Groombridge 750. Mag. 6.7			Groombridge 944. Mag. 6.4		
Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.
Sept.	h m °	'	Sept.	h m °	'	Sept.	h m °	'	Sept.	h m °	'	Sept.	h m °	'
	0 57	+85 49		1 33	+88 52		1 41	-85 9		4 11	+85 20		5 36	+85 9
	s "	" "		s "	" "		s "	" "		s "	" "		s "	" "
0.6	58.96	48.35	0.6	13.92	39.43	0.6	52.98	58.77	0.7	15.04	22.20	0.8	22.16	14.36
1.6	59.15	48.64	1.6	14.79	39.69	1.6	53.16	59.00	1.7	15.34	22.24	1.8	22.43	14.27
2.6	59.35	48.95	2.6	15.68	39.95	2.6	53.81	59.23	2.7	15.65	22.29	2.8	22.73	14.18
3.6	59.56	49.27	3.6	16.61	40.23	3.6	53.46	59.45	3.7	15.97	22.34	3.8	23.04	14.09
4.6	59.77	49.61	4.6	17.54	40.54	4.6	53.61	59.65	4.7	16.31	22.42	4.8	23.36	14.02
5.6	59.97	49.97	5.6	18.43	40.86	5.6	53.78	59.85	5.7	16.66	22.51	5.8	23.70	13.96
6.6	60.15	50.35	6.6	19.24	41.22	6.6	53.94	60.04	6.7	17.00	22.64	6.8	24.04	13.93
7.6	60.30	50.73	7.6	19.97	41.57	7.6	54.12	60.28	7.7	17.33	22.77	7.8	24.38	13.92
8.6	60.44	51.11	8.6	20.64	41.91	8.6	54.31	60.42	8.7	17.65	22.92	8.8	24.69	13.93
9.6	60.56	51.47	9.6	21.25	42.24	9.6	54.49	60.64	9.7	17.93	23.07	9.8	24.98	13.94
10.6	60.68	51.81	10.6	21.83	42.57	10.6	54.68	60.87	10.7	18.21	23.20	10.8	25.27	13.95
11.6	60.80	52.15	11.6	22.41	42.87	11.6	54.86	61.14	11.7	18.48	23.33	11.8	25.55	13.95
12.6	60.92	52.47	12.6	23.04	43.16	12.6	55.01	61.41	12.7	18.75	23.48	12.8	25.83	13.93
13.6	61.05	52.79	13.6	23.72	43.45	13.6	55.16	61.69	13.7	19.02	23.54	13.8	26.11	13.90
14.6	61.19	53.11	14.6	24.44	43.76	14.6	55.29	61.98	14.7	19.32	23.64	14.7	26.39	13.86
15.6	61.36	53.44	15.6	25.18	44.07	15.6	55.40	62.27	15.7	19.63	23.75	15.7	26.69	13.83
16.6	61.51	53.80	16.6	25.91	44.38	16.6	55.51	62.55	16.7	19.93	23.87	16.7	27.01	13.79
17.5	61.66	54.16	17.6	26.62	44.71	17.6	55.63	62.82	17.7	20.24	23.99	17.7	27.32	13.78
18.5	61.80	54.53	18.6	27.30	45.07	18.6	55.75	63.09	18.7	20.55	24.13	18.7	27.65	13.78
19.5	61.92	54.91	19.6	27.93	45.44	19.6	55.87	63.35	19.7	20.86	24.30	19.7	27.98	13.81
20.5	62.03	55.29	20.6	28.51	45.80	20.6	55.99	63.60	20.7	21.17	24.47	20.7	28.30	13.84
21.5	62.12	55.68	21.6	29.03	46.16	21.6	56.12	63.86	21.7	21.46	24.65	21.7	28.61	13.89
22.5	62.20	56.06	22.6	29.51	46.53	22.6	56.24	64.13	22.7	21.73	24.85	22.7	28.93	13.95
23.5	62.28	56.43	23.6	29.94	46.89	23.6	56.37	64.41	23.7	22.00	25.05	23.7	29.23	14.02
24.5	62.33	56.80	24.6	30.36	47.23	24.6	56.50	64.70	24.7	22.27	25.24	24.7	29.52	14.08
25.5	62.39	57.16	25.6	30.78	47.57	25.6	56.61	65.01	25.7	22.52	25.43	25.7	29.80	14.14
26.5	62.45	57.50	26.5	31.16	47.91	26.6	56.71	65.33	26.7	22.77	25.61	26.7	30.07	14.20
27.5	62.52	57.84	27.5	31.60	48.23	27.6	56.80	65.65	27.7	23.02	25.76	27.7	30.34	14.24
28.5	62.60	58.20	28.5	32.06	48.55	28.5	56.89	65.98	28.7	23.28	25.92	28.7	30.62	14.28
29.5	62.69	58.55	29.5	32.57	48.88	29.5	56.95	66.31	29.7	23.55	26.09	29.7	30.91	14.31
30.5	62.79	58.91	30.5	33.13	49.23	30.5	57.01	66.63	30.6	23.84	26.26	30.7	31.22	14.34
31.5	62.89	59.29	31.5	33.67	49.59	31.5	57.05	66.93	31.6	24.14	26.44	31.7	31.54	14.38
13.76	+13.72		51.11	+51.10		11.87	-11.83		12.31	+12.27		11.84	+11.79	
0 <sup>h</sup> 57 <sup>m</sup>	32 <sup>s</sup> .323		1 <sup>h</sup> 31 <sup>m</sup>	41 <sup>s</sup> .366		1 <sup>h</sup> 41 <sup>m</sup>	51 <sup>s</sup> .117		4 <sup>h</sup> 10 <sup>m</sup>	55 <sup>s</sup> .493		5 <sup>h</sup> 36 <sup>m</sup>	9 <sup>s</sup> .111	
+85° 49'	43'' .15		+88° 52'	39'' .02		-85° 10'	27'' .09		+85° 20'	38'' .12		+85° 9'	36'' .60	

CIRCUMPOLAR STARS.

FOR THE UPPER TRANSIT AT WASHINGTON.

31 G. Menes.			ζ Menes.			51 H. Cephei.			25 H. Camelopard.			7 G. Octantis.		
Mag. 6.2			Mag. 5.6			Mag. 5.3			Mag. 5.1			Mag. 6.4		
Wash. Mean Time.	Right Ascension.	Declination.	Wash. Mean Time.	Right Ascension.	Declination.	Wash. Mean Time.	Right Ascension.	Declination.	Wash. Mean Time.	Right Ascension.	Declination.	Wash. Mean Time.	Right Ascension.	Declination.
Sept. 5 45	-84 48		Sept. 6 46	-80 43		Sept. 7 3	+87 10		Sept. 7 14	+82 33		Sept. 7 14	-86 54	
	"	"		"	"		"	"		"	"		"	"
0.8	24.24	29.86	0.8	35.34	48.57	0.8	39.08	12.56	0.9	24.65	45.67	0.9	48.04	23.76
1.8	24.48	29.77	1.8	35.46	48.41	1.8	39.48	12.34	1.9	24.80	45.44	1.9	48.36	23.57
2.8	24.70	29.72	2.8	35.57	48.27	2.8	39.84	12.12	2.9	24.95	45.21	2.9	48.69	23.40
3.8	24.92	29.66	3.8	35.69	48.14	3.8	40.29	11.89	3.8	25.12	44.98	3.8	49.00	23.23
4.8	25.14	29.58	4.8	35.79	48.01	4.8	40.75	11.67	4.8	25.30	44.74	4.8	49.29	23.07
5.8	25.34	29.51	5.8	35.89	42.88	5.8	41.25	11.47	5.8	25.49	44.51	5.8	49.57	22.90
6.8	25.54	29.43	6.8	36.00	42.73	6.8	41.76	11.28	6.8	25.69	44.32	6.8	49.85	22.73
7.8	25.76	29.34	7.8	36.11	42.56	7.8	42.28	11.13	7.8	25.90	44.14	7.8	50.12	22.54
8.8	25.97	29.24	8.8	36.23	42.39	8.8	42.79	10.99	8.8	26.09	44.00	8.8	50.42	22.35
9.8	26.20	29.14	9.8	36.36	42.22	9.8	43.27	10.86	9.8	26.27	43.85	9.8	50.73	22.15
10.8	26.44	29.05	10.8	36.48	42.05	10.8	43.73	10.74	10.8	26.46	43.71	10.8	51.06	21.95
11.8	26.69	28.99	11.8	36.61	41.91	11.8	44.16	10.60	11.8	26.61	43.57	11.8	51.42	21.76
12.8	26.95	28.94	12.8	36.74	41.78	12.8	44.58	10.45	12.8	26.77	43.40	12.8	51.79	21.60
13.8	27.21	28.93	13.8	36.87	41.68	13.8	45.00	10.28	13.8	26.93	43.23	13.8	52.18	21.46
14.8	27.45	28.93	14.8	37.01	41.59	14.8	45.45	10.11	14.8	27.09	43.05	14.8	52.56	21.33
15.8	27.69	28.95	15.8	37.14	41.51	15.8	45.90	9.94	15.8	27.26	42.86	15.8	52.94	21.22
16.8	27.93	28.97	16.8	37.27	41.46	16.8	46.37	9.77	16.8	27.45	42.68	16.8	53.31	21.12
17.7	28.16	28.98	17.8	37.40	41.39	17.8	46.86	9.63	17.8	27.64	42.50	17.8	53.66	21.02
18.7	28.38	28.99	18.8	37.53	41.31	18.8	47.40	9.48	18.8	27.83	42.35	18.8	54.02	20.92
19.7	28.60	28.99	19.8	37.65	41.23	19.8	47.92	9.35	19.8	28.02	42.20	19.8	54.35	20.81
20.7	28.83	29.00	20.8	37.78	41.15	20.8	48.44	9.25	20.8	28.23	42.06	20.8	54.70	20.69
21.7	29.06	29.00	21.8	37.90	41.07	21.8	48.96	9.15	21.8	28.43	41.94	21.8	55.05	20.57
22.7	29.30	28.99	22.8	38.04	40.99	22.8	49.48	9.06	22.8	28.63	41.84	22.8	55.41	20.45
23.7	29.54	28.99	23.8	38.17	40.91	23.8	49.99	8.97	23.8	28.82	41.75	23.8	55.78	20.33
24.7	29.79	28.99	24.8	38.31	40.83	24.8	50.47	8.90	24.8	29.01	41.67	24.8	56.16	20.21
25.7	30.03	29.02	25.8	38.45	40.78	25.8	50.95	8.82	25.8	29.19	41.59	25.8	56.57	20.11
26.7	30.30	29.06	26.8	38.59	40.72	26.8	51.41	8.75	26.8	29.36	41.49	26.8	56.99	20.01
27.7	30.56	29.11	27.8	38.73	40.68	27.8	51.86	8.67	27.8	29.53	41.39	27.8	57.41	19.94
28.7	30.80	29.20	28.8	38.88	40.63	28.8	52.33	8.57	28.8	29.71	41.27	28.8	57.83	19.89
29.7	31.05	29.30	29.8	39.02	40.69	29.8	52.80	8.45	29.8	29.90	41.15	29.8	58.25	19.85
30.7	31.28	29.40	30.8	39.16	40.72	30.8	53.31	8.34	30.8	30.09	41.02	30.8	58.66	19.85
31.7	31.50	29.51	31.8	39.29	40.75	31.8	53.84	8.24	31.8	30.29	40.89	31.8	59.05	19.84
11.09	-11.04		6.21	-6.13		20.25	+20.23		7.72	+7.66		18.53	-18.50	
5 <sup>h</sup> 45 <sup>m</sup>	39° 71'9"		6 <sup>h</sup> 46 <sup>m</sup>	43° 70'4"		7 <sup>h</sup> 3 <sup>m</sup>	31° 43'4"		7 <sup>h</sup> 14 <sup>m</sup>	20° 71'3"		7 <sup>h</sup> 15 <sup>m</sup>	19° 35'2"	
-84° 49'	42'' 94		-80° 43'	50'' 12		+87° 10'	38'' 36		+82° 34'	10'' 90		-86° 54'	26'' 23	

CIRCUMPOLAR STARS.

FOR THE UPPER TRANSIT AT WASHINGTON.

Greenwich 1119. Mag. 7.0			ζ Octantis. Mag. 5.4			1 H. Draconis. Mag. 4.6			ζ Chamaeleontis. Mag. 5.2			30 H. Camelopard. Mag. 5.3		
Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.
Sept.	h m ° '	° '	Sept.	h m ° '	° '	Sept.	h m ° '	° '	Sept.	h m ° '	° '	Sept.	h m ° '	° '
	8 18	+88 51	Sept.	9 8	-85 20	Sept.	9 25	+81 40	Sept.	9 36	-80 36	Sept.	10 21	+82 57
	s "	" "		s "	" "		s "	" "		s "	" "		s "	" "
0.9	32.54	60.65	0.9	15.35	52.08	0.9	45.14	32.14	0.9	10.48	8.52	0.9	20.69	40.61
1.9	33.23	60.36	1.9	15.47	51.79	1.9	45.19	31.81	1.9	10.52	8.23	1.9	20.70	40.25
2.9	33.94	60.04	2.9	15.60	51.51	2.9	45.24	31.44	2.9	10.58	7.93	2.9	20.72	39.88
3.9	34.72	59.72	3.9	15.72	51.26	3.9	45.30	31.08	3.9	10.63	7.65	3.9	20.75	39.50
4.9	35.60	59.40	4.9	15.83	51.01	4.9	45.39	30.71	4.9	10.68	7.39	4.9	20.78	39.09
5.9	36.55	59.09	5.9	15.93	50.75	5.9	45.48	30.34	5.9	10.72	7.13	5.9	20.84	38.68
6.9	37.56	58.80	6.9	16.03	50.49	6.9	45.58	29.98	6.9	10.76	6.86	6.9	20.92	38.29
7.9	38.69	58.52	7.9	16.12	50.22	7.9	45.69	29.64	7.9	10.80	6.57	7.9	21.00	37.91
8.9	39.62	58.27	8.9	16.22	49.93	8.9	45.80	29.31	8.9	10.84	6.28	8.9	21.09	37.53
9.9	40.61	58.03	9.9	16.32	49.63	9.9	45.90	29.01	9.9	10.87	5.96	9.9	21.15	37.19
10.9	41.54	57.81	10.9	16.45	49.33	10.9	46.00	28.73	10.9	10.92	5.64	10.9	21.22	36.86
11.9	42.41	57.58	11.9	16.59	49.03	11.9	46.09	28.44	11.9	10.98	5.32	11.9	21.28	36.53
12.9	43.25	57.34	12.9	16.74	48.73	12.9	46.15	28.15	12.9	11.04	5.01	12.9	21.32	36.20
13.9	44.08	57.07	13.9	16.92	48.46	13.9	46.23	27.84	13.9	11.12	4.72	13.9	21.36	35.86
14.9	44.92	56.81	14.9	17.10	48.22	14.9	46.31	27.52	14.9	11.20	4.44	14.9	21.41	35.50
15.9	45.81	56.53	15.9	17.28	47.98	15.9	46.40	27.18	15.9	11.28	4.19	15.9	21.46	35.13
16.9	46.75	56.26	16.9	17.46	47.75	16.9	46.49	26.85	16.9	11.36	3.94	16.9	21.52	34.75
17.9	47.75	56.00	17.9	17.63	47.52	17.9	46.60	26.51	17.9	11.44	3.70	17.9	21.60	34.37
18.9	48.79	55.75	18.9	17.80	47.30	18.9	46.70	26.18	18.9	11.50	3.46	18.9	21.68	34.00
19.8	49.87	55.51	19.9	17.96	47.08	19.9	46.81	25.85	19.9	11.58	3.22	19.9	21.77	33.63
20.8	50.98	55.28	20.9	18.12	46.85	20.9	46.94	25.54	20.9	11.66	2.97	20.9	21.86	33.29
21.8	52.10	55.05	21.9	18.28	46.62	21.9	47.07	25.25	21.9	11.72	2.70	21.9	21.96	32.94
22.8	53.21	54.86	22.9	18.44	46.38	22.9	47.19	24.96	22.9	11.79	2.44	22.9	22.07	32.60
23.8	54.31	54.66	23.9	18.61	46.13	23.9	47.32	24.68	23.9	11.87	2.17	23.9	22.17	32.28
24.8	55.39	54.47	24.9	18.79	45.88	24.9	47.42	24.42	24.9	11.95	1.90	24.9	22.27	31.96
25.8	56.44	54.29	25.9	18.98	45.63	25.9	47.53	24.16	25.9	12.04	1.63	25.9	22.37	31.65
26.8	57.46	54.11	26.9	19.20	45.39	26.9	47.64	23.90	26.9	12.13	1.36	26.9	22.46	31.34
27.8	58.44	53.92	27.9	19.42	45.16	27.9	47.75	23.63	27.9	12.22	1.12	27.9	22.55	31.03
28.8	59.42	53.72	28.9	19.65	44.97	28.9	47.85	23.36	28.9	12.32	0.89	28.9	22.63	30.71
29.8	60.43	53.49	29.9	19.89	44.78	29.9	47.95	23.07	29.9	12.43	0.68	29.9	22.71	30.37
30.8	61.48	53.27	30.9	20.12	44.62	30.9	48.08	22.76	30.9	12.54	0.48	30.9	22.80	30.01
31.8	62.61	53.05	31.9	20.34	44.47	31.9	48.20	22.44	31.9	12.65	0.31	31.9	22.90	29.65
50.52	+50.51		12.33	-12.29		6.91	+6.83		6.11	-6.03		8.16	+8.10	
8 <sup>h</sup> 18 <sup>m</sup>	46 <sup>s</sup> .642		9 <sup>h</sup> 8 <sup>m</sup>	33 <sup>s</sup> .397		9 <sup>h</sup> 25 <sup>m</sup>	48 <sup>s</sup> .041		9 <sup>h</sup> 36 <sup>m</sup>	17 <sup>s</sup> .360		10 <sup>h</sup> 21 <sup>m</sup>	27 <sup>s</sup> .495	
+88°	52' 28".44		-85°	20' 41".44		+81°	40' 54".43		-80°	34' 55".47		+82°	57' 59".46	



CIRCUMPOLAR STARS.

FOR THE UPPER TRANSIT AT WASHINGTON.

γ Octantis. Mag. 6.3			Bradley 1072. Mag. 6.3			δ Octantis. Mag. 5.4			23 H. Camelopard. seq. Mag. 5.3			κ Octantis. Mag. 5.6		
Wash. Mean Time.	Right Ascension.	Declination.	Wash. Mean Time.	Right Ascension.	Declination.	Wash. Mean Time.	Right Ascension.	Declination.	Wash. Mean Time.	Right Ascension.	Declination.	Wash. Mean Time.	Right Ascension.	Declination.
Sept.	h m	° ' "	Sept.	h m	° ' "	Sept.	h m	° ' "	Sept.	h m	° ' "	Sept.	h m	° ' "
	10 59	-84 16		12 13	+88 8		12 46	-84 41		12 48	+83 50		13 27	-86 22
1.0	45.69	9.65	1.1	41.29	27.32	1.1	23.89	47.50	1.1	18.43	47.07	1.1	44.23	65.08
2.0	45.69	9.32	2.1	40.97	26.99	2.1	23.79	47.21	2.1	18.31	46.77	2.1	44.08	64.82
3.0	45.69	9.01	3.1	40.64	26.64	3.1	23.69	46.94	3.1	18.18	46.46	3.1	43.94	64.58
4.0	45.71	8.73	4.1	40.34	26.27	4.1	23.61	46.67	4.1	18.06	46.13	4.1	43.81	64.34
5.0	45.72	8.45	5.1	40.06	25.89	5.1	23.53	46.43	5.1	17.95	45.77	5.1	43.67	64.11
5.9	45.71	8.17	6.1	39.83	25.48	6.1	23.44	46.18	6.1	17.85	45.41	6.1	43.54	63.91
6.9	45.71	7.90	7.0	39.65	25.08	7.1	23.35	45.94	7.1	17.77	45.03	7.1	43.39	63.72
7.9	45.69	7.62	8.0	39.52	24.68	8.1	23.23	45.70	8.1	17.70	44.65	8.1	43.22	63.51
8.9	45.68	7.31	9.0	39.42	24.90	9.1	23.11	45.44	9.1	17.64	44.28	9.1	43.05	63.29
9.9	45.66	6.99	10.0	39.32	23.94	10.1	22.99	45.16	10.1	17.58	43.92	10.1	42.87	63.03
10.9	45.65	6.65	11.0	39.19	23.61	11.1	22.88	44.85	11.1	17.52	43.59	11.1	42.70	62.76
11.9	45.66	6.30	12.0	39.06	23.27	12.1	22.78	44.54	12.1	17.44	43.26	12.1	42.54	62.48
12.9	45.69	5.96	13.0	38.90	22.93	13.1	22.70	44.22	13.1	17.35	42.94	13.1	42.40	62.19
13.9	45.73	5.62	14.0	38.72	22.58	14.1	22.65	43.90	14.1	17.27	42.62	14.1	42.27	61.88
14.9	45.78	5.30	15.0	38.53	22.22	15.0	22.59	43.59	15.0	17.19	42.29	15.1	42.17	61.58
15.9	45.83	4.98	16.0	38.33	21.85	16.0	22.54	43.27	16.0	17.10	41.94	16.1	42.07	61.29
16.9	45.89	4.69	17.0	38.15	21.47	17.0	22.50	42.96	17.0	17.01	41.58	17.1	41.98	61.01
17.9	45.95	4.40	18.0	38.00	21.08	18.0	22.46	42.68	18.0	16.94	41.21	18.1	41.89	60.74
18.9	46.00	4.12	19.0	37.90	20.68	19.0	22.41	42.39	19.0	16.88	40.82	19.1	41.80	60.47
19.9	46.05	3.83	20.0	37.83	20.27	20.0	22.37	42.12	20.0	16.82	40.44	20.1	41.71	60.20
20.9	46.09	3.54	21.0	37.78	19.87	21.0	22.32	41.84	21.0	16.77	40.06	21.1	41.61	59.93
21.9	46.14	3.23	22.0	37.76	19.49	22.0	22.27	41.55	22.0	16.73	39.67	22.1	41.51	59.66
22.9	46.18	2.93	23.0	37.76	19.11	23.0	22.21	41.24	23.0	16.69	39.29	23.1	41.40	59.38
23.9	46.23	2.62	24.0	37.78	18.73	24.0	22.16	40.93	24.0	16.66	38.92	24.1	41.29	59.08
24.9	46.28	2.30	24.9	37.81	18.37	25.0	22.11	40.60	25.0	16.64	38.56	25.0	41.18	58.77
25.9	46.34	1.98	25.9	37.82	18.01	26.0	22.06	40.27	26.0	16.61	38.20	26.0	41.07	58.46
26.9	46.42	1.66	26.9	37.82	17.66	27.0	22.03	39.93	27.0	16.57	37.85	27.0	40.98	58.13
27.9	46.50	1.33	27.9	37.79	17.31	28.0	22.01	39.58	28.0	16.54	37.51	28.0	40.91	57.79
28.9	46.60	1.02	28.9	37.74	16.95	29.0	22.00	39.23	29.0	16.50	37.16	29.0	40.86	57.45
29.9	46.71	0.73	29.9	37.69	16.57	30.0	22.02	38.90	30.0	16.45	36.80	30.0	40.82	57.13
30.9	46.83	0.45	30.9	37.64	16.17	31.0	22.05	38.59	31.0	16.40	36.43	31.0	40.81	56.81
31.9	46.94	0.20	31.9	37.60	15.77	32.0	22.08	38.30	32.0	16.36	36.03	32.0	40.80	56.52

9.84	-9.79	30.80	+30.79	10.82	-10.77	9.33	+9.27	12.43	-12.38
10 <sup>h</sup> 59 <sup>m</sup> 54 <sup>s</sup> .174		12 <sup>h</sup> 14 <sup>m</sup> 29 <sup>s</sup> .583		12 <sup>h</sup> 46 <sup>m</sup> 25 <sup>s</sup> .116		12 <sup>h</sup> 48 <sup>m</sup> 31 <sup>s</sup> .755		13 <sup>h</sup> 27 <sup>m</sup> 42 <sup>s</sup> .050	
-84° 9' 48".70		+89° 8' 36".24		-84° 41' 21".18		+83° 50' 51".72		-85° 22' 38".10	

CIRCUMPOLAR STARS.

FOR THE UPPER TRANSIT AT WASHINGTON.

δ Octantis. Mag. 4.1			Groombridge 2232. Mag. 7.2			ρ Octantis. Mag. 5.7			ε Ursæ Minoris. Mag. 4.4			59 G. Apodis. Mag. 5.9		
Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.
Sept.	h m s	° '	Sept.	h m s	° '	Sept.	h m s	° '	Sept.	h m s	° '	Sept.	h m s	° '
	14 13	-83 18		15 1	+87 32		15 24	-84 12		16 53	+82 10		17 16	-80 47
1.1	61.15	37.44	1.2	67.76	38.77	1.2	48.06	31.37	1.3	61.18	36.76	1.3	40.50	32.13
2.1	61.00	37.23	2.2	67.24	38.62	2.2	47.87	31.24	2.3	61.00	36.80	2.3	40.46	32.14
3.1	60.88	37.02	3.2	66.69	38.47	3.2	47.69	31.11	3.3	60.83	36.84	3.3	40.35	32.15
4.1	60.77	36.82	4.2	66.14	38.30	4.2	47.54	31.01	4.2	60.64	36.86	4.3	40.24	32.16
5.1	60.66	36.64	5.2	65.58	38.11	5.2	47.38	30.90	5.2	60.44	36.86	5.3	40.14	32.19
6.1	60.55	36.47	6.2	65.05	37.89	6.2	47.23	30.81	6.2	60.25	36.84	6.3	40.03	32.22
7.1	60.43	36.31	7.2	64.54	37.66	7.2	47.06	30.72	7.2	60.06	36.80	7.3	39.92	32.27
8.1	60.30	36.14	8.2	64.06	37.42	8.2	46.88	30.64	8.2	59.87	36.73	8.3	39.82	32.32
9.1	60.16	35.96	9.2	63.59	37.18	9.2	46.69	30.55	9.2	59.70	36.68	9.3	39.70	32.38
10.1	60.02	35.77	10.2	63.16	36.94	10.2	46.49	30.43	10.2	59.58	36.59	10.2	39.56	32.42
11.1	59.88	35.54	11.2	62.73	36.72	11.2	46.28	30.30	11.2	59.36	36.52	11.2	39.42	32.44
12.1	59.73	35.31	12.2	62.30	36.52	12.2	46.08	30.14	12.2	59.19	36.46	12.2	39.28	32.45
13.1	59.59	35.04	13.1	61.85	36.33	13.2	45.88	29.97	13.2	59.02	36.42	13.2	39.14	32.42
14.1	59.48	34.78	14.1	61.39	36.13	14.2	45.70	29.78	14.2	58.84	36.39	14.2	39.00	32.39
15.1	59.37	34.51	15.1	60.91	35.93	15.2	45.53	29.58	15.2	58.67	36.37	15.2	38.87	32.34
16.1	59.27	34.24	16.1	60.41	35.71	16.2	45.38	29.38	16.2	58.49	36.34	16.2	38.75	32.28
17.1	59.18	34.00	17.1	59.93	35.49	17.2	45.23	29.19	17.2	58.31	36.30	17.2	38.63	32.22
18.1	59.10	33.76	18.1	59.44	35.23	18.1	45.08	29.01	18.2	58.12	36.23	18.2	38.52	32.17
19.1	59.01	33.52	19.1	58.97	34.97	19.1	44.93	28.83	19.2	57.93	36.15	19.2	38.41	32.12
20.1	58.92	33.28	20.1	58.51	34.71	20.1	44.78	28.66	20.2	57.75	36.05	20.2	38.28	32.07
21.1	58.82	33.04	21.1	58.09	34.44	21.1	44.63	28.49	21.2	57.58	35.95	21.2	38.17	32.04
22.1	58.72	32.81	22.1	57.67	34.15	22.1	44.46	28.33	22.2	57.40	35.82	22.2	38.06	32.00
23.1	58.61	32.57	23.1	57.28	33.86	23.1	44.29	28.15	23.2	57.23	35.69	23.2	37.93	31.97
24.1	58.50	32.30	24.1	56.90	33.59	24.1	44.12	27.96	24.2	57.06	35.55	24.2	37.79	31.93
25.1	58.39	32.03	25.1	56.52	33.32	25.1	43.95	27.76	25.2	56.91	35.41	25.2	37.65	31.89
26.1	58.29	31.75	26.1	56.15	33.05	26.1	43.78	27.54	26.2	56.74	35.28	26.2	37.52	31.81
27.1	58.19	31.44	27.1	55.78	32.78	27.1	43.61	27.31	27.2	56.57	35.18	27.2	37.38	31.72
28.1	58.10	31.13	28.1	55.40	32.54	28.1	43.46	27.05	28.2	56.41	35.07	28.2	37.23	31.61
29.1	58.03	30.82	29.1	55.00	32.28	29.1	43.31	26.78	29.2	56.24	34.97	29.2	37.10	31.48
30.1	57.97	30.51	30.1	54.59	32.02	30.1	43.18	26.52	30.2	56.07	34.87	30.2	36.99	31.35
31.1	57.92	30.21	31.1	54.17	31.75	31.1	43.07	26.27	31.2	55.89	34.75	31.2	36.88	31.21
32.1	57.88	29.93	32.1	53.73	31.47	32.1	42.97	26.02	32.2	55.71	34.63	32.2	36.78	31.07
8.58	-8.52		23.33	+23.31		9.91	-9.86		7.35	+7.28		6.25	-6.17	
14 <sup>h</sup> 13 <sup>m</sup>	55°.644		15 <sup>h</sup> 2 <sup>m</sup>	43°.277		15 <sup>h</sup> 24 <sup>m</sup>	36°.751		16 <sup>h</sup> 54 <sup>m</sup>	6°.748		17 <sup>h</sup> 16 <sup>m</sup>	29°.406	
-83° 18'	11''.26		+87° 32'	28''.69		-84° 12'	7''.93		+82° 10'	15''.74		-80° 47'	18''.10	

CIRCUMPOLAR STARS.

FOR THE UPPER TRANSIT AT WASHINGTON.

δ Ursæ Minoris. Mag. 4.4			χ Octantis. Mag. 5.2			λ Ursæ Minoris. Mag. 5.6			σ Octantis. Mag. 5.5			76 Denebris. Mag. 5.7		
Wash. Mean Time.	Right Ascension.	Declination.	Wash. Mean Time.	Right Ascension.	Declination.	Wash. Mean Time.	Right Ascension.	Declination.	Wash. Mean Time.	Right Ascension.	Declination.	Wash. Mean Time.	Right Ascension.	Declination.
Sept.	h m	° ' "	Sept.	h m	° ' "	Sept.	h m	° ' "	Sept.	h m	° ' "	Sept.	h m	° ' "
	17 57	+86 37		18 8	-87 40		18 58	+89 1		19 34	-89 13		20 48	+82 14
1.3	53.19	15.53	1.3	43.81	0.04	1.3	48.33	44.29	1.4	41.78	5.40	1.4	34.85	36.52
2.3	52.81	15.65	2.3	43.32	0.13	2.3	47.15	44.51	2.4	40.54	5.00	2.4	34.77	36.85
3.3	52.40	15.78	3.3	42.85	0.21	3.3	45.92	44.74	3.4	39.40	5.79	3.4	34.69	37.19
4.3	51.97	15.91	4.3	42.42	0.29	4.3	44.60	44.96	4.4	38.34	5.97	4.4	34.60	37.54
5.3	51.52	16.02	5.3	42.01	0.38	5.3	43.21	45.16	5.4	37.34	6.14	5.4	34.50	37.89
6.3	51.07	16.11	6.3	41.61	0.46	6.3	41.75	45.35	6.4	36.39	6.31	6.4	34.40	38.23
7.3	50.61	16.17	7.3	41.20	0.60	7.3	40.27	45.50	7.4	35.45	6.50	7.4	34.28	38.55
8.3	50.18	16.21	8.3	40.78	0.73	8.3	38.80	45.65	8.3	34.46	6.72	8.4	34.15	38.85
9.3	49.76	16.24	9.3	40.32	0.86	9.3	37.88	45.78	9.3	33.39	6.94	9.4	34.02	39.14
10.3	49.34	16.27	10.3	39.81	0.97	10.3	36.02	45.90	10.3	32.20	7.17	10.4	33.91	39.41
11.3	48.95	16.30	11.3	39.29	1.08	11.3	34.72	46.03	11.3	30.89	7.38	11.4	33.80	39.67
12.3	48.56	16.35	12.3	38.74	1.15	12.3	33.47	46.16	12.3	29.50	7.58	12.4	33.68	39.94
13.3	48.17	16.41	13.3	38.18	1.21	13.3	32.22	46.31	13.3	28.06	7.76	13.4	33.58	40.22
14.3	47.78	16.48	14.3	37.63	1.25	14.3	30.96	46.46	14.3	26.60	7.91	14.4	33.47	40.53
15.3	47.37	16.55	15.3	37.11	1.28	15.3	29.65	46.64	15.3	25.18	8.05	15.4	33.37	40.84
16.3	46.95	16.62	16.3	36.59	1.29	16.3	28.28	46.81	16.3	23.80	8.18	16.4	33.26	41.14
17.3	46.52	16.68	17.3	36.10	1.30	17.3	26.86	46.96	17.3	22.45	8.30	17.4	33.13	41.44
18.3	46.06	16.73	18.3	35.62	1.32	18.3	25.41	47.10	18.3	21.14	8.43	18.4	33.01	41.73
19.3	45.61	16.75	19.3	35.15	1.35	19.3	23.92	47.23	19.3	19.85	8.57	19.4	32.89	42.02
20.3	45.18	16.78	20.3	34.68	1.39	20.3	22.42	47.34	20.3	18.57	8.70	20.4	32.76	42.29
21.2	44.74	16.76	21.3	34.21	1.42	21.3	20.91	47.44	21.3	17.28	8.84	21.4	32.62	42.57
22.2	44.30	16.75	22.3	33.71	1.45	22.3	19.40	47.53	22.3	15.96	8.99	22.4	32.48	42.80
23.2	43.87	16.72	23.2	33.20	1.48	23.3	17.93	47.61	23.3	14.59	9.13	23.4	32.34	43.04
24.2	43.45	16.69	24.2	32.67	1.51	24.3	16.48	47.67	24.3	13.17	9.28	24.4	32.19	43.27
25.2	43.05	16.65	25.2	32.12	1.52	25.3	15.08	47.73	25.3	11.69	9.42	25.4	32.06	43.49
26.2	42.65	16.62	26.2	31.57	1.53	26.3	13.70	47.80	26.3	10.12	9.55	26.4	31.92	43.70
27.2	42.26	16.61	27.2	31.00	1.50	27.3	12.35	47.86	27.3	8.49	9.65	27.3	31.78	43.92
28.2	41.87	16.60	28.2	30.42	1.47	28.3	11.01	47.95	28.3	6.85	9.74	28.3	31.65	44.15
29.2	41.46	16.59	29.2	29.87	1.42	29.3	9.64	48.04	29.3	5.20	9.81	29.3	31.53	44.38
30.2	41.04	16.59	30.2	29.34	1.36	30.3	8.23	48.15	30.3	3.61	9.86	30.3	31.39	44.63
31.2	40.59	16.59	31.2	28.84	1.27	31.3	6.74	48.25	31.3	2.09	9.89	31.3	31.26	44.90
32.2	40.14	16.58	32.2	28.38	1.19	32.3	5.17	48.35	32.3	0.65	9.93	32.3	31.11	45.16
16.97	+16.94		24.57	-24.55		59.05	+59.04		73.35	-73.35		7.41	+7.34	
17 <sup>h</sup> 58 <sup>m</sup>	2 <sup>h</sup> 814		18 <sup>h</sup> 7 <sup>m</sup>	59 <sup>h</sup> 062		18 <sup>h</sup> 59 <sup>m</sup>	2 <sup>h</sup> 477		19 <sup>h</sup> 32 <sup>m</sup>	24 <sup>h</sup> 283		20 <sup>h</sup> 48 <sup>m</sup>	27 <sup>h</sup> 964	
+86° 36'	50'' 93		-87° 39'	50'' 94		+89° 1'	17'' 96		-89° 13'	5'' 55		+82° 14'	10'' 29	

## CIRCUMPOLAR STARS.

FOR THE UPPER TRANSIT AT WASHINGTON.

λ Octantis. Mag. 5.4			ν Octantis. Mag. 5.7			β Octantis. Mag. 4.3			39 H. Cephei. Mag. 5.6			γ <sup>1</sup> Octantis. Mag. 5.1		
Wash. Mean Time.	Right Ascen- sion.	Declina- tion.	Wash. Mean Time.	Right Ascen- sion.	Declina- tion.	Wash. Mean Time.	Right Ascen- sion.	Declina- tion.	Wash. Mean Time.	Right Ascen- sion.	Declina- tion.	Wash. Mean Time.	Right Ascen- sion.	Declina- tion.
Sept.	h m 21 39	° ' -83 5	Sept.	h m 22 17	° ' -86 22	Sept.	h m 22 38	° ' -81 47	Sept.	h m 23 28	° ' +86 52	Sept.	h m 23 47	° ' -82 27
	s 3.83	" 2.69		s 10.10	" 14.26		s 9.57	" 45.09		s 13.56	" 13.06		s 36.25	" 22.85
1.5	3.83	2.69	1.5	10.10	14.26	1.5	9.57	45.09	1.5	13.56	13.06	1.5	36.25	22.85
2.5	3.77	2.96	2.5	10.06	14.57	2.5	9.56	45.38	2.5	13.67	13.45	2.5	36.29	23.15
3.4	3.71	3.24	3.5	10.00	14.85	3.5	9.55	45.66	3.5	13.78	13.84	3.5	36.32	23.43
4.4	3.66	3.50	4.5	9.95	15.12	4.5	9.55	45.93	4.5	13.88	14.24	4.5	36.36	23.70
5.4	3.63	3.74	5.5	9.92	15.38	5.5	9.56	46.19	5.5	13.94	14.64	5.5	36.40	23.96
6.4	3.60	4.00	6.5	9.91	15.65	6.5	9.57	46.46	6.5	13.99	15.06	6.5	36.45	24.20
7.4	3.57	4.27	7.5	9.89	15.93	7.5	9.59	46.73	7.5	14.00	15.48	7.5	36.51	24.46
8.4	3.55	4.53	8.5	9.89	16.23	8.5	9.60	47.01	8.5	14.00	15.86	8.5	36.57	24.73
9.4	3.52	4.87	9.5	9.87	16.54	9.5	9.61	47.32	9.5	13.97	16.25	9.5	36.63	25.03
10.4	3.48	5.19	10.5	9.83	16.87	10.5	9.61	47.65	10.5	13.95	16.62	10.5	36.68	25.34
11.4	3.42	5.51	11.5	9.76	17.20	11.5	9.59	47.98	11.5	13.94	16.97	11.5	36.72	25.66
12.4	3.33	5.82	12.5	9.67	17.53	12.5	9.56	48.32	12.5	13.94	17.32	12.5	36.74	26.00
13.4	3.24	6.11	13.4	9.54	17.86	13.5	9.53	48.65	13.5	13.97	17.67	13.5	36.75	26.33
14.4	3.15	6.39	14.4	9.42	18.15	14.5	9.48	48.97	14.5	14.00	18.03	14.5	36.76	26.66
15.4	3.06	6.65	15.4	9.28	18.44	15.5	9.43	49.26	15.5	14.03	18.40	15.5	36.76	26.99
16.4	2.96	6.89	16.4	9.14	18.72	16.5	9.39	49.55	16.5	14.06	18.78	16.5	36.75	27.30
17.4	2.87	7.13	17.4	9.01	19.00	17.5	9.35	49.83	17.5	14.07	19.18	17.5	36.75	27.60
18.4	2.78	7.38	18.4	8.90	19.27	18.4	9.32	50.11	18.5	14.07	19.58	18.5	36.75	27.88
19.4	2.70	7.63	19.4	8.78	19.54	19.4	9.28	50.39	19.5	14.04	19.99	19.5	36.75	28.17
20.4	2.62	7.89	20.4	8.68	19.81	20.4	9.25	50.66	20.5	13.99	20.39	20.5	36.76	28.47
21.4	2.54	8.15	21.4	8.58	20.09	21.4	9.22	50.94	21.5	13.92	20.77	21.5	36.77	28.76
22.4	2.46	8.41	22.4	8.46	20.37	22.4	9.18	51.24	22.5	13.84	21.16	22.5	36.79	29.07
23.4	2.37	8.67	23.4	8.34	20.66	23.4	9.14	51.54	23.5	13.76	21.54	23.5	36.79	29.38
24.4	2.28	8.94	24.4	8.21	20.97	24.4	9.09	51.85	24.5	13.66	21.91	24.5	36.79	29.71
25.4	2.18	9.22	25.4	8.06	21.28	25.4	9.05	52.17	25.5	13.56	22.27	25.5	36.79	30.04
26.4	2.06	9.49	26.4	7.89	21.58	26.4	8.99	52.48	26.5	13.47	22.60	26.5	36.77	30.37
27.4	1.94	9.75	27.4	7.70	21.87	27.4	8.92	52.80	27.5	13.39	22.94	27.5	36.74	30.71
28.4	1.81	9.99	28.4	7.49	22.16	28.4	8.84	53.09	28.5	13.34	23.29	28.5	36.71	31.06
29.4	1.68	10.22	29.4	7.27	22.43	29.4	8.76	53.38	29.5	13.28	23.65	29.5	36.67	31.39
30.4	1.54	10.44	30.4	7.05	22.67	30.4	8.67	53.65	30.5	13.23	24.02	30.5	36.63	31.70
31.4	1.40	10.63	31.4	6.84	22.90	31.4	8.59	53.89	31.4	13.16	24.42	31.5	36.58	31.99
32.4	1.28	10.81	32.4	6.64	23.12	32.4	8.50	54.12	32.4	13.08	24.82	32.5	36.53	32.27

8.31	-8.24	15.80	-15.77	7.01	-6.94	13.32	+13.30	7.62	-7.55
21 <sup>h</sup> 38 <sup>m</sup> 48 <sup>s</sup> .035		22 <sup>h</sup> 16 <sup>m</sup> 45 <sup>s</sup> .446		22 <sup>h</sup> 37 <sup>m</sup> 57 <sup>s</sup> .920		20 <sup>h</sup> 27 <sup>m</sup> 43 <sup>s</sup> .285		23 <sup>h</sup> 47 <sup>m</sup> 27 <sup>s</sup> .240	
-83° 5' 17".96		-86° 22' 32".81		-81° 48' 6".08		+86° 51' 58".49		-82° 27' 48".42	

CIRCUMPOLAR STARS.

FOR THE UPPER TRANSIT AT WASHINGTON.

48 H. Cephei. Mag. 4.5			α Ursa Minoris. (Polaris.) Mag. 2.1			4 G. Octantis. Mag. 5.6			Groombridge 750. Mag. 6.7			Groombridge 944. Mag. 6.4		
Wash. Mean Time.	Right Ascension.	Declination.	Wash. Mean Time.	Right Ascension.	Declination.	Wash. Mean Time.	Right Ascension.	Declination.	Wash. Mean Time.	Right Ascension.	Declination.	Wash. Mean Time.	Right Ascension.	Declination.
Oct.	h m	° ' "	Oct.	h m	° ' "	Oct.	h m	° ' "	Oct.	h m	° ' "	Oct.	h m	° ' "
	0 58	+85 49		1 83	+88 52		1 41	-85 10		4 11	+85 20		5 36	+85 9
	s	"		s	"		s	"		s	"		s	"
0.5	2.79	58.91	0.5	33.13	49.23	0.5	57.01	6.68	0.6	23.84	26.26	0.7	31.22	14.34
1.5	2.89	59.20	1.5	33.67	49.59	1.5	57.05	6.93	1.6	24.14	26.44	1.7	31.54	14.38
2.5	2.98	59.69	2.5	34.19	49.97	2.5	57.09	7.23	2.6	24.45	26.65	2.7	31.87	14.46
3.5	3.06	60.11	3.5	34.64	50.38	3.5	57.13	7.50	3.6	24.75	26.87	3.7	32.21	14.54
4.5	3.11	60.52	4.5	35.01	50.79	4.5	57.19	7.79	4.6	25.04	27.13	4.7	32.54	14.64
5.5	3.14	60.92	5.5	35.31	51.19	5.5	57.26	8.07	5.6	25.31	27.39	5.7	32.87	14.77
6.5	3.14	61.32	6.5	35.52	51.58	6.5	57.33	8.36	6.6	25.56	27.64	6.7	33.16	14.91
7.5	3.14	61.70	7.5	35.70	51.96	7.5	57.40	8.67	7.6	25.79	27.89	7.7	33.45	15.05
8.5	3.14	62.07	8.5	35.88	52.33	8.5	57.46	8.99	8.6	26.02	28.14	8.7	33.72	15.18
9.5	3.14	62.43	9.5	36.08	52.67	9.5	57.51	9.33	9.6	26.24	28.37	9.7	33.98	15.29
10.5	3.16	62.76	10.5	36.31	53.01	10.5	57.55	9.69	10.6	26.46	28.59	10.7	34.24	15.39
11.5	3.19	63.10	11.5	36.59	53.36	11.5	57.57	10.05	11.6	26.69	28.79	11.7	34.50	15.49
12.5	3.22	63.46	12.5	36.90	53.70	12.5	57.57	10.39	12.6	26.93	29.01	12.7	34.78	15.58
13.5	3.26	63.83	13.5	37.22	54.06	13.5	57.56	10.73	13.6	27.19	29.23	13.7	35.06	15.66
14.5	3.29	64.20	14.5	37.52	54.44	14.5	57.55	11.07	14.6	27.44	29.46	14.7	35.37	15.76
15.5	3.31	64.58	15.5	37.79	54.83	15.5	57.53	11.38	15.6	27.69	29.70	15.7	35.68	15.89
16.5	3.31	64.99	16.5	38.00	55.22	16.5	57.52	11.69	16.6	27.94	29.97	16.7	35.97	16.02
17.5	3.30	65.38	17.5	38.16	55.62	17.5	57.51	12.00	17.6	28.19	30.24	17.7	36.27	16.16
18.5	3.29	65.77	18.5	38.26	56.01	18.5	57.51	12.31	18.6	28.42	30.52	18.7	36.57	16.34
19.5	3.25	66.16	19.5	38.31	56.40	19.5	57.51	12.62	19.6	28.64	30.80	19.7	36.86	16.51
20.5	3.21	66.54	20.5	38.31	56.78	20.5	57.51	12.93	20.6	28.84	31.10	20.7	37.13	16.70
21.5	3.15	66.91	21.5	38.28	57.16	21.5	57.51	13.24	21.6	29.04	31.39	21.6	37.38	16.89
22.5	3.09	67.25	22.5	38.24	57.53	22.5	57.50	13.58	22.6	29.23	31.67	22.6	37.63	17.07
23.5	3.03	67.59	23.5	38.19	57.89	23.5	57.49	13.93	23.6	29.41	31.95	23.6	37.86	17.26
24.4	2.97	67.93	24.5	38.15	58.23	24.5	57.45	14.27	24.6	29.58	32.22	24.6	38.10	17.42
25.4	2.91	68.27	25.5	38.15	58.57	25.5	57.41	14.61	25.6	29.76	32.48	25.6	38.35	17.57
26.4	2.87	68.60	26.5	38.19	58.93	26.5	57.34	14.96	26.6	29.95	32.74	26.6	38.59	17.73
27.4	2.84	68.95	27.5	38.26	59.29	27.5	57.26	15.30	27.6	30.15	33.00	27.6	38.86	17.88
28.4	2.82	69.31	28.5	38.34	59.65	28.5	57.17	15.63	28.6	30.37	33.26	28.6	39.13	18.03
29.4	2.79	69.69	29.5	38.40	60.03	29.5	57.09	15.93	29.6	30.60	33.53	29.6	39.42	18.20
30.4	2.75	70.08	30.5	38.42	60.44	30.5	57.00	16.22	30.6	30.82	33.84	30.6	39.71	18.39
31.4	2.69	70.47	31.5	38.36	60.85	31.5	56.92	16.51	31.6	31.03	34.16	31.6	40.00	18.61

13.77	+13.73	51.24	+51.23	11.88	-11.83	12.31	+12.27	11.84	+11.80
0 <sup>a</sup> 57 <sup>m</sup>	32° 32'	1 <sup>b</sup> 51 <sup>m</sup>	41° 36'	1 <sup>b</sup> 41 <sup>m</sup>	51° 11'	4 <sup>b</sup> 10 <sup>m</sup>	55° 49'	5 <sup>b</sup> 36 <sup>m</sup>	9° 11'
+85° 49'	43'' .85	+85° 52'	39'' .02	-85° 10'	27'' .09	+85° 20'	38'' .12	+85° 9'	36'' .60

## CIRCUMPOLAR STARS.

FOR THE UPPER TRANSIT AT WASHINGTON.

31 G. Mensse. Mag. 6.2			J Mensse. Mag. 5.6			51 H. Cephei. Mag. 5.3			25 H. Camelop. Mag. 5.1			7 G. Octantis. Mag. 6.4		
Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.
Oct.	h m 5 45	° ' " -84 49	Oct.	h m 6 46	° ' " -80 48	Oct.	h m 7 3	° ' " +87 10	Oct.	h m 7 14	° ' " +82 33	Oct.	h m 7 14	° ' " -86 54
	s "	"		s "	"		s "	"		s "	"		s "	"
0.7	31.28	29.40	0.8	39.16	40.72	0.8	53.31	8.34	0.8	30.09	41.02	0.8	58.66	19.85
1.7	31.50	29.51	1.8	39.29	40.75	1.8	53.84	8.24	1.8	30.29	40.89	1.8	59.05	19.84
2.7	31.71	29.62	2.7	39.43	40.78	2.8	54.39	8.14	2.8	30.51	40.79	2.8	59.42	19.83
3.7	31.92	29.72	3.7	39.56	40.80	3.8	54.96	8.06	3.8	30.73	40.69	3.8	59.77	19.81
4.7	32.13	29.81	4.7	39.68	40.81	4.8	55.54	8.01	4.8	30.96	40.62	4.8	60.12	19.78
5.7	32.35	29.88	5.7	39.80	40.81	5.8	56.11	7.98	5.8	31.18	40.57	5.8	60.48	19.74
6.7	32.58	29.95	6.7	39.94	40.80	6.8	56.64	7.98	6.8	31.40	40.53	6.8	60.85	19.70
7.7	32.80	30.02	7.7	40.08	40.80	7.7	57.16	7.98	7.8	31.59	40.51	7.8	61.25	19.65
8.7	33.04	30.11	8.7	40.22	40.80	8.7	57.65	7.97	8.8	31.78	40.48	8.8	61.66	19.61
9.7	33.29	30.24	9.7	40.36	40.84	9.7	58.12	7.95	9.7	31.96	40.45	9.8	62.10	19.61
10.7	33.53	30.38	10.7	40.51	40.89	10.7	58.59	7.92	10.7	32.14	40.41	10.7	62.55	19.63
11.7	33.76	30.55	11.7	40.66	40.98	11.7	59.06	7.89	11.7	32.32	40.36	11.7	62.98	19.66
12.7	33.99	30.72	12.7	40.80	41.08	12.7	59.56	7.84	12.7	32.50	40.29	12.7	63.41	19.71
13.7	34.21	30.90	13.7	40.94	41.19	13.7	60.06	7.79	13.7	32.69	40.22	13.7	63.83	19.77
14.7	34.40	31.09	14.7	41.07	41.30	14.7	60.58	7.75	14.7	32.89	40.16	14.7	64.23	19.83
15.7	34.60	31.27	15.7	41.20	41.41	15.7	61.12	7.74	15.7	33.11	40.10	15.7	64.61	19.89
16.7	34.80	31.45	16.7	41.34	41.51	16.7	61.67	7.73	16.7	33.32	40.07	16.7	64.99	19.96
17.7	35.00	31.62	17.7	41.47	41.61	17.7	62.23	7.74	17.7	33.54	40.06	17.7	65.37	20.02
18.7	35.20	31.78	18.7	41.59	41.70	18.7	62.77	7.77	18.7	33.76	40.06	18.7	65.74	20.07
19.7	35.40	31.94	19.7	41.72	41.79	19.7	63.29	7.80	19.7	33.96	40.06	19.7	66.12	20.12
20.7	35.60	32.11	20.7	41.85	41.88	20.7	63.82	7.85	20.7	34.16	40.11	20.7	66.50	20.16
21.7	35.82	32.27	21.7	41.99	41.97	21.7	64.34	7.90	21.7	34.36	40.14	21.7	66.90	20.21
22.7	36.03	32.43	22.7	42.12	42.07	22.7	64.82	7.96	22.7	34.55	40.18	22.7	67.31	20.27
23.6	36.25	32.63	23.7	42.25	42.20	23.7	65.30	8.02	23.7	34.74	40.21	23.7	67.72	20.35
24.6	36.45	32.85	24.7	42.39	42.33	24.7	65.77	8.07	24.7	34.92	40.24	24.7	68.14	20.44
25.6	36.65	33.09	25.7	42.52	42.50	25.7	66.22	8.12	25.7	35.10	40.25	25.7	68.56	20.56
26.6	36.84	33.35	26.7	42.66	42.68	26.7	66.69	8.14	26.7	35.28	40.25	26.7	68.98	20.68
27.6	37.02	33.61	27.7	42.79	42.87	27.7	67.19	8.15	27.7	35.47	40.25	27.7	69.37	20.83
28.6	37.19	33.87	28.7	42.91	43.08	28.7	67.69	8.17	28.7	35.66	40.24	28.7	69.75	21.00
29.6	37.35	34.13	29.7	43.04	43.29	29.7	68.23	8.20	29.7	35.88	40.24	29.7	70.11	21.17
30.6	37.49	34.37	30.7	43.14	43.49	30.7	68.78	8.25	30.7	36.10	40.27	30.7	70.44	21.34
31.6	37.64	34.62	31.7	43.25	43.67	31.7	69.34	8.33	31.7	36.32	40.31	31.7	70.77	21.48
11.09	-11.04		6.21	-6.13		20.25	+20.22		7.72	+7.66		18.52	-18.50	
5 <sup>h</sup> 45 <sup>m</sup> 39 <sup>s</sup> .719			6 <sup>h</sup> 46 <sup>m</sup> 43 <sup>s</sup> .704			7 <sup>h</sup> 3 <sup>m</sup> 31 <sup>s</sup> .434			7 <sup>h</sup> 14 <sup>m</sup> 20 <sup>s</sup> .713			7 <sup>h</sup> 15 <sup>m</sup> 19 <sup>s</sup> .352		
-84° 49' 42".94			-80° 43' 50".12			+87° 10' 38".36			+82° 34' 10".90			-86° 54' 26".23		

CIRCUMPOLAR STARS.

FOR THE UPPER TRANSIT AT WASHINGTON.

Greenwich 1119. Mag. 7.0			♄ Octantis. Mag. 5.4			♃ H. Denebis. Mag. 4.6			♄ Chamaeleontis. Mag. 5.2			♃ H. Camelopard. Mag. 5.3		
Wash. Mean Time.	Right Ascension.	Declination.	Wash. Mean Time.	Right Ascension.	Declination.	Wash. Mean Time.	Right Ascension.	Declination.	Wash. Mean Time.	Right Ascension.	Declination.	Wash. Mean Time.	Right Ascension.	Declination.
Oct.	h m	° ' "	Oct.	h m	° ' "	Oct.	h m	° ' "	Oct.	h m	° ' "	Oct.	h m	° ' "
	8 19	+83 51		9 8	-85 20		9 25	+81 40		9 36	-80 34		10 21	+82 57
0.8	1.48	53.27	0.9	20.12	44.62	0.9	48.08	22.76	0.9	12.54	60.48	0.9	22.80	30.01
1.8	2.61	53.05	1.9	20.34	44.47	1.9	48.20	22.44	1.9	12.65	60.31	1.9	22.90	29.65
2.8	3.80	52.83	2.8	20.56	44.33	2.9	48.34	22.13	2.9	12.76	60.14	2.9	23.01	29.29
3.8	5.06	52.63	3.8	20.76	44.18	3.9	48.49	21.83	3.9	12.86	59.98	3.9	23.14	28.92
4.8	6.37	52.45	4.8	20.95	44.01	4.9	48.64	21.55	4.9	12.96	59.80	4.9	23.29	28.58
5.8	7.67	52.30	5.8	21.15	43.85	5.9	48.80	21.30	5.9	13.04	59.61	5.9	23.44	28.25
6.8	8.93	52.16	6.8	21.35	43.67	6.8	48.95	21.06	6.9	13.14	59.40	6.9	23.58	27.93
7.8	10.13	52.03	7.8	21.57	43.48	7.8	49.09	20.83	7.9	13.24	59.19	7.9	23.71	27.64
8.8	11.27	51.90	8.8	21.80	43.30	8.8	49.23	20.61	8.9	13.34	58.98	8.9	23.85	27.36
9.8	12.36	51.78	9.8	22.05	43.13	9.8	49.36	20.39	9.8	13.46	58.77	9.9	23.96	27.09
10.8	13.43	51.64	10.8	22.32	42.98	10.8	49.48	20.17	10.8	13.59	58.59	10.9	24.07	26.81
11.8	14.50	51.49	11.8	22.59	42.84	11.8	49.60	19.93	11.8	13.71	58.41	11.9	24.18	26.51
12.8	15.60	51.33	12.8	22.86	42.73	12.8	49.73	19.68	12.8	13.84	58.27	12.9	24.29	26.20
13.8	16.74	51.18	13.8	23.13	42.64	13.8	49.87	19.43	13.8	13.97	58.14	13.9	24.41	25.89
14.8	17.94	51.02	14.8	23.39	42.55	14.8	50.01	19.18	14.8	14.10	58.01	14.9	24.54	25.56
15.8	19.18	50.88	15.8	23.65	42.47	15.8	50.15	18.94	15.8	14.22	57.89	15.9	24.67	25.24
16.8	20.44	50.74	16.8	23.89	42.38	16.8	50.31	18.70	16.8	14.34	57.77	16.9	24.83	24.93
17.8	21.74	50.62	17.8	24.13	42.29	17.8	50.47	18.47	17.8	14.46	57.66	17.9	24.96	24.64
18.8	23.04	50.52	18.8	24.38	42.19	18.8	50.64	18.26	18.8	14.58	57.55	18.9	25.15	24.36
19.8	24.35	50.43	19.8	24.62	42.08	19.8	50.81	18.06	19.8	14.70	57.42	19.9	25.32	24.08
20.8	25.64	50.35	20.8	24.86	41.98	20.8	50.96	17.87	20.8	14.82	57.29	20.8	25.48	23.81
21.8	26.91	50.26	21.8	25.12	41.87	21.8	51.12	17.69	21.8	14.94	57.16	21.8	25.63	23.57
22.8	28.11	50.23	22.8	25.37	41.77	22.8	51.28	17.52	22.8	15.07	57.03	22.8	25.78	23.33
23.8	29.29	50.17	23.8	25.64	41.68	23.8	51.43	17.36	23.8	15.20	56.92	23.8	25.93	23.10
24.8	30.45	50.11	24.8	25.92	41.61	24.8	51.58	17.19	24.8	15.33	56.81	24.8	26.06	22.87
25.8	31.57	50.03	25.8	26.21	41.56	25.8	51.72	17.03	25.8	15.47	56.71	25.8	26.22	22.64
26.7	32.71	49.95	26.8	26.51	41.52	26.8	51.86	16.88	26.8	15.62	56.65	26.8	26.36	22.39
27.7	33.87	49.86	27.8	26.80	41.51	27.8	52.01	16.66	27.8	15.76	56.61	27.8	26.50	22.12
28.7	35.10	49.77	28.8	27.09	41.51	28.8	52.17	16.45	28.8	15.91	56.59	28.8	26.65	21.85
29.7	36.39	49.68	29.8	27.36	41.53	29.8	52.34	16.24	29.8	16.06	56.58	29.8	26.82	21.57
30.7	37.75	49.61	30.8	27.63	41.55	30.8	52.51	16.04	30.8	16.19	56.57	30.8	27.00	21.30
31.7	39.14	49.56	31.8	27.88	41.57	31.8	52.70	15.86	31.8	16.31	56.56	31.8	27.19	21.05
50.45	+50.44	12.32	-12.28	6.90	+6.83	6.11	-6.03	8.16	+8.09					
8° 18'	46°.642	0° 8'	38°.397	9° 25'	43°.041	9° 36'	17°.300	10° 21'	27°.485					
+86° 52'	26".44	-85° 20'	41".44	+81° 40'	54".43	-60° 24'	55".47	+82° 57'	59".46					

CIRCUMPOLAR STARS.

FOR THE UPPER TRANSIT AT WASHINGTON.

η Octantis. Mag. 6.3			Bradley 1672. Mag. 6.3			ι Octantis. Mag. 5.4			83 H. Camelopard. seq. Mag. 5.3			κ Octantis. Mag. 5.6		
Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.
Oct.	h m s	° '	Oct.	h m s	° '	Oct.	h m s	° '	Oct.	h m s	° '	Oct.	h m s	° '
	10 59	-84 9		12 13	+88 8		12 46	-84 41		12 48	+83 50		13 27	-85 22
0.9	46.83	60.45	0.9	37.64	16.17	1.0	22.05	38.59	1.0	16.40	36.43	1.0	40.81	56.81
1.9	46.94	60.20	1.9	37.60	15.77	2.0	22.08	38.30	2.0	16.36	36.08	2.0	40.80	56.52
2.9	47.05	59.96	2.9	37.61	15.36	2.9	22.12	38.01	3.0	16.33	35.62	3.0	40.79	56.23
3.9	47.15	59.72	3.9	37.67	14.94	3.9	22.13	37.74	3.9	16.32	35.20	4.0	40.76	55.96
4.9	47.25	59.47	4.9	37.78	14.53	4.9	22.14	37.47	4.9	16.32	34.77	5.0	40.73	55.69
5.9	47.34	59.21	5.9	37.94	14.12	5.9	22.14	37.19	5.9	16.33	34.36	6.0	40.70	55.41
6.9	47.42	58.94	6.9	38.11	13.74	6.9	22.14	36.88	6.9	16.35	33.96	7.0	40.65	55.10
7.9	47.52	58.65	7.9	38.28	13.37	7.9	22.14	36.56	7.9	16.37	33.58	8.0	40.59	54.79
8.9	47.62	58.36	8.9	38.43	13.01	8.9	22.15	36.23	8.9	16.39	33.22	9.0	40.55	54.46
9.9	47.75	58.07	9.9	38.55	12.68	9.9	22.18	35.88	9.9	16.39	32.88	10.0	40.53	54.11
10.9	47.89	57.79	10.9	38.64	12.32	10.9	22.22	35.52	10.9	16.39	32.53	11.0	40.53	53.76
11.9	48.03	57.52	11.9	38.72	11.96	11.9	22.23	35.18	11.9	16.38	32.17	12.0	40.55	53.42
12.9	48.19	57.28	12.9	38.80	11.60	12.9	22.25	34.85	12.9	16.37	31.81	13.0	40.58	53.08
13.9	48.36	57.04	13.9	38.88	11.23	13.9	22.43	34.54	13.9	16.36	31.43	13.9	40.63	52.75
14.9	48.51	56.82	14.9	39.00	10.85	14.9	22.51	34.25	14.9	16.37	31.05	14.9	40.67	52.43
15.9	48.66	56.60	15.9	39.16	10.46	15.9	22.59	33.97	15.9	16.39	30.64	15.9	40.71	52.12
16.9	48.81	56.39	16.9	39.33	10.07	16.9	22.67	33.69	16.9	16.42	30.23	16.9	40.76	51.84
17.9	48.96	56.18	17.9	39.54	9.68	17.9	22.74	33.41	17.9	16.45	29.83	17.9	40.79	51.55
18.9	49.10	55.97	18.9	39.78	9.29	18.9	22.81	33.12	18.9	16.49	29.43	18.9	40.82	51.24
19.9	49.25	55.75	19.9	40.05	8.93	19.9	22.88	32.84	19.9	16.53	29.04	19.9	40.86	50.94
20.9	49.39	55.53	20.9	40.34	8.56	20.9	22.95	32.54	20.9	16.59	28.67	20.9	40.89	50.64
21.9	49.53	55.30	21.9	40.64	8.22	21.9	23.02	32.23	21.9	16.65	28.30	21.9	40.92	50.33
22.9	49.68	55.07	22.9	40.93	7.88	22.9	23.10	31.92	22.9	16.71	27.93	22.9	40.95	50.01
23.9	49.85	54.84	23.9	41.22	7.55	23.9	23.18	31.61	23.9	16.77	27.57	23.9	41.00	49.68
24.9	50.02	54.61	24.9	41.48	7.23	24.9	23.27	31.29	24.9	16.82	27.24	24.9	41.05	49.35
25.9	50.20	54.41	25.9	41.72	6.90	25.9	23.39	30.97	25.9	16.86	26.90	25.9	41.14	49.02
26.9	50.40	54.22	26.9	41.94	6.57	26.9	23.51	30.68	26.9	16.90	26.55	26.9	41.24	48.68
27.9	50.61	54.05	27.9	42.16	6.21	27.9	23.66	30.39	27.9	16.94	26.19	27.9	41.37	48.37
28.9	50.82	53.91	28.9	42.38	5.84	28.9	23.81	30.14	28.9	16.98	25.81	28.9	41.49	48.06
29.9	51.01	53.78	29.9	42.64	5.48	29.9	23.96	29.90	29.9	17.03	25.40	29.9	41.62	47.80
30.8	51.21	53.66	30.9	42.95	5.08	30.9	24.11	29.67	30.9	17.11	25.00	30.9	41.75	47.54
31.8	51.40	53.54	31.9	43.31	4.71	31.9	24.24	29.44	31.9	17.19	24.60	31.9	41.87	47.28
9.84 -9.79			30.75 +30.73			10.81 -10.77			9.32 +9.27			12.42 -12.33		
10 <sup>h</sup> 59 <sup>m</sup> 54 <sup>s</sup> .174			12 <sup>h</sup> 14 <sup>m</sup> 29 <sup>s</sup> .583			12 <sup>h</sup> 46 <sup>m</sup> 25 <sup>s</sup> .116			12 <sup>h</sup> 48 <sup>m</sup> 31 <sup>s</sup> .755			13 <sup>h</sup> 27 <sup>m</sup> 42 <sup>s</sup> .060		
-84° 9' 48".70			+88° 8' 36".24			-84° 41' 21".28			+83° 50' 51".72			-85° 22' 38".10		



CIRCUMPOLAR STARS.

FOR THE UPPER TRANSIT AT WASHINGTON.

δ Octantis. Mag. 4.1			Groombridge 2333. Mag. 7.2			ρ Octantis. Mag. 5.7			ε Ursae Minoris. Mag. 4.4			50 G. Apedis. Mag. 5.9		
Wash. Mean Time.	Right Ascension.	Declination.	Wash. Mean Time.	Right Ascension.	Declination.	Wash. Mean Time.	Right Ascension.	Declination.	Wash. Mean Time.	Right Ascension.	Declination.	Wash. Mean Time.	Right Ascension.	Declination.
h m	° ' "	° ' "	h m	° ' "	° ' "	h m	° ' "	° ' "	h m	° ' "	° ' "	h m	° ' "	° ' "
Oct. 14 13	-83 18		Oct. 15 1	+87 32		Oct. 15 24	-84 12		Oct. 16 53	+82 10		Oct. 17 16	-80 47	
	s	"		s	"		s	"		s	"		s	"
1.1	57.92	30.21	1.1	54.17	31.75	1.1	43.07	26.27	1.2	55.89	34.75	1.2	36.88	31.31
2.1	57.88	29.93	2.1	53.73	31.47	2.1	42.97	26.02	2.2	55.71	34.63	2.2	36.78	31.07
3.1	57.85	29.66	3.1	53.30	31.15	3.1	42.87	25.79	3.2	55.53	34.49	3.2	36.68	30.94
4.1	57.81	29.39	4.1	52.91	30.82	4.1	42.78	25.56	4.2	55.35	34.31	4.2	36.59	30.84
5.1	57.75	29.13	5.1	52.54	30.48	5.1	42.66	25.35	5.2	55.17	34.12	5.2	36.50	30.74
6.1	57.69	28.87	6.1	52.21	30.13	6.1	42.54	25.13	6.2	55.02	33.91	6.2	36.38	30.64
7.0	57.63	28.60	7.1	51.92	29.79	7.1	42.41	24.91	7.2	54.87	33.70	7.2	36.26	30.52
8.0	57.57	28.30	8.1	51.63	29.46	8.1	42.28	24.67	8.2	54.72	33.50	8.2	36.14	30.40
9.0	57.51	27.99	9.1	51.35	29.15	9.1	42.14	24.40	9.2	54.57	33.31	9.2	36.01	30.27
10.0	57.45	27.66	10.1	51.07	28.86	10.1	42.01	24.11	10.2	54.42	33.14	10.2	35.88	30.11
11.0	57.40	27.31	11.1	50.76	28.57	11.1	41.90	23.80	11.1	54.28	32.97	11.2	35.75	29.93
12.0	57.37	26.97	12.1	50.44	28.29	12.1	41.79	23.48	12.1	54.11	32.81	12.2	35.64	29.74
13.0	57.36	26.63	13.1	50.11	27.99	13.1	41.70	23.17	13.1	53.95	32.64	13.2	35.53	29.53
14.0	57.35	26.31	14.1	49.77	27.68	14.1	41.64	22.88	14.1	53.79	32.47	14.2	35.44	29.33
15.0	57.35	26.00	15.1	49.44	27.36	15.1	41.57	22.59	15.1	53.63	32.29	15.2	35.35	29.13
16.0	57.35	25.71	16.1	49.13	27.02	16.1	41.51	22.30	16.1	53.48	32.08	16.2	35.26	28.94
17.0	57.35	25.42	17.1	48.84	26.67	17.1	41.45	22.02	17.1	53.32	31.86	17.1	35.17	28.75
18.0	57.34	25.13	18.1	48.56	26.31	18.1	41.39	21.75	18.1	53.17	31.63	18.1	35.08	28.57
19.0	57.33	24.85	19.0	48.31	25.95	19.1	41.31	21.48	19.1	53.02	31.39	19.1	34.99	28.39
20.0	57.32	24.54	20.0	48.07	25.59	20.1	41.23	21.21	20.1	52.88	31.12	20.1	34.90	28.22
21.0	57.31	24.23	21.0	47.87	25.23	21.1	41.15	20.93	21.1	52.74	30.86	21.1	34.80	28.04
22.0	57.29	23.92	22.0	47.67	24.87	22.1	41.07	20.65	22.1	52.61	30.61	22.1	34.69	27.86
23.0	57.28	23.61	23.0	47.48	24.53	23.1	40.98	20.34	23.1	52.49	30.36	23.1	34.59	27.65
24.0	57.27	23.28	24.0	47.30	24.19	24.1	40.92	20.03	24.1	52.37	30.12	24.1	34.48	27.43
24.9	57.26	22.94	25.0	47.12	23.86	25.0	40.85	19.71	25.1	52.24	29.88	25.1	34.38	27.19
25.0	57.29	22.59	26.0	46.92	23.54	26.0	40.80	19.37	26.1	52.11	29.66	26.1	34.29	26.93
26.9	57.32	22.25	27.0	46.70	23.22	27.0	40.77	19.02	27.1	51.98	29.44	27.1	34.20	26.67
27.9	57.37	21.91	28.0	46.47	22.89	28.0	40.76	18.68	28.1	51.84	29.21	28.1	34.13	26.40
28.9	57.42	21.59	29.0	46.23	22.54	29.0	40.75	18.36	29.1	51.70	28.96	29.1	34.07	26.13
29.9	57.48	21.30	30.0	45.99	22.17	30.0	40.75	18.06	30.1	51.57	28.71	30.1	34.02	25.89
30.9	57.54	21.02	31.0	45.78	21.80	31.0	40.76	17.77	31.1	51.44	28.43	31.1	33.97	25.65
31.9	57.59	20.75	32.0	45.59	21.40	32.0	40.76	17.50	32.1	51.31	28.12	32.1	33.92	25.42
8.58	-9.52		23.31	+23.29		9.91	-9.66		7.35	+7.28		6.25	-6.17	
14 <sup>h</sup> 13 <sup>m</sup>	55 <sup>s</sup> .644		15 <sup>h</sup> 2 <sup>m</sup>	43 <sup>s</sup> .277		15 <sup>h</sup> 24 <sup>m</sup>	36 <sup>s</sup> .751		10 <sup>h</sup> 54 <sup>m</sup>	6 <sup>s</sup> .748		17 <sup>h</sup> 16 <sup>m</sup>	23 <sup>s</sup> .406	
-83° 18'	11'' .26		+87° 32'	28'' .69		-84° 12'	7'' .93		+82° 10'	15'' .74		-80° 47'	13'' .10	

CIRCUMPOLAR STARS.

FOR THE UPPER TRANSIT AT WASHINGTON.

δ Ursae Minoris. Mag. 4.4			χ Octantis. Mag. 5.2			λ Ursae Minoris. Mag. 6.6			σ Octantis. Mag. 5.5			76 Draconis. Mag. 5.7		
Wash. Mean Time.	Right Ascension.	Declination.	Wash. Mean Time.	Right Ascension.	Declination.	Wash. Mean Time.	Right Ascension.	Declination.	Wash. Mean Time.	Right Ascension.	Declination.	Wash. Mean Time.	Right Ascension.	Declination.
Oct.	h m ° 17 57 +86 37		Oct.	h m ° 18 8 -87 39		Oct.	h m ° 18 57 +89 1		Oct.	h m ° 19 33 -89 13		Oct.	h m ° 20 48 +82 14	
1.2	40.59	16.59	1.2	28.84	61.27	1.3	66.74	48.25	1.3	62.09	9.89	1.3	31.26	44.90
2.2	40.14	16.58	2.2	28.38	61.19	2.3	65.17	48.35	2.3	60.65	9.93	2.3	31.11	45.16
3.2	39.68	16.54	3.2	27.95	61.13	3.3	63.54	48.41	3.3	59.28	9.96	3.3	30.96	45.41
4.2	39.21	16.49	4.2	27.51	61.07	4.3	61.90	48.46	4.3	57.97	10.01	4.3	30.79	45.64
5.2	38.76	16.40	5.2	27.06	61.03	5.3	60.27	48.47	5.3	56.63	10.07	5.3	30.62	45.84
6.2	38.33	16.29	6.2	26.60	61.00	6.3	58.68	48.48	6.3	55.24	10.16	6.3	30.45	46.04
7.2	37.91	16.18	7.2	26.09	60.97	7.2	57.16	48.48	7.3	53.76	10.22	7.3	30.30	46.22
8.2	37.50	16.07	8.2	25.55	60.93	8.2	55.71	48.48	8.3	52.16	10.29	8.3	30.14	46.37
9.2	37.12	15.97	9.2	25.00	60.85	9.2	54.32	48.47	9.3	50.49	10.35	9.3	29.99	46.52
10.2	36.74	15.89	10.2	24.44	60.76	10.2	52.96	48.48	10.3	48.75	10.37	10.3	29.83	46.69
11.2	36.36	15.82	11.2	23.89	60.63	11.2	51.58	48.52	11.3	47.00	10.38	11.3	29.68	46.87
12.2	35.97	15.76	12.2	23.37	60.49	12.2	50.19	48.55	12.3	45.29	10.37	12.3	29.54	47.06
13.2	35.56	15.70	13.2	22.88	60.34	13.2	48.75	48.58	13.3	43.64	10.34	13.3	29.39	47.25
14.2	35.15	15.62	14.2	22.41	60.19	14.2	47.26	48.61	14.3	42.05	10.31	14.3	29.24	47.44
15.2	34.72	15.54	15.2	21.95	60.03	15.2	45.73	48.62	15.2	40.50	10.27	15.3	29.09	47.62
16.2	34.30	15.44	16.2	21.51	59.89	16.2	44.19	48.63	16.2	39.01	10.23	16.3	28.92	47.80
17.2	33.88	15.31	17.2	21.08	59.75	17.2	42.61	48.61	17.2	37.55	10.20	17.3	28.75	47.96
18.2	33.46	15.18	18.2	20.65	59.62	18.2	41.06	48.58	18.2	36.09	10.19	18.3	28.57	48.11
19.2	33.05	15.03	19.2	20.22	59.49	19.2	39.51	48.53	19.2	34.61	10.17	19.3	28.40	48.24
20.2	32.64	14.88	20.2	19.76	59.36	20.2	38.00	48.48	20.2	33.13	10.14	20.3	28.22	48.35
21.2	32.26	14.71	21.2	19.30	59.23	21.2	36.53	48.41	21.2	31.60	10.11	21.3	28.05	48.46
22.2	31.89	14.54	22.2	18.83	59.10	22.2	35.08	48.33	22.2	30.02	10.09	22.3	27.88	48.57
23.2	31.52	14.39	23.2	18.34	58.95	23.2	33.69	48.25	23.2	28.37	10.06	23.3	27.71	48.66
24.2	31.18	14.23	24.2	17.85	58.78	24.2	32.33	48.17	24.2	26.71	10.01	24.3	27.54	48.74
25.2	30.82	14.08	25.2	17.37	58.60	25.2	31.01	48.11	25.2	25.02	9.94	25.3	27.39	48.83
26.2	30.46	13.94	26.2	16.89	58.40	26.2	29.67	48.06	26.2	23.33	9.85	26.3	27.23	48.93
27.1	30.09	13.80	27.2	16.45	58.17	27.2	28.30	48.02	27.2	21.69	9.74	27.3	27.07	49.06
28.1	29.72	13.67	28.2	16.05	57.94	28.2	26.87	47.99	28.2	20.14	9.61	28.3	26.91	49.19
29.1	29.33	13.53	29.2	15.68	57.71	29.2	25.38	47.96	29.2	18.68	9.47	29.3	26.74	49.32
30.1	28.92	13.36	30.1	15.35	57.48	30.2	23.84	47.91	30.2	17.32	9.34	30.3	26.57	49.45
31.1	28.52	13.19	31.1	15.03	57.26	31.2	22.27	47.82	31.2	16.05	9.21	31.3	26.39	49.55
32.1	28.13	12.99	32.1	14.71	57.06	32.2	20.71	47.72	32.2	14.79	9.11	32.3	26.21	49.62
16.97	+16.94		24.56	-24.54		59.08	+59.07		73.41	-73.41		7.41	+7.34	
17 <sup>h</sup> 58 <sup>m</sup>	2°.814		18 <sup>h</sup> 7 <sup>m</sup>	59°.062		19 <sup>h</sup> 59 <sup>m</sup>	2°.477		19 <sup>h</sup> 32 <sup>m</sup>	24°.283		20 <sup>h</sup> 48 <sup>m</sup>	27°.964	
+86° 36'	50''.93		-87° 39'	50''.34		+89° 1'	17''.96		-89° 13'	5''.55		+82° 14'	10''.29	

CIRCUMPOLAR STARS.

FOR THE UPPER TRANSIT AT WASHINGTON.

λ Octantis. Mag. 5.4			ν Octantis. Mag. 5.7			β Octantis. Mag. 4.3			39 H. Cephei. Mag. 5.6			γ Octantis. Mag. 5.1		
Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.
Oct.	h m 21 38	° -83 5	Oct.	h m 22 16	° -86 22	Oct.	h m 22 38	° -81 47	Oct.	h m 23 28	° +86 52	Oct.	h m 23 47	° -82 27
	s "	"		s "	"		s "	"		s "	"		s "	"
1.4	61.40	10.63	1.4	66.84	22.90	1.4	8.59	53.89	1.4	13.16	24.42	1.5	36.58	31.99
2.4	61.28	10.81	2.4	66.64	23.12	2.4	8.50	54.12	2.4	13.08	24.82	2.5	36.53	32.27
3.4	61.18	10.99	3.4	66.45	23.34	3.4	8.45	54.35	3.4	12.99	25.23	3.5	36.49	32.54
4.4	61.07	11.17	4.4	66.27	23.56	4.4	8.39	54.59	4.4	12.86	25.63	4.5	36.46	32.81
5.4	60.97	11.38	5.4	66.11	23.79	5.4	8.33	54.83	5.4	12.70	26.02	5.5	36.44	33.09
6.4	60.86	11.60	6.4	65.94	24.03	6.4	8.27	55.10	6.4	12.52	26.39	6.4	36.41	33.39
7.4	60.74	11.83	7.4	65.75	24.30	7.4	8.19	55.37	7.4	12.34	26.73	7.4	36.38	33.70
8.4	60.61	12.06	8.4	65.58	24.57	8.4	8.11	55.65	8.4	12.17	27.06	8.4	36.34	34.02
9.4	60.46	12.28	9.4	65.30	24.83	9.4	8.01	55.94	9.4	12.00	27.39	9.4	36.30	34.35
10.3	60.29	12.48	10.4	65.03	25.08	10.4	7.91	56.22	10.4	11.86	27.71	10.4	36.22	34.68
11.3	60.12	12.67	11.4	64.75	25.32	11.4	7.81	56.49	11.4	11.72	28.05	11.4	36.14	35.01
12.3	59.96	12.85	12.4	64.46	25.54	12.4	7.68	56.72	12.4	11.60	28.38	12.4	36.06	35.32
13.3	59.80	12.99	13.4	64.17	25.73	13.4	7.56	56.95	13.4	11.47	28.74	13.4	35.97	35.61
14.3	59.65	13.14	14.4	63.90	25.92	14.4	7.46	57.16	14.4	11.34	29.10	14.4	35.89	35.88
15.3	59.50	13.27	15.4	63.63	26.09	15.4	7.36	57.36	15.4	11.17	29.47	15.4	35.81	36.15
16.3	59.35	13.41	16.4	63.37	26.27	16.4	7.25	57.56	16.4	10.99	29.84	16.4	35.73	36.41
17.3	59.20	13.55	17.4	63.11	26.46	17.4	7.16	57.76	17.4	10.80	30.20	17.4	35.66	36.67
18.3	59.07	13.69	18.4	62.87	26.64	18.4	7.06	57.98	18.4	10.58	30.54	18.4	35.59	36.93
19.3	58.94	13.83	19.3	62.62	26.83	19.4	6.96	58.19	19.4	10.35	30.88	19.4	35.52	37.20
20.3	58.79	13.99	20.3	62.36	27.02	20.4	6.86	58.41	20.4	10.11	31.21	20.4	35.45	37.47
21.3	58.64	14.14	21.3	62.10	27.22	21.4	6.76	58.62	21.4	9.86	31.53	21.4	35.37	37.75
22.3	58.47	14.30	22.3	61.83	27.41	22.4	6.64	58.84	22.4	9.62	31.82	22.4	35.29	38.04
23.3	58.31	14.45	23.3	61.55	27.61	23.4	6.52	59.06	23.4	9.38	32.11	23.4	35.20	38.33
24.3	58.13	14.60	24.3	61.24	27.80	24.4	6.39	59.28	24.4	9.15	32.40	24.4	35.10	38.62
25.3	57.94	14.73	25.3	60.91	27.97	25.3	6.26	59.48	25.4	8.93	32.69	25.4	34.99	38.91
26.3	57.76	14.82	26.3	60.58	28.12	26.3	6.12	59.68	26.4	8.73	32.99	26.4	34.87	39.18
27.3	57.58	14.90	27.3	60.24	28.25	27.3	5.99	59.85	27.4	8.53	33.30	27.4	34.75	39.43
28.3	57.40	14.95	28.3	59.90	28.36	28.3	5.85	59.99	28.4	8.31	33.61	28.4	34.62	39.66
29.3	57.22	15.00	29.3	59.58	28.46	29.3	5.71	60.12	29.4	8.10	33.94	29.4	34.50	39.86
30.3	57.07	15.04	30.3	59.27	28.55	30.3	5.58	60.24	30.4	7.86	34.28	30.4	34.40	40.06
31.3	56.92	15.08	31.3	58.99	28.64	31.3	5.46	60.35	31.4	7.59	34.62	31.4	34.29	40.25
32.3	56.78	15.13	32.3	58.71	28.73	32.3	5.36	60.47	32.4	7.29	34.95	32.4	34.19	40.45
	8.31	-8.25		15.81	-15.78		7.01	-6.94		18.34	+18.32		7.62	-7.55
	21 <sup>h</sup> 38 <sup>m</sup> 48 <sup>s</sup> .035		22 <sup>h</sup> 16 <sup>m</sup> 45 <sup>s</sup> .446			22 <sup>h</sup> 37 <sup>m</sup> 57 <sup>s</sup> .920			23 <sup>h</sup> 27 <sup>m</sup> 43 <sup>s</sup> .285			23 <sup>h</sup> 47 <sup>m</sup> 27 <sup>s</sup> .240		
	-83° 5' 17".98		-86° 22' 32".81			-81° 48' 6".03			+86° 51' 58".49			-82° 27' 48".42		

CIRCUMPOLAR STARS.

FOR THE UPPER TRANSIT AT WASHINGTON.

49 H. Cephei. Mag. 4.5			$\alpha$ Urse Minoris. (Polaris). Mag. 2.1			4 G. Octantis. Mag. 5.6			Groombridge 750. Mag. 6.7			Groombridge 944. Mag. 6.4		
Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.
Nov.	h m	° '	Nov.	h m	° '	Nov.	h m	° '	Nov.	h m	° '	Nov.	h m	° '
	0 57	+85 50		1 33	+88 53		1 41	-85 10		4 11	+85 20		5 36	+85 9
	s	"		s	"		s	"		s	"		s	"
0.4	62.69	10.47	0.5	38.36	0.85	0.5	56.92	16.51	0.6	31.03	34.16	0.6	40.00	18.61
1.4	62.60	10.86	1.5	38.21	1.25	1.5	56.86	16.78	1.6	31.23	34.50	1.6	40.28	18.85
2.4	62.50	11.24	2.4	38.00	1.64	2.5	56.80	17.06	2.6	31.40	34.84	2.6	40.53	19.09
3.4	62.37	11.60	3.4	37.72	2.02	3.5	56.74	17.35	3.6	31.55	35.19	3.6	40.77	19.34
4.4	62.24	11.94	4.4	37.42	2.39	4.4	56.67	17.66	4.6	31.69	35.52	4.6	40.98	19.59
5.4	62.11	12.26	5.4	37.12	2.72	5.4	56.59	17.97	5.5	31.82	35.84	5.6	41.18	19.83
6.4	62.01	12.57	6.4	36.86	3.05	6.4	56.49	18.31	6.5	31.95	36.13	6.6	41.37	20.05
7.4	61.90	12.87	7.4	36.62	3.37	7.4	56.37	18.65	7.5	32.07	36.41	7.6	41.58	20.25
8.4	61.80	13.18	8.4	36.43	3.70	8.4	56.24	18.98	8.5	32.21	36.68	8.6	41.80	20.45
9.4	61.71	13.49	9.4	36.26	4.03	9.4	56.10	19.30	9.5	32.35	36.97	9.6	42.01	20.67
10.4	61.62	13.82	10.4	36.09	4.40	10.4	55.96	19.60	10.5	32.52	37.27	10.6	42.24	20.88
11.4	61.53	14.16	11.4	35.88	4.75	11.4	55.82	19.89	11.5	32.67	37.58	11.6	42.48	21.09
12.4	61.42	14.49	12.4	35.62	5.11	12.4	55.67	20.17	12.5	32.83	37.89	12.6	42.71	21.32
13.4	61.29	14.83	13.4	35.32	5.47	13.4	55.54	20.43	13.5	32.98	38.23	13.6	42.94	21.58
14.4	61.15	15.17	14.4	34.96	5.84	14.4	55.40	20.69	14.5	33.11	38.57	14.6	43.16	21.84
15.4	61.00	15.50	15.4	34.54	6.20	15.4	55.27	20.94	15.5	33.22	38.93	15.6	43.36	22.11
16.4	60.83	15.82	16.4	34.07	6.56	16.4	55.14	21.19	16.5	33.33	39.29	16.6	43.57	22.40
17.4	60.66	16.13	17.4	33.57	6.90	17.4	55.01	21.46	17.5	33.42	39.63	17.6	43.75	22.69
18.4	60.48	16.42	18.4	33.05	7.23	18.4	54.88	21.73	18.5	33.50	39.98	18.6	43.92	22.97
19.4	60.29	16.71	19.4	32.50	7.54	19.4	54.74	22.00	19.5	33.56	40.32	19.6	44.08	23.26
20.4	60.11	16.98	20.4	31.97	7.84	20.4	54.59	22.29	20.5	33.62	40.64	20.6	44.23	23.54
21.4	59.93	17.23	21.4	31.45	8.13	21.4	54.43	22.58	21.5	33.70	40.95	21.6	44.38	23.80
22.4	59.78	17.49	22.4	30.98	8.42	22.4	54.25	22.86	22.5	33.77	41.24	22.6	44.55	24.05
23.4	59.63	17.75	23.4	30.55	8.72	23.4	54.06	23.13	23.5	33.85	41.55	23.6	44.71	24.30
24.4	59.48	18.03	24.4	30.14	9.03	24.4	53.86	23.37	24.5	33.95	41.85	24.6	44.89	24.54
25.4	59.34	18.33	25.4	29.73	9.35	25.4	53.65	23.61	25.5	34.05	42.16	25.6	45.07	24.80
26.4	59.17	18.62	26.4	29.29	9.68	26.4	53.45	23.81	26.5	34.16	42.49	26.6	45.27	25.07
27.4	59.00	18.92	27.4	28.79	10.04	27.4	53.24	24.00	27.5	34.26	42.85	27.5	45.47	25.37
28.4	58.81	19.22	28.4	28.21	10.38	28.4	53.05	24.19	28.5	34.35	43.22	28.5	45.66	25.68
29.3	58.59	19.52	29.4	27.53	10.72	29.4	52.87	24.37	29.5	34.40	43.59	29.5	45.82	26.00
30.3	58.36	19.80	30.4	26.79	11.03	30.4	52.69	24.56	30.5	34.45	43.96	30.5	45.97	26.34
31.3	58.13	20.04	31.4	26.01	11.32	31.4	52.52	24.77	31.5	34.46	44.33	31.5	46.09	26.68
13.77	+13.74		51.39	+51.36		11.88	-11.84		12.32	+12.28		11.84	+11.80	
0 <sup>h</sup> 57 <sup>m</sup>	32° 32'		1 <sup>h</sup> 31 <sup>m</sup>	41° 36'		1 <sup>h</sup> 41 <sup>m</sup>	51° 11'		4 <sup>h</sup> 10 <sup>m</sup>	55° 49'		5 <sup>h</sup> 36 <sup>m</sup>	9° 11'	
+85° 49'	43'' .55		+88° 52'	39'' .02		-85° 10'	27'' .09		+85° 20'	38'' .12		+85° 9'	36'' .60	

CIRCUMPOLAR STARS.

FOR THE UPPER TRANSIT AT WASHINGTON.

31 G. Menes. Mag. 6.2			1 Menes. Mag. 5.6			51 H. Cephei. Mag. 5.3			25 H. Camelop. Mag. 5.1			7 G. Ootantia. Mag. 6.4		
Wash. Mean Time.	Right Ascension.	Declination.	Wash. Mean Time.	Right Ascension.	Declination.	Wash. Mean Time.	Right Ascension.	Declination.	Wash. Mean Time.	Right Ascension.	Declination.	Wash. Mean Time.	Right Ascension.	Declination.
Nov.	h m .	'	Nov.	h m .	'	Nov.	h m .	'	Nov.	h m .	'	Nov.	h m .	'
	5 45	-84 49		6 46	-80 43		7 4	+87 16		7 14	+82 33		7 15	-86 54
0.6	37.64	34.62	0.7	43.25	43.67	0.7	9.34	8.83	0.7	36.32	40.31	0.7	10.77	21.48
1.6	37.79	34.85	1.7	43.36	43.84	1.7	9.89	8.42	1.7	36.55	40.39	1.7	11.10	21.62
2.6	37.94	35.07	2.7	43.48	44.02	2.7	10.42	8.55	2.7	36.76	40.48	2.7	11.43	21.74
3.6	38.11	35.29	3.7	43.60	44.18	3.7	10.98	8.68	3.7	36.95	40.59	3.7	11.78	21.86
4.6	38.28	35.52	4.7	43.72	44.35	4.7	11.40	8.82	4.7	37.14	40.69	4.7	12.14	21.98
5.6	38.45	35.77	5.7	43.83	44.53	5.7	11.84	8.94	5.7	37.31	40.80	5.7	12.52	22.14
6.6	38.62	36.05	6.7	43.95	44.75	6.7	12.28	9.04	6.7	37.48	40.89	6.7	12.91	22.31
7.6	38.79	36.36	7.7	44.07	44.98	7.7	12.69	9.14	7.7	37.65	40.97	7.7	13.30	22.50
8.6	38.93	36.67	8.6	44.19	45.25	8.7	13.14	9.23	8.7	37.82	41.04	8.7	13.67	22.72
9.6	39.07	36.99	9.6	44.29	45.51	9.7	13.59	9.32	9.7	38.00	41.12	9.7	14.08	22.93
10.6	39.21	37.31	10.6	44.39	45.78	10.7	14.05	9.41	10.7	38.18	41.19	10.7	14.36	23.16
11.6	39.33	37.63	11.6	44.50	46.06	11.7	14.52	9.53	11.7	38.37	41.26	11.7	14.68	23.39
12.6	39.43	37.98	12.6	44.61	46.33	12.6	15.01	9.65	12.7	38.57	41.35	12.7	15.00	23.62
13.6	39.54	38.22	13.6	44.70	46.59	13.6	15.50	9.78	13.7	38.77	41.45	13.7	15.29	23.85
14.6	39.65	38.51	14.6	44.80	46.83	14.6	15.98	9.92	14.7	38.96	41.58	14.7	15.57	24.07
15.6	39.75	38.80	15.6	44.89	47.07	15.6	16.46	10.10	15.6	39.15	41.72	15.6	15.87	24.28
16.6	39.87	39.09	16.6	44.99	47.32	16.6	16.92	10.27	16.6	39.33	41.87	16.6	16.16	24.49
17.6	39.99	39.37	17.6	45.08	47.57	17.6	17.35	10.46	17.6	39.51	42.04	17.6	16.47	24.70
18.6	40.09	39.65	18.6	45.17	47.83	18.6	17.78	10.65	18.6	39.68	42.21	18.6	16.77	24.91
19.6	40.20	39.96	19.6	45.26	48.09	19.6	18.18	10.85	19.6	39.83	42.38	19.6	17.08	25.13
20.6	40.31	40.27	20.6	45.35	48.36	20.6	18.54	11.04	20.6	39.98	42.55	20.6	17.39	25.36
21.6	40.42	40.59	21.6	45.45	48.64	21.6	18.93	11.22	21.6	40.13	42.70	21.6	17.71	25.62
22.6	40.51	40.94	22.6	45.55	48.95	22.6	19.31	11.39	22.6	40.28	42.85	22.6	18.00	25.89
23.6	40.59	41.30	23.6	45.63	49.28	23.6	19.69	11.56	23.6	40.45	42.98	23.6	18.29	26.19
24.6	40.65	41.67	24.6	45.71	49.62	24.6	20.10	11.70	24.6	40.62	43.10	24.6	18.56	26.50
25.6	40.71	42.03	25.6	45.79	49.96	25.6	20.52	11.87	25.6	40.79	43.23	25.6	18.79	26.81
26.6	40.76	42.37	26.6	45.85	50.30	26.6	20.97	12.04	26.6	40.97	43.37	26.6	19.01	27.11
27.6	40.79	42.71	27.6	45.91	50.62	27.6	21.43	12.23	27.6	41.16	43.54	27.6	19.20	27.40
28.6	40.83	43.08	28.6	45.97	50.93	28.6	21.89	12.45	28.6	41.35	43.72	28.6	19.39	27.68
29.5	40.86	43.34	29.6	46.08	51.22	29.6	22.32	12.68	29.6	41.53	43.94	29.6	19.58	27.95
30.5	40.90	43.64	30.6	46.09	51.51	30.6	22.71	12.92	30.6	41.70	44.17	30.6	19.77	28.21
31.5	40.95	43.96	31.6	46.15	51.80	31.6	23.08	13.19	31.6	41.84	44.40	31.6	19.99	28.47
11.00	-11.05		6.21	-6.13		20.25	+20.22		7.72	+7.66		13.53	-18.50	
5 <sup>h</sup> 45 <sup>m</sup>	39°.719		6 <sup>h</sup> 46 <sup>m</sup>	43°.704		7 <sup>h</sup> 3 <sup>m</sup>	31°.434		7 <sup>h</sup> 14 <sup>m</sup>	20°.713		7 <sup>h</sup> 15 <sup>m</sup>	19°.352	
-84° 49'	42".94		-80° 43'	50".12		+87° 10'	38".36		+82° 34'	10".90		-86° 54'	26".23	

CIRCUMPOLAR STARS.

FOR THE UPPER TRANSIT AT WASHINGTON.

Groombridge 1119. Mag. 7.0			ζ Octantis. Mag. 5.4			1 H. Draconis. Mag. 4.6			ζ Chamaeleontis. Mag. 5.2			30 H. Camelopard. Mag. 5.3		
Wash. Mean Time.	Right Ascension.	Declination.	Wash. Mean Time.	Right Ascension.	Declination.	Wash. Mean Time.	Right Ascension.	Declination.	Wash. Mean Time.	Right Ascension.	Declination.	Wash. Mean Time.	Right Ascension.	Declination.
Nov.	h m "	" "	Nov.	h m "	" "	Nov.	h m "	" "	Nov.	h m "	" "	Nov.	h m "	" "
	8 19	+88 51		9 8	-85 20		9 25	+81 40		9 36	-90 34		10 21	+82 57
0.7	39.14	49.56	0.8	27.88	41.57	0.8	52.70	15.86	0.8	16.31	56.56	0.8	27.19	21.05
1.7	40.53	49.52	1.8	28.12	41.57	1.8	52.88	15.71	1.8	16.44	56.52	1.8	27.40	20.80
2.7	41.90	49.52	2.8	28.36	41.56	2.8	53.06	15.87	2.8	16.57	56.48	2.8	27.59	20.59
3.7	43.22	49.52	3.8	28.63	41.53	3.8	53.24	15.46	3.8	16.69	56.43	3.8	27.78	20.39
4.7	44.46	49.53	4.8	28.90	41.51	4.8	53.42	15.35	4.8	16.82	56.38	4.8	27.96	20.20
5.7	45.63	49.53	5.8	29.18	41.50	5.8	53.58	15.26	5.8	16.96	56.33	5.8	28.13	20.02
6.7	46.77	49.54	6.8	29.46	41.51	6.8	53.73	15.16	6.8	17.10	56.31	6.8	28.30	19.84
7.7	47.89	49.54	7.7	29.77	41.54	7.8	53.88	15.04	7.8	17.26	56.30	7.8	28.45	19.66
8.7	49.01	49.53	8.7	30.06	41.58	8.8	54.03	14.91	8.8	17.41	56.33	8.8	28.61	19.46
9.7	50.17	49.51	9.7	30.35	41.66	9.8	54.18	14.78	9.8	17.57	56.36	9.8	28.78	19.26
10.7	51.37	49.49	10.7	30.64	41.75	10.8	54.36	14.65	10.8	17.72	56.40	10.8	28.95	19.06
11.7	52.61	49.48	11.7	30.93	41.84	11.8	54.53	14.53	11.8	17.86	56.46	11.8	29.13	18.86
12.7	53.88	49.48	12.7	31.21	41.93	12.7	54.70	14.42	12.8	18.00	56.52	12.8	29.31	18.67
13.7	55.18	49.49	13.7	31.46	42.01	13.7	54.88	14.31	13.8	18.15	56.57	13.8	29.51	18.48
14.7	56.48	49.53	14.7	31.71	42.09	14.7	55.06	14.21	14.7	18.29	56.62	14.8	29.71	18.31
15.7	57.76	49.59	15.7	31.96	42.17	15.7	55.26	14.14	15.7	18.42	56.68	15.8	29.92	18.15
16.7	59.03	49.66	16.7	32.21	42.23	16.7	55.45	14.09	16.7	18.55	56.74	16.8	30.12	18.00
17.7	60.27	49.74	17.7	32.48	42.31	17.7	55.63	14.05	17.7	18.68	56.79	17.8	30.32	17.87
18.7	61.47	49.83	18.7	32.74	42.39	18.7	55.80	14.02	18.7	18.81	56.84	18.8	30.51	17.77
19.7	62.61	49.91	19.7	33.01	42.47	19.7	55.97	13.99	19.7	18.96	56.90	19.8	30.70	17.66
20.7	63.71	50.00	20.7	33.29	42.56	20.7	56.12	13.96	20.7	19.10	56.96	20.8	30.88	17.56
21.7	64.79	50.08	21.7	33.56	42.69	21.7	56.28	13.92	21.7	19.24	57.06	21.8	31.06	17.45
22.7	65.86	50.15	22.7	33.85	42.82	22.7	56.43	13.89	22.7	19.39	57.15	22.8	31.23	17.34
23.7	66.93	50.21	23.7	34.13	42.97	23.7	56.58	13.84	23.7	19.54	57.23	23.8	31.41	17.21
24.7	68.06	50.27	24.7	34.41	43.15	24.7	56.75	13.78	24.7	19.69	57.42	24.8	31.58	17.08
25.7	69.23	50.32	25.7	34.66	43.34	25.7	56.92	13.72	25.7	19.84	57.59	25.8	31.78	16.95
26.7	70.46	50.40	26.7	34.91	43.54	26.7	57.11	13.66	26.7	19.98	57.76	26.7	31.98	16.81
27.7	71.73	50.48	27.7	35.14	43.73	27.7	57.30	13.62	27.7	20.11	57.93	27.7	32.21	16.67
28.7	73.01	50.58	28.7	35.36	43.92	28.7	57.50	13.60	28.7	20.23	58.08	28.7	32.43	16.56
29.7	74.28	50.71	29.7	35.58	44.10	29.7	57.69	13.60	29.7	20.36	58.24	29.7	32.65	16.46
30.7	75.48	50.85	30.7	35.80	44.25	30.7	57.88	13.62	30.7	20.49	58.39	30.7	32.86	16.40
31.7	76.61	51.01	31.7	36.02	44.41	31.7	58.06	13.66	31.7	20.61	58.52	31.7	33.07	16.36
50.43	+50.42	12.32	-12.28	6.90	+6.83	6.11	-6.03	8.15	+8.09					
8 <sup>h</sup> 18 <sup>m</sup>	46°.642	9 <sup>h</sup> 8 <sup>m</sup>	83°.397	9 <sup>h</sup> 25 <sup>m</sup>	48°.041	9 <sup>h</sup> 36 <sup>m</sup>	17°.360	10 <sup>h</sup> 21 <sup>m</sup>	27°.495					
+88°	52' 26".44	-85°	20' 41".44	+81°	40' 54".43	-80°	34' 55".47	+82°	57' 59".46					

CIRCUMPOLAR STARS.

FOR THE UPPER TRANSIT AT WASHINGTON.

γ Octantis. Mag. 6.3			Bradley 1678. Mag. 6.3			ι Octantis. Mag. 5.4			23 H. Camelopard. seq. Mag. 5.3			κ Octantis. Mag. 5.6		
Wash. Mean Time.	Right Ascension.	Declination.	Wash. Mean Time.	Right Ascension.	Declination.	Wash. Mean Time.	Right Ascension.	Declination.	Wash. Mean Time.	Right Ascension.	Declination.	Wash. Mean Time.	Right Ascension.	Declination.
	h m "	° '		h m "	° '		h m "	° '		h m "	° '		h m "	° '
Nov. 19 50	-84 9		Nov. 12 13	+88 7		Nov. 12 46	-84 41		Nov. 12 48	+83 50		Nov. 13 27	-85 22	
0.8	51.40	58.54	0.9	43.31	64.71	0.9	24.24	29.44	0.9	17.19	24.60	0.9	41.87	47.28
1.8	51.57	58.41	1.9	43.72	64.35	1.9	24.37	29.22	1.9	17.29	24.21	1.9	41.97	47.03
2.8	51.73	58.27	2.9	44.15	64.01	2.9	24.49	28.98	2.9	17.39	23.83	2.9	42.07	46.76
3.8	51.91	58.11	3.9	44.60	63.68	3.9	24.60	28.71	3.9	17.49	23.47	3.9	42.16	46.48
4.8	52.09	52.94	4.9	45.08	63.37	4.9	24.72	28.45	4.9	17.59	23.13	4.9	42.26	46.19
5.8	52.28	52.78	5.9	45.44	63.09	5.9	24.85	28.17	5.9	17.69	22.80	5.9	42.36	45.88
6.8	52.49	52.63	6.9	45.81	62.81	6.9	25.01	27.89	6.9	17.78	22.49	6.9	42.49	45.57
7.8	52.71	52.49	7.9	46.14	62.51	7.9	25.18	27.62	7.9	17.86	22.18	7.9	42.64	45.26
8.8	52.94	52.38	8.9	46.46	62.20	8.9	25.36	27.36	8.9	17.94	21.85	8.9	42.82	44.97
9.8	53.18	52.28	9.9	46.83	61.89	9.9	25.55	27.12	9.9	18.02	21.53	9.9	42.99	44.69
10.8	53.41	52.20	10.9	47.19	61.57	10.9	25.75	26.89	10.9	18.10	21.19	10.9	43.18	44.43
11.8	53.63	52.14	11.9	47.58	61.26	11.9	25.95	26.70	11.9	18.20	20.83	11.9	43.36	44.19
12.8	53.84	52.08	12.9	48.00	60.94	12.9	26.14	26.51	12.9	18.31	20.45	12.9	43.55	43.94
13.8	54.06	52.02	13.9	48.46	60.63	13.9	26.32	26.32	13.9	18.43	20.10	13.9	43.73	43.71
14.8	54.25	51.96	14.9	48.96	60.33	14.9	26.50	26.18	14.9	18.55	19.76	14.9	43.90	43.48
15.8	54.46	51.89	15.9	49.48	60.04	15.9	26.68	25.94	15.9	18.68	19.43	15.9	44.07	43.25
16.8	54.66	51.82	16.9	50.03	59.75	16.9	26.85	25.74	16.9	18.82	19.11	16.9	44.23	43.02
17.8	54.86	51.74	17.9	50.57	59.48	17.9	27.02	25.55	17.9	18.97	18.79	17.9	44.39	42.79
18.8	55.07	51.67	18.9	51.11	59.22	18.9	27.20	25.35	18.9	19.11	18.50	18.9	44.55	42.55
19.8	55.29	51.61	19.8	51.63	58.98	19.9	27.38	25.15	19.9	19.25	18.21	19.9	44.73	42.30
20.8	55.51	51.55	20.8	52.14	58.74	20.9	27.57	24.94	20.9	19.38	17.93	20.9	44.91	42.06
21.8	55.74	51.49	21.8	52.61	58.51	21.9	27.79	24.74	21.9	19.51	17.66	21.9	45.12	41.81
22.8	55.97	51.46	22.8	53.08	58.27	22.9	28.01	24.54	22.9	19.64	17.39	22.9	45.34	41.56
23.8	56.22	51.45	23.8	53.55	58.03	23.9	28.24	24.37	23.9	19.76	17.10	23.9	45.57	41.33
24.8	56.47	51.44	24.8	54.02	57.76	24.9	28.49	24.23	24.9	19.88	16.80	24.9	45.83	41.12
25.8	56.72	51.47	25.8	54.51	57.50	25.9	28.74	24.10	25.9	20.01	16.49	25.9	46.09	40.93
26.8	56.96	51.52	26.8	55.02	57.22	26.8	28.99	24.00	26.8	20.16	16.17	26.9	46.38	40.78
27.8	57.19	51.58	27.8	55.58	56.95	27.8	29.22	23.90	27.8	20.32	15.85	27.9	46.58	40.63
28.8	57.40	51.64	28.8	56.19	56.68	28.8	29.44	23.81	28.8	20.49	15.53	28.9	46.81	40.50
29.8	57.61	51.68	29.8	56.84	56.45	29.8	29.64	23.71	29.8	20.67	15.24	29.9	47.04	40.36
30.8	57.80	51.71	30.8	57.51	56.22	30.8	29.84	23.61	30.8	20.85	14.95	30.9	47.24	40.19
31.8	58.01	51.72	31.8	58.17	56.03	31.8	30.04	23.48	31.8	21.03	14.70	31.9	47.44	40.02

9.83 -9.78 29.70 +30.69 19.81 -19.76 9.32 +9.26 12.41 -12.37  
 10<sup>h</sup> 50<sup>m</sup> 54<sup>s</sup>.174 12<sup>h</sup> 14<sup>m</sup> 29<sup>s</sup>.583 12<sup>h</sup> 46<sup>m</sup> 25<sup>s</sup>.116 12<sup>h</sup> 48<sup>m</sup> 31<sup>s</sup>.755 18<sup>h</sup> 27<sup>m</sup> 42<sup>s</sup>.050  
 -84° 9' 48".70 +88° 8' 36".24 -84° 41' 21".18 +83° 50' 51".72 -85° 22' 38".10

CIRCUMPOLAR STARS.

FOR THE UPPER TRANSIT AT WASHINGTON.

δ Octantis. Mag. 4.1			Groenbridge 2222. Mag. 7.2			ρ Octantis. Mag. 5.7			ε Ursæ Minoris. Mag. 4.4			59 G. Apodis. Mag. 5.9		
Wash. Mean Time.	Right Ascen- sion.	Declina- tion.	Wash. Mean Time.	Right Ascen- sion.	Declina- tion.	Wash. Mean Time.	Right Ascen- sion.	Declina- tion.	Wash. Mean Time.	Right Ascen- sion.	Declina- tion.	Wash. Mean Time.	Right Ascen- sion.	Declina- tion.
Nov.	h m	° ' "	Nov.	h m	° ' "	Nov.	h m	° ' "	Nov.	h m	° ' "	Nov.	h m	° ' "
	14 13	-83 18		15 1	+87 32		15 24	-84 12		16 53	+82 10		17 16	-80 47
0.9	57.59	20.75	1.0	45.59	21.40	1.0	40.76	17.50	1.1	51.31	28.12	1.1	33.92	25.42
1.9	57.64	20.49	2.0	45.45	21.00	2.0	40.75	17.24	2.1	51.18	27.81	2.1	33.87	25.21
2.9	57.68	20.23	3.0	45.35	20.61	3.0	40.72	16.96	3.1	51.06	27.49	3.1	33.81	24.99
3.9	57.71	19.94	4.0	45.27	20.23	4.0	40.69	16.65	4.1	50.98	27.18	4.1	33.73	24.76
4.9	57.74	19.63	5.0	45.19	19.85	5.0	40.66	16.34	5.1	50.87	26.88	5.1	33.65	24.51
5.9	57.78	19.31	5.9	45.12	19.51	6.0	40.64	16.02	6.1	50.77	26.59	6.1	33.57	24.24
6.9	57.82	18.98	6.9	45.05	19.17	7.0	40.63	15.67	7.1	50.67	26.32	7.1	33.49	23.96
7.9	57.90	18.66	7.9	44.95	18.83	8.0	40.64	15.31	8.1	50.57	26.05	8.1	33.43	23.65
8.9	57.98	18.34	8.9	44.83	18.51	9.0	40.67	14.96	9.1	50.47	25.78	9.1	33.37	23.33
9.9	58.07	18.01	9.9	44.71	18.16	10.0	40.70	14.62	10.1	50.36	25.51	10.1	33.32	23.02
10.9	58.17	17.72	10.9	44.61	17.80	11.0	40.74	14.29	11.1	50.25	25.22	11.1	33.28	22.73
11.9	58.27	17.43	11.9	44.50	17.45	11.9	40.79	13.97	12.1	50.15	24.92	12.1	33.24	22.44
12.9	58.36	17.16	12.9	44.42	17.08	12.9	40.84	13.68	13.1	50.05	24.61	13.1	33.22	22.15
13.9	58.46	16.90	13.9	44.37	16.69	13.9	40.89	13.39	14.1	49.97	24.28	14.1	33.19	21.87
14.9	58.55	16.64	14.9	44.34	16.30	14.9	40.93	13.10	15.1	49.88	23.94	15.1	33.17	21.60
15.9	58.65	16.39	15.9	44.33	15.92	15.9	40.98	12.81	16.1	49.79	23.60	16.1	33.14	21.34
16.9	58.74	16.13	16.9	44.35	15.54	16.9	41.02	12.52	17.0	49.71	23.25	17.1	33.11	21.06
17.9	58.82	15.87	17.9	44.38	15.16	17.9	41.05	12.22	18.0	49.65	22.90	18.1	33.07	20.81
18.9	58.90	15.60	18.9	44.41	14.78	18.9	41.09	11.91	19.0	49.58	22.55	19.1	33.04	20.53
19.9	58.99	15.32	19.9	44.47	14.44	19.9	41.13	11.61	20.0	49.51	22.22	20.1	32.99	20.23
20.9	59.08	15.04	20.9	44.53	14.10	20.9	41.18	11.29	21.0	49.45	21.89	21.1	32.95	19.92
21.9	59.20	14.75	21.9	44.56	13.76	21.9	41.23	10.96	22.0	49.39	21.58	22.0	32.92	19.60
22.9	59.32	14.47	22.9	44.59	13.43	22.9	41.31	10.63	23.0	49.33	21.27	23.0	32.90	19.27
23.9	59.45	14.19	23.9	44.60	13.10	23.9	41.40	10.30	24.0	49.27	20.97	24.0	32.89	18.94
24.9	59.59	13.94	24.9	44.61	12.75	24.9	41.53	9.98	25.0	49.20	20.66	25.0	32.89	18.60
25.9	59.75	13.71	25.9	44.61	12.39	25.9	41.65	9.69	26.0	49.13	20.34	26.0	32.90	18.27
26.9	59.91	13.50	26.9	44.63	12.01	26.9	41.77	9.41	27.0	49.06	19.99	27.0	32.92	17.98
27.9	60.06	13.31	27.9	44.67	11.63	27.9	41.90	9.16	28.0	49.00	19.63	28.0	32.94	17.69
28.9	60.21	13.12	28.9	44.76	11.24	28.9	42.01	8.91	29.0	48.94	19.24	29.0	32.96	17.41
29.9	60.34	12.94	29.9	44.86	10.85	29.9	42.12	8.66	30.0	48.89	18.85	30.0	32.98	17.14
30.9	60.46	12.74	30.9	45.04	10.47	30.9	42.21	8.40	31.0	48.80	18.46	31.0	32.99	16.87
31.9	60.59	12.52	31.9	45.21	10.11	31.9	42.30	8.14	32.0	48.84	18.09	32.0	32.99	16.59
8.58 -8.52			23.28 +23.26			9.90 -9.86			7.34 +7.28			6.25 -6.17		
14 <sup>h</sup> 13 <sup>m</sup> 55 <sup>s</sup> .644			15 <sup>h</sup> 1 <sup>m</sup> 43 <sup>s</sup> .277			15 <sup>h</sup> 24 <sup>m</sup> 36 <sup>s</sup> .751			16 <sup>h</sup> 54 <sup>m</sup> 6 <sup>s</sup> .748			17 <sup>h</sup> 16 <sup>m</sup> 28 <sup>s</sup> .406		
-83° 18' 11".26			+87° 32' 28".69			-84° 12' 7".93			+82° 10' 15".74			-80° 47' 18".10		



CIRCUMPOLAR STARS.

FOR THE UPPER TRANSIT AT WASHINGTON.

δ Ursae Minoris. Mag. 4.4			χ Octantis. Mag. 5.2			λ Ursae Minoris. Mag. 6.6			σ Octantis. Mag. 5.5			78 Draconis. Mag. 5.7		
Wash. Mean Time.	Right Ascension.	Declination.	Wash. Mean Time.	Right Ascension.	Declination.	Wash. Mean Time.	Right Ascension.	Declination.	Wash. Mean Time.	Right Ascension.	Declination.	Wash. Mean Time.	Right Ascension.	Declination.
h m	° "		h m	° "		h m	° "		h m	° "		h m	° "	
Nov. 17 57	+86 37		Nov. 18 8	-87 39		Nov. 18 56	+89 1		Nov. 19 32	-89 13		Nov. 20 48	+82 14	
1.1 28.13	12.99	1.1	14.71	57.06	1.2	80.71	47.72	1.2	74.79	9.11	1.3	26.21	49.62	
2.1 27.75	12.76	2.1	14.38	56.87	2.2	79.18	47.58	2.2	73.50	9.00	2.3	26.02	49.68	
3.1 27.40	12.52	3.1	14.01	56.69	3.2	77.72	47.44	3.2	72.14	8.90	3.2	25.83	49.72	
4.1 27.06	12.28	4.1	13.63	56.50	4.2	76.35	47.29	4.2	70.71	8.81	4.2	25.65	49.73	
5.1 26.74	12.04	5.1	13.22	56.29	5.2	75.07	47.14	5.2	69.18	8.69	5.2	25.48	49.74	
6.1 26.44	11.83	6.1	12.81	56.06	6.2	73.83	47.00	6.2	67.60	8.56	6.2	25.31	49.75	
7.1 26.15	11.63	7.1	12.41	55.80	7.2	72.61	46.87	7.2	66.01	8.42	7.2	25.16	49.79	
8.1 25.84	11.43	8.1	12.03	55.53	8.2	71.37	46.77	8.2	64.46	8.24	8.2	25.00	49.82	
9.1 25.52	11.24	9.1	11.68	55.25	9.2	70.12	46.67	9.2	62.97	8.05	9.2	24.84	49.87	
10.1 25.20	11.06	10.1	11.36	54.96	10.2	68.81	46.57	10.2	61.55	7.85	10.2	24.68	49.91	
11.1 24.87	10.85	11.1	11.08	54.67	11.2	67.48	46.45	11.2	60.22	7.65	11.2	24.51	49.96	
12.1 24.54	10.63	12.1	10.80	54.39	12.1	66.13	46.32	12.2	58.96	7.45	12.2	24.34	50.00	
13.1 24.21	10.39	13.1	10.56	54.12	13.1	64.76	46.17	13.2	57.76	7.25	13.2	24.16	50.01	
14.1 23.89	10.15	14.1	10.32	53.85	14.1	63.40	46.00	14.2	56.59	7.06	14.2	23.98	50.01	
15.1 23.57	9.87	15.1	10.07	53.61	15.1	62.08	45.83	15.2	55.41	6.86	15.2	23.80	50.00	
16.1 23.28	9.59	16.1	9.82	53.35	16.1	60.77	45.64	16.2	54.23	6.67	16.2	23.63	49.97	
17.1 22.99	9.31	17.1	9.55	53.10	17.1	59.51	45.44	17.2	53.04	6.49	17.2	23.45	49.93	
18.1 22.72	9.03	18.1	9.28	52.84	18.1	58.31	45.23	18.2	51.83	6.31	18.2	23.27	49.87	
19.1 22.47	8.75	19.1	9.01	52.57	19.1	57.16	45.02	19.2	50.57	6.12	19.2	23.10	49.80	
20.1 22.23	8.46	20.1	8.73	52.30	20.1	56.06	44.81	20.1	49.27	5.93	20.2	22.93	49.73	
21.1 21.99	8.19	21.1	8.45	52.01	21.1	54.99	44.61	21.1	47.97	5.70	21.2	22.78	49.67	
22.1 21.76	7.94	22.1	8.20	51.69	22.1	53.96	44.42	22.1	46.67	5.47	22.2	22.62	49.62	
23.1 21.52	7.69	23.1	7.96	51.36	23.1	52.90	44.24	23.1	45.43	5.20	23.2	22.47	49.58	
24.1 21.27	7.45	24.1	7.77	51.02	24.1	51.81	44.06	24.1	44.27	4.93	24.2	22.31	49.54	
25.1 21.01	7.20	25.1	7.62	50.68	25.1	50.67	43.89	25.1	43.22	4.64	25.2	22.16	49.51	
26.1 20.74	6.93	26.1	7.51	50.35	26.1	49.47	43.71	26.1	42.30	4.36	26.2	22.00	49.48	
27.1 20.47	6.65	27.1	7.42	50.03	27.1	48.22	43.51	27.1	41.48	4.08	27.2	21.83	49.44	
28.1 20.21	6.36	28.1	7.35	49.72	28.1	46.99	43.28	28.1	40.72	3.81	28.2	21.66	49.37	
29.1 19.96	6.04	29.1	7.27	49.43	29.1	45.79	43.04	29.1	39.97	3.57	29.2	21.48	49.28	
30.1 19.73	5.71	30.1	7.18	49.15	30.1	44.66	42.77	30.1	39.16	3.33	30.2	21.30	49.15	
31.1 19.59	5.37	31.1	7.05	48.87	31.1	43.62	42.49	31.1	38.29	3.10	31.2	21.13	49.02	
32.1 19.35	5.04	32.1	6.91	48.58	32.1	42.69	42.21	32.1	37.35	2.85	32.2	20.98	48.88	
16.96	+16.93		24.54	-24.52		59.06	+59.03		73.33	-73.32		7.41	+7.36	
17 <sup>h</sup> 58 <sup>m</sup>	2° 31.4		18 <sup>h</sup> 7 <sup>m</sup>	59° 06.2		18 <sup>h</sup> 59 <sup>m</sup>	2° 47.7		19 <sup>h</sup> 82 <sup>m</sup>	24° 28.3		29 <sup>h</sup> 48 <sup>m</sup>	27° 96.4	
+36° 36'	50'' 93		-87° 39'	50'' 34		+89° 1'	17'' 96		-89° 13'	5'' 55		+82° 14'	10'' 29	

CIRCUMPOLAR STARS.

FOR THE UPPER TRANSIT AT WASHINGTON.

λ Octantis. Mag. 5.4			ν Octantis. Mag. 5.7			β Octantis. Mag. 4.3			39 H. Cephei. Mag. 5.6			γ <sup>1</sup> Octantis. Mag. 5.1		
Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.
Nov.	h m 21 38	° ' " -83 5	Nov.	h m 22 16	° ' " -86 22	Nov.	h m 22 38	° ' " -81 48	Nov.	h m 23 27	° ' " +86 52	Nov.	h m 23 47	° ' " -82 27
1.3	56.78	15.13	1.3	58.71	28.73	1.3	5.36	0.47	1.4	67.29	34.95	1.4	34.19	40.45
2.3	56.64	15.19	2.3	58.44	28.83	2.3	5.26	0.60	2.4	66.98	35.25	2.4	34.09	40.65
3.3	56.49	15.27	3.3	58.18	28.95	3.3	5.18	0.75	3.4	66.65	35.53	3.4	33.99	40.87
4.3	56.32	15.35	4.3	57.85	29.07	4.3	5.00	0.91	4.4	66.33	35.79	4.4	33.89	41.10
5.3	56.14	15.43	5.3	57.53	29.19	5.3	4.87	1.08	5.4	66.02	36.03	5.4	33.76	41.34
6.3	55.95	15.49	6.3	57.18	29.29	6.3	4.73	1.23	6.4	65.73	36.26	6.4	33.63	41.59
7.3	55.76	15.55	7.3	56.82	29.40	7.3	4.58	1.37	7.3	65.45	36.50	7.4	33.49	41.82
8.3	55.56	15.57	8.3	56.45	29.48	8.3	4.42	1.49	8.3	65.18	36.75	8.4	33.34	42.04
9.3	55.37	15.58	9.3	56.08	29.54	9.3	4.26	1.59	9.3	64.92	37.01	9.4	33.19	42.23
10.3	55.18	15.57	10.3	55.72	29.59	10.3	4.11	1.67	10.3	64.65	37.27	10.4	33.05	42.42
11.3	55.00	15.54	11.3	55.38	29.63	11.3	3.96	1.73	11.3	64.38	37.54	11.4	32.90	42.58
12.3	54.83	15.51	12.3	55.05	29.64	12.3	3.82	1.79	12.3	64.08	37.80	12.3	32.77	42.73
13.3	54.66	15.48	13.3	54.72	29.65	13.3	3.68	1.85	13.3	63.76	38.06	13.3	32.63	42.88
14.3	54.49	15.46	14.3	54.40	29.67	14.3	3.55	1.90	14.3	63.43	38.31	14.3	32.50	43.03
15.2	54.35	15.45	15.3	54.08	29.70	15.3	3.41	1.96	15.3	63.07	38.55	15.3	32.37	43.18
16.2	54.19	15.43	16.3	53.77	29.73	16.3	3.28	2.02	16.3	62.71	38.78	16.3	32.24	43.33
17.2	54.02	15.41	17.3	53.46	29.77	17.3	3.15	2.10	17.3	62.35	38.98	17.3	32.10	43.48
18.2	53.86	15.40	18.3	53.14	29.80	18.3	3.02	2.18	18.3	61.98	39.17	18.3	31.97	43.63
19.2	53.69	15.39	19.3	52.80	29.82	19.3	2.87	2.25	19.3	61.61	39.36	19.3	31.83	43.79
20.2	53.51	15.37	20.3	52.45	29.85	20.3	2.72	2.31	20.3	61.25	39.53	20.3	31.68	43.94
21.2	53.33	15.34	21.3	52.09	29.86	21.3	2.57	2.37	21.3	60.91	39.70	21.3	31.53	44.10
22.2	53.14	15.30	22.3	51.72	29.87	22.3	2.40	2.41	22.3	60.58	39.87	22.3	31.36	44.25
23.2	52.95	15.22	23.3	51.34	29.84	23.3	2.23	2.43	23.3	60.27	40.05	23.3	31.19	44.38
24.2	52.76	15.12	24.3	50.96	29.79	24.3	2.08	2.43	24.3	59.96	40.23	24.3	31.02	44.48
25.2	52.59	15.00	25.2	50.60	29.73	25.3	1.93	2.46	25.3	59.64	40.43	25.3	30.85	44.56
26.2	52.45	14.87	26.2	50.27	29.65	26.3	1.79	2.36	26.3	59.31	40.64	26.3	30.69	44.62
27.2	52.30	14.74	27.2	49.96	29.56	27.3	1.65	2.31	27.3	58.94	40.85	27.3	30.54	44.67
28.2	52.15	14.61	28.2	49.66	29.47	28.3	1.52	2.25	28.3	58.55	41.06	28.3	30.40	44.71
29.2	52.02	14.51	29.2	49.38	29.39	29.3	1.40	2.21	29.3	58.14	41.24	29.3	30.26	44.76
30.2	51.88	14.41	30.2	49.10	29.33	30.2	1.28	2.18	30.3	57.72	41.39	30.3	30.14	44.81
31.2	51.74	14.31	31.2	48.79	29.27	31.2	1.15	2.17	31.3	57.29	41.53	31.3	30.00	44.89
32.2	51.57	14.21	32.2	48.47	29.22	32.2	1.00	2.16	32.3	56.88	41.64	32.3	29.85	44.97

8.31	-8.25	15.82	-15.78	7.01	-6.94	18.36	+18.33	7.62	-7.54
21 <sup>h</sup> 38 <sup>m</sup>	48 <sup>s</sup> .085	22 <sup>h</sup> 16 <sup>m</sup>	45 <sup>s</sup> .446	22 <sup>h</sup> 37 <sup>m</sup>	57 <sup>s</sup> .920	23 <sup>h</sup> 27 <sup>m</sup>	43 <sup>s</sup> .285	23 <sup>h</sup> 47 <sup>m</sup>	27 <sup>s</sup> .240
-83° 5' 17".98		-86° 22' 32".81		-81° 48' 6".08		+86° 51' 58".40		-82° 27' 43".42	

# APPARENT PLACES OF STARS, 1920.

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## CIRCUMPOLAR STARS.

FOR THE UPPER TRANSIT AT WASHINGTON.

48 H. Cephei. Mag. 4.5			α Ursa Minoris. (Polaris.) Mag. 2.1			4 G. Octantis. Mag. 5.6			Groombridge 750. Mag. 6.7			Groombridge 944. Mag. 6.4		
Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.
Dec.	h m	°	Dec.	h m	°	Dec.	h m	°	Dec.	h m	°	Dec.	h m	°
	0 57	+85 50		1 33	+88 53		1 41	-85 10		4 11	+85 20		5 36	+85 9
	s	"		s	"		s	"		s	"		s	"
0.3	58.36	19.80	0.4	26.79	11.08	0.4	52.69	24.56	0.5	34.45	43.96	0.5	45.97	26.34
1.3	58.13	20.04	1.4	26.01	11.32	1.4	52.52	24.77	1.5	34.46	44.33	1.5	46.09	26.68
2.3	57.89	20.28	2.4	25.24	11.60	2.4	52.34	24.99	2.5	34.47	44.67	2.5	46.19	27.00
3.3	57.66	20.50	3.4	24.49	11.84	3.4	52.15	25.22	3.5	34.47	45.00	3.5	46.29	27.29
4.3	57.44	20.70	4.4	23.78	12.09	4.4	51.93	25.45	4.5	34.46	45.31	4.5	46.38	27.59
5.3	57.24	20.90	5.4	23.11	12.33	5.4	51.71	25.67	5.5	34.47	45.62	5.5	46.48	27.87
6.3	57.04	21.10	6.4	22.47	12.57	6.4	51.47	25.87	6.5	34.50	45.92	6.5	46.58	28.14
7.3	56.84	21.32	7.4	21.83	12.83	7.4	51.23	26.07	7.5	34.52	46.22	7.5	46.70	28.41
8.3	56.64	21.54	8.3	21.18	13.09	8.4	50.99	26.26	8.5	34.55	46.53	8.5	46.82	28.69
9.3	56.42	21.76	9.3	20.49	13.36	9.4	50.74	26.41	9.5	34.56	46.85	9.5	46.94	28.99
10.3	56.20	21.98	10.3	19.76	13.63	10.4	50.50	26.56	10.5	34.58	47.19	10.5	47.05	29.30
11.3	55.97	22.20	11.3	18.98	13.89	11.3	50.27	26.70	11.5	34.59	47.53	11.5	47.16	29.62
12.3	55.71	22.40	12.3	18.14	14.14	12.3	50.05	26.83	12.4	34.59	47.88	12.5	47.26	29.96
13.3	55.45	22.60	13.3	17.25	14.39	13.3	49.82	26.96	13.4	34.55	48.24	13.5	47.35	30.30
14.3	55.19	22.79	14.3	16.32	14.63	14.3	49.60	27.09	14.4	34.52	48.59	14.5	47.41	30.64
15.3	54.91	22.96	15.3	15.36	14.86	15.3	49.38	27.23	15.4	34.47	48.93	15.5	47.47	30.98
16.3	54.63	23.10	16.3	14.39	15.06	16.3	49.16	27.37	16.4	34.41	49.26	16.5	47.52	31.32
17.3	54.35	23.25	17.3	13.44	15.27	17.3	48.93	27.51	17.4	34.33	49.57	17.5	47.55	31.65
18.3	54.07	23.39	18.3	12.50	15.45	18.3	48.69	27.65	18.4	34.25	49.86	18.5	47.58	31.97
19.3	53.81	23.52	19.3	11.60	15.62	19.3	48.42	27.79	19.4	34.19	50.16	19.5	47.60	32.26
20.3	53.56	23.65	20.3	10.74	15.79	20.3	48.16	27.92	20.4	34.12	50.45	20.5	47.63	32.55
21.3	53.33	23.77	21.3	9.92	15.97	21.3	47.89	28.03	21.4	34.07	50.72	21.5	47.67	32.84
22.3	53.11	23.91	22.3	9.12	16.16	22.3	47.61	28.13	22.4	34.04	51.00	22.5	47.71	33.13
23.3	52.87	24.06	23.3	8.31	16.35	23.3	47.33	28.20	23.4	34.00	51.31	23.5	47.77	33.43
24.3	52.63	24.21	24.3	7.46	16.56	24.3	47.05	28.25	24.4	33.97	51.63	24.5	47.84	33.74
25.3	52.36	24.37	25.3	6.52	16.77	25.3	46.78	28.29	25.4	33.93	51.96	25.5	47.90	34.07
26.3	52.09	24.52	26.3	5.51	16.98	26.3	46.54	28.30	26.4	33.86	52.30	26.5	47.96	34.43
27.3	51.78	24.67	27.3	4.44	17.18	27.3	46.30	28.33	27.4	33.78	52.64	27.5	47.98	34.79
28.3	51.47	24.78	28.3	3.31	17.34	28.3	46.06	28.36	28.4	33.67	52.98	28.5	47.99	35.13
29.3	51.15	24.88	29.3	2.19	17.49	29.3	45.83	28.41	29.4	33.54	53.28	29.5	47.96	35.48
30.3	50.84	24.94	30.3	1.09	17.62	30.3	45.58	28.47	30.4	33.41	53.57	30.5	47.92	35.81
31.3	50.56	24.98	31.3	0.03	17.72	31.3	45.31	28.54	31.4	33.27	53.82	31.5	47.88	36.11
13.78	+13.75		51.50	+51.49		11.89	-11.85		12.33	+12.29		11.85	+11.81	
0 <sup>h</sup> 57 <sup>m</sup>	32 <sup>s</sup> .323		1 <sup>h</sup> 31 <sup>m</sup>	41 <sup>s</sup> .366		1 <sup>h</sup> 41 <sup>m</sup>	51 <sup>s</sup> .117		4 <sup>h</sup> 10 <sup>m</sup>	55 <sup>s</sup> .493		5 <sup>h</sup> 36 <sup>m</sup>	9 <sup>s</sup> .111	
+85° 49'	43'' .56		+86° 52'	39'' .02		-85° 10'	27'' .09		+85° 20'	38'' .12		+85° 9'	36'' .60	

CIRCUMPOLAR STARS.

FOR THE UPPER TRANSIT AT WASHINGTON.

31 G. Mensse. Mag. 6.2			5 Mensse. Mag. 5.6			51 H. Cephei. Mag. 5.3			35 H. Camelop. Mag. 5.1			7 G. Octantis. Mag. 6.4		
Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.
Dec.	h m 5 45	° ' " -84 49	Dec.	h m 6 46	° ' " -80 48	Dec.	h m 7 4	° ' " +87 10	Dec.	h m 7 14	° ' " +82 33	Dec.	h m 7 15	° ' " -86 54
0.5	40.90	43.64	0.6	46.09	51.51	0.6	22.71	12.92	0.6	41.70	44.17	0.6	19.77	28.21
1.5	40.95	43.96	1.6	46.15	51.80	1.6	23.08	13.19	1.6	41.84	44.40	1.6	19.99	28.47
2.5	41.01	44.28	2.6	46.22	52.11	2.6	23.40	13.43	2.6	41.98	44.64	2.6	20.21	28.74
3.5	41.06	44.63	3.6	46.29	52.42	3.6	23.71	13.68	3.6	42.10	44.86	3.6	20.44	29.04
4.5	41.11	44.99	4.6	46.36	52.76	4.6	24.00	13.91	4.6	42.21	45.06	4.6	20.68	29.35
5.5	41.14	45.35	5.6	46.42	53.12	5.6	24.30	14.13	5.6	42.33	45.25	5.6	20.91	29.67
6.5	41.17	45.72	6.6	46.47	53.49	6.6	24.61	14.34	6.6	42.46	45.43	6.6	21.11	30.00
7.5	41.18	46.11	7.6	46.52	53.86	7.6	24.93	14.55	7.6	42.60	45.62	7.6	21.31	30.36
8.5	41.18	46.49	8.6	46.57	54.23	8.6	25.25	14.77	8.6	42.74	45.81	8.6	21.47	30.70
9.5	41.18	46.85	9.6	46.61	54.60	9.6	25.59	15.00	9.6	42.88	46.03	9.6	21.61	31.04
10.5	41.16	47.18	10.6	46.64	54.96	10.6	25.93	15.24	10.6	43.02	46.25	10.6	21.74	31.38
11.5	41.13	47.52	11.6	46.68	55.32	11.6	26.27	15.51	11.6	43.17	46.48	11.6	21.86	31.71
12.5	41.11	47.85	12.6	46.71	55.66	12.6	26.60	15.79	12.6	43.31	46.74	12.6	21.98	32.04
13.5	41.09	48.18	13.6	46.74	55.99	13.6	26.91	16.08	13.6	43.44	47.00	13.6	22.08	32.35
14.5	41.08	48.51	14.5	46.77	56.31	14.6	27.19	16.37	14.6	43.56	47.27	14.6	22.20	32.66
15.5	41.07	48.83	15.5	46.80	56.64	15.6	27.44	16.68	15.6	43.68	47.55	15.6	22.32	32.97
16.5	41.05	49.16	16.5	46.83	56.97	16.6	27.68	16.99	16.6	43.78	47.83	16.6	22.44	33.28
17.5	41.04	49.49	17.5	46.86	57.31	17.6	27.91	17.27	17.6	43.87	48.10	17.6	22.57	33.59
18.5	41.01	49.85	18.5	46.89	57.67	18.6	28.10	17.55	18.6	43.96	48.36	18.6	22.69	33.93
19.5	40.99	50.21	19.5	46.91	58.04	19.5	28.29	17.82	19.6	44.04	48.61	19.6	22.82	34.29
20.5	40.95	50.58	20.5	46.93	58.42	20.5	28.48	18.08	20.6	44.12	48.85	20.6	22.92	34.66
21.5	40.90	50.97	21.5	46.94	58.83	21.5	28.71	18.34	21.6	44.21	49.09	21.6	23.00	35.03
22.5	40.82	51.36	22.5	46.95	59.24	22.5	28.94	18.59	22.5	44.32	49.32	22.5	23.05	35.41
23.5	40.74	51.72	23.5	46.96	59.62	23.5	29.18	18.85	23.5	44.43	49.55	23.5	23.08	35.80
24.5	40.64	52.06	24.5	46.96	60.00	24.5	29.44	19.12	24.5	44.55	49.81	24.5	23.08	36.18
25.5	40.55	52.39	25.5	46.95	60.36	25.5	29.70	19.43	25.5	44.67	50.08	25.5	23.07	36.54
26.5	40.45	52.70	26.5	46.94	60.69	26.5	29.94	19.74	26.5	44.77	50.38	26.5	23.06	36.88
27.5	40.36	53.00	27.5	46.92	61.02	27.5	30.17	20.07	27.5	44.87	50.69	27.5	23.04	37.20
28.5	40.28	53.30	28.5	46.91	61.35	28.5	30.35	20.40	28.5	44.95	51.02	28.5	23.03	37.51
29.5	40.20	53.61	29.5	46.90	61.68	29.5	30.48	20.73	29.5	45.01	51.34	29.5	23.04	37.83
30.5	40.13	53.92	30.5	46.89	62.02	30.5	30.59	21.06	30.5	45.06	51.64	30.5	23.07	38.17
31.5	40.05	54.25	31.5	46.89	62.38	31.5	30.68	21.38	31.5	45.11	51.93	31.5	23.10	38.53
11.10	-11.05		6.21	-6.13		20.26	+20.24		7.73	+7.66		18.55	-18.52	
5 <sup>h</sup> 45 <sup>m</sup>	89° 71'9		6 <sup>h</sup> 46 <sup>m</sup>	43° 70'4		7 <sup>h</sup> 3 <sup>m</sup>	31° 43'4		7 <sup>h</sup> 14 <sup>m</sup>	20° 71'3		7 <sup>h</sup> 15 <sup>m</sup>	19° 35'2	
-84° 49'	42'' 94		-80° 43'	50'' 12		+87° 10'	38'' 36		+82° 34'	10'' 90		+86° 54'	26'' 23	

CIRCUMPOLAR STARS.

FOR THE UPPER TRANSIT AT WASHINGTON.

Groombridge 1119. Mag. 7.0			ζ Octantis. Mag. 5.4			1 H. Deneb. Mag. 4.0			ζ Chamæleonis. Mag. 5.2			30 H. Camelopard. Mag. 5.3		
Wash. Mean Time.	Right Ascension.	Declination.	Wash. Mean Time.	Right Ascension.	Declination.	Wash. Mean Time.	Right Ascension.	Declination.	Wash. Mean Time.	Right Ascension.	Declination.	Wash. Mean Time.	Right Ascension.	Declination.
Dec.	h m	° ' "	Dec.	h m	° ' "	Dec.	h m	° ' "	Dec.	h m	° ' "	Dec.	h m	° ' "
	8 20	+88 51		9 8	-86 20		9 25	+81 40		9 26	-80 34		10 21	+82 57
0.7	15.48	50.85	0.7	35.80	44.25	0.7	57.88	13.62	0.7	20.49	58.39	0.7	32.86	16.40
1.7	16.61	51.01	1.7	36.02	44.41	1.7	58.06	13.66	1.7	20.61	58.52	1.7	33.07	16.36
2.6	17.66	51.17	2.7	36.26	44.58	2.7	58.21	13.72	2.7	20.73	58.65	2.7	33.27	16.33
3.6	18.64	51.33	3.7	36.51	44.75	3.7	58.37	13.77	3.7	20.86	58.79	3.7	33.46	16.30
4.6	19.58	51.48	4.7	36.78	44.98	4.7	58.52	13.81	4.7	21.00	58.97	4.7	33.63	16.28
5.6	20.52	51.63	5.7	37.04	45.15	5.7	58.66	13.85	5.7	21.14	59.16	5.7	33.81	16.25
6.6	21.48	51.76	6.7	37.29	45.38	6.7	58.80	13.89	6.7	21.28	59.35	6.7	33.99	16.20
7.6	22.45	51.88	7.7	37.54	45.62	7.7	58.97	13.92	7.7	21.42	59.58	7.7	34.17	16.15
8.6	23.47	52.01	8.7	37.77	45.87	8.7	59.14	13.94	8.7	21.56	59.81	8.7	34.36	16.10
9.6	24.51	52.16	9.7	37.99	46.13	9.7	59.30	13.97	9.7	21.68	60.04	9.7	34.55	16.06
10.6	25.58	52.33	10.7	38.19	46.38	10.7	59.47	14.01	10.7	21.80	60.27	10.7	34.75	16.03
11.6	26.64	52.51	11.7	38.39	46.63	11.7	59.65	14.07	11.7	21.91	60.50	11.7	34.96	16.02
12.6	27.68	52.69	12.7	38.58	46.88	12.7	59.82	14.16	12.7	22.02	60.73	12.7	35.17	16.01
13.6	28.71	52.89	13.7	38.77	47.13	13.7	59.99	14.25	13.7	22.13	60.95	13.7	35.38	16.01
14.6	29.70	53.11	14.6	38.96	47.37	14.7	60.16	14.37	14.7	22.24	61.17	14.7	35.59	16.05
15.6	30.64	53.34	15.6	39.15	47.60	15.7	60.33	14.50	15.7	22.35	61.39	15.7	35.79	16.09
16.6	31.53	53.57	16.6	39.35	47.83	16.7	60.48	14.61	16.7	22.47	61.61	16.7	35.98	16.14
17.6	32.35	53.81	17.6	39.54	48.07	17.7	60.62	14.74	17.7	22.58	61.83	17.7	36.17	16.29
18.6	33.14	54.04	18.6	39.75	48.33	18.6	60.75	14.88	18.7	22.69	62.07	18.7	36.35	16.26
19.6	33.90	54.27	19.6	39.95	48.60	19.6	60.88	15.01	19.7	22.82	62.31	19.7	36.52	16.32
20.6	34.65	54.47	20.6	40.15	48.88	20.6	61.01	15.12	20.7	22.93	62.50	20.7	36.69	16.37
21.6	35.42	54.67	21.6	40.35	49.20	21.6	61.15	15.22	21.6	23.04	62.88	21.7	36.87	16.41
22.6	36.23	54.86	22.6	40.54	49.53	22.6	61.30	15.31	22.6	23.16	63.20	22.7	37.05	16.44
23.6	37.09	55.05	23.6	40.71	49.87	23.6	61.45	15.40	23.6	23.27	63.52	23.7	37.23	16.46
24.6	38.00	55.25	24.6	40.86	50.20	24.6	61.60	15.50	24.6	23.37	63.84	24.7	37.43	16.49
25.6	38.93	55.48	25.6	41.00	50.54	25.6	61.77	15.62	25.6	23.46	64.16	25.7	37.63	16.53
26.6	39.84	55.72	26.6	41.13	50.86	26.6	61.94	15.76	26.6	23.55	64.45	26.7	37.84	16.60
27.6	40.70	56.00	27.6	41.25	51.15	27.6	62.09	15.93	27.6	23.62	64.74	27.7	38.04	16.69
28.6	41.47	56.28	28.6	41.37	51.44	28.6	62.23	16.11	28.6	23.71	65.02	28.7	38.24	16.81
29.6	42.17	56.57	29.6	41.50	51.74	29.6	62.38	16.30	29.6	23.79	65.29	29.7	38.43	16.94
30.6	42.79	56.86	30.6	41.64	52.02	30.6	62.51	16.50	30.6	23.88	65.56	30.7	38.60	17.06
31.6	43.35	57.13	31.6	41.80	52.32	31.6	62.61	16.70	31.6	23.97	65.86	31.7	38.75	17.22
50.47	+50.46		12.33	-12.29		6.90	+6.83		6.11	-6.08		8.15	+8.09	
8 <sup>h</sup> 18 <sup>m</sup>	46 <sup>s</sup> .642		9 <sup>h</sup> 8 <sup>m</sup>	33 <sup>s</sup> .397		9 <sup>h</sup> 25 <sup>m</sup>	48 <sup>s</sup> .041		9 <sup>h</sup> 26 <sup>m</sup>	17 <sup>s</sup> .360		10 <sup>h</sup> 21 <sup>m</sup>	27 <sup>s</sup> .495	
+88° 52'	26''.44		-85° 20'	41''.44		+81° 40'	54''.43		-80° 34'	55''.47		+82° 57'	59''.46	

CIRCUMPOLAR STARS:

FOR THE UPPER TRANSIT AT WASHINGTON.

η Octantis. Mag. 6.3			Bradley 1673. Mag. 6.3			ι Octantis. Mag. 5.4			32 H. Camelopard. seq. Mag. 5.3			κ Octantis. Mag. 5.6		
Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.
Dec.	h m	° ' "	Dec.	h m	° ' "	Dec.	h m	° ' "	Dec.	h m	° ' "	Dec.	h m	° ' "
	10 59	-84 9		12 13	+88 7		12 46	-84 41		12 48	+89 50		13 27	-85 22
	s	"		s	"		s	"		s	"		s	"
0.8	57.80	51.71	0.8	57.51	56.22	0.8	29.84	23.61	0.8	20.85	14.95	0.9	47.24	40.19
1.8	58.01	51.72	1.8	58.17	56.03	1.8	30.04	23.48	1.8	21.03	14.70	1.9	47.44	40.02
2.8	58.23	51.73	2.8	58.79	55.86	2.8	30.26	23.35	2.8	21.21	14.46	2.9	47.66	39.83
3.8	58.46	51.75	3.8	59.39	55.68	3.8	30.49	23.22	3.8	21.38	14.25	3.9	47.90	39.64
4.8	58.70	51.78	4.8	59.95	55.51	4.8	30.73	23.06	4.8	21.53	14.04	4.9	48.15	39.46
5.8	58.95	51.83	5.8	60.50	55.34	5.8	30.99	22.97	5.8	21.68	13.83	5.9	48.42	39.27
6.7	59.20	51.91	6.8	61.04	55.16	6.8	31.26	22.88	6.8	21.83	13.60	6.9	48.70	39.11
7.7	59.44	51.99	7.8	61.59	54.98	7.8	31.53	22.79	7.8	22.00	13.38	7.8	48.99	38.97
8.7	59.67	52.09	8.8	62.17	54.80	8.8	31.79	22.74	8.8	22.17	13.15	8.8	49.28	38.86
9.7	59.91	52.22	9.8	62.76	54.61	9.8	32.05	22.69	9.8	22.34	12.91	9.8	49.57	38.76
10.7	60.13	52.35	10.8	63.40	54.43	10.8	32.31	22.65	10.8	22.53	12.68	10.8	49.85	38.66
11.7	60.36	52.46	11.8	64.06	54.25	11.8	32.55	22.62	11.8	22.72	12.45	11.8	50.12	38.57
12.7	60.57	52.57	12.8	64.75	54.09	12.8	32.79	22.59	12.8	22.91	12.22	12.8	50.38	38.48
13.7	60.77	52.69	13.8	65.45	53.94	13.8	33.03	22.56	13.8	23.11	12.02	13.8	50.62	38.39
14.7	60.97	52.81	14.8	66.16	53.80	14.8	33.27	22.53	14.8	23.32	11.82	14.8	50.87	38.29
15.7	61.17	52.92	15.8	66.86	53.70	15.8	33.49	22.49	15.8	23.53	11.64	15.8	51.12	38.20
16.7	61.39	53.02	16.8	67.55	53.60	16.8	33.72	22.45	16.8	23.74	11.49	16.8	51.38	38.11
17.7	61.61	53.14	17.8	68.22	53.51	17.8	33.97	22.40	17.8	23.93	11.34	17.8	51.65	38.01
18.7	61.83	53.26	18.8	68.87	53.43	18.8	34.22	22.35	18.8	24.12	11.20	18.8	51.93	37.91
19.7	62.06	53.38	19.8	69.49	53.34	19.8	34.48	22.32	19.8	24.31	11.07	19.8	52.23	37.80
20.7	62.30	53.52	20.8	70.10	53.26	20.8	34.75	22.32	20.8	24.49	10.93	20.8	52.54	37.71
21.7	62.53	53.70	21.8	70.70	53.16	21.8	35.04	22.32	21.8	24.67	10.78	21.8	52.86	37.66
22.7	62.76	53.90	22.8	71.30	53.04	22.8	35.33	22.36	22.8	24.85	10.61	22.8	53.18	37.62
23.7	62.98	54.12	23.8	71.94	52.92	23.8	35.62	22.41	23.8	25.05	10.44	23.8	53.50	37.61
24.7	63.19	54.34	24.8	72.62	52.80	24.8	35.90	22.49	24.8	25.25	10.26	24.8	53.83	37.60
25.7	63.38	54.57	25.7	73.34	52.70	25.8	36.16	22.57	25.8	25.47	10.09	25.8	54.12	37.61
26.7	63.57	54.79	26.7	74.08	52.61	26.8	36.40	22.65	26.8	25.69	9.94	26.8	54.40	37.63
27.7	63.75	54.99	27.7	74.84	52.54	27.8	36.64	22.71	27.8	25.92	9.80	27.8	54.68	37.64
28.7	63.93	55.18	28.7	75.60	52.49	28.8	36.87	22.77	28.8	26.15	9.70	28.8	54.95	37.65
29.7	64.11	55.36	29.7	76.34	52.48	29.8	37.10	22.82	29.8	26.38	9.61	29.8	55.22	37.65
30.7	64.30	55.55	30.7	77.03	52.47	30.8	37.34	22.86	30.8	26.59	9.56	30.8	55.50	37.64
31.7	64.49	55.74	31.7	77.68	52.47	31.8	37.61	22.89	31.8	26.79	9.50	31.8	55.79	37.62
9.84	-9.78		30.67	+30.66		10.80	-10.76		9.31	+9.26		12.41	-12.37	
10 <sup>h</sup> 59 <sup>m</sup>	54 <sup>s</sup> .174		12 <sup>h</sup> 14 <sup>m</sup>	29 <sup>s</sup> .583		12 <sup>h</sup> 46 <sup>m</sup>	25 <sup>s</sup> .116		12 <sup>h</sup> 48 <sup>m</sup>	31 <sup>s</sup> .755		13 <sup>h</sup> 27 <sup>m</sup>	42 <sup>s</sup> .060	
-84° 9' 48".70			+88° 8' 36".24			-84° 41' 21".16			+83° 50' 51".72			-85° 22' 38".10		

CIRCUMPOLAR STARS.

FOR THE UPPER TRANSIT AT WASHINGTON.

δ Octantis. Mag. 4.1			Greenwich 6253. Mag. 7.2			ρ Octantis. Mag. 5.7			ε Ursæ Minoris. Mag. 4.4			56 G. Apodis. Mag. 5.9		
Wash. Mean Time.	Right Ascension.	Declination.	Wash. Mean Time.	Right Ascension.	Declination.	Wash. Mean Time.	Right Ascension.	Declination.	Wash. Mean Time.	Right Ascension.	Declination.	Wash. Mean Time.	Right Ascension.	Declination.
Dec.	h m "	° '	Dec.	h m "	° '	Dec.	h m "	° '	Dec.	h m "	° '	Dec.	h m "	° '
	14 14	-83 18		15 1	+87 32		15 24	-84 12		16 53	+82 10		17 16	-80 47
	s	"		s	"		s	"		s	"		s	"
0.9	0.46	12.74	0.9	45.04	10.47	0.9	42.21	8.40	1.0	48.86	18.46	1.0	32.99	16.87
1.9	0.59	12.52	1.9	45.21	10.11	1.9	42.30	8.14	2.0	48.84	18.00	2.0	32.99	16.59
2.9	0.72	12.30	2.9	45.39	9.77	2.9	42.39	7.86	3.0	48.81	17.74	3.0	32.98	16.28
3.9	0.86	12.07	3.9	45.56	9.45	3.9	42.49	7.57	4.0	48.80	17.40	4.0	32.97	15.98
4.9	1.01	11.84	4.9	45.71	9.14	4.9	42.60	7.26	4.9	48.78	17.08	5.0	32.97	15.62
5.9	1.18	11.60	5.9	45.85	8.84	5.9	42.73	6.95	5.9	48.75	16.75	6.0	32.98	15.27
6.9	1.35	11.39	6.9	45.99	8.53	6.9	42.87	6.66	6.9	48.72	16.43	7.0	33.01	14.93
7.9	1.52	11.19	7.9	46.12	8.22	7.9	43.03	6.38	7.9	48.69	16.10	8.0	33.05	14.60
8.9	1.70	11.01	8.9	46.26	7.89	8.9	43.19	6.11	8.9	48.66	15.76	9.0	33.09	14.27
9.9	1.89	10.84	9.9	46.42	7.56	9.9	43.35	5.87	9.9	48.65	15.41	10.0	33.13	13.95
10.9	2.07	10.69	10.9	46.60	7.22	10.9	43.51	5.64	10.9	48.63	15.05	10.9	33.18	13.66
11.9	2.24	10.54	11.9	46.80	6.88	11.9	43.67	5.41	11.9	48.62	14.67	11.9	33.23	13.37
12.9	2.41	10.40	12.9	47.06	6.54	12.9	43.83	5.18	12.9	48.62	14.29	12.9	33.28	13.10
13.9	2.58	10.26	13.9	47.28	6.21	13.9	43.98	4.96	13.9	48.62	13.92	13.9	33.32	12.82
14.9	2.73	10.12	14.9	47.55	5.88	14.9	44.12	4.74	14.9	48.63	13.54	14.9	33.35	12.55
15.9	2.89	9.98	15.9	47.84	5.56	15.9	44.27	4.52	15.9	48.65	13.16	15.9	33.39	12.27
16.9	3.06	9.83	16.9	48.13	5.26	16.9	44.42	4.29	16.9	48.67	12.80	16.9	33.43	11.98
17.9	3.23	9.67	17.9	48.43	4.98	17.9	44.56	4.06	17.9	48.69	12.45	17.9	33.46	11.67
18.8	3.41	9.51	18.9	48.73	4.70	18.9	44.72	3.82	18.9	48.71	12.10	18.9	33.50	11.36
19.8	3.60	9.36	19.9	49.01	4.43	19.9	44.89	3.58	19.9	48.73	11.77	19.9	33.55	11.06
20.8	3.79	9.22	20.9	49.28	4.17	20.9	45.07	3.34	20.9	48.75	11.45	20.9	33.61	10.73
21.8	4.01	9.09	21.9	49.52	3.91	21.9	45.29	3.11	21.9	48.77	11.14	21.9	33.69	10.39
22.8	4.23	8.98	22.9	49.76	3.63	22.9	45.51	2.91	22.9	48.79	10.82	22.9	33.77	10.07
23.8	4.46	8.89	23.9	50.00	3.34	23.9	45.73	2.71	23.9	48.80	10.48	23.9	33.86	9.78
24.8	4.68	8.84	24.9	50.27	3.03	24.9	45.95	2.55	24.9	48.83	10.12	24.9	33.96	9.50
25.8	4.89	8.80	25.9	50.57	2.72	25.9	46.18	2.40	25.9	48.86	9.74	25.9	34.05	9.25
26.8	5.08	8.77	26.9	50.90	2.40	26.9	46.38	2.26	26.9	48.89	9.35	26.9	34.15	9.01
27.8	5.27	8.72	27.9	51.27	2.11	27.9	46.57	2.12	27.9	48.93	8.97	27.9	34.23	8.77
28.8	5.45	8.67	28.9	51.65	1.83	28.9	46.75	1.98	28.9	48.98	8.60	28.9	34.30	8.52
29.8	5.64	8.59	29.9	52.06	1.59	29.9	46.93	1.81	29.9	49.04	8.25	29.9	34.38	8.26
30.8	5.82	8.51	30.8	52.45	1.35	30.9	47.12	1.64	30.9	49.10	7.91	30.9	34.44	7.99
31.8	6.02	8.41	31.8	52.83	1.15	31.9	47.31	1.45	31.9	49.17	7.60	31.9	34.52	7.71
	8.58	-8.52	23.25	+23.23		9.90	-9.85		7.34	+7.27		6.25	-6.17	
	14 <sup>h</sup> 13 <sup>m</sup> 55 <sup>s</sup> .644		15 <sup>h</sup> 2 <sup>m</sup> 43 <sup>s</sup> .277			15 <sup>h</sup> 24 <sup>m</sup> 36 <sup>s</sup> .751			16 <sup>h</sup> 54 <sup>m</sup> 6 <sup>s</sup> .748			17 <sup>h</sup> 16 <sup>m</sup> 28 <sup>s</sup> .406		
	-83° 18' 11".26		+87° 32' 28".69			-84° 12' 7".93			+82° 10' 15".74			-80° 47' 18".10		

CIRCUMPOLAR STARS.

FOR THE UPPER TRANSIT AT WASHINGTON.

δ Ursa Minoris. Mag. 4.4			χ Octantis. Mag. 5.2			λ Ursa Minoris. Mag. 6.6			σ Octantis. Mag. 5.5			76 Draconis. Mag. 5.7		
Wash. Mean Time.	Right Ascension.	Declination.	Wash. Mean Time.	Right Ascension.	Declination.	Wash. Mean Time.	Right Ascension.	Declination.	Wash. Mean Time.	Right Ascension.	Declination.	Wash. Mean Time.	Right Ascension.	Declination.
Dec.	h m	° ' "	Dec.	h m	° ' "	Dec.	h m	° ' "	Dec.	h m	° ' "	Dec.	h m	° ' "
	17 57	+86 36		18 8	-87 39		18 56	+89 1		19 32	-89 12		20 48	+82 14
1.1	19.53	65.37	1.1	7.05	48.87	1.1	43.62	42.49	1.1	38.29	63.10	1.2	21.13	49.02
2.1	19.35	65.04	2.1	6.91	48.58	2.1	42.69	42.21	2.1	37.35	62.85	2.2	20.98	48.86
3.0	19.18	64.71	3.1	6.75	48.26	3.1	41.83	41.95	3.1	36.36	62.58	3.2	20.83	48.74
4.0	19.03	64.41	4.1	6.60	47.93	4.1	41.01	41.70	4.1	35.34	62.31	4.2	20.69	48.60
5.0	18.88	64.12	5.0	6.46	47.59	5.1	40.21	41.46	5.1	34.34	62.02	5.2	20.55	48.48
6.0	18.73	63.83	6.0	6.36	47.23	6.1	39.39	41.24	6.1	33.41	61.70	6.2	20.41	48.36
7.0	18.56	63.56	7.0	6.30	46.86	7.1	38.54	41.02	7.1	32.57	61.37	7.2	20.27	48.25
8.0	18.39	63.28	8.0	6.28	46.50	8.1	37.66	40.79	8.1	31.83	61.04	8.2	20.13	48.13
9.0	18.21	62.97	9.0	6.27	46.16	9.1	36.76	40.55	9.1	31.17	60.72	9.1	19.98	48.00
10.0	18.04	62.66	10.0	6.29	45.82	10.1	35.85	40.28	10.1	30.59	60.39	10.1	19.83	47.87
11.0	17.89	62.33	11.0	6.31	45.50	11.1	34.95	40.01	11.1	30.06	60.07	11.1	19.69	47.72
12.0	17.74	62.00	12.0	6.34	45.18	12.1	34.06	39.73	12.1	29.53	59.77	12.1	19.54	47.55
13.0	17.61	61.65	13.0	6.37	44.86	13.1	33.26	39.43	13.1	29.03	59.48	13.1	19.39	47.37
14.0	17.50	61.29	14.0	6.39	44.55	14.1	32.48	39.12	14.1	28.53	59.19	14.1	19.24	47.18
15.0	17.39	60.93	15.0	6.40	44.25	15.1	31.76	38.80	15.1	28.01	58.90	15.1	19.09	46.98
16.0	17.29	60.57	16.0	6.41	43.93	16.1	31.10	38.48	16.1	27.46	58.61	16.1	18.95	46.76
17.0	17.28	60.23	17.0	6.42	43.62	17.1	30.51	38.17	17.1	26.90	58.30	17.1	18.82	46.54
18.0	17.17	59.90	18.0	6.42	43.29	18.1	29.97	37.86	18.1	26.30	57.99	18.1	18.69	46.34
19.0	17.11	59.58	19.0	6.43	42.95	19.0	29.46	37.57	19.1	25.72	57.66	19.1	18.58	46.13
20.0	17.06	59.26	20.0	6.47	42.60	20.0	28.96	37.29	20.1	25.18	57.31	20.1	18.47	45.93
20.9	17.00	58.94	21.0	6.55	42.24	21.0	28.45	37.01	21.1	24.72	56.95	21.1	18.36	45.73
21.9	16.93	58.66	22.0	6.66	41.87	22.0	27.89	36.75	22.1	24.37	56.58	22.1	18.25	45.53
22.9	16.85	58.35	23.0	6.82	41.49	23.0	27.28	36.48	23.1	24.15	56.21	23.1	18.12	45.35
23.9	16.76	58.03	23.9	7.01	41.15	24.0	26.62	36.20	24.1	24.06	55.84	24.1	18.00	45.10
24.9	16.68	57.69	24.9	7.23	40.82	25.0	25.97	35.89	25.1	24.06	55.48	25.1	17.87	44.96
25.9	16.62	57.32	25.9	7.46	40.51	26.0	25.34	35.57	26.1	24.07	55.13	26.1	17.75	44.73
26.9	16.56	56.95	26.9	7.66	40.22	27.0	24.76	35.21	27.0	24.09	54.80	27.1	17.62	44.49
27.9	16.54	56.57	27.9	7.84	39.93	28.0	24.28	34.85	28.0	24.06	54.48	28.1	17.49	44.22
28.9	16.54	56.19	28.9	8.00	39.64	29.0	23.91	34.51	29.0	23.95	54.19	29.1	17.39	43.94
29.9	16.55	55.83	29.9	8.14	39.33	30.0	23.62	34.17	30.0	23.78	53.88	30.1	17.29	43.65
30.9	16.59	55.49	30.9	8.26	39.01	31.0	23.39	33.84	31.0	23.57	53.55	31.1	17.20	43.37
31.9	16.63	55.17	31.9	8.41	38.68	32.0	23.21	33.54	32.0	23.35	53.19	32.1	17.11	43.10

16.95	+16.92	24.52	-24.50	58.92	+58.91	73.12	-73.11	7.41	+7.34
17 <sup>h</sup> 58 <sup>m</sup> 2 <sup>s</sup> .814		18 <sup>h</sup> 7 <sup>m</sup> 59 <sup>s</sup> .062		18 <sup>h</sup> 59 <sup>m</sup> 2 <sup>s</sup> .477		19 <sup>h</sup> 32 <sup>m</sup> 24 <sup>s</sup> .283		20 <sup>h</sup> 48 <sup>m</sup> 27 <sup>s</sup> .964	
+86° 36' 50".93		-87° 39' 50".34		+89° 1' 17".96		-89° 13' 5".55		+82° 14' 10".29	



CIRCUMPOLAR STARS.

FOR THE UPPER TRANSIT AT WASHINGTON.

λ Octantis. Mag. 5.4			ν Octantis. Mag. 5.7			β Octantis. Mag. 4.8			30 H. Cephei. Mag. 5.6			γ Octantis. Mag. 5.1		
Wash. Mean Time.	Right Ascen- sion.	Declin- ation.	Wash. Mean Time.	Right Ascen- sion.	Declin- ation.	Wash. Mean Time.	Right Ascen- sion.	Declin- ation.	Wash. Mean Time.	Right Ascen- sion.	Declin- ation.	Wash. Mean Time.	Right Ascen- sion.	Declin- ation.
Dec.	h m	° ' "	Dec.	h m	° ' "	Dec.	h m	° ' "	Dec.	h m	° ' "	Dec.	h m	° ' "
	21 38	-83 5		22 16	-86 22		22 37	-81 47		23 27	+86 52		23 47	-82 27
	s	"		s	"		s	"		s	"		s	"
1.2	51.74	14.31	1.2	48.79	29.27	1.2	61.15	62.17	1.3	57.29	41.53	1.3	30.00	44.89
2.2	51.57	14.21	2.2	48.47	29.22	2.2	61.00	62.16	2.3	56.88	41.64	2.3	29.85	44.97
3.2	51.41	14.11	3.2	48.13	29.17	3.2	60.85	62.15	3.3	56.51	41.74	3.3	29.68	45.06
4.2	51.23	13.99	4.2	47.77	29.10	4.2	60.69	62.12	4.3	56.13	41.84	4.3	29.51	45.13
5.2	51.05	13.86	5.2	47.42	29.02	5.2	60.52	62.08	5.3	55.77	41.93	5.3	29.33	45.19
6.2	50.88	13.71	6.2	47.05	28.92	6.2	60.35	62.00	6.3	55.44	42.02	6.3	29.15	45.24
7.2	50.71	13.54	7.2	46.69	28.79	7.2	60.21	61.92	7.3	55.08	42.14	7.3	28.96	45.27
8.2	50.56	13.35	8.2	46.36	28.65	8.2	60.06	61.83	8.3	54.73	42.26	8.3	28.79	45.28
9.2	50.41	13.16	9.2	46.03	28.50	9.2	59.92	61.73	9.3	54.37	42.38	9.3	28.62	45.27
10.2	50.27	12.96	10.2	45.71	28.35	10.2	59.78	61.62	10.3	53.98	42.48	10.3	28.47	45.25
11.2	50.14	12.78	11.2	45.43	28.19	11.2	59.65	61.51	11.3	53.57	42.59	11.3	28.32	45.23
12.2	50.01	12.60	12.2	45.14	28.04	12.2	59.52	61.40	12.3	53.16	42.68	12.3	28.17	45.22
13.2	49.89	12.42	13.2	44.87	27.90	13.2	59.40	61.28	13.2	52.73	42.76	13.3	28.01	45.20
14.2	49.76	12.24	14.2	44.60	27.75	14.2	59.28	61.18	14.2	52.30	42.82	14.3	27.87	45.18
15.2	49.64	12.06	15.2	44.32	27.61	15.2	59.15	61.08	15.2	51.88	42.87	15.3	27.72	45.17
16.2	49.51	11.89	16.2	44.03	27.47	16.2	59.02	60.98	16.2	51.45	42.90	16.3	27.57	45.16
17.2	49.38	11.71	17.2	43.72	27.33	17.2	58.89	60.88	17.2	51.03	42.91	17.3	27.40	45.15
18.2	49.24	11.53	18.2	43.41	27.18	18.2	58.75	60.77	18.2	50.62	42.91	18.2	27.24	45.14
19.2	49.09	11.33	19.2	43.09	27.01	19.2	58.61	60.65	19.2	50.24	42.91	19.2	27.07	45.11
20.2	48.93	11.11	20.2	42.76	26.83	20.2	58.46	60.51	20.2	49.87	42.92	20.2	26.89	45.07
21.2	48.79	10.87	21.2	42.44	26.62	21.2	58.32	60.33	21.2	49.51	42.95	21.2	26.71	45.02
22.1	48.66	10.60	22.2	42.14	26.40	22.2	58.19	60.15	22.2	49.16	42.98	22.2	26.54	44.93
23.1	48.54	10.32	23.2	41.86	26.16	23.2	58.06	59.95	23.2	48.80	43.02	23.2	26.37	44.83
24.1	48.44	10.03	24.2	41.61	25.90	24.2	57.93	59.73	24.2	48.42	43.06	24.2	26.22	44.70
25.1	48.35	9.75	25.2	41.37	25.65	25.2	57.83	59.51	25.2	48.02	43.09	25.2	26.07	44.57
26.1	48.27	9.48	26.2	41.15	25.41	26.2	57.73	59.31	26.2	47.60	43.11	26.2	25.93	44.43
27.1	48.19	9.24	27.2	40.94	25.17	27.2	57.64	59.11	27.2	47.14	43.11	27.2	25.80	44.31
28.1	48.10	9.00	28.2	40.73	24.95	28.2	57.54	58.91	28.2	46.69	43.08	28.2	25.66	44.20
29.1	48.01	8.77	29.2	40.50	24.74	29.2	57.44	58.73	29.2	46.27	43.03	29.2	25.52	44.10
30.1	47.91	8.53	30.2	40.28	24.53	30.2	57.31	58.55	30.2	45.86	42.95	30.2	25.37	44.01
31.1	47.81	8.29	31.2	40.00	24.32	31.2	57.19	58.38	31.2	45.47	42.88	31.2	25.22	43.92
32.1	47.70	8.02	32.1	39.73	24.09	32.2	57.06	58.20	32.2	45.09	42.80	32.2	25.06	43.82
8.31	-8.25		15.81	-15.78		7.01	-6.94		18.86	+18.34		7.62	-7.56	
21 <sup>h</sup> 38 <sup>m</sup>	49°.035		22 <sup>h</sup> 16 <sup>m</sup>	45°.446		22 <sup>h</sup> 37 <sup>m</sup>	57°.920		23 <sup>h</sup> 27 <sup>m</sup>	43°.285		23 <sup>h</sup> 47 <sup>m</sup>	27°.240	
-83° 5'	17''.98		-86° 22'	32''.81		-81° 48'	6''.03		+86° 51'	58''.49		-82° 27'	48''.42	

FOR THE UPPER TRANSIT AT WASHINGTON.

Washington Mean Time.	33 Piscium. Mag. 4.7		$\alpha$ Andromedæ. (Alpheratz.) Mag. 2.2		$\beta$ Cassiopeie. Mag. 2.4		$\epsilon$ Phœnicis. Mag. 3.9	
	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.
	h m 0 1	° ' " - 6 8	h m 0 4	° ' " +28 38	h m 0 4	° ' " +58 42	h m 0 5	° ' " -46 10
	s	"	s	"	s	"	s	"
Jan. 0.2	15.097	76.22	15.824	69.71	55.209	53.01	21.426	90.22
10.2	14.984 <sup>118</sup>	76.84 <sup>62</sup>	15.682 <sup>142</sup>	68.75 <sup>96</sup>	54.896 <sup>312</sup>	52.22 <sup>79</sup>	21.219 <sup>207</sup>	89.92 <sup>30</sup>
20.2	14.879 <sup>105</sup>	77.35 <sup>51</sup>	15.546 <sup>136</sup>	67.55 <sup>120</sup>	54.597 <sup>299</sup>	50.97 <sup>125</sup>	21.026 <sup>193</sup>	89.17 <sup>75</sup>
30.1	14.785 <sup>94</sup>	77.72 <sup>37</sup>	15.420 <sup>126</sup>	66.12 <sup>143</sup>	54.321 <sup>276</sup>	49.22 <sup>178</sup>	20.855 <sup>171</sup>	87.97 <sup>120</sup>
Feb. 9.1	14.707 <sup>78</sup>	77.94 <sup>22</sup>	15.313 <sup>107</sup>	64.54 <sup>158</sup>	54.081 <sup>240</sup>	47.08 <sup>214</sup>	20.710 <sup>145</sup>	86.37 <sup>160</sup>
	58	5	83	167	193	246	112	197
19.1	14.649	77.99	15.230	62.87	53.888	44.62	20.598	84.40
29.1	14.616 <sup>33</sup>	77.83 <sup>16</sup>	15.179 <sup>51</sup>	61.20 <sup>167</sup>	53.754 <sup>134</sup>	41.98 <sup>264</sup>	20.523 <sup>75</sup>	82.11 <sup>229</sup>
Mar. 10.0	14.612 <sup>4</sup>	77.48 <sup>35</sup>	15.163 <sup>16</sup>	59.60 <sup>160</sup>	53.690	39.21 <sup>277</sup>	20.490	79.54 <sup>267</sup>
20.0	14.643 <sup>31</sup>	76.88 <sup>60</sup>	15.191 <sup>28</sup>	58.16 <sup>144</sup>	53.700 <sup>10</sup>	36.48 <sup>273</sup>	20.503 <sup>13</sup>	78.76 <sup>278</sup>
30.0	14.710 <sup>67</sup>	76.06 <sup>82</sup>	15.262 <sup>71</sup>	56.87 <sup>129</sup>	53.789 <sup>89</sup>	33.84 <sup>264</sup>	20.565 <sup>62</sup>	73.82 <sup>294</sup>
	106	107	116	98	160	237	113	305
Apr. 9.0	14.816	74.99	15.378	55.89	53.958	31.47	20.678	70.77
18.9	14.961 <sup>145</sup>	73.70 <sup>129</sup>	15.542 <sup>164</sup>	55.24 <sup>65</sup>	54.203 <sup>245</sup>	29.40 <sup>207</sup>	20.843 <sup>165</sup>	67.68 <sup>309</sup>
28.9	15.144 <sup>183</sup>	72.19 <sup>151</sup>	15.752 <sup>210</sup>	54.96 <sup>28</sup>	54.521 <sup>318</sup>	27.77 <sup>163</sup>	21.058 <sup>215</sup>	64.68 <sup>305</sup>
May 8.9	15.363 <sup>219</sup>	70.48 <sup>171</sup>	16.001 <sup>249</sup>	55.07 <sup>11</sup>	54.901 <sup>380</sup>	26.57 <sup>120</sup>	21.321 <sup>263</sup>	61.64 <sup>299</sup>
18.8	15.614 <sup>251</sup>	68.62 <sup>186</sup>	16.281 <sup>280</sup>	55.57 <sup>50</sup>	55.332 <sup>431</sup>	25.89 <sup>68</sup>	21.627 <sup>306</sup>	58.84 <sup>280</sup>
	276	196	308	87	471	16	342	258
28.8	15.890	66.66	16.589	56.44	55.803	25.73	21.969	56.26
June 7.8	16.184 <sup>294</sup>	64.63 <sup>203</sup>	16.918 <sup>329</sup>	57.69 <sup>125</sup>	56.300 <sup>497</sup>	26.09 <sup>36</sup>	22.338 <sup>369</sup>	53.95 <sup>231</sup>
17.8	16.492 <sup>308</sup>	62.59 <sup>204</sup>	17.256 <sup>338</sup>	59.26 <sup>157</sup>	56.809 <sup>509</sup>	26.97 <sup>88</sup>	22.726 <sup>388</sup>	51.99 <sup>196</sup>
27.7	16.802 <sup>310</sup>	60.59 <sup>200</sup>	17.595 <sup>339</sup>	61.11 <sup>185</sup>	57.319 <sup>510</sup>	28.35 <sup>138</sup>	23.122 <sup>396</sup>	50.42 <sup>187</sup>
July 7.7	17.105 <sup>368</sup>	58.70 <sup>189</sup>	17.926 <sup>331</sup>	63.18 <sup>207</sup>	57.815 <sup>496</sup>	30.17 <sup>182</sup>	23.516 <sup>394</sup>	49.29 <sup>113</sup>
	289	175	315	227	468	222	381	67
17.7	17.394	56.95	18.241	65.45	58.283	32.39	23.897	48.62
27.7	17.664 <sup>270</sup>	55.40 <sup>155</sup>	18.534 <sup>293</sup>	67.85 <sup>240</sup>	58.715 <sup>432</sup>	34.99 <sup>260</sup>	24.254 <sup>357</sup>	48.43 <sup>19</sup>
Aug. 6.6	17.907 <sup>243</sup>	54.07 <sup>133</sup>	18.796 <sup>262</sup>	70.30 <sup>245</sup>	59.099 <sup>384</sup>	37.86 <sup>267</sup>	24.579 <sup>325</sup>	48.72 <sup>29</sup>
16.6	18.117 <sup>210</sup>	52.99 <sup>108</sup>	19.024 <sup>228</sup>	72.77 <sup>247</sup>	59.430 <sup>331</sup>	40.97 <sup>311</sup>	24.861 <sup>282</sup>	49.47 <sup>75</sup>
26.6	18.291 <sup>174</sup>	52.19 <sup>80</sup>	19.210 <sup>186</sup>	75.19 <sup>242</sup>	59.700 <sup>270</sup>	44.23 <sup>326</sup>	25.094 <sup>233</sup>	50.66 <sup>119</sup>
	137	53	148	284	210	335	180	159
Sept. 5.5	18.428	51.66	19.358	77.53	59.910	47.58	25.274	52.25
15.5	18.525 <sup>97</sup>	51.40 <sup>26</sup>	19.465 <sup>107</sup>	79.72 <sup>219</sup>	60.056 <sup>146</sup>	50.95 <sup>337</sup>	25.398 <sup>124</sup>	54.15 <sup>190</sup>
25.5	18.583 <sup>58</sup>	51.39 <sup>1</sup>	19.530 <sup>66</sup>	81.77 <sup>205</sup>	60.137 <sup>81</sup>	54.26 <sup>331</sup>	25.464 <sup>66</sup>	56.31 <sup>216</sup>
Oct. 5.5	18.605 <sup>23</sup>	51.63 <sup>24</sup>	19.556 <sup>26</sup>	83.59 <sup>182</sup>	60.157 <sup>20</sup>	57.46 <sup>320</sup>	25.473 <sup>9</sup>	58.62 <sup>231</sup>
15.4	18.594 <sup>11</sup>	52.05 <sup>42</sup>	19.548 <sup>8</sup>	85.19 <sup>160</sup>	60.116 <sup>41</sup>	60.46 <sup>300</sup>	25.430 <sup>43</sup>	61.01 <sup>239</sup>
	40	58	39	136	97	277	91	235
25.4	18.554	52.63	19.509	86.55	60.019	63.23	25.339	63.36
Nov. 4.4	18.490 <sup>64</sup>	53.34 <sup>71</sup>	19.440 <sup>69</sup>	87.60 <sup>105</sup>	59.871 <sup>148</sup>	65.68 <sup>245</sup>	25.207 <sup>132</sup>	65.59 <sup>223</sup>
14.4	18.406 <sup>84</sup>	54.12 <sup>78</sup>	19.349 <sup>91</sup>	88.38 <sup>78</sup>	59.677 <sup>194</sup>	67.79 <sup>211</sup>	25.041 <sup>156</sup>	67.59 <sup>200</sup>
24.3	18.308 <sup>98</sup>	54.95 <sup>83</sup>	19.238 <sup>111</sup>	88.83 <sup>45</sup>	59.442 <sup>235</sup>	69.40 <sup>161</sup>	24.850 <sup>191</sup>	69.30 <sup>171</sup>
Dec. 4.3	18.199 <sup>109</sup>	55.78 <sup>83</sup>	19.111 <sup>127</sup>	88.98 <sup>15</sup>	59.172 <sup>270</sup>	70.57 <sup>117</sup>	24.641 <sup>209</sup>	70.64 <sup>194</sup>
	116	82	137	19	295	65	218	94
14.3	18.083	56.60	18.974	88.79	58.877	71.22	24.423	71.58
24.2	17.965 <sup>118</sup>	57.36 <sup>76</sup>	18.830 <sup>144</sup>	88.81 <sup>48</sup>	58.568 <sup>309</sup>	71.34 <sup>12</sup>	24.203 <sup>220</sup>	72.06 <sup>48</sup>
34.2	17.849 <sup>116</sup>	58.04 <sup>68</sup>	18.683 <sup>147</sup>	87.51 <sup>80</sup>	58.251 <sup>317</sup>	70.69 <sup>44</sup>	23.988 <sup>215</sup>	72.07 <sup>1</sup>
Mean Place	14.469	78.36	14.932	55.63	53.989	30.86	21.239	80.18
Sec $\delta$ , Tan $\delta$	1.006	-0.108	1.140	+0.546	1.926	+1.646	1.444	-1.042
$D\psi\alpha$ , $D\omega\alpha$	+0.061	+0.007	+0.061	-0.036	+0.062	-0.110	+0.061	+0.070
$D\psi\delta$ , $D\omega\delta$	+0.40	+0.01	+0.40	+0.02	+0.40	+0.02	+0.40	+0.02

FOR THE UPPER TRANSIT AT WASHINGTON.

Washington Mean Time.	22 Andromedæ. Mag. 5.1		γ Pegasi. Mag. 2.9		σ Andromedæ. Mag. 4.5		ι Ceti. Mag. 3.8	
	Right Ascension.	Declination.	Right Ascension.	Declination.	Right Ascension.	Declination.	Right Ascension.	Declination.
	h m 0 6	° +45 37	h m 0 9	° +14 44	h m 0 14	° +36 20	h m 0 15	° - 9 15
Jan. 0.2	10.512	56.60	7.678	29.20	9.673	46.47	21.812	61.60
10.2	10.806 <sup>206</sup>	55.72 <sup>88</sup>	7.558 <sup>120</sup>	28.33 <sup>87</sup>	9.507 <sup>106</sup>	45.61 <sup>86</sup>	21.694 <sup>118</sup>	62.20 <sup>60</sup>
20.2	10.107 <sup>190</sup>	54.42 <sup>130</sup>	7.442 <sup>116</sup>	27.33 <sup>100</sup>	9.346 <sup>161</sup>	44.41 <sup>130</sup>	21.582 <sup>112</sup>	62.65 <sup>45</sup>
30.2	9.923 <sup>184</sup>	52.76 <sup>166</sup>	7.334 <sup>108</sup>	26.28 <sup>105</sup>	9.195 <sup>151</sup>	42.93 <sup>148</sup>	21.477 <sup>105</sup>	62.93 <sup>28</sup>
Feb. 9.1	9.765 <sup>195</sup>	50.81 <sup>195</sup>	7.243 <sup>91</sup>	25.19 <sup>100</sup>	9.062 <sup>133</sup>	41.22 <sup>171</sup>	21.387 <sup>90</sup>	63.02 <sup>9</sup>
19.1	9.639 <sup>126</sup>	48.62 <sup>219</sup>	7.172 <sup>71</sup>	24.12 <sup>167</sup>	8.956 <sup>106</sup>	39.35 <sup>157</sup>	21.316 <sup>71</sup>	62.94 <sup>8</sup>
29.1	9.563 <sup>86</sup>	46.31 <sup>261</sup>	7.123 <sup>44</sup>	23.13 <sup>99</sup>	8.882 <sup>74</sup>	37.40 <sup>195</sup>	21.268 <sup>48</sup>	62.62 <sup>32</sup>
Mar. 10.0	9.516 <sup>37</sup>	43.97 <sup>294</sup>	7.114 <sup>14</sup>	22.26 <sup>87</sup>	8.848 <sup>34</sup>	35.46 <sup>194</sup>	21.252 <sup>16</sup>	62.09 <sup>53</sup>
20.0	9.533 <sup>16</sup>	41.70 <sup>227</sup>	7.137 <sup>23</sup>	21.58 <sup>68</sup>	8.860 <sup>12</sup>	33.61 <sup>185</sup>	21.266 <sup>14</sup>	61.34 <sup>75</sup>
30.0	9.607 <sup>75</sup>	39.60 <sup>210</sup>	7.199 <sup>62</sup>	21.14 <sup>44</sup>	8.921 <sup>61</sup>	31.95 <sup>166</sup>	21.319 <sup>53</sup>	60.32 <sup>102</sup>
Apr. 9.0	9.742 <sup>125</sup>	37.75 <sup>185</sup>	7.303 <sup>104</sup>	20.96 <sup>18</sup>	9.033 <sup>112</sup>	30.53 <sup>142</sup>	21.411 <sup>92</sup>	59.07 <sup>125</sup>
18.9	9.934 <sup>192</sup>	36.24 <sup>151</sup>	7.442 <sup>145</sup>	21.08 <sup>12</sup>	9.196 <sup>103</sup>	29.45 <sup>108</sup>	21.544 <sup>133</sup>	57.61 <sup>146</sup>
28.9	10.186 <sup>246</sup>	35.13 <sup>111</sup>	7.633 <sup>187</sup>	21.51 <sup>48</sup>	9.408 <sup>312</sup>	28.73 <sup>72</sup>	21.715 <sup>171</sup>	55.95 <sup>166</sup>
May 8.9	10.476 <sup>206</sup>	34.46 <sup>67</sup>	7.859 <sup>294</sup>	22.25 <sup>74</sup>	9.665 <sup>257</sup>	28.42 <sup>81</sup>	21.925 <sup>210</sup>	54.12 <sup>183</sup>
18.8	10.812 <sup>287</sup>	34.26 <sup>30</sup>	8.116 <sup>287</sup>	23.30 <sup>105</sup>	9.961 <sup>286</sup>	28.53 <sup>11</sup>	22.167 <sup>242</sup>	52.14 <sup>198</sup>
28.8	11.180 <sup>288</sup>	34.53 <sup>37</sup>	8.393 <sup>282</sup>	24.64 <sup>134</sup>	10.286 <sup>295</sup>	29.07 <sup>54</sup>	22.434 <sup>267</sup>	50.09 <sup>205</sup>
June 7.8	11.576 <sup>360</sup>	35.29 <sup>76</sup>	8.706 <sup>309</sup>	26.21 <sup>157</sup>	10.634 <sup>248</sup>	30.01 <sup>94</sup>	22.725 <sup>291</sup>	48.00 <sup>209</sup>
17.8	11.973 <sup>408</sup>	36.48 <sup>119</sup>	9.014 <sup>314</sup>	28.00 <sup>179</sup>	10.994 <sup>300</sup>	31.35 <sup>124</sup>	23.029 <sup>304</sup>	45.93 <sup>207</sup>
27.7	12.376 <sup>408</sup>	38.09 <sup>161</sup>	9.331 <sup>317</sup>	29.97 <sup>197</sup>	11.358 <sup>364</sup>	33.04 <sup>189</sup>	23.338 <sup>307</sup>	43.94 <sup>199</sup>
July 7.7	12.797 <sup>391</sup>	40.08 <sup>190</sup>	9.642 <sup>311</sup>	32.02 <sup>205</sup>	11.713 <sup>265</sup>	35.02 <sup>198</sup>	23.645 <sup>309</sup>	42.06 <sup>188</sup>
17.7	13.140 <sup>373</sup>	42.37 <sup>229</sup>	9.939 <sup>297</sup>	34.13 <sup>211</sup>	12.052 <sup>289</sup>	37.26 <sup>224</sup>	23.940 <sup>295</sup>	40.36 <sup>170</sup>
27.7	13.484 <sup>344</sup>	44.94 <sup>287</sup>	10.216 <sup>377</sup>	36.25 <sup>312</sup>	12.387 <sup>315</sup>	39.68 <sup>242</sup>	24.217 <sup>277</sup>	38.89 <sup>147</sup>
Aug. 6.6	13.791 <sup>307</sup>	47.70 <sup>376</sup>	10.467 <sup>263</sup>	38.31 <sup>208</sup>	12.653 <sup>295</sup>	42.26 <sup>258</sup>	24.471 <sup>254</sup>	37.65 <sup>124</sup>
16.6	14.056 <sup>265</sup>	50.60 <sup>390</sup>	10.635 <sup>218</sup>	40.27 <sup>196</sup>	12.902 <sup>249</sup>	44.90 <sup>304</sup>	24.693 <sup>222</sup>	36.69 <sup>96</sup>
26.6	14.275 <sup>289</sup>	53.58 <sup>298</sup>	10.867 <sup>182</sup>	42.11 <sup>184</sup>	13.110 <sup>208</sup>	47.56 <sup>286</sup>	24.879 <sup>186</sup>	36.03 <sup>66</sup>
Sept. 5.5	14.447 <sup>173</sup>	56.57 <sup>390</sup>	11.012 <sup>145</sup>	43.77 <sup>166</sup>	13.276 <sup>168</sup>	50.19 <sup>283</sup>	25.031 <sup>152</sup>	35.68 <sup>35</sup>
15.5	14.568 <sup>121</sup>	59.52 <sup>295</sup>	11.118 <sup>196</sup>	45.24 <sup>147</sup>	13.399 <sup>128</sup>	52.73 <sup>264</sup>	25.031 <sup>110</sup>	35.68 <sup>11</sup>
25.5	14.641 <sup>73</sup>	62.36 <sup>284</sup>	11.186 <sup>68</sup>	46.51 <sup>127</sup>	13.478 <sup>79</sup>	55.14 <sup>241</sup>	25.141 <sup>74</sup>	35.57 <sup>17</sup>
Oct. 5.5	14.668 <sup>37</sup>	65.04 <sup>268</sup>	11.219 <sup>33</sup>	47.54 <sup>163</sup>	13.516 <sup>38</sup>	57.39 <sup>225</sup>	25.215 <sup>26</sup>	35.74 <sup>36</sup>
15.4	14.649 <sup>19</sup>	67.51 <sup>247</sup>	11.218 <sup>1</sup>	48.33 <sup>79</sup>	13.517 <sup>1</sup>	59.40 <sup>301</sup>	25.253 <sup>2</sup>	36.18 <sup>44</sup>
25.4	14.560 <sup>88</sup>	69.71 <sup>220</sup>	11.189 <sup>30</sup>	48.91 <sup>88</sup>	13.481 <sup>38</sup>	61.17 <sup>177</sup>	25.227 <sup>26</sup>	36.81 <sup>77</sup>
Nov. 4.4	14.496 <sup>94</sup>	71.62 <sup>191</sup>	11.134 <sup>55</sup>	49.26 <sup>35</sup>	13.414 <sup>67</sup>	62.66 <sup>149</sup>	25.172 <sup>55</sup>	37.58 <sup>88</sup>
14.4	14.369 <sup>188</sup>	73.17 <sup>185</sup>	11.059 <sup>76</sup>	49.39 <sup>12</sup>	13.320 <sup>94</sup>	63.83 <sup>117</sup>	25.115 <sup>76</sup>	38.46 <sup>93</sup>
24.3	14.213 <sup>156</sup>	74.33 <sup>116</sup>	10.964 <sup>94</sup>	49.32 <sup>7</sup>	13.201 <sup>119</sup>	64.66 <sup>63</sup>	25.096 <sup>92</sup>	39.39 <sup>96</sup>
Dec. 4.3	14.087 <sup>176</sup>	75.07 <sup>74</sup>	10.857 <sup>107</sup>	49.04 <sup>28</sup>	13.063 <sup>133</sup>	65.14 <sup>48</sup>	25.004 <sup>107</sup>	40.35 <sup>96</sup>
14.3	13.945 <sup>184</sup>	75.37 <sup>30</sup>	10.742 <sup>115</sup>	48.55 <sup>49</sup>	12.911 <sup>162</sup>	65.23 <sup>9</sup>	24.897 <sup>116</sup>	41.90 <sup>89</sup>
24.2	13.638 <sup>205</sup>	75.20 <sup>17</sup>	10.619 <sup>123</sup>	47.91 <sup>64</sup>	12.747 <sup>164</sup>	64.95 <sup>28</sup>	24.781 <sup>120</sup>	42.19 <sup>82</sup>
34.2	13.426 <sup>212</sup>	74.58 <sup>62</sup>	10.493 <sup>124</sup>	47.13 <sup>73</sup>	12.573 <sup>160</sup>	64.30 <sup>65</sup>	24.661 <sup>122</sup>	43.01 <sup>70</sup>
Mean Place	9.452	37.55	6.854	19.91	8.636	30.22	21.129	62.26
Sec δ, Tan δ	1.430	+1.022	1.084	+0.263	1.242	+0.786	1.613	-0.163
D <sub>20</sub> , D <sub>22</sub>	+0.062	-0.068	+0.062	+0.018	+0.062	-0.049	+0.061	+0.011
D <sub>15</sub> , D <sub>18</sub>	+0.40	+0.08	+0.40	+0.04	+0.40	+0.06	+0.40	+0.07

FOR THE UPPER TRANSIT AT WASHINGTON.

Washington Mean Time.	ζ Tucanae. Mag. 4.3		44 Piscium. Mag. 6.0		β Hydrī. Mag. 2.9		α Phœnicis. Mag. 2.4	
	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.
	h m 0 15	° ' " -65 20	h m 0 21	° ' " + 1 29	h m 0 21	° ' " -77 41	h m 0 22	° ' " -42 43
Jan. 0.2	54.58	54.30	18.862	52.26	32.70	92.44	20.393	95.34
10.2	54.17 <sup>41</sup>	53.56 <sup>74</sup>	18.747 <sup>115</sup>	51.53 <sup>73</sup>	31.78 <sup>92</sup>	91.48 <sup>96</sup>	20.196 <sup>107</sup>	95.30 <sup>4</sup>
20.2	53.78 <sup>39</sup>	52.27 <sup>130</sup>	18.634 <sup>113</sup>	50.83 <sup>70</sup>	30.91 <sup>87</sup>	89.92 <sup>156</sup>	20.009 <sup>157</sup>	94.82 <sup>48</sup>
30.2	53.43 <sup>35</sup>	50.45 <sup>182</sup>	18.529 <sup>105</sup>	50.19 <sup>64</sup>	30.12 <sup>79</sup>	87.83 <sup>209</sup>	19.837 <sup>172</sup>	93.91 <sup>91</sup>
Feb. 9.1	53.12 <sup>31</sup>	48.17 <sup>228</sup>	18.436 <sup>98</sup>	49.64 <sup>98</sup>	29.44 <sup>68</sup>	85.27 <sup>256</sup>	19.687 <sup>150</sup>	92.59 <sup>132</sup>
19.1	52.88 <sup>24</sup>	45.47 <sup>270</sup>	18.362 <sup>74</sup>	49.20 <sup>44</sup>	28.87 <sup>57</sup>	82.28 <sup>200</sup>	19.563 <sup>124</sup>	90.89 <sup>170</sup>
29.1	52.70 <sup>18</sup>	42.44 <sup>303</sup>	18.310 <sup>52</sup>	48.93 <sup>27</sup>	28.44 <sup>43</sup>	78.99 <sup>329</sup>	19.474 <sup>89</sup>	88.84 <sup>205</sup>
Mar. 10.0	52.58 <sup>12</sup>	39.14 <sup>330</sup>	18.287 <sup>23</sup>	48.83 <sup>10</sup>	28.14 <sup>30</sup>	75.42 <sup>357</sup>	19.421 <sup>53</sup>	86.50 <sup>224</sup>
20.0	52.55 <sup>8</sup>	35.65 <sup>349</sup>	18.297 <sup>10</sup>	48.94 <sup>11</sup>	28.00 <sup>14</sup>	71.70 <sup>372</sup>	19.412 <sup>9</sup>	83.91 <sup>259</sup>
30.0	52.60 <sup>5</sup>	32.03 <sup>362</sup>	18.344 <sup>47</sup>	49.29 <sup>35</sup>	28.02 <sup>2</sup>	67.90 <sup>380</sup>	19.449 <sup>27</sup>	81.13 <sup>278</sup>
Apr. 9.0	52.72 <sup>12</sup>	28.39 <sup>304</sup>	18.431 <sup>87</sup>	49.89 <sup>60</sup>	28.16	64.11 <sup>379</sup>	19.536 <sup>87</sup>	78.20 <sup>293</sup>
18.9	52.93 <sup>21</sup>	24.78 <sup>361</sup>	18.559 <sup>128</sup>	50.74 <sup>86</sup>	28.51 <sup>38</sup>	60.40 <sup>371</sup>	19.672 <sup>136</sup>	75.20 <sup>300</sup>
28.9	53.22 <sup>29</sup>	21.30 <sup>348</sup>	18.727 <sup>168</sup>	51.85 <sup>111</sup>	28.98 <sup>47</sup>	56.85 <sup>355</sup>	19.859 <sup>187</sup>	72.17 <sup>303</sup>
May 8.9	53.58 <sup>36</sup>	18.00 <sup>330</sup>	18.933 <sup>206</sup>	53.19 <sup>134</sup>	29.60 <sup>63</sup>	53.57 <sup>328</sup>	20.099 <sup>234</sup>	69.19 <sup>298</sup>
18.9	54.01 <sup>43</sup>	14.98 <sup>302</sup>	19.171 <sup>238</sup>	54.75 <sup>156</sup>	30.34 <sup>74</sup>	50.60 <sup>297</sup>	20.370 <sup>277</sup>	66.34 <sup>285</sup>
28.8	54.50 <sup>49</sup>	12.28 <sup>270</sup>	19.439 <sup>268</sup>	56.48 <sup>173</sup>	31.20 <sup>86</sup>	47.99 <sup>261</sup>	20.685 <sup>315</sup>	63.65 <sup>269</sup>
June 7.8	55.04 <sup>54</sup>	9.98 <sup>290</sup>	19.727 <sup>238</sup>	58.35 <sup>187</sup>	32.14 <sup>94</sup>	45.83 <sup>216</sup>	21.029 <sup>344</sup>	61.21 <sup>244</sup>
17.8	55.62 <sup>58</sup>	8.13 <sup>186</sup>	20.031 <sup>304</sup>	60.31 <sup>196</sup>	33.16 <sup>102</sup>	44.14 <sup>169</sup>	21.393 <sup>364</sup>	59.08 <sup>213</sup>
27.7	56.21 <sup>59</sup>	6.77 <sup>136</sup>	20.340 <sup>309</sup>	62.31 <sup>200</sup>	34.22 <sup>106</sup>	43.03 <sup>111</sup>	21.769 <sup>376</sup>	57.30 <sup>178</sup>
July 7.7	56.80 <sup>59</sup>	5.96 <sup>81</sup>	20.645 <sup>305</sup>	64.29 <sup>198</sup>	35.29 <sup>107</sup>	42.45 <sup>58</sup>	22.147 <sup>378</sup>	55.94 <sup>136</sup>
17.7	57.38 <sup>58</sup>	5.67 <sup>39</sup>	20.989 <sup>294</sup>	66.19 <sup>190</sup>	36.34 <sup>106</sup>	42.46 <sup>1</sup>	22.515 <sup>368</sup>	55.03 <sup>91</sup>
27.7	57.94 <sup>56</sup>	5.96 <sup>29</sup>	21.217 <sup>278</sup>	67.97 <sup>178</sup>	37.35 <sup>101</sup>	43.03 <sup>57</sup>	22.865 <sup>350</sup>	54.58 <sup>45</sup>
Aug. 6.6	58.44 <sup>50</sup>	6.77 <sup>81</sup>	21.469 <sup>282</sup>	69.59 <sup>162</sup>	38.29 <sup>94</sup>	44.16 <sup>113</sup>	23.186 <sup>321</sup>	54.60 <sup>2</sup>
16.6	58.89 <sup>45</sup>	8.11 <sup>184</sup>	21.692 <sup>228</sup>	71.02 <sup>143</sup>	39.11 <sup>82</sup>	45.81 <sup>168</sup>	23.472 <sup>286</sup>	55.10 <sup>50</sup>
26.6	59.27 <sup>38</sup>	9.93 <sup>182</sup>	21.883 <sup>161</sup>	72.21 <sup>119</sup>	39.81 <sup>70</sup>	47.94 <sup>228</sup>	23.713 <sup>241</sup>	56.04 <sup>94</sup>
Sept. 5.6	59.56 <sup>29</sup>	12.14 <sup>221</sup>	22.036 <sup>158</sup>	73.17 <sup>96</sup>	40.85 <sup>84</sup>	50.45 <sup>251</sup>	23.905 <sup>192</sup>	57.39 <sup>135</sup>
15.5	59.76 <sup>20</sup>	14.68 <sup>284</sup>	22.151 <sup>115</sup>	73.88 <sup>71</sup>	40.72 <sup>87</sup>	53.27 <sup>282</sup>	24.045 <sup>140</sup>	59.10 <sup>171</sup>
25.5	59.86 <sup>10</sup>	17.45 <sup>277</sup>	22.230 <sup>79</sup>	74.83 <sup>45</sup>	40.91 <sup>19</sup>	56.32 <sup>305</sup>	24.182 <sup>87</sup>	61.10 <sup>200</sup>
Oct. 5.5	59.87 <sup>1</sup>	20.35 <sup>200</sup>	22.274 <sup>44</sup>	74.55 <sup>22</sup>	40.90 <sup>1</sup>	59.45 <sup>313</sup>	24.165 <sup>33</sup>	63.31 <sup>221</sup>
15.4	59.79 <sup>8</sup>	23.27 <sup>302</sup>	22.284 <sup>10</sup>	74.55 <sup>0</sup>	40.72 <sup>18</sup>	62.55 <sup>310</sup>	24.149 <sup>16</sup>	65.63 <sup>222</sup>
25.4	59.79 <sup>17</sup>	26.07 <sup>290</sup>	22.284 <sup>19</sup>	74.55 <sup>19</sup>	40.72 <sup>37</sup>	62.55 <sup>294</sup>	24.149 <sup>61</sup>	65.63 <sup>224</sup>
Nov. 4.4	59.62 <sup>25</sup>	26.07 <sup>286</sup>	22.265 <sup>44</sup>	74.86 <sup>85</sup>	40.85 <sup>88</sup>	65.49 <sup>300</sup>	24.088 <sup>101</sup>	67.97 <sup>225</sup>
14.4	59.37 <sup>31</sup>	28.65 <sup>236</sup>	22.221 <sup>66</sup>	74.01 <sup>48</sup>	39.82 <sup>68</sup>	68.18 <sup>299</sup>	23.987 <sup>126</sup>	70.22 <sup>163</sup>
24.3	59.06 <sup>36</sup>	30.90 <sup>235</sup>	22.155 <sup>83</sup>	73.53 <sup>80</sup>	39.14 <sup>68</sup>	70.48 <sup>299</sup>	23.851 <sup>162</sup>	72.30 <sup>168</sup>
Dec. 4.3	58.70 <sup>41</sup>	32.73 <sup>183</sup>	22.072 <sup>83</sup>	72.94 <sup>88</sup>	38.36 <sup>78</sup>	72.29 <sup>181</sup>	23.689 <sup>162</sup>	74.13 <sup>153</sup>
14.3	58.29 <sup>36</sup>	34.09 <sup>136</sup>	21.975 <sup>97</sup>	72.25 <sup>69</sup>	37.48 <sup>69</sup>	73.59 <sup>139</sup>	23.507 <sup>162</sup>	75.64 <sup>151</sup>
24.3	57.87 <sup>42</sup>	34.89 <sup>99</sup>	21.867 <sup>198</sup>	71.53 <sup>73</sup>	36.56 <sup>92</sup>	73.59 <sup>98</sup>	23.507 <sup>197</sup>	75.64 <sup>114</sup>
34.2	57.44 <sup>43</sup>	35.13 <sup>24</sup>	21.753 <sup>114</sup>	70.78 <sup>75</sup>	35.61 <sup>85</sup>	74.34 <sup>6</sup>	23.109 <sup>201</sup>	76.78 <sup>70</sup>
34.2	57.01 <sup>48</sup>	34.76 <sup>37</sup>	21.636 <sup>117</sup>	70.02 <sup>76</sup>	34.67 <sup>94</sup>	73.78 <sup>56</sup>	22.987 <sup>202</sup>	77.75 <sup>27</sup>
Mean Place	54.919	40.44	18.059	48.00	34.208	77.27	20.052	85.06
Sec δ, Tan δ	2.397	-2.178	1.000	+0.028	4.695	-4.587	1.362	-0.924
D <sub>α</sub> , D <sub>δ</sub>	+0.057	+0.145	+0.061	-0.002	+0.050	+0.805	+0.050	+0.061
D <sub>β</sub> , D <sub>γ</sub>	+0.40	+0.07	+0.40	+0.09	+0.40	+0.09	+0.40	+0.10

FOR THE UPPER TRANSIT AT WASHINGTON.

Washington Mean Time.	12 Ceti. Mag. 6.0		18 Ceti. Mag. 5.2		♃ Cassiopeia. Mag. 3.7		♄ Andromeda. Mag. 4.4	
	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.
	h m 0 25	° ' " - 4 23	h m 0 31	° ' " - 4 1	h m 0 32	° ' " +53 27	h m 0 32	° ' " +33 16
Jan. 0.2	58.165	54.85	8.594	56.79	31.852	44.93	37.373	59.82
10.2	58.048 <sup>117</sup>	55.52 <sup>67</sup>	8.476 <sup>118</sup>	57.47 <sup>68</sup>	31.590 <sup>262</sup>	44.42 <sup>51</sup>	37.215 <sup>153</sup>	59.08 <sup>74</sup>
20.2	57.935 <sup>112</sup>	56.12 <sup>60</sup>	8.362 <sup>114</sup>	58.07 <sup>60</sup>	31.331 <sup>260</sup>	43.43 <sup>99</sup>	37.057 <sup>158</sup>	58.05 <sup>103</sup>
30.2	57.827 <sup>108</sup>	56.59 <sup>47</sup>	8.253 <sup>109</sup>	58.54 <sup>47</sup>	31.081 <sup>260</sup>	42.00 <sup>143</sup>	36.905 <sup>152</sup>	56.74 <sup>131</sup>
Feb. 9.1	57.731 <sup>96</sup>	56.89 <sup>30</sup>	8.154 <sup>98</sup>	58.87 <sup>30</sup>	30.855 <sup>226</sup>	40.17 <sup>183</sup>	36.768 <sup>137</sup>	55.23 <sup>151</sup>
19.1	57.655 <sup>86</sup>	57.04 <sup>15</sup>	8.072 <sup>83</sup>	59.04 <sup>17</sup>	30.662 <sup>198</sup>	38.02 <sup>215</sup>	36.652 <sup>116</sup>	53.55 <sup>168</sup>
29.1	57.599 <sup>86</sup>	57.01 <sup>8</sup>	8.013 <sup>89</sup>	59.03 <sup>1</sup>	30.515 <sup>147</sup>	35.65 <sup>287</sup>	36.566 <sup>86</sup>	51.80 <sup>175</sup>
Mar. 10.1	57.570 <sup>29</sup>	56.76 <sup>25</sup>	7.981 <sup>23</sup>	58.80 <sup>23</sup>	30.423 <sup>98</sup>	33.15 <sup>260</sup>	36.514 <sup>52</sup>	50.04 <sup>176</sup>
20.0	57.575 <sup>5</sup>	56.28 <sup>48</sup>	7.981 <sup>0</sup>	58.36 <sup>44</sup>	30.393 <sup>30</sup>	30.63 <sup>252</sup>	36.506 <sup>8</sup>	48.38 <sup>166</sup>
30.0	57.617 <sup>42</sup>	55.59 <sup>69</sup>	8.019 <sup>38</sup>	57.67 <sup>69</sup>	30.432 <sup>39</sup>	28.19 <sup>244</sup>	36.545 <sup>39</sup>	46.86 <sup>152</sup>
Apr. 9.0	57.697 <sup>80</sup>	54.63 <sup>96</sup>	8.019 <sup>76</sup>	57.67 <sup>91</sup>	30.432 <sup>108</sup>	28.19 <sup>286</sup>	36.545 <sup>89</sup>	46.86 <sup>128</sup>
18.9	57.820 <sup>128</sup>	53.44 <sup>119</sup>	8.094 <sup>118</sup>	56.76 <sup>117</sup>	30.540 <sup>180</sup>	25.93 <sup>197</sup>	36.634 <sup>140</sup>	45.58 <sup>99</sup>
28.9	57.982 <sup>192</sup>	52.02 <sup>142</sup>	8.213 <sup>159</sup>	55.59 <sup>188</sup>	30.720 <sup>246</sup>	23.96 <sup>162</sup>	36.774 <sup>189</sup>	44.59 <sup>65</sup>
May 8.9	58.182 <sup>200</sup>	50.42 <sup>180</sup>	8.372 <sup>197</sup>	54.21 <sup>160</sup>	30.966 <sup>307</sup>	22.34 <sup>121</sup>	36.963 <sup>233</sup>	43.94 <sup>27</sup>
18.9	58.418 <sup>236</sup>	48.63 <sup>179</sup>	8.569 <sup>221</sup>	52.61 <sup>177</sup>	31.273 <sup>359</sup>	21.13 <sup>75</sup>	37.196 <sup>274</sup>	43.67 <sup>12</sup>
28.8	58.681 <sup>263</sup>	46.71 <sup>192</sup>	8.800 <sup>262</sup>	50.84 <sup>190</sup>	31.632 <sup>403</sup>	20.38 <sup>27</sup>	37.470 <sup>307</sup>	43.79 <sup>50</sup>
June 7.8	58.966 <sup>285</sup>	44.71 <sup>200</sup>	9.062 <sup>284</sup>	48.94 <sup>198</sup>	32.035 <sup>434</sup>	20.11 <sup>22</sup>	37.777 <sup>331</sup>	44.29 <sup>90</sup>
17.8	59.268 <sup>302</sup>	42.67 <sup>204</sup>	9.346 <sup>301</sup>	46.96 <sup>203</sup>	32.469 <sup>454</sup>	29.33 <sup>71</sup>	38.108 <sup>349</sup>	45.19 <sup>126</sup>
27.8	59.576 <sup>308</sup>	40.66 <sup>201</sup>	9.647 <sup>309</sup>	44.93 <sup>208</sup>	32.923 <sup>460</sup>	21.04 <sup>117</sup>	38.457 <sup>354</sup>	46.45 <sup>159</sup>
July 7.7	59.881 <sup>296</sup>	38.73 <sup>198</sup>	9.954 <sup>306</sup>	42.90 <sup>195</sup>	33.383 <sup>455</sup>	22.21 <sup>161</sup>	38.811 <sup>350</sup>	48.04 <sup>186</sup>
17.7	60.177 <sup>280</sup>	36.98 <sup>184</sup>	10.262 <sup>296</sup>	40.95 <sup>181</sup>	33.838 <sup>438</sup>	23.82 <sup>199</sup>	39.161 <sup>339</sup>	49.90 <sup>210</sup>
27.7	60.457 <sup>268</sup>	35.29 <sup>164</sup>	10.566 <sup>283</sup>	39.14 <sup>164</sup>	34.276 <sup>412</sup>	25.81 <sup>232</sup>	39.500 <sup>320</sup>	52.00 <sup>228</sup>
Aug. 6.6	60.715 <sup>268</sup>	33.86 <sup>143</sup>	10.843 <sup>280</sup>	37.50 <sup>145</sup>	34.688 <sup>378</sup>	28.13 <sup>262</sup>	39.820 <sup>292</sup>	54.28 <sup>240</sup>
16.6	60.941 <sup>226</sup>	32.67 <sup>119</sup>	11.102 <sup>232</sup>	36.05 <sup>120</sup>	35.066 <sup>324</sup>	30.75 <sup>284</sup>	40.112 <sup>259</sup>	56.68 <sup>246</sup>
26.6	61.134 <sup>193</sup>	31.75 <sup>92</sup>	11.334 <sup>198</sup>	34.85 <sup>95</sup>	35.400 <sup>287</sup>	33.59 <sup>800</sup>	40.371 <sup>224</sup>	59.14 <sup>249</sup>
Sept. 5.6	61.298 <sup>189</sup>	31.10 <sup>65</sup>	11.532 <sup>163</sup>	33.90 <sup>66</sup>	35.687 <sup>233</sup>	36.59 <sup>309</sup>	40.595 <sup>184</sup>	61.63 <sup>245</sup>
15.5	61.412 <sup>110</sup>	31.10 <sup>36</sup>	11.695 <sup>126</sup>	33.24 <sup>39</sup>	35.929 <sup>180</sup>	39.68 <sup>813</sup>	40.779 <sup>143</sup>	64.08 <sup>236</sup>
25.5	61.497 <sup>85</sup>	30.74 <sup>10</sup>	11.821 <sup>90</sup>	32.85 <sup>12</sup>	36.109 <sup>126</sup>	42.81 <sup>810</sup>	40.922 <sup>102</sup>	66.44 <sup>225</sup>
Oct. 5.5	61.548 <sup>46</sup>	30.64 <sup>15</sup>	11.911 <sup>53</sup>	32.73 <sup>13</sup>	36.226 <sup>71</sup>	45.91 <sup>800</sup>	41.024 <sup>62</sup>	68.69 <sup>206</sup>
15.5	61.558 <sup>15</sup>	30.79 <sup>34</sup>	11.964 <sup>19</sup>	32.86 <sup>32</sup>	36.297 <sup>18</sup>	48.91 <sup>286</sup>	41.086 <sup>24</sup>	70.75 <sup>188</sup>
25.4	61.544 <sup>14</sup>	31.13 <sup>54</sup>	11.983 <sup>11</sup>	33.18 <sup>52</sup>	36.315 <sup>31</sup>	51.77 <sup>264</sup>	41.110 <sup>10</sup>	72.63 <sup>164</sup>
Nov. 4.4	61.544 <sup>43</sup>	31.67 <sup>65</sup>	11.972 <sup>36</sup>	33.70 <sup>67</sup>	36.284 <sup>78</sup>	54.41 <sup>239</sup>	41.100 <sup>41</sup>	74.27 <sup>139</sup>
14.4	61.501 <sup>65</sup>	32.32 <sup>77</sup>	11.936 <sup>59</sup>	34.37 <sup>75</sup>	36.206 <sup>123</sup>	56.80 <sup>305</sup>	41.059 <sup>71</sup>	75.66 <sup>110</sup>
24.3	61.436 <sup>81</sup>	33.09 <sup>83</sup>	11.877 <sup>93</sup>	35.12 <sup>82</sup>	36.084 <sup>162</sup>	58.85 <sup>167</sup>	40.988 <sup>95</sup>	76.76 <sup>80</sup>
Dec. 4.3	61.355 <sup>99</sup>	33.91 <sup>85</sup>	11.797 <sup>98</sup>	35.94 <sup>85</sup>	35.922 <sup>195</sup>	60.52 <sup>126</sup>	40.893 <sup>115</sup>	77.56 <sup>48</sup>
14.3	61.256 <sup>107</sup>	34.76 <sup>84</sup>	11.704 <sup>105</sup>	36.79 <sup>84</sup>	35.727 <sup>225</sup>	61.77 <sup>70</sup>	40.775 <sup>138</sup>	78.04 <sup>14</sup>
24.3	61.149 <sup>116</sup>	35.60 <sup>81</sup>	11.599 <sup>114</sup>	37.63 <sup>81</sup>	35.502 <sup>247</sup>	62.56 <sup>20</sup>	40.640 <sup>149</sup>	78.18 <sup>21</sup>
34.2	61.033 <sup>120</sup>	36.41 <sup>73</sup>	11.436 <sup>119</sup>	38.44 <sup>73</sup>	35.255 <sup>263</sup>	62.85 <sup>20</sup>	40.491 <sup>158</sup>	77.97 <sup>54</sup>
34.2	60.918 <sup>120</sup>	37.14 <sup>73</sup>	11.366 <sup>119</sup>	39.17 <sup>73</sup>	34.993 <sup>263</sup>	62.65 <sup>20</sup>	40.333 <sup>158</sup>	77.43 <sup>54</sup>
Mean Place	57.882	56.90	7.777	58.80	30.382	24.59	36.215	44.99
Sec δ, Tan δ	1.003	-0.077	1.002	-0.070	1.689	+1.350	1.196	+0.656
D <sub>α</sub> , D <sub>β</sub>	+0.061	+0.005	+0.061	+0.005	+0.066	-0.069	+0.064	-0.043
D <sub>γ</sub> , D <sub>δ</sub>	+0.40	+0.11	+0.39	+0.14	+0.39	+0.14	+0.39	+0.14

FOR THE UPPER TRANSIT AT WASHINGTON.

Washington Mean Time.	ε Andromedæ. Mag. 4.5		δ Andromedæ. Mag. 3.5		α Cassiopeiæ. (Schediv.) Var. 2.2-2.8		μ Phœnicis. Mag. 4.6	
	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.
	h m 0 34	° ' " +28 52	h m 0 35	° ' " +30 25	h m 0 35	° ' " +56 5	h m 0 37	° ' " -46 30
Jan. 0.2	20.572	52.61	3.901	37.57	59.015	78.55	33.205	99.09
10.2	20.425 <sup>147</sup>	51.85 <sup>76</sup>	3.752 <sup>149</sup>	36.83 <sup>74</sup>	58.729 <sup>266</sup>	76.12 <sup>43</sup>	32.981 <sup>224</sup>	99.12 <sup>3</sup>
20.2	20.278 <sup>147</sup>	50.85 <sup>100</sup>	3.601 <sup>151</sup>	35.82 <sup>101</sup>	58.443 <sup>260</sup>	75.19 <sup>98</sup>	32.764 <sup>217</sup>	98.67 <sup>45</sup>
30.2	20.137 <sup>141</sup>	49.61 <sup>124</sup>	3.457 <sup>144</sup>	34.57 <sup>125</sup>	58.169 <sup>274</sup>	73.77 <sup>142</sup>	32.562 <sup>202</sup>	97.75 <sup>92</sup>
Feb. 9.1	20.008 <sup>129</sup>	48.20 <sup>141</sup>	3.324 <sup>163</sup>	33.13 <sup>144</sup>	57.918 <sup>261</sup>	71.97 <sup>180</sup>	32.379 <sup>183</sup>	96.38 <sup>137</sup>
19.1	19.899 <sup>109</sup>	46.67 <sup>158</sup>	3.212 <sup>112</sup>	31.55 <sup>168</sup>	57.705 <sup>213</sup>	69.80 <sup>217</sup>	32.379 <sup>155</sup>	96.38 <sup>178</sup>
29.1	19.809 <sup>82</sup>	45.10 <sup>157</sup>	3.129 <sup>83</sup>	29.92 <sup>163</sup>	57.542 <sup>163</sup>	67.40 <sup>240</sup>	32.224 <sup>121</sup>	94.60 <sup>215</sup>
Mar. 10.1	19.817 <sup>49</sup>	43.54 <sup>156</sup>	3.079 <sup>50</sup>	28.30 <sup>162</sup>	57.542 <sup>108</sup>	64.84 <sup>256</sup>	32.103 <sup>83</sup>	92.45 <sup>247</sup>
20.0	19.768 <sup>8</sup>	42.08 <sup>146</sup>	3.070 <sup>9</sup>	26.77 <sup>153</sup>	57.434 <sup>40</sup>	62.25 <sup>269</sup>	32.020 <sup>38</sup>	89.98 <sup>272</sup>
30.0	19.760 <sup>36</sup>	40.79 <sup>129</sup>	3.070 <sup>37</sup>	25.41 <sup>186</sup>	57.394 <sup>82</sup>	59.71 <sup>264</sup>	31.982 <sup>11</sup>	87.26 <sup>294</sup>
Apr. 9.0	19.796 <sup>88</sup>	40.79 <sup>104</sup>	3.107 <sup>85</sup>	25.41 <sup>114</sup>	57.426 <sup>106</sup>	59.71 <sup>206</sup>	31.993 <sup>62</sup>	84.32 <sup>309</sup>
18.9	19.879	39.75 <sup>76</sup>	3.192	24.27 <sup>84</sup>	57.532	57.35	32.055	81.23
28.9	20.011 <sup>132</sup>	38.99 <sup>44</sup>	3.326 <sup>124</sup>	23.43 <sup>51</sup>	57.715 <sup>188</sup>	55.25 <sup>210</sup>	32.171 <sup>116</sup>	78.06 <sup>317</sup>
May 8.9	20.199 <sup>179</sup>	38.55 <sup>7</sup>	3.507 <sup>181</sup>	22.92 <sup>51</sup>	57.970 <sup>255</sup>	53.50 <sup>175</sup>	32.341 <sup>170</sup>	74.88 <sup>318</sup>
18.9	20.413 <sup>223</sup>	38.48 <sup>7</sup>	3.733 <sup>226</sup>	22.78 <sup>14</sup>	58.238 <sup>316</sup>	52.15 <sup>125</sup>	32.564 <sup>223</sup>	71.74 <sup>314</sup>
28.8	20.675 <sup>262</sup>	38.78 <sup>30</sup>	3.998 <sup>266</sup>	23.01 <sup>28</sup>	58.664 <sup>376</sup>	51.28 <sup>87</sup>	32.834 <sup>270</sup>	68.74 <sup>300</sup>
June 7.8	20.970 <sup>295</sup>	39.45 <sup>67</sup>	4.296 <sup>296</sup>	23.62 <sup>61</sup>	59.084 <sup>420</sup>	50.86 <sup>42</sup>	33.146 <sup>312</sup>	65.91 <sup>283</sup>
17.8	21.288 <sup>318</sup>	40.48 <sup>108</sup>	4.619 <sup>323</sup>	24.60 <sup>98</sup>	59.540 <sup>466</sup>	50.96 <sup>10</sup>	33.493 <sup>347</sup>	63.35 <sup>256</sup>
27.8	21.623 <sup>335</sup>	41.83 <sup>126</sup>	4.958 <sup>329</sup>	25.91 <sup>121</sup>	60.016 <sup>478</sup>	51.54 <sup>58</sup>	33.866 <sup>373</sup>	61.11 <sup>224</sup>
July 7.7	21.964 <sup>341</sup>	43.47 <sup>164</sup>	5.304 <sup>345</sup>	27.52 <sup>161</sup>	60.502 <sup>486</sup>	52.60 <sup>106</sup>	34.255 <sup>389</sup>	59.22 <sup>189</sup>
17.7	22.303 <sup>360</sup>	45.35 <sup>188</sup>	5.647 <sup>343</sup>	29.38 <sup>186</sup>	60.983 <sup>481</sup>	54.13 <sup>153</sup>	34.649 <sup>394</sup>	57.78 <sup>144</sup>
27.7	22.631 <sup>328</sup>	47.44 <sup>209</sup>	5.980 <sup>333</sup>	31.46 <sup>208</sup>	61.447 <sup>494</sup>	56.04 <sup>191</sup>	35.037 <sup>398</sup>	56.82 <sup>96</sup>
Aug. 6.6	22.940 <sup>309</sup>	49.66 <sup>222</sup>	6.293 <sup>313</sup>	33.71 <sup>225</sup>	61.855 <sup>428</sup>	58.32 <sup>226</sup>	35.037 <sup>373</sup>	56.82 <sup>48</sup>
16.6	23.224 <sup>284</sup>	51.97 <sup>231</sup>	6.584 <sup>201</sup>	36.04 <sup>263</sup>	62.286 <sup>401</sup>	60.93 <sup>261</sup>	35.410 <sup>348</sup>	56.34 <sup>3</sup>
26.6	23.477 <sup>263</sup>	54.31 <sup>234</sup>	6.840 <sup>256</sup>	38.42 <sup>228</sup>	62.643 <sup>357</sup>	63.76 <sup>268</sup>	35.756 <sup>310</sup>	56.37 <sup>52</sup>
Sept. 5.6	23.693 <sup>216</sup>	56.63 <sup>232</sup>	7.061 <sup>221</sup>	40.79 <sup>237</sup>	62.959 <sup>307</sup>	66.77 <sup>301</sup>	36.066 <sup>268</sup>	56.89 <sup>100</sup>
15.5	23.872 <sup>179</sup>	58.89 <sup>226</sup>	7.244 <sup>183</sup>	42.12 <sup>223</sup>	63.261 <sup>261</sup>	68.77 <sup>315</sup>	36.334 <sup>219</sup>	57.89 <sup>143</sup>
25.5	24.013 <sup>141</sup>	61.03 <sup>214</sup>	7.489 <sup>142</sup>	43.33 <sup>221</sup>	63.201 <sup>198</sup>	69.92 <sup>319</sup>	36.558 <sup>165</sup>	59.32 <sup>182</sup>
Oct. 5.5	24.113 <sup>100</sup>	63.03 <sup>200</sup>	7.886 <sup>103</sup>	45.33 <sup>209</sup>	63.369 <sup>138</sup>	73.11 <sup>319</sup>	36.718 <sup>109</sup>	61.14 <sup>213</sup>
15.5	24.175 <sup>62</sup>	64.86 <sup>183</sup>	7.489 <sup>66</sup>	47.42 <sup>192</sup>	63.537 <sup>80</sup>	76.28 <sup>317</sup>	36.827 <sup>52</sup>	63.27 <sup>235</sup>
25.4	24.201 <sup>6</sup>	66.48 <sup>162</sup>	7.555 <sup>27</sup>	49.34 <sup>171</sup>	63.817 <sup>22</sup>	79.38 <sup>206</sup>	36.879 <sup>2</sup>	65.62 <sup>248</sup>
Nov. 4.4	24.195 <sup>26</sup>	67.88 <sup>140</sup>	7.582 <sup>5</sup>	51.05 <sup>148</sup>	63.639 <sup>31</sup>	82.34 <sup>279</sup>	36.877 <sup>52</sup>	68.10 <sup>251</sup>
14.4	24.195 <sup>88</sup>	67.88 <sup>114</sup>	7.577 <sup>87</sup>	52.53 <sup>124</sup>	63.808 <sup>80</sup>	85.13 <sup>249</sup>	36.825 <sup>98</sup>	70.61 <sup>246</sup>
24.3	24.157 <sup>64</sup>	69.02 <sup>88</sup>	7.540 <sup>64</sup>	53.77 <sup>96</sup>	63.528 <sup>170</sup>	87.62 <sup>219</sup>	36.727 <sup>136</sup>	73.07 <sup>227</sup>
Dec. 4.3	24.093 <sup>87</sup>	69.90 <sup>59</sup>	7.476 <sup>88</sup>	54.73 <sup>67</sup>	63.398 <sup>130</sup>	89.81 <sup>179</sup>	36.591 <sup>169</sup>	75.34 <sup>201</sup>
14.3	24.006 <sup>108</sup>	70.49 <sup>30</sup>	7.388 <sup>109</sup>	55.40 <sup>126</sup>	63.224 <sup>210</sup>	91.60 <sup>91</sup>	36.422 <sup>103</sup>	77.35 <sup>106</sup>
24.3	23.898 <sup>125</sup>	70.79 <sup>1</sup>	7.279 <sup>126</sup>	55.78 <sup>5</sup>	63.014 <sup>242</sup>	92.99 <sup>91</sup>	36.229 <sup>213</sup>	79.01 <sup>126</sup>
34.2	23.773 <sup>138</sup>	70.80 <sup>20</sup>	7.153 <sup>140</sup>	55.83 <sup>24</sup>	62.772 <sup>265</sup>	93.90 <sup>20</sup>	36.016 <sup>222</sup>	80.27 <sup>83</sup>
Mean Place	19.449	39.24	2.757	23.71	57.439	55.71	32.799	87.94
Sec δ, Tan δ	1.142	+0.552	1.169	+0.587	1.793	+1.488	1.453	-1.055
D <sub>α</sub> , D <sub>αα</sub>	+0.063	-0.036	+0.064	-0.039	+0.067	-0.098	+0.057	+0.069
D <sub>δ</sub> , D <sub>δδ</sub>	+0.39	+0.15	+0.39	+0.15	+0.39	+0.16	+0.39	+0.16

# APPARENT PLACES OF STARS, 1920.

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FOR THE UPPER TRANSIT AT WASHINGTON.

Washington Mean Time.	β Ceti. Mag. 2.2		ο Cassiopeia. Mag. 4.7		δ1 Cassiopeia. Mag. 5.6		γ Andromeda. Mag. 4.3	
	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.
	h m 0 39	° ' "	h m 0 40	° ' "	h m 0 40	° ' "	h m 0 43	° ' "
		-18 25		+47 50		+74 32		+23 49
Jan. 0.3	35.229	34.67	17.055	67.23	22.95	87.60	6.807	67.43
10.2	35.095 <sup>134</sup>	35.22 <sup>55</sup>	16.835 <sup>220</sup>	66.73 <sup>80</sup>	22.24 <sup>71</sup>	87.58 <sup>2</sup>	6.671 <sup>136</sup>	66.70 <sup>73</sup>
20.2	34.964 <sup>131</sup>	35.54 <sup>32</sup>	16.612 <sup>223</sup>	65.78 <sup>96</sup>	21.53 <sup>71</sup>	86.96 <sup>62</sup>	6.532 <sup>139</sup>	65.77 <sup>93</sup>
30.2	34.841 <sup>123</sup>	35.57 <sup>3</sup>	16.397 <sup>215</sup>	64.43 <sup>136</sup>	20.86 <sup>67</sup>	85.75 <sup>121</sup>	6.397 <sup>135</sup>	64.67 <sup>110</sup>
Feb. 9.1	34.729 <sup>112</sup>	35.35 <sup>22</sup>	16.200 <sup>197</sup>	62.72 <sup>171</sup>	20.23 <sup>63</sup>	83.99 <sup>178</sup>	6.273 <sup>124</sup>	63.43 <sup>124</sup>
19.1	34.631 <sup>98</sup>	34.84 <sup>51</sup>	16.031 <sup>169</sup>	60.74 <sup>198</sup>	19.70 <sup>53</sup>	81.77 <sup>222</sup>	6.165 <sup>108</sup>	62.12 <sup>131</sup>
29.1	34.558 <sup>73</sup>	34.06 <sup>78</sup>	15.899 <sup>132</sup>	58.55 <sup>219</sup>	19.28 <sup>42</sup>	79.17 <sup>260</sup>	6.082 <sup>83</sup>	60.79 <sup>133</sup>
Mar. 10.1	34.511 <sup>47</sup>	33.03 <sup>108</sup>	15.812 <sup>87</sup>	56.26 <sup>239</sup>	18.98 <sup>30</sup>	76.31 <sup>266</sup>	6.029 <sup>53</sup>	59.50 <sup>129</sup>
20.0	34.499 <sup>12</sup>	31.75 <sup>126</sup>	15.780 <sup>32</sup>	53.96 <sup>230</sup>	18.82 <sup>16</sup>	73.30 <sup>301</sup>	6.014 <sup>15</sup>	58.34 <sup>116</sup>
30.0	34.523 <sup>24</sup>	30.22 <sup>153</sup>	15.808 <sup>28</sup>	51.75 <sup>221</sup>	18.83 <sup>1</sup>	70.27 <sup>303</sup>	6.041 <sup>27</sup>	57.34 <sup>100</sup>
Apr. 9.0	34.589 <sup>66</sup>	28.47 <sup>175</sup>	15.900 <sup>92</sup>	49.73 <sup>202</sup>	18.98 <sup>15</sup>	67.23 <sup>294</sup>	6.113 <sup>72</sup>	56.57 <sup>77</sup>
19.0	34.696 <sup>107</sup>	26.51 <sup>196</sup>	16.053 <sup>153</sup>	47.98 <sup>125</sup>	19.29 <sup>31</sup>	64.59 <sup>374</sup>	6.232 <sup>119</sup>	56.07 <sup>50</sup>
28.9	34.846 <sup>150</sup>	24.38 <sup>213</sup>	16.267 <sup>214</sup>	46.56 <sup>142</sup>	19.74 <sup>45</sup>	62.16 <sup>243</sup>	6.397 <sup>165</sup>	55.89 <sup>18</sup>
May 8.9	35.034 <sup>188</sup>	22.15 <sup>233</sup>	16.538 <sup>271</sup>	45.54 <sup>102</sup>	20.33 <sup>59</sup>	60.13 <sup>203</sup>	6.605 <sup>208</sup>	56.05 <sup>16</sup>
18.9	35.263 <sup>229</sup>	19.84 <sup>231</sup>	16.858 <sup>320</sup>	44.95 <sup>69</sup>	21.03 <sup>70</sup>	58.55 <sup>158</sup>	6.852 <sup>247</sup>	56.53 <sup>48</sup>
28.8	35.523 <sup>259</sup>	17.50 <sup>234</sup>	17.218 <sup>360</sup>	44.82 <sup>13</sup>	21.81 <sup>78</sup>	57.48 <sup>107</sup>	6.852 <sup>279</sup>	56.53 <sup>83</sup>
June 7.8	35.808 <sup>286</sup>	15.21 <sup>239</sup>	17.609 <sup>391</sup>	45.15 <sup>33</sup>	22.66 <sup>85</sup>	56.95 <sup>53</sup>	7.131 <sup>305</sup>	57.36 <sup>115</sup>
17.8	36.111 <sup>303</sup>	13.02 <sup>219</sup>	18.019 <sup>410</sup>	45.94 <sup>79</sup>	23.55 <sup>89</sup>	56.97 <sup>2</sup>	7.436 <sup>305</sup>	58.51 <sup>142</sup>
27.8	36.426 <sup>315</sup>	10.94 <sup>206</sup>	18.438 <sup>419</sup>	47.15 <sup>121</sup>	24.47 <sup>92</sup>	57.54 <sup>57</sup>	7.757 <sup>321</sup>	59.93 <sup>168</sup>
July 7.7	36.742 <sup>316</sup>	9.10 <sup>184</sup>	18.855 <sup>417</sup>	48.76 <sup>161</sup>	25.37 <sup>90</sup>	58.63 <sup>109</sup>	8.086 <sup>329</sup>	61.61 <sup>187</sup>
17.7	37.053 <sup>311</sup>	7.51 <sup>159</sup>	19.258 <sup>403</sup>	50.73 <sup>197</sup>	26.25 <sup>88</sup>	60.23 <sup>160</sup>	8.416 <sup>321</sup>	63.48 <sup>202</sup>
27.7	37.347 <sup>294</sup>	6.21 <sup>130</sup>	19.640 <sup>382</sup>	52.99 <sup>226</sup>	27.08 <sup>83</sup>	62.29 <sup>206</sup>	8.737 <sup>321</sup>	65.50 <sup>213</sup>
Aug. 6.7	37.622 <sup>275</sup>	5.21 <sup>100</sup>	19.990 <sup>350</sup>	55.50 <sup>251</sup>	27.84 <sup>76</sup>	64.77 <sup>248</sup>	9.040 <sup>303</sup>	67.63 <sup>217</sup>
16.6	37.867 <sup>245</sup>	4.59 <sup>62</sup>	20.304 <sup>314</sup>	58.20 <sup>270</sup>	28.74 <sup>68</sup>	67.59 <sup>282</sup>	9.322 <sup>282</sup>	69.80 <sup>217</sup>
26.6	38.079 <sup>212</sup>	4.32 <sup>27</sup>	20.575 <sup>271</sup>	61.04 <sup>284</sup>	28.52 <sup>59</sup>	70.72 <sup>813</sup>	9.574 <sup>218</sup>	71.97 <sup>210</sup>
Sept. 5.6	38.257 <sup>178</sup>	4.40 <sup>8</sup>	20.801 <sup>226</sup>	63.94 <sup>290</sup>	29.11 <sup>47</sup>	74.08 <sup>336</sup>	9.792 <sup>184</sup>	74.07 <sup>202</sup>
15.5	38.393 <sup>136</sup>	4.40 <sup>42</sup>	20.801 <sup>177</sup>	63.94 <sup>292</sup>	29.58 <sup>38</sup>	74.08 <sup>352</sup>	9.976 <sup>146</sup>	76.09 <sup>189</sup>
25.5	38.492 <sup>99</sup>	4.82 <sup>70</sup>	20.978 <sup>130</sup>	66.88 <sup>287</sup>	29.96 <sup>25</sup>	77.60 <sup>361</sup>	10.122 <sup>108</sup>	77.98 <sup>173</sup>
Oct. 5.5	38.551 <sup>59</sup>	5.52 <sup>98</sup>	21.108 <sup>80</sup>	69.73 <sup>277</sup>	30.21 <sup>14</sup>	81.21 <sup>362</sup>	10.230 <sup>71</sup>	79.71 <sup>154</sup>
15.5	38.574 <sup>23</sup>	6.50 <sup>119</sup>	21.188 <sup>34</sup>	72.50 <sup>261</sup>	30.35 <sup>1</sup>	84.83 <sup>355</sup>	10.301 <sup>36</sup>	81.25 <sup>134</sup>
25.4	38.563 <sup>11</sup>	7.69 <sup>129</sup>	21.222 <sup>11</sup>	75.11 <sup>241</sup>	30.36 <sup>11</sup>	88.38 <sup>342</sup>	10.337 <sup>5</sup>	82.59 <sup>111</sup>
Nov. 4.4	38.563 <sup>40</sup>	8.98 <sup>141</sup>	21.211 <sup>52</sup>	77.52 <sup>214</sup>	30.25 <sup>21</sup>	91.80 <sup>320</sup>	10.342 <sup>25</sup>	83.70 <sup>89</sup>
14.4	38.523 <sup>66</sup>	10.39 <sup>141</sup>	21.159 <sup>90</sup>	79.66 <sup>185</sup>	30.04 <sup>33</sup>	95.00 <sup>289</sup>	10.317 <sup>60</sup>	84.59 <sup>64</sup>
24.4	38.457 <sup>86</sup>	11.80 <sup>137</sup>	21.069 <sup>126</sup>	81.51 <sup>149</sup>	29.71 <sup>44</sup>	97.89 <sup>251</sup>	10.267 <sup>75</sup>	85.23 <sup>40</sup>
Dec. 4.3	38.371 <sup>106</sup>	13.17 <sup>126</sup>	20.943 <sup>157</sup>	83.00 <sup>110</sup>	29.27 <sup>53</sup>	100.40 <sup>205</sup>	10.192 <sup>95</sup>	85.63 <sup>14</sup>
14.3	38.265 <sup>119</sup>	14.43 <sup>113</sup>	20.786 <sup>183</sup>	84.10 <sup>67</sup>	28.74 <sup>60</sup>	102.45 <sup>154</sup>	10.097 <sup>113</sup>	85.77 <sup>10</sup>
24.3	38.146 <sup>126</sup>	15.56 <sup>94</sup>	20.603 <sup>205</sup>	84.77 <sup>23</sup>	28.14 <sup>66</sup>	103.99 <sup>96</sup>	9.984 <sup>125</sup>	85.67 <sup>36</sup>
34.2	38.020 <sup>132</sup>	16.50 <sup>69</sup>	20.398 <sup>219</sup>	85.00 <sup>24</sup>	27.48 <sup>70</sup>	104.95 <sup>37</sup>	9.859 <sup>136</sup>	85.31 <sup>60</sup>
34.2	37.888 <sup>132</sup>	17.19 <sup>69</sup>	20.179 <sup>219</sup>	84.76 <sup>24</sup>	26.78 <sup>70</sup>	105.32 <sup>37</sup>	9.723 <sup>136</sup>	84.71 <sup>60</sup>
Mean Place	34.481	31.48	15.615	48.48	20.245	63.78	5.673	55.98
Sec δ, Tan δ	1.054	-0.333	1.490	+1.105	3.755	+3.620	1.093	+0.442
D <sub>α</sub> , D <sub>ωα</sub>	+0.060	+0.022	+0.066	-0.073	+0.078	-0.238	+0.063	-0.029
D <sub>δ</sub> , D <sub>ωδ</sub>	+0.39	+0.17	+0.39	+0.17	+0.39	+0.18	+0.39	+0.19

FOR THE UPPER TRANSIT AT WASHINGTON.

Washington Mean Time.	γ Cassiopeie. Mag. 3.6		δ Piscium. Mag. 4.6		λ Hydr. Mag. 5.0		20 Ceti. Mag. 4.9	
	Right Ascension.	Declination.	Right Ascension.	Declination.	Right Ascension.	Declination.	Right Ascension.	Declination.
	h m 0 44	° ' " +57 23	h m 0 44	° ' " + 7 8	h m 0 45	° ' " -75 20	h m 0 48	° ' " - 1 34
	s	"	s	"	s	"	s	"
Jan. 0.3	16.759	53.97	32.791	65.45	48.88	106.40	56.011	39.37
10.2	16.465 <sup>294</sup>	53.66 31	32.672 <sup>119</sup>	64.70 75	48.08 <sup>80</sup>	105.85 55	55.892 <sup>119</sup>	40.08 71
20.2	16.168 <sup>297</sup>	52.82 84	32.551 <sup>121</sup>	63.93 77	47.31 <sup>77</sup>	104.70 115	55.771 <sup>121</sup>	40.73 65
30.2	15.880 <sup>288</sup>	51.51 181	32.435 <sup>116</sup>	63.16 77	46.58 <sup>73</sup>	102.99 171	55.654 <sup>117</sup>	41.28 55
Feb. 9.1	15.616 <sup>264</sup>	49.77 174	32.326 <sup>109</sup>	62.42 74	45.93 <sup>65</sup>	100.76 223	55.544 <sup>110</sup>	41.72 44
	229	212	94	66	57	260	96	28
19.1	15.387	47.65	32.232	61.76	45.36	98.07	55.448	42.00
29.1	15.205 <sup>182</sup>	45.27 238	32.160 <sup>72</sup>	61.20 56	44.89 <sup>47</sup>	95.01 306	55.373 <sup>75</sup>	42.12 12
Mar. 10.1	15.082 <sup>123</sup>	42.70 257	32.113 <sup>47</sup>	60.78 42	44.54 <sup>35</sup>	91.66 335	55.324 <sup>48</sup>	42.05 7
20.0	15.028 <sup>54</sup>	40.08 262	32.100 <sup>18</sup>	60.56 22	44.31 <sup>23</sup>	88.07 359	55.306 <sup>19</sup>	41.76 29
30.0	15.048 <sup>20</sup>	37.50 258	32.125 <sup>25</sup>	60.55 1	44.20 <sup>11</sup>	84.36 371	55.325 <sup>19</sup>	41.24 52
	100	245	66	23	4	378	59	76
Apr. 9.0	15.148	35.05	32.191	60.78	44.24	80.58	55.384	40.48
19.0	15.325 <sup>177</sup>	32.86 219	32.299 <sup>108</sup>	61.26 48	44.40 <sup>16</sup>	76.83 375	55.484 <sup>100</sup>	39.48 100
28.9	15.576 <sup>251</sup>	30.99 187	32.449 <sup>150</sup>	62.02 76	44.70 <sup>30</sup>	73.19 364	55.625 <sup>141</sup>	38.24 124
May 8.9	15.898 <sup>322</sup>	29.52 147	32.638 <sup>189</sup>	63.04 102	45.12 <sup>42</sup>	69.75 344	55.807 <sup>182</sup>	36.79 145
18.9	16.280 <sup>382</sup>	28.49 103	32.865 <sup>227</sup>	64.31 127	45.67 <sup>55</sup>	66.56 319	56.026 <sup>219</sup>	35.14 165
	430	55	258	148	65	285	251	181
28.8	16.710	27.94	33.123	65.79	46.32	63.71	56.277	33.33
June 7.8	17.177 <sup>467</sup>	27.88 6	33.406 <sup>283</sup>	67.47 168	47.06 <sup>74</sup>	61.26 245	56.553 <sup>276</sup>	31.41 192
17.8	17.671 <sup>494</sup>	28.33 45	33.706 <sup>300</sup>	69.29 182	47.87 <sup>81</sup>	59.27 199	56.848 <sup>285</sup>	29.42 139
27.8	18.175 <sup>504</sup>	29.26 93	34.015 <sup>309</sup>	71.20 191	48.74 <sup>87</sup>	57.79 148	57.154 <sup>306</sup>	27.42 200
July 7.7	18.676 <sup>501</sup>	30.65 139	34.325 <sup>310</sup>	73.15 195	49.63 <sup>89</sup>	56.87 92	57.461 <sup>307</sup>	25.47 196
	484	181	302	194	90	36	299	186
17.7	19.160	32.46	34.627	75.09	50.53	56.51	57.760	23.61
27.7	19.621 <sup>461</sup>	34.63 217	34.916 <sup>289</sup>	76.98 189	51.40 <sup>87</sup>	56.73 22	58.047 <sup>287</sup>	21.90 171
Aug. 6.7	20.046 <sup>425</sup>	37.13 250	35.182 <sup>266</sup>	78.76 178	52.22 <sup>82</sup>	57.53 80	58.314 <sup>267</sup>	20.37 133
16.6	20.428 <sup>382</sup>	39.89 276	35.422 <sup>240</sup>	80.38 162	52.96 <sup>74</sup>	58.89 136	58.556 <sup>242</sup>	19.05 132
26.6	20.760 <sup>332</sup>	42.84 295	35.630 <sup>208</sup>	81.83 145	53.61 <sup>65</sup>	60.76 187	58.767 <sup>177</sup>	17.99 106
	276	310	175	123	52	231	211	79
Sept. 5.6	21.036	45.94	35.805	83.06	54.13	63.07	58.944	17.20
15.5	21.255 <sup>219</sup>	49.11 817	35.945 <sup>140</sup>	84.08 102	54.52 <sup>89</sup>	65.76 269	59.086 <sup>142</sup>	16.66 54
25.5	21.415 <sup>160</sup>	52.29 318	36.048 <sup>103</sup>	84.86 78	54.76 <sup>24</sup>	68.71 295	59.192 <sup>106</sup>	16.40 26
Oct. 5.5	21.517 <sup>102</sup>	55.42 313	36.116 <sup>68</sup>	85.41 55	54.83 <sup>7</sup>	71.82 311	59.263 <sup>71</sup>	16.38 2
15.5	21.559 <sup>42</sup>	58.42 300	36.151 <sup>35</sup>	85.73 32	54.75 <sup>8</sup>	74.98 316	59.300 <sup>87</sup>	16.59 21
	13	282	6	13	23	308	8	40
25.4	21.546	61.24	36.157	85.86	54.52	78.06	59.308	16.99
Nov. 4.4	21.479 <sup>67</sup>	63.82 258	36.134 <sup>23</sup>	85.80 6	54.15 <sup>37</sup>	80.95 289	59.286 <sup>22</sup>	17.54 55
14.4	21.361 <sup>118</sup>	66.08 226	36.089 <sup>45</sup>	85.56 24	53.63 <sup>52</sup>	83.51 256	59.242 <sup>44</sup>	18.23 69
24.4	21.197 <sup>164</sup>	67.99 191	36.022 <sup>67</sup>	85.19 37	53.02 <sup>61</sup>	85.66 215	59.176 <sup>66</sup>	18.98 75
Dec. 4.3	20.991 <sup>206</sup>	69.47 148	35.938 <sup>84</sup>	84.70 49	52.32 <sup>70</sup>	87.31 165	59.093 <sup>88</sup>	19.78 50
	241	103	99	59	76	108	98	82
14.3	20.750	70.50	35.839	84.11	51.56	88.39	58.995	20.60
24.3	20.479 <sup>271</sup>	71.02 52	35.729 <sup>110</sup>	83.42 69	50.77 <sup>79</sup>	88.86 47	58.885 <sup>110</sup>	21.41 81
34.2	20.189 <sup>290</sup>	71.01 1	35.610 <sup>119</sup>	82.69 73	49.96 <sup>81</sup>	88.72 14	58.766 <sup>119</sup>	22.18 77
Mean Place	15.039	33.14	31.803	59.86	49.557	90.64	55.069	41.70
Sec δ, Tan δ	1.856	+1.564	1.008	+0.125	3.955	-3.827	1.000	-0.028
D <sub>γδ</sub> , D <sub>ωδ</sub>	+0.069	-0.102	+0.062	-0.006	+0.041	+0.250	+0.061	+0.002
D <sub>γδ</sub> , D <sub>ωδ</sub>	+0.39	+0.19	+0.39	+0.19	+0.39	+0.20	+0.39	+0.21



# APPARENT PLACES OF STARS, 1920.

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FOR THE UPPER TRANSIT AT WASHINGTON.

Washington Mean Time.	γ Cassiopeia. Mag. 2.2		μ Andromedæ. Mag. 3.9		α Sculptoris. Mag. 4.4		ε Piscium. Mag. 4.4	
	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.
	h m ° 51	° 16	h m ° 52	+88 3	h m ° 54	-29 46	h m ° 58	+ 7 27
	s	"	s	"	s	"	s	"
Jan. 0.3	53.96	83.00	19.811	72.09	45.770	90.52	48.444	40.22
10.2	53.63	82.84	19.638	71.58	45.612	91.01	48.323	39.50
20.2	53.29	82.15	19.461	70.70	45.454	91.14	48.199	38.76
30.2	52.96	80.93	19.286	69.52	45.300	90.90	48.075	38.00
Feb. 9.2	52.65	79.27	19.123	68.05	45.159	90.30	47.957	37.28
19.1	52.38	77.21	18.979	66.37	45.034	89.35	47.853	36.63
29.1	52.16	74.85	18.864	64.55	44.932	88.08	47.769	36.08
Mar. 10.1	52.01	72.27	18.785	62.67	44.857	86.47	47.710	35.64
20.0	51.93	69.60	18.753	60.80	44.818	84.61	47.682	35.40
30.0	51.93	66.93	18.769	59.05	44.819	82.48	47.694	35.38
Apr. 9.0	52.02	64.58	18.838	57.49	44.862	80.15	47.746	35.57
19.0	52.19	62.06	18.960	56.18	44.953	77.63	47.840	36.03
28.9	52.44	60.05	19.137	55.21	45.068	74.99	47.979	36.72
May 8.9	52.77	58.43	19.366	54.59	45.267	72.29	48.156	37.71
18.9	53.17	57.22	19.637	54.36	45.489	69.59	48.372	38.93
28.9	53.62	56.49	19.945	54.52	45.746	66.93	48.622	40.35
June 7.8	54.11	56.26	20.284	55.08	46.035	64.40	48.898	41.98
17.8	54.63	56.53	20.643	56.05	46.347	62.04	49.190	43.76
27.8	55.16	57.31	21.012	57.35	46.675	59.92	49.496	45.61
July 7.7	55.70	58.56	21.384	58.99	47.008	58.10	49.807	47.53
17.7	56.22	60.24	21.744	60.91	47.338	56.64	50.112	49.44
27.7	56.72	62.31	22.089	63.07	47.656	55.55	50.405	51.32
Aug. 6.7	57.18	64.75	22.409	65.39	47.955	54.88	50.678	53.08
16.6	57.59	67.46	22.700	67.85	48.226	54.63	50.925	54.70
26.6	57.96	70.41	22.953	70.37	48.465	54.82	51.147	56.14
Sept. 5.6	58.26	73.52	23.168	72.92	48.666	55.43	51.332	57.40
15.6	58.51	76.73	23.343	75.42	48.825	56.41	51.487	58.41
25.5	58.69	79.99	23.476	77.84	48.942	57.72	51.603	59.20
Oct. 5.5	58.81	83.23	23.568	80.14	49.017	59.32	51.687	59.76
15.5	58.87	86.37	23.617	82.27	49.051	61.11	51.736	60.11
25.4	58.86	89.34	23.631	84.18	49.046	63.04	51.757	60.23
Nov. 4.4	58.80	92.08	23.610	85.88	49.005	65.00	51.750	60.16
14.4	58.67	94.54	23.553	87.29	48.934	66.91	51.715	59.96
24.4	58.50	96.63	23.469	88.41	48.837	68.71	51.657	59.61
Dec. 4.3	58.27	98.30	23.356	89.18	48.718	70.32	51.581	59.12
14.3	58.00	99.51	23.222	89.62	48.583	71.67	51.487	58.54
24.3	57.70	100.22	23.067	89.69	48.433	72.72	51.379	57.90
34.3	57.38	100.39	22.896	89.37	48.275	73.44	51.261	57.18
Mean Place	52.033	61.83	18.427	56.47	45.040	83.31	47.365	34.99
Sec δ, Tan δ	2.018	+1.752	1.270	+0.783	1.152	-0.572	1.009	+0.131
D <sub>γ</sub> α, D <sub>α</sub> α	+0.072	-0.114	+0.066	-0.051	+0.058	+0.037	+0.062	-0.008
D <sub>γ</sub> δ, D <sub>α</sub> δ	+0.39	+0.22	+0.39	+0.23	+0.39	+0.24	+0.38	+0.25

FOR THE UPPER TRANSIT AT WASHINGTON.

Washington Mean Time.	$\beta$ Phœnicis. Mag. 3.4		$\mu$ Cassiopeia. Mag. 5.3		$\gamma$ Ceti. Mag. 3.6		$\beta$ Andromedæ. Mag. 2.4	
	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.
	h m 1 2	° ' " -47 8	h m 1 2	° ' " +54 31	h m 1 4	° ' " -10 35	h m 1 5	° ' " +35 11
Jan. 0.3	31.426 <sup>236</sup>	62.17 29	57.978 <sup>255</sup>	62.46 18	34.871 <sup>125</sup>	82.57 72	16.262 <sup>162</sup>	62.52 46
10.2	31.190 <sup>234</sup>	62.46 21	57.723 <sup>264</sup>	62.28 08	34.746 <sup>128</sup>	83.29 55	16.100 <sup>168</sup>	62.06 70
20.2	30.956 <sup>227</sup>	62.25 70	57.459 <sup>261</sup>	61.60 115	34.618 <sup>126</sup>	83.84 26	15.932 <sup>169</sup>	61.27 108
30.2	30.729 <sup>211</sup>	61.55 116	57.198 <sup>247</sup>	60.45 158	34.490 <sup>122</sup>	84.20 13	15.763 <sup>163</sup>	60.19 134
Feb. 9.2	30.518 <sup>188</sup>	60.39 161	56.951 <sup>220</sup>	58.87 193	34.368 <sup>109</sup>	84.38 7	15.600 <sup>144</sup>	58.25 153
19.1	30.330 <sup>158</sup>	58.78 201	56.731 <sup>181</sup>	56.94 222	34.259 <sup>91</sup>	84.26 32	15.456 <sup>121</sup>	57.32 167
29.1	30.172 <sup>121</sup>	56.77 236	56.550 <sup>129</sup>	54.72 241	34.168 <sup>65</sup>	83.94 54	15.335 <sup>87</sup>	55.65 172
Mar. 10.1	30.051 <sup>78</sup>	54.41 265	56.421 <sup>69</sup>	52.31 250	34.103 <sup>35</sup>	83.40 80	15.248 <sup>44</sup>	53.93 169
20.0	29.973 <sup>30</sup>	51.76 291	56.352 <sup>0</sup>	49.81 249	34.068 <sup>1</sup>	82.60 103	15.204 <sup>1</sup>	52.24 160
30.0	29.943 <sup>22</sup>	48.85 309	56.352 <sup>71</sup>	47.32 238	34.067 <sup>40</sup>	81.57 139	15.205 <sup>51</sup>	50.64 142
Apr. 9.0	29.965 <sup>80</sup>	45.76 330	56.423 <sup>146</sup>	44.94 216	34.107 <sup>83</sup>	80.28 150	15.266 <sup>107</sup>	49.22 119
19.0	30.045 <sup>134</sup>	42.56 326	56.569 <sup>217</sup>	42.78 198	34.190 <sup>125</sup>	78.78 171	15.363 <sup>157</sup>	48.03 93
28.9	30.179 <sup>191</sup>	39.30 325	56.786 <sup>152</sup>	40.90 188	34.315 <sup>167</sup>	77.07 186	15.520 <sup>207</sup>	47.15 57
May 8.9	30.370 <sup>241</sup>	36.05 314	57.072 <sup>345</sup>	39.38 111	34.482 <sup>206</sup>	75.19 202	15.729 <sup>255</sup>	46.58 16
18.9	30.611 <sup>289</sup>	32.91 299	57.417 <sup>397</sup>	38.27 66	34.688 <sup>239</sup>	73.17 213	15.984 <sup>289</sup>	46.42 18
28.9	30.900 <sup>328</sup>	29.92 275	57.814 <sup>436</sup>	37.62 18	34.927 <sup>268</sup>	71.04 216	16.273 <sup>323</sup>	46.60 55
June 7.8	31.228 <sup>359</sup>	27.17 245	58.250 <sup>464</sup>	37.44 29	35.195 <sup>299</sup>	68.88 215	16.596 <sup>344</sup>	47.15 94
17.8	31.587 <sup>381</sup>	24.72 209	58.714 <sup>481</sup>	37.73 76	35.484 <sup>304</sup>	66.73 207	16.940 <sup>358</sup>	48.09 125
27.8	31.968 <sup>392</sup>	22.63 164	59.195 <sup>494</sup>	38.49 119	35.788 <sup>306</sup>	64.66 196	17.298 <sup>363</sup>	49.34 158
July 7.7	32.360 <sup>393</sup>	20.99 120	59.679 <sup>473</sup>	39.68 159	36.096 <sup>305</sup>	62.70 179	17.661 <sup>354</sup>	50.92 183
17.7	32.753 <sup>382</sup>	19.79 70	60.152 <sup>454</sup>	41.27 196	36.401 <sup>296</sup>	60.91 156	18.015 <sup>341</sup>	52.75 204
27.7	33.135 <sup>362</sup>	19.09 18	60.606 <sup>426</sup>	43.23 227	36.697 <sup>278</sup>	59.35 139	18.356 <sup>322</sup>	54.79 219
Aug. 6.7	33.497 <sup>383</sup>	18.91 34	61.032 <sup>390</sup>	45.50 254	36.975 <sup>254</sup>	58.06 100	18.678 <sup>290</sup>	56.98 223
16.6	33.830 <sup>394</sup>	19.25 84	61.422 <sup>346</sup>	48.04 274	37.229 <sup>224</sup>	57.06 68	18.968 <sup>280</sup>	59.30 237
26.6	34.124 <sup>248</sup>	20.09 132	61.768 <sup>298</sup>	50.78 237	37.453 <sup>183</sup>	56.38 35	19.228 <sup>224</sup>	61.67 236
Sept. 5.6	34.372 <sup>197</sup>	21.41 175	62.066 <sup>246</sup>	53.65 296	37.646 <sup>156</sup>	56.03 5	19.452 <sup>185</sup>	64.03 234
15.6	34.569 <sup>144</sup>	23.16 209	62.312 <sup>193</sup>	56.61 299	37.802 <sup>121</sup>	55.98 27	19.637 <sup>143</sup>	66.37 225
25.5	34.713 <sup>87</sup>	25.25 238	62.505 <sup>139</sup>	59.60 295	37.923 <sup>85</sup>	56.25 53	19.780 <sup>107</sup>	68.62 212
Oct. 5.5	34.800 <sup>32</sup>	27.63 256	62.644 <sup>85</sup>	62.55 296	38.008 <sup>59</sup>	56.78 78	19.887 <sup>68</sup>	70.74 195
15.5	34.832 <sup>20</sup>	30.19 264	62.729 <sup>32</sup>	65.41 270	38.060 <sup>18</sup>	57.56 95	19.955 <sup>31</sup>	72.69 177
25.4	34.812 <sup>69</sup>	32.83 260	62.761 <sup>18</sup>	68.11 247	38.078 <sup>11</sup>	58.51 108	19.986 <sup>4</sup>	74.46 155
Nov. 4.4	34.743 <sup>113</sup>	35.43 247	62.743 <sup>67</sup>	70.58 231	38.067 <sup>37</sup>	59.59 115	19.982 <sup>36</sup>	76.01 130
14.4	34.630 <sup>149</sup>	37.90 223	62.676 <sup>112</sup>	72.79 188	38.030 <sup>61</sup>	60.74 118	19.946 <sup>68</sup>	77.31 103
24.4	34.481 <sup>181</sup>	40.13 192	62.564 <sup>155</sup>	74.67 149	37.969 <sup>80</sup>	61.92 116	19.878 <sup>91</sup>	78.34 71
Dec. 4.3	34.300 <sup>205</sup>	42.05 153	62.409 <sup>191</sup>	76.16 107	37.889 <sup>98</sup>	63.08 108	19.787 <sup>121</sup>	79.05 42
14.3	34.095 <sup>222</sup>	43.58 109	62.218 <sup>234</sup>	77.23 60	37.791 <sup>112</sup>	64.16 98	19.666 <sup>142</sup>	79.47 4
24.3	33.873 <sup>233</sup>	44.67 62	61.994 <sup>248</sup>	77.83 12	37.679 <sup>122</sup>	65.14 84	19.524 <sup>156</sup>	79.51 26
34.3	33.640	45.29	61.746	77.95	37.557	65.98	19.368	79.26
Mean Place	30.844	50.21	56.122	42.96	33.914	81.26	14.818	48.23
Sec $\delta$ , Tan $\delta$	1.470	-1.078	1.724	+1.404	1.017	-0.187	1.224	+0.705
$D\alpha$ , $D_{\omega}$	+0.053	+0.069	+0.071	-0.080	+0.060	+0.012	+0.066	-0.045
$D\delta$ , $D_{\omega}$	+0.38	+0.27	+0.38	+0.27	+0.38	+0.28	+0.38	+0.28

# APPARENT PLACES OF STARS, 1920.

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FOR THE UPPER TRANSIT AT WASHINGTON.

Washington Mean Time.	γ Piscium. Mag. 4.7		ζ Piscium. Mag. 5.6		κ Tucanae. Mag. 5.0		f Piscium. Mag. 5.3	
	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.
	h m 1 7	° ' " +29 39	h m 1 9	° ' " + 7 9	h m 1 12	° ' " -69 17	h m 1 13	° ' " + 3 11
Jan. 0.3	16.362	67.52	34.136	14.35	63.61	79.76	41.394	39.88
10.2	16.217 <sup>145</sup>	67.01 <sup>51</sup>	34.016 <sup>120</sup>	13.63 <sup>72</sup>	63.05 <sup>56</sup>	79.74 <sup>2</sup>	41.275 <sup>119</sup>	39.13 <sup>75</sup>
20.2	16.063 <sup>154</sup>	66.22 <sup>79</sup>	33.891 <sup>126</sup>	12.90 <sup>73</sup>	62.50 <sup>55</sup>	79.12 <sup>62</sup>	41.148 <sup>127</sup>	38.42 <sup>71</sup>
30.2	15.909 <sup>154</sup>	65.20 <sup>102</sup>	33.765 <sup>126</sup>	12.17 <sup>73</sup>	61.97 <sup>53</sup>	77.92 <sup>120</sup>	41.022 <sup>126</sup>	37.76 <sup>66</sup>
Feb. 9.2	15.760 <sup>149</sup>	63.97 <sup>123</sup>	33.643 <sup>123</sup>	11.48 <sup>69</sup>	61.47 <sup>50</sup>	76.17 <sup>175</sup>	40.901 <sup>121</sup>	37.18 <sup>58</sup>
19.1	15.625 <sup>136</sup>	62.61 <sup>136</sup>	33.533 <sup>110</sup>	10.85 <sup>63</sup>	61.02 <sup>45</sup>	73.94 <sup>223</sup>	40.787 <sup>114</sup>	36.70 <sup>48</sup>
29.1	15.514 <sup>111</sup>	61.15 <sup>146</sup>	33.440 <sup>93</sup>	10.32 <sup>53</sup>	60.63 <sup>39</sup>	71.27 <sup>267</sup>	40.692 <sup>95</sup>	36.35 <sup>35</sup>
Mar. 10.1	15.433 <sup>81</sup>	59.67 <sup>148</sup>	33.372 <sup>68</sup>	9.92 <sup>40</sup>	60.32 <sup>31</sup>	68.25 <sup>302</sup>	40.621 <sup>71</sup>	36.17 <sup>18</sup>
20.1	15.389 <sup>44</sup>	58.24 <sup>143</sup>	33.336 <sup>36</sup>	9.70 <sup>22</sup>	60.09 <sup>23</sup>	64.94 <sup>381</sup>	40.580 <sup>41</sup>	36.17 <sup>0</sup>
30.0	15.389 <sup>0</sup>	56.93 <sup>131</sup>	33.335 <sup>1</sup>	9.68 <sup>2</sup>	59.96 <sup>13</sup>	61.40 <sup>354</sup>	40.576 <sup>4</sup>	36.37 <sup>20</sup>
Apr. 9.0	15.437 <sup>48</sup>	55.81 <sup>112</sup>	33.375 <sup>40</sup>	9.89 <sup>21</sup>	59.91 <sup>5</sup>	57.75 <sup>365</sup>	40.610 <sup>24</sup>	36.82 <sup>45</sup>
19.0	15.535 <sup>98</sup>	54.92 <sup>89</sup>	33.459 <sup>84</sup>	10.34 <sup>45</sup>	59.96 <sup>5</sup>	54.04 <sup>371</sup>	40.685 <sup>75</sup>	37.51 <sup>69</sup>
28.9	15.683 <sup>148</sup>	54.33 <sup>59</sup>	33.586 <sup>127</sup>	11.05 <sup>71</sup>	60.12 <sup>16</sup>	50.35 <sup>369</sup>	40.808 <sup>123</sup>	38.44 <sup>93</sup>
May 8.9	15.879 <sup>196</sup>	54.07 <sup>26</sup>	33.755 <sup>169</sup>	12.00 <sup>95</sup>	60.37 <sup>25</sup>	46.78 <sup>357</sup>	40.972 <sup>164</sup>	39.60 <sup>116</sup>
18.9	16.117 <sup>238</sup>	54.15 <sup>8</sup>	33.963 <sup>208</sup>	13.21 <sup>121</sup>	60.72 <sup>36</sup>	43.39 <sup>339</sup>	41.173 <sup>201</sup>	40.98 <sup>138</sup>
28.9	16.393 <sup>276</sup>	54.57 <sup>42</sup>	34.204 <sup>241</sup>	14.62 <sup>141</sup>	61.16 <sup>44</sup>	40.27 <sup>312</sup>	41.410 <sup>237</sup>	42.56 <sup>158</sup>
June 7.8	16.700 <sup>307</sup>	55.34 <sup>77</sup>	34.476 <sup>272</sup>	16.23 <sup>161</sup>	61.67 <sup>51</sup>	37.48 <sup>279</sup>	41.676 <sup>266</sup>	44.31 <sup>175</sup>
17.8	17.028 <sup>328</sup>	56.44 <sup>110</sup>	34.768 <sup>292</sup>	17.98 <sup>175</sup>	62.24 <sup>57</sup>	35.11 <sup>287</sup>	41.963 <sup>287</sup>	46.15 <sup>184</sup>
27.8	17.368 <sup>340</sup>	57.82 <sup>138</sup>	35.074 <sup>306</sup>	19.83 <sup>185</sup>	62.86 <sup>62</sup>	33.19 <sup>192</sup>	42.261 <sup>298</sup>	48.03 <sup>188</sup>
July 7.8	17.712 <sup>344</sup>	59.48 <sup>166</sup>	35.384 <sup>310</sup>	21.72 <sup>189</sup>	63.51 <sup>65</sup>	31.79 <sup>140</sup>	42.567 <sup>306</sup>	49.94 <sup>191</sup>
17.7	18.052 <sup>340</sup>	61.33 <sup>185</sup>	35.689 <sup>306</sup>	23.60 <sup>188</sup>	64.17 <sup>66</sup>	30.96 <sup>83</sup>	42.872 <sup>306</sup>	51.84 <sup>190</sup>
27.7	18.379 <sup>327</sup>	63.35 <sup>202</sup>	35.985 <sup>296</sup>	25.44 <sup>184</sup>	64.83 <sup>66</sup>	30.71 <sup>25</sup>	43.168 <sup>296</sup>	53.62 <sup>178</sup>
Aug. 6.7	18.685 <sup>306</sup>	65.48 <sup>213</sup>	36.264 <sup>279</sup>	27.18 <sup>174</sup>	65.46 <sup>63</sup>	31.03 <sup>33</sup>	43.446 <sup>278</sup>	55.25 <sup>163</sup>
16.6	18.965 <sup>280</sup>	67.67 <sup>219</sup>	36.518 <sup>254</sup>	28.77 <sup>159</sup>	66.05 <sup>59</sup>	31.94 <sup>91</sup>	43.702 <sup>236</sup>	56.72 <sup>147</sup>
26.6	19.214 <sup>249</sup>	69.87 <sup>220</sup>	36.745 <sup>227</sup>	30.19 <sup>142</sup>	66.58 <sup>53</sup>	33.39 <sup>145</sup>	43.931 <sup>229</sup>	57.99 <sup>127</sup>
36.6	19.214 <sup>214</sup>	71.61 <sup>216</sup>	36.941 <sup>196</sup>	31.39 <sup>120</sup>	67.03 <sup>45</sup>	35.35 <sup>196</sup>	44.130 <sup>199</sup>	59.01 <sup>102</sup>
Sept. 5.6	19.428 <sup>178</sup>	72.03 <sup>208</sup>	36.941 <sup>182</sup>	31.39 <sup>99</sup>	67.03 <sup>35</sup>	35.35 <sup>238</sup>	44.130 <sup>164</sup>	59.01 <sup>77</sup>
15.6	19.606 <sup>140</sup>	74.11 <sup>197</sup>	37.103 <sup>128</sup>	32.38 <sup>74</sup>	67.38 <sup>25</sup>	37.73 <sup>274</sup>	44.294 <sup>131</sup>	59.78 <sup>53</sup>
25.5	19.746 <sup>103</sup>	76.08 <sup>183</sup>	37.231 <sup>95</sup>	33.12 <sup>53</sup>	67.63 <sup>14</sup>	40.47 <sup>299</sup>	44.425 <sup>96</sup>	60.31 <sup>29</sup>
Oct. 5.5	19.849 <sup>66</sup>	77.91 <sup>165</sup>	37.326 <sup>61</sup>	33.65 <sup>30</sup>	67.77 <sup>4</sup>	43.46 <sup>313</sup>	44.521 <sup>66</sup>	60.60 <sup>6</sup>
15.5	19.915 <sup>32</sup>	79.56 <sup>146</sup>	37.387 <sup>30</sup>	33.95 <sup>10</sup>	67.81 <sup>8</sup>	46.59 <sup>314</sup>	44.587 <sup>24</sup>	60.66 <sup>16</sup>
25.5	19.947 <sup>1</sup>	81.02 <sup>123</sup>	37.417 <sup>3</sup>	34.05 <sup>8</sup>	67.73 <sup>19</sup>	49.73 <sup>303</sup>	44.621 <sup>3</sup>	60.50 <sup>32</sup>
Nov. 4.4	19.948 <sup>30</sup>	82.25 <sup>101</sup>	37.420 <sup>24</sup>	33.97 <sup>25</sup>	67.54 <sup>27</sup>	52.76 <sup>281</sup>	44.624 <sup>21</sup>	60.18 <sup>46</sup>
14.4	19.918 <sup>57</sup>	83.26 <sup>74</sup>	37.396 <sup>47</sup>	33.72 <sup>38</sup>	67.27 <sup>47</sup>	55.57 <sup>267</sup>	44.603 <sup>46</sup>	59.72 <sup>56</sup>
24.4	19.861 <sup>84</sup>	84.00 <sup>49</sup>	37.349 <sup>69</sup>	33.34 <sup>49</sup>	66.91 <sup>43</sup>	58.04 <sup>204</sup>	44.557 <sup>68</sup>	59.16 <sup>67</sup>
Dec. 4.3	19.777 <sup>106</sup>	84.49 <sup>20</sup>	37.280 <sup>86</sup>	32.85 <sup>59</sup>	66.48 <sup>49</sup>	60.08 <sup>154</sup>	44.489 <sup>85</sup>	58.49 <sup>73</sup>
14.3	19.671 <sup>127</sup>	84.69 <sup>7</sup>	37.194 <sup>103</sup>	32.26 <sup>65</sup>	65.99 <sup>53</sup>	61.62 <sup>96</sup>	44.404 <sup>102</sup>	57.76 <sup>74</sup>
24.3	19.544 <sup>141</sup>	84.62 <sup>36</sup>	37.091 <sup>117</sup>	31.61 <sup>72</sup>	65.46 <sup>55</sup>	62.58 <sup>88</sup>	44.302 <sup>115</sup>	57.02 <sup>74</sup>
34.3	19.403	84.26	36.974	30.89	64.91	62.96	44.187	56.28
Mean Place	14.985	55.04	32.994	9.60	63.426	63.89	40.266	36.64
Sec δ, Tan δ	1.151	+0.570	1.008	+0.126	2.829	-2.646	1.002	+0.056
D <sub>α</sub> , D <sub>αα</sub>	+0.066	-0.036	+0.062	-0.008	+0.039	+0.168	+0.062	-0.004
D <sub>δ</sub> , D <sub>δδ</sub>	+0.38	+0.29	+0.38	+0.30	+0.38	+0.31	+0.38	+0.32

FOR THE UPPER TRANSIT AT WASHINGTON.

Washington Mean Time.	ν Piscium. Mag. 4.7		θ Ceti. Mag. 3.8		δ Cassiopeie. Mag. 2.8		γ Phœnicis. Mag. 3.4	
	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.
	h m l 15 s	° ' " +26 50 "	h m l 20 s	° ' " - 8 35 "	h m l 20 s	° ' " +59 49 "	h m l 24 s	° ' " -43 43 "
Jan. 0.3	5.289 <sup>139</sup>	49.56 51	2.501 <sup>124</sup>	45.88 80	36.449 <sup>318</sup>	32.45 17	54.321 <sup>217</sup>	52.54 61
10.3	5.150 <sup>148</sup>	49.05 75	2.377 <sup>130</sup>	46.68 62	36.136 <sup>330</sup>	32.62 35	54.104 <sup>223</sup>	53.15 12
20.2	5.002 <sup>151</sup>	48.30 96	2.247 <sup>133</sup>	47.30 46	35.806 <sup>333</sup>	32.27 87	53.881 <sup>221</sup>	53.27 37
30.2	4.851 <sup>146</sup>	47.35 113	2.114 <sup>128</sup>	47.76 24	35.473 <sup>322</sup>	31.40 135	53.660 <sup>210</sup>	52.90 84
Feb. 9.2	4.705 <sup>135</sup>	46.22 125	1.986 <sup>121</sup>	48.00 3	35.151 <sup>296</sup>	30.05 177	53.450 <sup>196</sup>	52.06 128
19.1	4.570 <sup>113</sup>	44.97 132	1.865 <sup>102</sup>	48.03 17	34.855 <sup>252</sup>	28.28 211	53.254 <sup>171</sup>	50.78 171
29.1	4.457 <sup>85</sup>	43.65 133	1.763 <sup>78</sup>	47.86 43	34.603 <sup>197</sup>	26.17 228	53.083 <sup>140</sup>	49.07 207
Mar. 10.1	4.372 <sup>50</sup>	42.32 127	1.685 <sup>52</sup>	47.43 67	34.406 <sup>136</sup>	23.79 255	52.943 <sup>101</sup>	47.00 240
20.1	4.322 <sup>7</sup>	41.05 98	1.633 <sup>14</sup>	46.76 88	34.278 <sup>51</sup>	21.24 259	52.842 <sup>57</sup>	44.60 269
30.0	4.315 <sup>38</sup>	39.91 73	1.619 <sup>26</sup>	45.88 114	34.227 <sup>33</sup>	18.65 254	52.785 <sup>7</sup>	41.91 290
Apr. 9.0	4.353 <sup>88</sup>	38.20 46	1.644 <sup>68</sup>	44.74 138	34.260 <sup>118</sup>	16.11 240	52.778 <sup>47</sup>	39.01 308
19.0	4.441 <sup>137</sup>	37.74 14	1.712 <sup>109</sup>	43.36 156	34.378 <sup>201</sup>	13.71 215	52.825 <sup>100</sup>	35.93 317
29.0	4.578 <sup>184</sup>	37.00 18	1.821 <sup>184</sup>	41.80 178	34.579 <sup>282</sup>	11.56 182	52.925 <sup>185</sup>	32.76 320
May 8.9	4.762 <sup>227</sup>	37.60 50	1.975 <sup>229</sup>	40.02 195	34.861 <sup>354</sup>	9.75 141	53.080 <sup>264</sup>	29.56 315
18.9	4.989 <sup>265</sup>	37.78 84	2.166 <sup>204</sup>	38.07 204	35.215 <sup>415</sup>	8.33 99	53.286 <sup>284</sup>	26.41 304
28.9	5.254 <sup>296</sup>	38.28 84	2.395 <sup>260</sup>	36.03 208	35.630 <sup>466</sup>	7.34 52	53.540 <sup>295</sup>	23.37 286
June 7.8	5.550 <sup>317</sup>	39.12 113	2.655 <sup>282</sup>	33.95 212	36.096 <sup>502</sup>	6.82 5	53.835 <sup>336</sup>	20.51 260
17.8	5.867 <sup>332</sup>	40.25 140	2.937 <sup>295</sup>	31.83 200	36.598 <sup>536</sup>	6.77 44	54.163 <sup>354</sup>	17.91 228
27.8	6.199 <sup>338</sup>	41.65 164	3.232 <sup>304</sup>	29.74 196	37.124 <sup>535</sup>	7.21 90	54.517 <sup>380</sup>	15.63 189
July 7.8	6.537 <sup>334</sup>	43.29 181	3.536 <sup>305</sup>	27.78 183	37.659 <sup>532</sup>	8.11 133	54.886 <sup>375</sup>	13.74 146
17.7	6.871 <sup>323</sup>	45.10 196	3.841 <sup>296</sup>	25.95 161	38.191 <sup>514</sup>	9.44 173	55.261 <sup>369</sup>	12.28 98
27.7	7.194 <sup>303</sup>	47.06 204	4.137 <sup>281</sup>	24.34 137	38.705 <sup>487</sup>	11.17 211	55.630 <sup>354</sup>	11.90 46
Aug. 6.7	7.497 <sup>280</sup>	49.10 208	4.418 <sup>262</sup>	22.97 108	39.192 <sup>451</sup>	13.28 241	55.984 <sup>331</sup>	10.84 4
16.7	7.777 <sup>251</sup>	51.18 208	4.680 <sup>233</sup>	21.89 78	39.643 <sup>406</sup>	15.69 260	56.315 <sup>298</sup>	10.88 56
26.6	8.028 <sup>217</sup>	53.26 203	4.913 <sup>201</sup>	21.11 47	40.049 <sup>355</sup>	18.38 289	56.613 <sup>269</sup>	11.44 103
Sept. 5.6	8.245 <sup>183</sup>	55.29 193	5.114 <sup>173</sup>	20.64 16	40.404 <sup>300</sup>	21.27 302	56.872 <sup>218</sup>	12.49 150
15.6	8.428 <sup>146</sup>	57.22 181	5.287 <sup>134</sup>	20.48 15	40.704 <sup>241</sup>	24.29 311	57.085 <sup>166</sup>	13.99 189
25.5	8.574 <sup>110</sup>	59.03 166	5.421 <sup>103</sup>	20.63 42	40.945 <sup>180</sup>	27.40 312	57.251 <sup>115</sup>	15.88 222
Oct. 5.5	8.684 <sup>75</sup>	60.68 149	5.524 <sup>66</sup>	21.05 86	41.125 <sup>119</sup>	30.52 307	57.366 <sup>64</sup>	18.10 244
15.5	8.759 <sup>42</sup>	62.17 139	5.590 <sup>37</sup>	21.71 88	41.244 <sup>58</sup>	33.59 297	57.430 <sup>15</sup>	20.54 259
25.5	8.801 <sup>9</sup>	63.46 108	5.627 <sup>3</sup>	22.59 101	41.302 <sup>6</sup>	36.56 279	57.445 <sup>32</sup>	23.13 261
Nov. 4.4	8.810 <sup>20</sup>	64.54 87	5.630 <sup>20</sup>	23.60 111	41.296 <sup>63</sup>	39.35 256	57.413 <sup>75</sup>	25.74 253
14.4	8.790 <sup>48</sup>	65.41 62	5.610 <sup>48</sup>	24.71 116	41.233 <sup>121</sup>	41.91 228	57.338 <sup>114</sup>	28.27 286
24.4	8.742 <sup>74</sup>	66.03 39	5.562 <sup>69</sup>	25.87 114	41.112 <sup>176</sup>	44.16 187	57.224 <sup>145</sup>	30.63 309
Dec. 4.4	8.668 <sup>97</sup>	66.42 13	5.493 <sup>89</sup>	27.01 109	40.936 <sup>224</sup>	46.03 147	57.079 <sup>174</sup>	32.72 175
14.3	8.571 <sup>118</sup>	66.55 13	5.404 <sup>106</sup>	28.10 100	40.712 <sup>267</sup>	47.50 101	56.905 <sup>198</sup>	34.47 138
24.3	8.453 <sup>134</sup>	66.42 36	5.298 <sup>121</sup>	29.10 86	40.445 <sup>303</sup>	48.51 49	56.709 <sup>212</sup>	35.82 90
34.3	8.319	66.06	5.177	29.96	40.142	49.00	56.497	36.72
Mean Place	3.894	38.29	1.438	44.81	34.154	12.62	53.536	40.85
Sec δ, Tan δ	1.121	+0.506	1.011	-0.151	1.990	+1.720	1.384	-0.956
D <sub>ψ</sub> α, D <sub>ω</sub> α	+0.066	-0.032	+0.060	+0.009	+0.077	-0.108	+0.062	+0.059
D <sub>ψ</sub> δ, D <sub>ω</sub> δ	+0.38	+0.32	+0.37	+0.34	+0.37	+0.34	+0.37	+0.36

# APPARENT PLACES OF STARS, 1920.

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## FOR THE UPPER TRANSIT AT WASHINGTON.

Washington Mean Time.	38 Cassiopeia. Mag. 6.0		7 Pictium. Mag. 3.7		40 Cassiopeia. Mag. 5.5		v Andromeda. Mag. 4.2	
	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.
	h m 1 25	° ' " +69 51	h m 1 27	° ' " +14 56	h m 1 32	° ' " +72 37	h m 1 32	° ' " +41 0
	s	"	s	"	s	"	s	"
Jan. 0.3	18.23	34.03	18.283	8.73	9.21	80.32	7.454	35.87
10.3	17.73 <sup>50</sup>	34.49 <sup>46</sup>	13.160 <sup>123</sup>	8.10 <sup>63</sup>	8.62 <sup>59</sup>	80.96 <sup>64</sup>	7.279 <sup>175</sup>	35.72 <sup>15</sup>
20.3	17.21 <sup>52</sup>	34.38 <sup>41</sup>	13.029 <sup>131</sup>	7.38 <sup>72</sup>	8.00 <sup>62</sup>	81.00 <sup>4</sup>	7.089 <sup>190</sup>	35.21 <sup>51</sup>
30.3	16.68 <sup>53</sup>	33.69 <sup>60</sup>	12.893 <sup>136</sup>	6.58 <sup>80</sup>	7.38 <sup>62</sup>	80.43 <sup>57</sup>	6.891 <sup>196</sup>	34.34 <sup>87</sup>
Feb. 9.3	16.17 <sup>51</sup>	32.45 <sup>124</sup>	12.758 <sup>125</sup>	5.74 <sup>84</sup>	6.77 <sup>61</sup>	79.29 <sup>114</sup>	6.696 <sup>196</sup>	33.16 <sup>118</sup>
19.1	15.70 <sup>47</sup>	30.70 <sup>175</sup>	12.633 <sup>125</sup>	4.89 <sup>85</sup>	6.21 <sup>56</sup>	77.65 <sup>164</sup>	6.513 <sup>183</sup>	31.71 <sup>145</sup>
29.1	15.29 <sup>41</sup>	28.53 <sup>217</sup>	12.521 <sup>112</sup>	4.07 <sup>88</sup>	5.71 <sup>50</sup>	75.53 <sup>212</sup>	6.354 <sup>180</sup>	30.03 <sup>168</sup>
Mar. 10.1	14.97 <sup>32</sup>	26.03 <sup>250</sup>	12.436 <sup>85</sup>	3.32 <sup>75</sup>	5.32 <sup>39</sup>	73.05 <sup>248</sup>	6.227 <sup>137</sup>	28.23 <sup>180</sup>
20.1	14.75 <sup>23</sup>	23.30 <sup>273</sup>	12.380 <sup>56</sup>	2.68 <sup>64</sup>	5.04 <sup>26</sup>	70.32 <sup>273</sup>	6.142 <sup>85</sup>	26.37 <sup>186</sup>
30.0	14.65 <sup>10</sup>	20.46 <sup>284</sup>	12.364 <sup>16</sup>	2.18 <sup>60</sup>	4.88 <sup>15</sup>	67.44 <sup>288</sup>	6.106 <sup>36</sup>	24.53 <sup>184</sup>
Apr. 9.0	14.66 <sup>1</sup>	17.61 <sup>285</sup>	12.387 <sup>23</sup>	1.90 <sup>28</sup>	4.86 <sup>2</sup>	64.53 <sup>201</sup>	6.125 <sup>19</sup>	22.79 <sup>174</sup>
19.0	14.79 <sup>13</sup>	14.87 <sup>274</sup>	12.458 <sup>71</sup>	1.87 <sup>3</sup>	5.00 <sup>14</sup>	61.70 <sup>263</sup>	6.201 <sup>76</sup>	21.24 <sup>155</sup>
29.0	15.05 <sup>26</sup>	12.34 <sup>253</sup>	12.572 <sup>114</sup>	2.08 <sup>21</sup>	5.26 <sup>26</sup>	59.06 <sup>264</sup>	6.336 <sup>135</sup>	19.94 <sup>130</sup>
May 8.9	15.42 <sup>37</sup>	10.12 <sup>222</sup>	12.731 <sup>159</sup>	2.57 <sup>49</sup>	5.66 <sup>40</sup>	56.99 <sup>237</sup>	6.528 <sup>192</sup>	18.94 <sup>100</sup>
18.9	15.89 <sup>47</sup>	8.28 <sup>186</sup>	12.931 <sup>200</sup>	3.32 <sup>75</sup>	6.18 <sup>52</sup>	54.70 <sup>199</sup>	6.771 <sup>243</sup>	18.29 <sup>65</sup>
28.9	16.45 <sup>56</sup>	6.85 <sup>141</sup>	13.170 <sup>239</sup>	4.34 <sup>102</sup>	6.80 <sup>62</sup>	53.12 <sup>158</sup>	7.060 <sup>280</sup>	18.01 <sup>25</sup>
June 7.8	17.08 <sup>63</sup>	5.93 <sup>92</sup>	13.439 <sup>289</sup>	5.57 <sup>133</sup>	7.50 <sup>70</sup>	52.02 <sup>110</sup>	7.386 <sup>326</sup>	18.11 <sup>10</sup>
17.8	17.77 <sup>69</sup>	5.50 <sup>43</sup>	13.731 <sup>292</sup>	7.02 <sup>145</sup>	8.27 <sup>77</sup>	51.42 <sup>60</sup>	7.742 <sup>326</sup>	18.59 <sup>45</sup>
27.8	18.49 <sup>72</sup>	5.59 <sup>9</sup>	14.040 <sup>300</sup>	8.64 <sup>162</sup>	9.09 <sup>82</sup>	51.33 <sup>9</sup>	8.117 <sup>376</sup>	19.46 <sup>87</sup>
July 7.8	19.23 <sup>74</sup>	6.18 <sup>59</sup>	14.354 <sup>314</sup>	10.38 <sup>174</sup>	9.92 <sup>83</sup>	51.76 <sup>43</sup>	8.501 <sup>384</sup>	20.67 <sup>121</sup>
17.7	19.96 <sup>73</sup>	7.28 <sup>106</sup>	14.668 <sup>314</sup>	12.19 <sup>181</sup>	10.76 <sup>84</sup>	52.70 <sup>94</sup>	8.883 <sup>382</sup>	22.17 <sup>150</sup>
27.7	20.68 <sup>78</sup>	8.81 <sup>155</sup>	14.973 <sup>305</sup>	14.05 <sup>186</sup>	11.58 <sup>82</sup>	54.11 <sup>141</sup>	9.256 <sup>373</sup>	23.94 <sup>177</sup>
Aug. 6.7	21.36 <sup>68</sup>	10.78 <sup>197</sup>	15.264 <sup>291</sup>	15.89 <sup>184</sup>	12.37 <sup>79</sup>	55.96 <sup>185</sup>	9.611 <sup>355</sup>	25.94 <sup>200</sup>
16.7	21.99 <sup>63</sup>	13.13 <sup>235</sup>	15.534 <sup>270</sup>	17.65 <sup>176</sup>	13.10 <sup>73</sup>	58.22 <sup>226</sup>	9.942 <sup>331</sup>	28.13 <sup>219</sup>
26.6	22.57 <sup>58</sup>	15.81 <sup>268</sup>	15.779 <sup>245</sup>	19.31 <sup>166</sup>	13.77 <sup>67</sup>	60.83 <sup>261</sup>	10.242 <sup>300</sup>	30.43 <sup>230</sup>
Sept. 5.6	23.07 <sup>50</sup>	18.76 <sup>295</sup>	15.993 <sup>214</sup>	20.81 <sup>150</sup>	13.77 <sup>59</sup>	60.83 <sup>290</sup>	10.242 <sup>285</sup>	30.43 <sup>237</sup>
15.6	23.50 <sup>43</sup>	21.92 <sup>316</sup>	16.176 <sup>183</sup>	22.14 <sup>133</sup>	14.36 <sup>51</sup>	63.73 <sup>315</sup>	10.507 <sup>228</sup>	32.80 <sup>240</sup>
25.5	23.84 <sup>34</sup>	25.23 <sup>331</sup>	16.324 <sup>148</sup>	23.30 <sup>116</sup>	14.87 <sup>41</sup>	66.88 <sup>321</sup>	10.735 <sup>189</sup>	35.20 <sup>235</sup>
Oct. 5.5	24.09 <sup>25</sup>	28.61 <sup>338</sup>	16.441 <sup>117</sup>	24.25 <sup>95</sup>	15.28 <sup>31</sup>	70.19 <sup>341</sup>	10.924 <sup>147</sup>	37.58 <sup>232</sup>
15.5	24.28 <sup>17</sup>	32.00 <sup>339</sup>	16.527 <sup>86</sup>	25.00 <sup>75</sup>	15.59 <sup>21</sup>	73.06 <sup>345</sup>	11.071 <sup>106</sup>	39.90 <sup>221</sup>
25.5	24.34 <sup>8</sup>	35.32 <sup>332</sup>	16.578 <sup>51</sup>	25.57 <sup>57</sup>	15.80 <sup>10</sup>	77.05 <sup>341</sup>	11.177 <sup>67</sup>	42.11 <sup>205</sup>
Nov. 4.4	24.32 <sup>2</sup>	38.50 <sup>318</sup>	16.578 <sup>21</sup>	25.57 <sup>37</sup>	15.90 <sup>1</sup>	80.46 <sup>329</sup>	11.244 <sup>89</sup>	44.16 <sup>158</sup>
14.4	24.20 <sup>12</sup>	41.46 <sup>296</sup>	16.599 <sup>6</sup>	25.94 <sup>19</sup>	15.89 <sup>12</sup>	83.75 <sup>309</sup>	11.273 <sup>10</sup>	46.04 <sup>165</sup>
24.4	24.00 <sup>20</sup>	44.12 <sup>266</sup>	16.593 <sup>31</sup>	26.13 <sup>4</sup>	15.77 <sup>21</sup>	86.84 <sup>263</sup>	11.263 <sup>45</sup>	47.69 <sup>141</sup>
Dec. 4.4	24.00 <sup>28</sup>	46.42 <sup>230</sup>	16.562 <sup>58</sup>	26.17 <sup>15</sup>	15.56 <sup>22</sup>	89.67 <sup>246</sup>	11.218 <sup>81</sup>	49.10 <sup>110</sup>
14.3	23.72 <sup>35</sup>	49.42 <sup>186</sup>	16.504 <sup>80</sup>	26.02 <sup>31</sup>	15.24 <sup>42</sup>	92.13 <sup>202</sup>	11.187 <sup>113</sup>	50.20 <sup>78</sup>
24.3	23.37 <sup>43</sup>	48.28 <sup>137</sup>	16.424 <sup>99</sup>	25.71 <sup>44</sup>	14.82 <sup>51</sup>	94.15 <sup>154</sup>	11.024 <sup>141</sup>	50.98 <sup>45</sup>
34.3	22.94 <sup>48</sup>	49.65 <sup>82</sup>	16.325 <sup>116</sup>	25.27 <sup>54</sup>	14.31 <sup>56</sup>	95.69 <sup>98</sup>	10.883 <sup>168</sup>	51.43 <sup>8</sup>
	22.46 <sup>48</sup>	50.47 <sup>82</sup>	16.209 <sup>116</sup>	24.73 <sup>54</sup>	13.75 <sup>56</sup>	96.67 <sup>98</sup>	10.715 <sup>168</sup>	51.51 <sup>8</sup>
Mean Place	15.076	12.76	11.955	1.90	5.528	59.06	5.681	21.10
Sec δ, Tan δ	2.904	+2.726	1.035	+0.267	3.351	+3.198	1.325	+0.870
D <sub>1</sub> δ, D <sub>2</sub> δ	+0.087	-0.169	+0.064	-0.017	+0.094	-0.196	+0.070	-0.053
D <sub>3</sub> δ, D <sub>4</sub> δ	+0.37	+0.36	+0.37	+0.37	+0.37	+0.39	+0.37	+0.39

APPARENT PLACES OF STARS, 1920.

FOR THE UPPER TRANSIT AT WASHINGTON.

Washington Mean Time.	$\pi$ Piscium. Mag. 5.6			$\nu$ Persei. Mag. 3.8			$\alpha$ Eridani. (Achernar.) Mag. 0.6			$\omega$ Cassiopeiæ. Mag. 5.5		
	Right Ascension.		Declina- tion.	Right Ascension.		Declina- tion.	Right Ascension.		Declina- tion.	Right Ascension.		Declina- tion.
	h	m	°	h	m	°	h	m	°	h	m	°
	1	32	+11 43	1	33	+48 13	1	34	-57 38	1	36	+67 38
	s	"	"	s	"	"	s	"	"	s	"	"
Jan. 0.3	52.609	63.22	6.337	40.78	44.860	49.36	26.73	41.06				
10.3	52.489 <sup>120</sup>	62.59 <sup>63</sup>	6.127 <sup>210</sup>	40.81 <sup>3</sup>	44.526 <sup>334</sup>	49.87 <sup>51</sup>	26.30 <sup>43</sup>	41.61 <sup>55</sup>				
20.2	52.359 <sup>130</sup>	61.87 <sup>72</sup>	5.900 <sup>227</sup>	40.41 <sup>40</sup>	44.184 <sup>342</sup>	49.82 <sup>5</sup>	25.83 <sup>47</sup>	41.59 <sup>2</sup>				
30.2	52.225 <sup>134</sup>	61.12 <sup>75</sup>	5.666 <sup>234</sup>	39.59 <sup>82</sup>	43.845 <sup>359</sup>	49.21 <sup>61</sup>	25.36 <sup>47</sup>	41.01 <sup>58</sup>				
Feb. 9.2	52.089 <sup>136</sup>	60.36 <sup>76</sup>	5.435 <sup>231</sup>	38.38 <sup>121</sup>	43.519 <sup>326</sup>	48.08 <sup>113</sup>	24.90 <sup>46</sup>	39.89 <sup>112</sup>				
19.2	51.963 <sup>126</sup>	59.63 <sup>73</sup>	5.220 <sup>215</sup>	36.83 <sup>155</sup>	43.219 <sup>300</sup>	46.41 <sup>167</sup>	24.47 <sup>43</sup>	38.27 <sup>162</sup>				
29.1	51.850 <sup>113</sup>	58.95 <sup>68</sup>	5.031 <sup>189</sup>	35.02 <sup>181</sup>	42.950 <sup>269</sup>	44.31 <sup>210</sup>	24.09 <sup>38</sup>	36.22 <sup>205</sup>				
Mar. 10.1	51.762 <sup>88</sup>	58.35 <sup>60</sup>	4.880 <sup>151</sup>	33.01 <sup>201</sup>	42.724 <sup>226</sup>	41.78 <sup>253</sup>	23.78 <sup>31</sup>	33.84 <sup>238</sup>				
20.1	51.703 <sup>59</sup>	57.86 <sup>49</sup>	4.777 <sup>108</sup>	30.88 <sup>213</sup>	42.549 <sup>175</sup>	38.95 <sup>283</sup>	23.56 <sup>22</sup>	31.21 <sup>263</sup>				
30.0	51.681 <sup>23</sup>	57.59 <sup>27</sup>	4.732 <sup>45</sup>	28.73 <sup>215</sup>	42.432 <sup>117</sup>	35.81 <sup>314</sup>	23.44 <sup>12</sup>	28.46 <sup>275</sup>				
	16	8	16	205	52	334	1	277				
Apr. 9.0	51.697	57.51	4.748	26.68	42.380	32.47	23.43	25.69				
19.0	51.760 <sup>63</sup>	57.63 <sup>12</sup>	4.829 <sup>81</sup>	24.77 <sup>191</sup>	42.397 <sup>17</sup>	28.96 <sup>351</sup>	23.54 <sup>11</sup>	23.00 <sup>269</sup>				
29.0	51.867 <sup>107</sup>	58.03 <sup>40</sup>	4.977 <sup>148</sup>	23.10 <sup>167</sup>	42.484 <sup>87</sup>	25.41 <sup>355</sup>	23.74 <sup>20</sup>	20.51 <sup>249</sup>				
May 8.9	52.020 <sup>153</sup>	58.70 <sup>67</sup>	5.187 <sup>210</sup>	21.73 <sup>137</sup>	42.640 <sup>156</sup>	21.89 <sup>352</sup>	24.06 <sup>32</sup>	18.29 <sup>222</sup>				
18.9	52.212 <sup>192</sup>	59.59 <sup>89</sup>	5.455 <sup>268</sup>	20.73 <sup>100</sup>	42.865 <sup>225</sup>	18.46 <sup>343</sup>	24.47 <sup>41</sup>	16.43 <sup>186</sup>				
	229	114	319	61	287	326	51	144				
28.9	52.441	60.73	5.774	20.12	43.152	15.20	24.98	14.99				
June 7.9	52.702 <sup>261</sup>	62.06 <sup>133</sup>	6.135 <sup>361</sup>	19.91 <sup>21</sup>	43.496 <sup>344</sup>	12.21 <sup>299</sup>	25.54 <sup>56</sup>	14.00 <sup>99</sup>				
17.8	52.989 <sup>287</sup>	63.61 <sup>155</sup>	6.528 <sup>393</sup>	20.13 <sup>22</sup>	43.888 <sup>392</sup>	9.55 <sup>296</sup>	26.16 <sup>62</sup>	13.51 <sup>49</sup>				
27.8	53.290 <sup>301</sup>	65.30 <sup>169</sup>	6.941 <sup>413</sup>	20.77 <sup>64</sup>	44.317 <sup>429</sup>	7.27 <sup>228</sup>	26.82 <sup>66</sup>	13.52 <sup>1</sup>				
July 7.8	53.601 <sup>311</sup>	67.06 <sup>176</sup>	7.365 <sup>424</sup>	21.80 <sup>103</sup>	44.771 <sup>454</sup>	5.45 <sup>182</sup>	27.50 <sup>68</sup>	14.02 <sup>50</sup>				
	310	182	424	139	467	131	67	98				
17.7	53.911	68.88	7.789	23.19	45.238	4.14	28.17	15.00				
27.7	54.216 <sup>305</sup>	70.69 <sup>181</sup>	8.203 <sup>414</sup>	24.91 <sup>172</sup>	45.704 <sup>466</sup>	3.35 <sup>79</sup>	28.84 <sup>67</sup>	16.44 <sup>144</sup>				
Aug. 6.7	54.505 <sup>289</sup>	72.46 <sup>177</sup>	8.596 <sup>383</sup>	26.92 <sup>201</sup>	46.157 <sup>453</sup>	3.15 <sup>20</sup>	29.48 <sup>64</sup>	18.29 <sup>185</sup>				
16.7	54.774 <sup>269</sup>	74.15 <sup>169</sup>	8.964 <sup>368</sup>	29.15 <sup>223</sup>	46.583 <sup>426</sup>	3.49 <sup>34</sup>	30.07 <sup>59</sup>	20.52 <sup>223</sup>				
26.6	55.021 <sup>247</sup>	75.66 <sup>151</sup>	9.298 <sup>334</sup>	31.57 <sup>242</sup>	46.972 <sup>389</sup>	4.43 <sup>94</sup>	30.62 <sup>55</sup>	23.08 <sup>256</sup>				
	216	136	296	256	341	146	48	282				
Sept. 5.6	55.237	77.02	9.594	34.13	47.313	5.89	31.10	25.90				
15.6	55.422 <sup>185</sup>	78.19 <sup>117</sup>	9.848 <sup>254</sup>	36.77 <sup>264</sup>	47.595 <sup>282</sup>	7.83 <sup>194</sup>	31.52 <sup>42</sup>	28.95 <sup>305</sup>				
25.6	55.575 <sup>153</sup>	79.16 <sup>97</sup>	10.058 <sup>210</sup>	39.42 <sup>265</sup>	47.813 <sup>218</sup>	10.17 <sup>234</sup>	31.86 <sup>94</sup>	32.14 <sup>319</sup>				
Oct. 5.5	55.695 <sup>120</sup>	79.93 <sup>77</sup>	10.223 <sup>165</sup>	42.06 <sup>264</sup>	47.966 <sup>153</sup>	12.84 <sup>267</sup>	32.13 <sup>27</sup>	35.42 <sup>328</sup>				
15.5	55.782 <sup>87</sup>	80.50 <sup>57</sup>	10.342 <sup>119</sup>	44.61 <sup>255</sup>	48.047 <sup>81</sup>	15.74 <sup>290</sup>	32.32 <sup>19</sup>	38.72 <sup>330</sup>				
	57	35	74	245	10	301	10	325				
25.5	55.839	80.85	10.416	47.06	48.057	18.75	32.42	41.97				
Nov. 4.4	55.866 <sup>27</sup>	81.01 <sup>16</sup>	10.444 <sup>28</sup>	49.33 <sup>227</sup>	47.998 <sup>59</sup>	21.75 <sup>300</sup>	32.43 <sup>1</sup>	45.09 <sup>312</sup>				
14.4	55.864 <sup>2</sup>	81.02 <sup>1</sup>	10.429 <sup>15</sup>	51.37 <sup>204</sup>	47.876 <sup>122</sup>	24.62 <sup>287</sup>	32.37 <sup>6</sup>	48.02 <sup>293</sup>				
24.4	55.838 <sup>26</sup>	80.88 <sup>14</sup>	10.371 <sup>58</sup>	53.14 <sup>177</sup>	47.698 <sup>178</sup>	27.27 <sup>265</sup>	32.23 <sup>14</sup>	50.67 <sup>265</sup>				
Dec. 4.4	55.785 <sup>53</sup>	80.57 <sup>31</sup>	10.272 <sup>99</sup>	54.61 <sup>147</sup>	47.470 <sup>228</sup>	29.60 <sup>233</sup>	32.01 <sup>23</sup>	52.98 <sup>231</sup>				
	77	41	136	110	271	188	30	190				
14.3	55.708	80.16	10.136	55.71	47.199	31.48	31.71	54.88				
24.3	55.612 <sup>96</sup>	79.64 <sup>52</sup>	9.965 <sup>171</sup>	56.42 <sup>71</sup>	46.899 <sup>300</sup>	32.88 <sup>140</sup>	31.35 <sup>36</sup>	56.30 <sup>142</sup>				
34.3	55.502 <sup>110</sup>	79.05 <sup>59</sup>	9.765 <sup>200</sup>	56.71 <sup>29</sup>	46.573 <sup>326</sup>	33.77 <sup>86</sup>	30.92 <sup>48</sup>	57.19 <sup>89</sup>				
Mean Place	51.282	57.72	4.363	24.16	44.159	34.71	23.628	20.71				
Sec $\delta$ , Tan $\delta$	1.021	+0.208	1.501	+1.120	1.868	-1.578	2.629	+2.431				
$D_{\delta a}$ , $D_{\alpha a}$	+0.063	-0.013	+0.073	-0.068	+0.044	+0.096	+0.087	-0.148				
$D_{\delta s}$ , $D_{\alpha s}$	+0.37	+0.39	+0.37	+0.40	+0.36	+0.40	+0.36	+0.41				

# APPARENT PLACES OF STARS, 1920.

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FOR THE UPPER TRANSIT AT WASHINGTON.

Washington Mean Time.	♄ Piscium. Mag. 4.7		♋ Persei. Mag. 4.2		♌ Ceti. Mag. 3.6		♍ Piscium. Mag. 4.5	
	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.
	h m 1 37	° ' " + 5 4	h m 1 38	° ' " +50 17	h m 1 40	° ' " -16 21	h m 1 41	° ' " + 8 45
	s	"	s	"	s	"	s	"
Jan. 0.3	17.265	62.81	40.297	27.55	22.150	34.18	11.358	24.12
10.3	17.148 <sup>117</sup>	62.09 <sup>72</sup>	40.077 <sup>220</sup>	27.69 <sup>14</sup>	22.016 <sup>134</sup>	35.01 <sup>83</sup>	11.242 <sup>116</sup>	23.46 <sup>66</sup>
20.2	17.021 <sup>127</sup>	61.40 <sup>69</sup>	39.838 <sup>239</sup>	27.37 <sup>32</sup>	21.872 <sup>144</sup>	35.59 <sup>81</sup>	11.114 <sup>128</sup>	22.77 <sup>69</sup>
30.2	16.888 <sup>133</sup>	60.73 <sup>67</sup>	39.589 <sup>249</sup>	26.63 <sup>74</sup>	21.723 <sup>149</sup>	35.90 <sup>81</sup>	10.979 <sup>135</sup>	22.07 <sup>70</sup>
Feb. 9.2	16.755 <sup>133</sup>	60.12 <sup>61</sup>	39.343 <sup>246</sup>	25.48 <sup>115</sup>	21.575 <sup>148</sup>	35.94 <sup>4</sup>	10.842 <sup>137</sup>	21.39 <sup>68</sup>
19.2	16.627 <sup>128</sup>	59.59 <sup>53</sup>	39.111 <sup>232</sup>	23.96 <sup>152</sup>	21.435 <sup>140</sup>	35.69 <sup>25</sup>	10.713 <sup>129</sup>	20.75 <sup>64</sup>
29.1	16.515 <sup>112</sup>	59.17 <sup>42</sup>	38.906 <sup>205</sup>	22.16 <sup>180</sup>	21.310 <sup>125</sup>	35.17 <sup>52</sup>	10.595 <sup>118</sup>	20.19 <sup>56</sup>
Mar. 10.1	16.424 <sup>91</sup>	58.91 <sup>26</sup>	38.740 <sup>166</sup>	20.13 <sup>203</sup>	21.206 <sup>104</sup>	34.35 <sup>82</sup>	10.502 <sup>93</sup>	19.73 <sup>46</sup>
20.1	16.361 <sup>63</sup>	58.80 <sup>11</sup>	38.624 <sup>116</sup>	17.96 <sup>217</sup>	21.132 <sup>74</sup>	33.26 <sup>109</sup>	10.435 <sup>67</sup>	19.44 <sup>29</sup>
30.0	16.333 <sup>28</sup>	58.88 <sup>8</sup>	38.566 <sup>58</sup>	15.76 <sup>220</sup>	21.093 <sup>39</sup>	31.91 <sup>135</sup>	10.405 <sup>80</sup>	19.32 <sup>12</sup>
	12	31	8	214	1	140	9	7
Apr. 9.0	16.345	59.19	38.574	13.62	21.092	30.31	10.414	19.39
19.0	16.400 <sup>55</sup>	59.72 <sup>53</sup>	38.649 <sup>75</sup>	11.61 <sup>201</sup>	21.135 <sup>43</sup>	28.49 <sup>182</sup>	10.468 <sup>54</sup>	19.71 <sup>32</sup>
29.0	16.499 <sup>99</sup>	60.50 <sup>78</sup>	38.793 <sup>144</sup>	9.82 <sup>179</sup>	21.222 <sup>87</sup>	26.46 <sup>203</sup>	10.564 <sup>96</sup>	20.28 <sup>57</sup>
May 8.9	16.642 <sup>143</sup>	61.51 <sup>101</sup>	39.002 <sup>209</sup>	8.33 <sup>149</sup>	21.354 <sup>132</sup>	24.28 <sup>218</sup>	10.707 <sup>143</sup>	21.09 <sup>81</sup>
18.9	16.825 <sup>183</sup>	62.75 <sup>124</sup>	39.272 <sup>270</sup>	7.19 <sup>114</sup>	21.528 <sup>174</sup>	21.99 <sup>229</sup>	10.892 <sup>185</sup>	22.12 <sup>103</sup>
	222	143	324	74	213	237	221	124
June 7.9	17.047 <sup>254</sup>	64.18 <sup>161</sup>	39.596 <sup>368</sup>	6.45 <sup>84</sup>	21.741 <sup>246</sup>	19.62 <sup>238</sup>	11.113 <sup>264</sup>	23.36 <sup>144</sup>
17.8	17.301 <sup>277</sup>	65.79 <sup>173</sup>	39.964 <sup>403</sup>	6.11 <sup>9</sup>	21.987 <sup>271</sup>	17.24 <sup>233</sup>	11.367 <sup>278</sup>	24.80 <sup>160</sup>
27.8	17.578 <sup>295</sup>	67.52 <sup>182</sup>	40.367 <sup>426</sup>	6.20 <sup>51</sup>	22.258 <sup>291</sup>	14.91 <sup>223</sup>	11.645 <sup>296</sup>	26.40 <sup>171</sup>
July 7.8	17.873 <sup>306</sup>	69.34 <sup>185</sup>	40.793 <sup>438</sup>	6.71 <sup>91</sup>	22.549 <sup>304</sup>	12.68 <sup>205</sup>	11.941 <sup>307</sup>	28.11 <sup>179</sup>
	306	184	439	130	306	184	308	181
17.7	18.485	73.03	41.670	8.92	23.159	8.79	12.556	31.71
27.7	18.785 <sup>300</sup>	74.80 <sup>177</sup>	42.100 <sup>430</sup>	10.56 <sup>164</sup>	23.460 <sup>301</sup>	7.23 <sup>156</sup>	12.860 <sup>304</sup>	33.49 <sup>178</sup>
Aug. 6.7	19.072 <sup>287</sup>	76.44 <sup>164</sup>	42.512 <sup>412</sup>	12.50 <sup>194</sup>	23.749 <sup>290</sup>	5.98 <sup>125</sup>	13.150 <sup>290</sup>	35.20 <sup>171</sup>
16.7	19.339 <sup>267</sup>	77.94 <sup>150</sup>	42.897 <sup>385</sup>	14.70 <sup>220</sup>	24.020 <sup>271</sup>	5.07 <sup>91</sup>	13.422 <sup>272</sup>	36.77 <sup>157</sup>
26.6	19.583 <sup>244</sup>	79.25 <sup>131</sup>	43.248 <sup>351</sup>	17.10 <sup>240</sup>	24.265 <sup>245</sup>	4.54 <sup>53</sup>	13.671 <sup>249</sup>	38.20 <sup>143</sup>
	217	108	313	256	216	16	221	122
Sept. 5.6	19.800	80.33	43.561	19.66	24.481	4.38	13.892	39.42
15.6	19.986 <sup>186</sup>	81.18 <sup>85</sup>	43.832 <sup>271</sup>	22.32 <sup>266</sup>	24.666 <sup>185</sup>	4.59 <sup>21</sup>	14.082 <sup>190</sup>	40.44 <sup>102</sup>
25.6	20.138 <sup>152</sup>	81.77 <sup>59</sup>	44.058 <sup>226</sup>	25.02 <sup>270</sup>	24.815 <sup>149</sup>	5.15 <sup>56</sup>	14.242 <sup>160</sup>	41.24 <sup>80</sup>
Oct. 5.5	20.259 <sup>121</sup>	82.14 <sup>37</sup>	44.237 <sup>179</sup>	27.72 <sup>270</sup>	24.929 <sup>114</sup>	6.01 <sup>86</sup>	14.371 <sup>129</sup>	41.82 <sup>58</sup>
15.5	20.349 <sup>89</sup>	82.28 <sup>14</sup>	44.369 <sup>132</sup>	30.37 <sup>265</sup>	25.008 <sup>79</sup>	7.12 <sup>111</sup>	14.464 <sup>93</sup>	42.18 <sup>36</sup>
	58	6	84	253	46	132	65	14
25.4	20.406 <sup>28</sup>	82.22 <sup>25</sup>	44.453 <sup>37</sup>	32.90 <sup>238</sup>	25.054 <sup>18</sup>	8.44 <sup>147</sup>	14.529 <sup>83</sup>	42.32 <sup>2</sup>
Nov. 4.4	20.434 <sup>1</sup>	81.97 <sup>25</sup>	44.490 <sup>10</sup>	35.28 <sup>216</sup>	25.067 <sup>17</sup>	9.91 <sup>153</sup>	14.562 <sup>6</sup>	42.30 <sup>17</sup>
14.4	20.435 <sup>26</sup>	81.58 <sup>39</sup>	44.480 <sup>55</sup>	37.44 <sup>191</sup>	25.050 <sup>44</sup>	11.44 <sup>153</sup>	14.568 <sup>23</sup>	42.13 <sup>33</sup>
24.4	20.409 <sup>49</sup>	81.07 <sup>60</sup>	44.425 <sup>99</sup>	39.35 <sup>188</sup>	25.006 <sup>70</sup>	12.97 <sup>148</sup>	14.545 <sup>44</sup>	41.80 <sup>45</sup>
Dec. 4.4	20.360 <sup>72</sup>	80.47 <sup>67</sup>	44.326 <sup>139</sup>	40.93 <sup>123</sup>	24.936 <sup>98</sup>	14.45 <sup>135</sup>	14.501 <sup>70</sup>	41.35 <sup>52</sup>
14.3	20.288	79.80	44.187	42.16	24.843	15.80	14.431	40.83
24.3	20.196 <sup>92</sup>	79.09 <sup>71</sup>	44.010 <sup>177</sup>	42.99 <sup>83</sup>	24.731 <sup>112</sup>	16.98 <sup>118</sup>	14.340 <sup>91</sup>	40.24 <sup>59</sup>
34.3	20.087 <sup>109</sup>	78.37 <sup>72</sup>	43.802 <sup>208</sup>	43.40 <sup>41</sup>	24.603 <sup>128</sup>	17.96 <sup>98</sup>	14.231 <sup>100</sup>	39.58 <sup>66</sup>
Mean Place	15.977	59.77	38.202	10.72	21.054	29.78	10.012	19.97
Sec δ, Tan δ	1.004	+0.089	1.565	+1.204	1.042	-0.294	1.012	+0.154
D <sub>α</sub> , D <sub>αα</sub>	+0.062	-0.005	+0.075	-0.073	+0.058	+0.018	+0.063	-0.009
D <sub>δ</sub> , D <sub>δδ</sub>	+0.36	+0.41	+0.36	+0.42	+0.36	+0.42	+0.36	+0.43

FOR THE UPPER TRANSIT AT WASHINGTON.

Washington Mean Time.	ε Sculptoris. Mag. 5.4		ζ Ceti. Mag. 3.9		α Trianguli. Mag. 3.6		ε Cassiopeiae. Mag. 3.4	
	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.
	h m 1 41	° -25 26	h m 1 47	° -10 43	h m 1 48	° +29 11	h m 1 48	° +63 16
Jan. 0.3	54.758	73.80	31.866	49.50	32.652	33.48	40.25	55.60
10.3	54.610 <sup>148</sup>	74.70 <sup>90</sup>	31.742 <sup>124</sup>	50.37 <sup>87</sup>	32.516 <sup>126</sup>	33.19 <sup>29</sup>	39.90 <sup>35</sup>	56.18 <sup>58</sup>
20.2	54.452 <sup>158</sup>	75.25 <sup>55</sup>	31.609 <sup>138</sup>	51.05 <sup>68</sup>	32.364 <sup>152</sup>	32.66 <sup>53</sup>	39.53 <sup>37</sup>	56.25 <sup>7</sup>
30.2	54.290 <sup>162</sup>	75.45 <sup>20</sup>	31.467 <sup>142</sup>	51.55 <sup>50</sup>	32.201 <sup>163</sup>	31.90 <sup>76</sup>	39.14 <sup>39</sup>	55.76 <sup>43</sup>
Feb. 9.2	54.127 <sup>163</sup>	75.29 <sup>16</sup>	31.325 <sup>142</sup>	51.81 <sup>26</sup>	32.037 <sup>164</sup>	30.94 <sup>96</sup>	38.75 <sup>39</sup>	54.75 <sup>101</sup>
19.2	53.974 <sup>153</sup>	74.80 <sup>49</sup>	31.188 <sup>137</sup>	51.83 <sup>2</sup>	31.879 <sup>158</sup>	29.82 <sup>112</sup>	38.39 <sup>36</sup>	53.27 <sup>148</sup>
29.1	53.836 <sup>138</sup>	73.94 <sup>86</sup>	31.063 <sup>125</sup>	51.62 <sup>21</sup>	31.736 <sup>143</sup>	28.58 <sup>124</sup>	38.06 <sup>33</sup>	51.38 <sup>189</sup>
Mar. 10.1	53.722 <sup>114</sup>	72.76 <sup>118</sup>	30.959 <sup>104</sup>	51.15 <sup>47</sup>	31.619 <sup>117</sup>	27.28 <sup>130</sup>	37.79 <sup>27</sup>	49.15 <sup>223</sup>
20.1	53.637 <sup>85</sup>	71.27 <sup>149</sup>	30.882 <sup>77</sup>	50.42 <sup>73</sup>	31.535 <sup>84</sup>	25.98 <sup>130</sup>	37.59 <sup>20</sup>	46.69 <sup>246</sup>
30.1	53.587 <sup>50</sup>	69.49 <sup>178</sup>	30.841 <sup>41</sup>	49.46 <sup>96</sup>	31.491 <sup>44</sup>	24.74 <sup>124</sup>	37.47 <sup>12</sup>	44.09 <sup>260</sup>
Apr. 9.0	53.579 <sup>8</sup>	67.45 <sup>204</sup>	30.837 <sup>4</sup>	48.23 <sup>123</sup>	31.494 <sup>3</sup>	23.64 <sup>110</sup>	37.44 <sup>3</sup>	41.47 <sup>262</sup>
19.0	53.615 <sup>36</sup>	65.20 <sup>225</sup>	30.875 <sup>38</sup>	46.79 <sup>144</sup>	31.546 <sup>62</sup>	22.72 <sup>92</sup>	37.51 <sup>7</sup>	38.93 <sup>254</sup>
29.0	53.697 <sup>82</sup>	62.77 <sup>243</sup>	30.957 <sup>82</sup>	45.11 <sup>168</sup>	31.650 <sup>104</sup>	22.04 <sup>68</sup>	37.67 <sup>16</sup>	36.56 <sup>237</sup>
May 8.9	53.826 <sup>129</sup>	60.20 <sup>257</sup>	31.082 <sup>125</sup>	43.24 <sup>187</sup>	31.805 <sup>155</sup>	21.61 <sup>43</sup>	37.92 <sup>25</sup>	34.45 <sup>211</sup>
18.9	54.000 <sup>174</sup>	57.56 <sup>264</sup>	31.250 <sup>168</sup>	41.22 <sup>202</sup>	32.006 <sup>201</sup>	21.50 <sup>11</sup>	38.27 <sup>35</sup>	32.67 <sup>178</sup>
28.9	54.214 <sup>214</sup>	54.90 <sup>266</sup>	31.459 <sup>209</sup>	39.12 <sup>210</sup>	32.251 <sup>245</sup>	21.69 <sup>19</sup>	38.27 <sup>41</sup>	32.67 <sup>139</sup>
June 7.9	54.465 <sup>251</sup>	52.29 <sup>261</sup>	31.700 <sup>241</sup>	36.94 <sup>218</sup>	32.530 <sup>279</sup>	22.19 <sup>50</sup>	38.68 <sup>48</sup>	31.28 <sup>96</sup>
17.8	54.744 <sup>279</sup>	49.79 <sup>260</sup>	31.969 <sup>269</sup>	34.76 <sup>218</sup>	32.839 <sup>309</sup>	23.01 <sup>82</sup>	39.16 <sup>43</sup>	30.32 <sup>49</sup>
27.8	55.046 <sup>302</sup>	47.46 <sup>233</sup>	32.256 <sup>287</sup>	32.63 <sup>213</sup>	33.168 <sup>329</sup>	24.10 <sup>109</sup>	39.69 <sup>33</sup>	29.83 <sup>49</sup>
July 7.8	55.361 <sup>315</sup>	45.38 <sup>208</sup>	32.554 <sup>298</sup>	30.60 <sup>203</sup>	33.507 <sup>339</sup>	25.42 <sup>132</sup>	40.25 <sup>56</sup>	29.81 <sup>2</sup>
17.8	55.680 <sup>319</sup>	43.59 <sup>179</sup>	32.859 <sup>305</sup>	28.75 <sup>185</sup>	33.850 <sup>343</sup>	26.98 <sup>156</sup>	40.84 <sup>30</sup>	30.26 <sup>45</sup>
27.7	55.997 <sup>317</sup>	42.14 <sup>145</sup>	33.162 <sup>308</sup>	27.10 <sup>165</sup>	34.187 <sup>337</sup>	28.69 <sup>171</sup>	41.43 <sup>58</sup>	31.17 <sup>135</sup>
Aug. 6.7	56.302 <sup>305</sup>	41.08 <sup>106</sup>	33.452 <sup>290</sup>	25.71 <sup>139</sup>	34.512 <sup>325</sup>	30.52 <sup>183</sup>	42.01 <sup>58</sup>	32.52 <sup>174</sup>
16.7	56.590 <sup>288</sup>	40.44 <sup>64</sup>	33.726 <sup>274</sup>	24.61 <sup>110</sup>	34.816 <sup>304</sup>	32.43 <sup>191</sup>	42.57 <sup>56</sup>	34.26 <sup>174</sup>
26.6	56.852 <sup>262</sup>	40.22 <sup>22</sup>	33.977 <sup>251</sup>	23.86 <sup>75</sup>	35.096 <sup>280</sup>	34.36 <sup>193</sup>	43.10 <sup>53</sup>	36.36 <sup>210</sup>
Sept. 5.6	57.066 <sup>234</sup>	40.44 <sup>22</sup>	34.201 <sup>224</sup>	23.36 <sup>43</sup>	35.096 <sup>251</sup>	34.36 <sup>193</sup>	43.59 <sup>49</sup>	38.76 <sup>240</sup>
15.6	57.284 <sup>198</sup>	40.44 <sup>22</sup>	34.201 <sup>224</sup>	23.43 <sup>7</sup>	35.347 <sup>218</sup>	36.29 <sup>188</sup>	44.03 <sup>39</sup>	41.42 <sup>266</sup>
25.6	57.446 <sup>162</sup>	41.07 <sup>68</sup>	34.394 <sup>193</sup>	23.36 <sup>7</sup>	35.565 <sup>218</sup>	38.17 <sup>188</sup>	44.42 <sup>39</sup>	44.29 <sup>287</sup>
Oct. 5.5	57.446 <sup>162</sup>	42.08 <sup>101</sup>	34.555 <sup>161</sup>	23.60 <sup>24</sup>	35.751 <sup>186</sup>	39.97 <sup>180</sup>	44.42 <sup>39</sup>	44.29 <sup>287</sup>
15.5	57.570 <sup>124</sup>	43.42 <sup>134</sup>	34.683 <sup>128</sup>	24.16 <sup>56</sup>	35.902 <sup>151</sup>	41.64 <sup>167</sup>	44.74 <sup>32</sup>	47.30 <sup>301</sup>
25.5	57.657 <sup>87</sup>	45.04 <sup>162</sup>	34.777 <sup>94</sup>	24.98 <sup>82</sup>	36.018 <sup>116</sup>	43.18 <sup>154</sup>	44.74 <sup>32</sup>	47.30 <sup>301</sup>
Nov. 4.5	57.707 <sup>50</sup>	46.85 <sup>181</sup>	34.839 <sup>62</sup>	25.98 <sup>100</sup>	36.018 <sup>82</sup>	43.18 <sup>188</sup>	45.00 <sup>26</sup>	50.39 <sup>309</sup>
14.4	57.721 <sup>14</sup>	48.79 <sup>194</sup>	34.868 <sup>29</sup>	27.18 <sup>120</sup>	36.100 <sup>49</sup>	44.56 <sup>120</sup>	45.00 <sup>26</sup>	50.39 <sup>309</sup>
24.4	57.701 <sup>20</sup>	50.76 <sup>197</sup>	34.869 <sup>1</sup>	28.46 <sup>128</sup>	36.149 <sup>16</sup>	45.76 <sup>102</sup>	45.32 <sup>6</sup>	56.57 <sup>297</sup>
Dec. 4.4	57.652 <sup>49</sup>	52.69 <sup>193</sup>	34.844 <sup>25</sup>	29.80 <sup>134</sup>	36.165 <sup>18</sup>	46.78 <sup>81</sup>	45.38 <sup>2</sup>	59.54 <sup>297</sup>
14.3	57.574 <sup>78</sup>	54.51 <sup>182</sup>	34.794 <sup>50</sup>	31.12 <sup>132</sup>	36.149 <sup>16</sup>	47.59 <sup>81</sup>	45.38 <sup>2</sup>	62.32 <sup>273</sup>
24.3	57.472 <sup>102</sup>	56.13 <sup>162</sup>	34.717 <sup>77</sup>	32.36 <sup>124</sup>	36.103 <sup>46</sup>	48.18 <sup>59</sup>	45.28 <sup>8</sup>	64.86 <sup>264</sup>
34.3	57.348 <sup>124</sup>	57.51 <sup>138</sup>	34.621 <sup>96</sup>	33.50 <sup>114</sup>	36.103 <sup>46</sup>	48.18 <sup>59</sup>	45.12 <sup>16</sup>	67.08 <sup>222</sup>
44.3	57.207 <sup>141</sup>	58.60 <sup>109</sup>	34.506 <sup>115</sup>	34.49 <sup>99</sup>	36.027 <sup>76</sup>	48.54 <sup>36</sup>	44.90 <sup>22</sup>	68.91 <sup>183</sup>
Mean Place	53.704	66.68	30.664	46.86	30.988	22.98	37.351	36.68
Sec δ, Tan δ	1.107	-0.476	1.018	-0.189	1.146	+0.559	2.224	+1.987
D <sub>α</sub> , D <sub>αα</sub>	+0.056	+0.029	+0.059	+0.011	+0.068	-0.033	+0.085	-0.118
D <sub>δ</sub> , D <sub>δδ</sub>	+0.36	+0.43	+0.35	+0.45	+0.35	+0.46	+0.35	+0.46



FOR THE UPPER TRANSIT AT WASHINGTON.

Washington Mean Time.	ξ Piscium. Mag. 4.8		β Arietis. Mag. 2.7		γ Phœnicis. Mag. 4.4		ν Ceti. Mag. 4.2	
	Right Ascension.	Declination.	Right Ascension.	Declination.	Right Ascension.	Declination.	Right Ascension.	Declination.
	h m 1 49 s	° ' " + 2 47	h m 1 50 s	° ' " + 20 25	h m 1 50 s	° ' " - 46 41	h m 1 58 s	° ' " - 21 27
Jan. 0.3	26.068	37.05	14.526	10.70	27.157	52.67	15.262	59.85
10.3	25.953 <sup>115</sup>	36.30 <sup>75</sup>	14.403 <sup>123</sup>	10.24 <sup>46</sup>	26.922 <sup>295</sup>	53.52 <sup>85</sup>	15.125 <sup>137</sup>	60.84 <sup>99</sup>
20.2	25.827 <sup>126</sup>	35.60 <sup>74</sup>	14.265 <sup>138</sup>	9.65 <sup>59</sup>	26.675 <sup>247</sup>	53.88 <sup>36</sup>	14.976 <sup>149</sup>	61.52 <sup>68</sup>
30.2	25.691 <sup>136</sup>	34.96 <sup>60</sup>	14.118 <sup>147</sup>	8.91 <sup>74</sup>	26.424 <sup>251</sup>	53.72 <sup>16</sup>	14.817 <sup>159</sup>	61.89 <sup>37</sup>
Feb. 9.2	25.553 <sup>138</sup>	34.40 <sup>56</sup>	13.968 <sup>150</sup>	8.06 <sup>85</sup>	26.177 <sup>247</sup>	53.05 <sup>67</sup>	14.658 <sup>159</sup>	61.93 <sup>4</sup>
19.2	25.420 <sup>133</sup>	33.95 <sup>45</sup>	13.826 <sup>142</sup>	7.12 <sup>94</sup>	25.943 <sup>234</sup>	51.91 <sup>114</sup>	14.503 <sup>155</sup>	61.64 <sup>20</sup>
29.1	25.300 <sup>120</sup>	33.63 <sup>32</sup>	13.696 <sup>130</sup>	6.16 <sup>96</sup>	25.730 <sup>213</sup>	50.31 <sup>160</sup>	14.361 <sup>142</sup>	61.03 <sup>61</sup>
Mar. 10.1	25.200 <sup>100</sup>	33.47 <sup>16</sup>	13.586 <sup>110</sup>	5.22 <sup>94</sup>	25.546 <sup>184</sup>	48.30 <sup>201</sup>	14.240 <sup>121</sup>	60.09 <sup>94</sup>
20.1	25.126 <sup>74</sup>	33.48 <sup>1</sup>	13.510 <sup>76</sup>	4.34 <sup>88</sup>	25.400 <sup>146</sup>	45.93 <sup>237</sup>	14.146 <sup>94</sup>	58.85 <sup>124</sup>
30.1	25.087 <sup>39</sup>	33.70 <sup>22</sup>	13.468 <sup>42</sup>	3.57 <sup>77</sup>	25.299 <sup>101</sup>	43.24 <sup>269</sup>	14.085 <sup>61</sup>	57.33 <sup>152</sup>
Apr. 9.0	25.086 <sup>1</sup>	34.12 <sup>42</sup>	13.469 <sup>1</sup>	2.95 <sup>62</sup>	25.249 <sup>50</sup>	40.31 <sup>293</sup>	14.065 <sup>20</sup>	55.54 <sup>179</sup>
19.0	25.128 <sup>42</sup>	34.79 <sup>67</sup>	13.517 <sup>48</sup>	2.55 <sup>40</sup>	25.255 <sup>6</sup>	37.17 <sup>314</sup>	14.087 <sup>22</sup>	53.50 <sup>204</sup>
29.0	25.215 <sup>87</sup>	35.67 <sup>88</sup>	13.613 <sup>96</sup>	2.40 <sup>15</sup>	25.317 <sup>62</sup>	33.92 <sup>325</sup>	14.154 <sup>67</sup>	51.27 <sup>223</sup>
May 8.9	25.345 <sup>130</sup>	36.79 <sup>112</sup>	13.756 <sup>143</sup>	2.49 <sup>9</sup>	25.437 <sup>120</sup>	30.60 <sup>332</sup>	14.270 <sup>116</sup>	48.89 <sup>238</sup>
18.9	25.518 <sup>173</sup>	38.12 <sup>133</sup>	13.941 <sup>185</sup>	2.85 <sup>36</sup>	25.614 <sup>177</sup>	27.31 <sup>329</sup>	14.430 <sup>160</sup>	46.40 <sup>249</sup>
28.9	25.729 <sup>211</sup>	39.63 <sup>151</sup>	14.170 <sup>229</sup>	3.48 <sup>63</sup>	25.844 <sup>230</sup>	24.10 <sup>321</sup>	14.630 <sup>200</sup>	43.87 <sup>253</sup>
June 7.9	25.973 <sup>244</sup>	41.30 <sup>167</sup>	14.433 <sup>263</sup>	3.48 <sup>90</sup>	26.121 <sup>277</sup>	21.08 <sup>302</sup>	14.866 <sup>236</sup>	41.33 <sup>254</sup>
17.8	26.243 <sup>270</sup>	43.08 <sup>178</sup>	14.724 <sup>291</sup>	4.38 <sup>112</sup>	26.438 <sup>317</sup>	18.29 <sup>279</sup>	15.133 <sup>267</sup>	38.88 <sup>245</sup>
27.8	26.533 <sup>290</sup>	44.93 <sup>185</sup>	15.034 <sup>310</sup>	5.50 <sup>135</sup>	26.786 <sup>348</sup>	15.83 <sup>248</sup>	15.423 <sup>290</sup>	36.55 <sup>233</sup>
July 7.8	26.833 <sup>300</sup>	46.79 <sup>186</sup>	15.352 <sup>318</sup>	6.85 <sup>153</sup>	27.156 <sup>370</sup>	13.75 <sup>206</sup>	15.728 <sup>305</sup>	34.41 <sup>214</sup>
17.8	27.138 <sup>305</sup>	48.61 <sup>182</sup>	15.676 <sup>324</sup>	8.38 <sup>166</sup>	27.156 <sup>382</sup>	12.10 <sup>165</sup>	16.041 <sup>313</sup>	32.54 <sup>187</sup>
27.7	27.439 <sup>301</sup>	50.35 <sup>174</sup>	15.994 <sup>318</sup>	10.04 <sup>174</sup>	27.538 <sup>384</sup>	10.95 <sup>115</sup>	16.362 <sup>311</sup>	32.54 <sup>157</sup>
Aug. 6.7	27.729 <sup>290</sup>	51.94 <sup>159</sup>	16.301 <sup>307</sup>	11.78 <sup>177</sup>	27.922 <sup>376</sup>	10.31 <sup>64</sup>	16.655 <sup>303</sup>	30.97 <sup>120</sup>
16.7	28.002 <sup>273</sup>	53.37 <sup>143</sup>	16.587 <sup>286</sup>	13.55 <sup>177</sup>	28.298 <sup>356</sup>	10.22 <sup>9</sup>	16.941 <sup>286</sup>	28.94 <sup>83</sup>
26.6	28.251 <sup>249</sup>	54.57 <sup>120</sup>	16.854 <sup>267</sup>	15.32 <sup>177</sup>	28.654 <sup>329</sup>	10.68 <sup>46</sup>	17.207 <sup>266</sup>	28.52 <sup>42</sup>
Sept. 5.6	28.476 <sup>225</sup>	55.55 <sup>98</sup>	17.092 <sup>228</sup>	17.03 <sup>164</sup>	28.983 <sup>292</sup>	10.68 <sup>97</sup>	17.207 <sup>237</sup>	28.52 <sup>0</sup>
15.6	28.670 <sup>194</sup>	56.27 <sup>72</sup>	17.300 <sup>208</sup>	18.67 <sup>150</sup>	29.275 <sup>260</sup>	11.65 <sup>147</sup>	17.444 <sup>207</sup>	28.52 <sup>41</sup>
25.6	28.834 <sup>164</sup>	56.74 <sup>47</sup>	17.475 <sup>175</sup>	20.17 <sup>138</sup>	29.525 <sup>203</sup>	13.12 <sup>190</sup>	17.651 <sup>173</sup>	28.93 <sup>78</sup>
Oct. 5.5	28.966 <sup>132</sup>	56.96 <sup>22</sup>	17.619 <sup>144</sup>	21.55 <sup>121</sup>	29.728 <sup>152</sup>	15.02 <sup>228</sup>	17.824 <sup>138</sup>	29.71 <sup>113</sup>
15.5	29.067 <sup>101</sup>	56.95 <sup>1</sup>	17.732 <sup>113</sup>	22.76 <sup>104</sup>	29.880 <sup>99</sup>	17.30 <sup>255</sup>	17.962 <sup>101</sup>	30.84 <sup>140</sup>
25.5	29.136 <sup>69</sup>	56.95 <sup>23</sup>	17.732 <sup>79</sup>	23.80 <sup>86</sup>	29.979 <sup>46</sup>	19.85 <sup>272</sup>	18.063 <sup>66</sup>	32.24 <sup>164</sup>
Nov. 4.5	29.136 <sup>40</sup>	56.72 <sup>40</sup>	17.811 <sup>48</sup>	24.66 <sup>68</sup>	30.025 <sup>5</sup>	22.57 <sup>279</sup>	18.129 <sup>82</sup>	33.88 <sup>177</sup>
14.4	29.176 <sup>12</sup>	56.32 <sup>20</sup>	17.859 <sup>20</sup>	25.34 <sup>49</sup>	30.020 <sup>53</sup>	25.36 <sup>279</sup>	18.161 <sup>1</sup>	35.65 <sup>185</sup>
24.4	29.188 <sup>16</sup>	55.78 <sup>64</sup>	17.879 <sup>13</sup>	25.83 <sup>32</sup>	29.967 <sup>96</sup>	28.12 <sup>276</sup>	18.160 <sup>30</sup>	37.50 <sup>184</sup>
Dec. 4.4	29.172 <sup>41</sup>	55.13 <sup>73</sup>	17.860 <sup>38</sup>	26.15 <sup>14</sup>	29.871 <sup>138</sup>	30.72 <sup>236</sup>	18.130 <sup>58</sup>	39.34 <sup>176</sup>
14.3	29.131 <sup>66</sup>	54.40 <sup>76</sup>	17.828 <sup>68</sup>	26.29 <sup>3</sup>	29.733 <sup>173</sup>	33.08 <sup>203</sup>	18.072 <sup>85</sup>	41.10 <sup>162</sup>
24.3	29.065 <sup>86</sup>	53.64 <sup>78</sup>	17.760 <sup>92</sup>	26.26 <sup>21</sup>	29.560 <sup>202</sup>	35.11 <sup>162</sup>	17.987 <sup>108</sup>	42.72 <sup>140</sup>
34.3	28.979 <sup>106</sup>	52.86 <sup>77</sup>	17.668 <sup>112</sup>	26.05 <sup>35</sup>	29.358 <sup>225</sup>	36.73 <sup>116</sup>	17.879 <sup>128</sup>	44.12 <sup>116</sup>
34.3	28.873 <sup>106</sup>	52.09 <sup>77</sup>	17.556 <sup>112</sup>	25.70 <sup>35</sup>	29.133 <sup>225</sup>	37.89 <sup>116</sup>	17.751 <sup>128</sup>	45.28 <sup>116</sup>
Mean Place	24.735	35.23	12.984	3.04	26.211	39.88	14.095	59.58
Sec δ, Tan δ	1.001	+0.049	1.067	+0.372	1.458	-1.061	1.075	-0.393
D <sub>α</sub> , D <sub>δ</sub>	+0.062	-0.003	+0.066	-0.022	+0.048	+0.063	+0.056	+0.023
D <sub>β</sub> , D <sub>γ</sub>	+0.35	+0.46	+0.35	+0.46	+0.35	+0.46	+0.35	+0.49

FOR THE UPPER TRANSIT AT WASHINGTON.

Washington Mean Time.	$\alpha$ Hydri. Mag. 3.0		50 Cassiopeiæ. Mag. 4.1		$\gamma$ Andromedæ <i>pr.</i> Mag. 2.3		$\alpha$ Arietis. Mag. 2.2	
	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.
	h m 1 56	° ' " -61 57	h m 1 56	° ' " +72 1	h m 1 58	° ' " +41 56	h m 2 2	° ' " +23 5
Jan. 0.3	15.36	47.29	38.31	85.82	60.896	61.12	41.215	13.24
10.3	14.96	48.02	37.78	86.74	60.725	61.25	41.093	12.88
20.3	14.55	48.18	37.19	87.08	60.536	60.99	40.952	12.34
30.2	14.14	47.76	36.59	86.84	60.332	60.36	40.803	11.66
Feb. 9.2	13.74	46.77	35.98	86.00	60.125	59.41	40.645	10.85
19.2	13.35	45.25	35.41	84.65	59.922	58.18	40.491	9.92
29.1	13.00	43.24	34.89	82.80	59.738	56.69	40.351	8.93
Mar. 10.1	12.70	40.80	34.46	80.55	59.585	55.01	40.230	7.92
20.1	12.45	37.98	34.12	77.98	59.469	53.25	40.142	6.93
30.1	12.26	34.86	33.91	75.23	59.401	51.45	40.087	6.04
Apr. 9.0	12.15	31.49	33.82	72.38	59.386	49.70	40.077	5.30
19.0	12.11	27.95	33.86	69.55	59.431	48.09	40.111	4.71
29.0	12.15	24.33	34.06	66.84	59.535	46.68	40.196	4.36
May 9.0	12.26	20.72	34.38	64.37	59.697	45.52	40.331	4.25
18.9	12.46	17.18	34.82	62.21	59.916	44.68	40.509	4.40
28.9	12.74	13.80	35.38	60.42	60.186	44.17	40.732	4.84
June 7.9	13.08	10.66	36.02	59.07	60.495	44.02	40.992	5.55
17.8	13.48	7.83	36.74	58.18	60.840	44.23	41.279	6.50
27.8	13.93	5.37	37.51	57.79	61.209	44.82	41.587	7.70
July 7.8	14.41	3.40	38.32	57.90	61.593	45.73	41.909	9.07
17.8	14.92	1.92	39.14	58.51	61.985	46.95	42.238	10.63
27.7	15.44	0.98	39.96	59.59	62.370	48.47	42.564	12.28
Aug. 6.7	15.95	0.63	40.75	61.13	62.742	50.22	42.877	13.99
16.7	16.44	0.87	41.51	63.08	63.096	52.19	43.176	15.73
26.7	16.89	1.70	42.21	65.39	63.425	54.28	43.455	17.45
Sept. 5.6	17.30	3.09	42.85	68.04	63.721	56.49	43.705	19.13
15.6	17.64	4.99	43.40	70.95	63.984	58.75	43.928	20.69
25.6	17.92	7.34	43.88	74.07	64.210	61.03	44.119	22.15
Oct. 5.5	18.13	10.05	44.27	77.33	64.397	63.29	44.280	23.46
15.5	18.25	13.03	44.56	80.67	64.544	65.47	44.408	24.61
25.5	18.30	16.15	44.75	84.02	64.651	67.55	44.502	25.59
Nov. 4.5	18.26	19.30	44.82	87.31	64.718	69.48	44.566	26.40
14.4	18.15	22.37	44.79	90.44	64.744	71.23	44.599	27.05
24.4	17.97	25.22	44.66	93.36	64.729	72.76	44.599	27.54
Dec. 4.4	17.73	27.76	44.42	95.97	64.677	74.04	44.569	27.83
14.4	17.42	29.88	44.09	98.20	64.590	75.02	44.509	27.97
24.3	17.08	31.52	43.65	99.97	64.465	75.70	44.423	27.89
34.3	16.70	32.62	43.14	101.23	64.309	76.01	44.314	27.63
Mean Place	14.490	31.73	34.230	66.10	58.881	47.53	39.559	5.30
Sec $\delta$ , Tan $\delta$	2.127	-1.877	3.243	+3.065	1.345	+0.899	1.087	+0.426
$D\psi_a, D_{\omega a}$	+0.037	+0.110	+0.101	-0.180	+0.073	-0.052	+0.067	-0.024
$D\psi_\delta, D_{\omega\delta}$	+0.35	+0.49	+0.35	+0.49	+0.35	+0.50	+0.34	+0.51

# APPARENT PLACES OF STARS, 1920.

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## FOR THE UPPER TRANSIT AT WASHINGTON.

Washington Mean Time.	β Trianguli. Mag. 3.1		55 Cassiopeie. Mag. 6.2		δ Persei. Mag. 5.4		ξ Ceti. Mag. 4.5	
	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.
	h m 2 4	° ' " +34 36	h m 2 8	° ' " +66 8	h m 2 8	° ' " +50 41	h m 2 8	° ' " + 8 28
	s	"	s	"	s	"	s	"
Jan. 0.3	48.534	45.57	14.42	79.37	18.874	56.89	46.942	21.00
10.3	48.392 <sup>142</sup>	45.54 <sup>3</sup>	14.04 <sup>38</sup>	80.27 <sup>90</sup>	18.668 <sup>206</sup>	57.33 <sup>44</sup>	46.833 <sup>109</sup>	21.25 <sup>65</sup>
20.3	48.227 <sup>165</sup>	45.18 <sup>36</sup>	13.63 <sup>41</sup>	80.62 <sup>35</sup>	18.436 <sup>222</sup>	57.34 <sup>1</sup>	46.707 <sup>126</sup>	20.58 <sup>67</sup>
30.2	48.052 <sup>175</sup>	44.57 <sup>61</sup>	13.19 <sup>44</sup>	80.42 <sup>20</sup>	18.185 <sup>251</sup>	56.91 <sup>43</sup>	46.569 <sup>133</sup>	19.92 <sup>66</sup>
Feb. 9.2	47.868 <sup>184</sup>	43.69 <sup>88</sup>	12.74 <sup>45</sup>	79.69 <sup>73</sup>	17.927 <sup>258</sup>	56.06 <sup>85</sup>	46.425 <sup>144</sup>	19.29 <sup>63</sup>
19.2	47.689 <sup>179</sup>	42.58 <sup>111</sup>	12.31 <sup>43</sup>	78.44 <sup>125</sup>	17.675 <sup>252</sup>	54.83 <sup>123</sup>	46.282 <sup>143</sup>	18.70 <sup>59</sup>
29.1	47.524 <sup>165</sup>	41.32 <sup>126</sup>	11.91 <sup>40</sup>	76.74 <sup>170</sup>	17.443 <sup>232</sup>	53.27 <sup>156</sup>	46.148 <sup>134</sup>	18.19 <sup>51</sup>
Mar. 10.1	47.385 <sup>139</sup>	39.90 <sup>142</sup>	11.57 <sup>34</sup>	74.65 <sup>209</sup>	17.244 <sup>199</sup>	51.45 <sup>182</sup>	46.033 <sup>115</sup>	17.79 <sup>40</sup>
20.1	47.278 <sup>107</sup>	38.44 <sup>146</sup>	11.30 <sup>27</sup>	72.27 <sup>238</sup>	17.090 <sup>154</sup>	49.44 <sup>201</sup>	45.943 <sup>90</sup>	17.52 <sup>27</sup>
30.1	47.213 <sup>65</sup>	36.99 <sup>145</sup>	11.12 <sup>18</sup>	69.69 <sup>258</sup>	16.992 <sup>98</sup>	47.32 <sup>212</sup>	45.887 <sup>56</sup>	17.41 <sup>11</sup>
Apr. 9.0	47.190 <sup>17</sup>	35.62 <sup>137</sup>	11.04 <sup>8</sup>	67.03 <sup>266</sup>	16.955 <sup>37</sup>	45.21 <sup>211</sup>	45.869 <sup>18</sup>	17.48 <sup>7</sup>
19.0	47.232 <sup>36</sup>	34.38 <sup>124</sup>	11.07 <sup>3</sup>	64.38 <sup>265</sup>	16.987 <sup>32</sup>	43.17 <sup>204</sup>	45.894 <sup>25</sup>	17.77 <sup>28</sup>
29.0	47.322 <sup>90</sup>	33.36 <sup>102</sup>	11.20 <sup>13</sup>	61.86 <sup>252</sup>	17.090 <sup>103</sup>	41.28 <sup>189</sup>	45.964 <sup>70</sup>	18.28 <sup>51</sup>
May 9.0	47.469 <sup>147</sup>	32.57 <sup>79</sup>	11.43 <sup>23</sup>	59.54 <sup>232</sup>	17.260 <sup>170</sup>	39.64 <sup>164</sup>	46.080 <sup>116</sup>	19.03 <sup>78</sup>
18.9	47.664 <sup>195</sup>	32.09 <sup>48</sup>	11.76 <sup>33</sup>	57.52 <sup>202</sup>	17.497 <sup>237</sup>	38.28 <sup>136</sup>	46.239 <sup>159</sup>	19.99 <sup>94</sup>
28.9	47.906 <sup>242</sup>	31.91 <sup>18</sup>	12.18 <sup>42</sup>	55.85 <sup>167</sup>	17.793 <sup>296</sup>	37.28 <sup>100</sup>	46.439 <sup>200</sup>	21.18 <sup>118</sup>
June 7.9	48.189 <sup>283</sup>	32.06 <sup>15</sup>	12.69 <sup>51</sup>	54.58 <sup>127</sup>	18.139 <sup>346</sup>	36.65 <sup>63</sup>	46.674 <sup>235</sup>	22.54 <sup>134</sup>
17.8	48.501 <sup>312</sup>	32.62 <sup>46</sup>	13.24 <sup>55</sup>	53.77 <sup>81</sup>	18.526 <sup>387</sup>	36.42 <sup>23</sup>	46.939 <sup>265</sup>	24.05 <sup>151</sup>
27.8	48.840 <sup>339</sup>	33.31 <sup>79</sup>	13.85 <sup>61</sup>	53.41 <sup>36</sup>	18.942 <sup>416</sup>	36.59 <sup>17</sup>	47.225 <sup>286</sup>	25.70 <sup>165</sup>
July 7.8	49.194 <sup>354</sup>	34.37 <sup>106</sup>	14.48 <sup>63</sup>	53.53 <sup>12</sup>	19.378 <sup>436</sup>	37.16 <sup>57</sup>	47.525 <sup>300</sup>	27.40 <sup>170</sup>
17.8	49.552 <sup>358</sup>	35.69 <sup>132</sup>	15.13 <sup>65</sup>	54.11 <sup>58</sup>	19.824 <sup>446</sup>	38.10 <sup>94</sup>	47.831 <sup>306</sup>	29.12 <sup>172</sup>
27.7	49.909 <sup>357</sup>	37.24 <sup>155</sup>	15.77 <sup>64</sup>	55.14 <sup>103</sup>	20.266 <sup>442</sup>	39.39 <sup>129</sup>	48.135 <sup>304</sup>	30.80 <sup>168</sup>
Aug. 6.7	50.255 <sup>346</sup>	38.96 <sup>172</sup>	16.41 <sup>64</sup>	56.60 <sup>146</sup>	20.697 <sup>441</sup>	41.00 <sup>161</sup>	48.432 <sup>297</sup>	32.41 <sup>161</sup>
16.7	50.585 <sup>330</sup>	40.81 <sup>185</sup>	17.01 <sup>60</sup>	58.43 <sup>183</sup>	21.110 <sup>413</sup>	42.88 <sup>188</sup>	48.715 <sup>283</sup>	33.91 <sup>150</sup>
26.7	50.890 <sup>305</sup>	42.74 <sup>193</sup>	17.58 <sup>57</sup>	60.62 <sup>219</sup>	21.493 <sup>383</sup>	44.99 <sup>211</sup>	48.977 <sup>262</sup>	35.26 <sup>135</sup>
Sept. 5.6	51.170 <sup>280</sup>	44.73 <sup>199</sup>	17.58 <sup>51</sup>	60.62 <sup>248</sup>	21.493 <sup>350</sup>	44.99 <sup>229</sup>	48.977 <sup>289</sup>	35.26 <sup>115</sup>
15.6	51.415 <sup>245</sup>	46.72 <sup>199</sup>	18.09 <sup>47</sup>	63.10 <sup>272</sup>	21.843 <sup>314</sup>	47.28 <sup>242</sup>	49.216 <sup>212</sup>	36.41 <sup>95</sup>
25.6	51.628 <sup>213</sup>	48.68 <sup>196</sup>	18.56 <sup>40</sup>	65.82 <sup>291</sup>	22.157 <sup>271</sup>	49.70 <sup>252</sup>	49.428 <sup>183</sup>	37.36 <sup>72</sup>
Oct. 5.5	51.807 <sup>179</sup>	48.68 <sup>189</sup>	18.96 <sup>33</sup>	68.73 <sup>306</sup>	22.428 <sup>227</sup>	52.22 <sup>255</sup>	49.611 <sup>152</sup>	38.08 <sup>51</sup>
15.5	51.950 <sup>143</sup>	50.57 <sup>179</sup>	19.29 <sup>27</sup>	71.79 <sup>312</sup>	22.655 <sup>182</sup>	54.77 <sup>254</sup>	49.763 <sup>122</sup>	38.59 <sup>28</sup>
25.5	52.058 <sup>108</sup>	52.36 <sup>167</sup>	19.56 <sup>18</sup>	74.91 <sup>313</sup>	22.837 <sup>135</sup>	57.31 <sup>248</sup>	49.885 <sup>92</sup>	38.87 <sup>10</sup>
Nov. 4.5	52.129 <sup>71</sup>	54.03 <sup>150</sup>	19.74 <sup>11</sup>	78.04 <sup>295</sup>	22.972 <sup>87</sup>	59.79 <sup>238</sup>	49.977 <sup>62</sup>	38.97 <sup>9</sup>
14.4	52.163 <sup>34</sup>	55.53 <sup>134</sup>	19.85 <sup>2</sup>	81.09 <sup>294</sup>	23.059 <sup>39</sup>	62.17 <sup>222</sup>	50.039 <sup>32</sup>	38.88 <sup>25</sup>
24.4	52.164 <sup>1</sup>	56.87 <sup>115</sup>	19.87 <sup>6</sup>	84.03 <sup>273</sup>	23.098 <sup>10</sup>	64.39 <sup>200</sup>	50.071 <sup>5</sup>	38.63 <sup>36</sup>
Dec. 4.4	52.129 <sup>35</sup>	58.02 <sup>91</sup>	19.81 <sup>13</sup>	86.76 <sup>245</sup>	23.088 <sup>58</sup>	66.39 <sup>174</sup>	50.076 <sup>24</sup>	38.27 <sup>47</sup>
14.4	52.061 <sup>68</sup>	58.93 <sup>66</sup>	19.68 <sup>21</sup>	89.21 <sup>209</sup>	23.030 <sup>105</sup>	68.13 <sup>144</sup>	50.052 <sup>50</sup>	37.80 <sup>54</sup>
24.3	51.958 <sup>103</sup>	59.59 <sup>39</sup>	19.47 <sup>29</sup>	91.30 <sup>168</sup>	22.925 <sup>149</sup>	69.57 <sup>108</sup>	50.002 <sup>75</sup>	37.26 <sup>60</sup>
34.3	51.830 <sup>128</sup>	59.98 <sup>14</sup>	19.18 <sup>24</sup>	92.98 <sup>121</sup>	22.776 <sup>188</sup>	70.65 <sup>69</sup>	49.927 <sup>98</sup>	36.66 <sup>64</sup>
		60.12	18.84	94.19	22.588	71.34	49.829	36.02
Mean Place	46.653	34.30	10.970	61.25	16.482	41.73	45.442	18.94
Sec δ, Tan δ	1.215	+0.690	2.473	+2.262	1.579	+1.222	1.011	+0.149
D <sub>ψ</sub> α, D <sub>ω</sub> α	+0.071	-0.039	+0.093	-0.128	+0.078	-0.069	+0.063	-0.008
D <sub>ψ</sub> δ, D <sub>ω</sub> δ	+0.34	+0.52	+0.34	+0.53	+0.34	+0.53	+0.34	+0.53

FOR THE UPPER TRANSIT AT WASHINGTON.

Washington Mean Time.	$\mu$ Fornacis. Mag. 5.2		$\gamma$ Trianguli. Mag. 4.1		$\delta$ 7 Ceti. Mag. 5.7		$\phi$ Eridani. Mag. 3.8	
	Right Ascension.	Declination.	Right Ascension.	Declination.	Right Ascension.	Declination.	Right Ascension.	Declination.
	h m 2 9	° ' " -31 5	h m 2 12	° ' " +33 28	h m 2 12	° ' " - 6 47	h m 2 13	° ' " -51 52
Jan. 0.3	23.999	65.59	35.077	50.95	60.881	27.20	40.074	69.82
10.3	23.840 <sup>159</sup>	66.69 <sup>110</sup>	34.943 <sup>134</sup>	50.93 <sup>2</sup>	60.767 <sup>114</sup>	28.13 <sup>93</sup>	39.804 <sup>370</sup>	70.91 <sup>109</sup>
20.3	23.665 <sup>175</sup>	67.41 <sup>72</sup>	34.784 <sup>159</sup>	50.62 <sup>31</sup>	60.638 <sup>129</sup>	28.92 <sup>79</sup>	39.516 <sup>288</sup>	71.47 <sup>56</sup>
30.2	23.481 <sup>184</sup>	67.73 <sup>82</sup>	34.611 <sup>173</sup>	50.08 <sup>56</sup>	60.496 <sup>142</sup>	29.53 <sup>61</sup>	39.218 <sup>298</sup>	71.47 <sup>0</sup>
Feb. 9.2	23.292 <sup>189</sup>	67.63 <sup>10</sup>	34.430 <sup>181</sup>	49.25 <sup>81</sup>	60.349 <sup>147</sup>	29.94 <sup>41</sup>	38.920 <sup>298</sup>	70.95 <sup>52</sup>
19.2	23.108 <sup>184</sup>	67.14 <sup>49</sup>	34.250 <sup>180</sup>	48.22 <sup>103</sup>	60.204 <sup>145</sup>	30.14 <sup>20</sup>	38.631 <sup>289</sup>	69.90 <sup>105</sup>
29.2	22.936 <sup>172</sup>	66.25 <sup>89</sup>	34.084 <sup>166</sup>	47.01 <sup>121</sup>	60.064 <sup>140</sup>	30.13 <sup>1</sup>	38.362 <sup>269</sup>	68.37 <sup>153</sup>
Mar. 10.1	22.785 <sup>151</sup>	64.97 <sup>128</sup>	33.938 <sup>146</sup>	45.69 <sup>132</sup>	59.944 <sup>120</sup>	29.91 <sup>22</sup>	38.121 <sup>241</sup>	66.39 <sup>198</sup>
20.1	22.662 <sup>123</sup>	63.96 <sup>161</sup>	33.826 <sup>112</sup>	44.31 <sup>138</sup>	59.849 <sup>95</sup>	29.43 <sup>48</sup>	37.919 <sup>202</sup>	64.02 <sup>237</sup>
30.1	22.575 <sup>87</sup>	61.43 <sup>193</sup>	33.753 <sup>73</sup>	42.93 <sup>138</sup>	59.783 <sup>66</sup>	28.72 <sup>71</sup>	37.763 <sup>156</sup>	61.30 <sup>272</sup>
Apr. 9.0	22.528 <sup>47</sup>	59.20 <sup>223</sup>	33.727 <sup>26</sup>	41.62 <sup>131</sup>	59.756 <sup>27</sup>	27.79 <sup>93</sup>	37.661 <sup>102</sup>	58.30 <sup>300</sup>
19.0	22.527 <sup>1</sup>	56.75 <sup>245</sup>	33.754 <sup>27</sup>	40.45 <sup>117</sup>	59.770 <sup>14</sup>	26.60 <sup>119</sup>	37.619 <sup>42</sup>	55.08 <sup>322</sup>
29.0	22.575 <sup>48</sup>	54.09 <sup>266</sup>	33.834 <sup>80</sup>	39.47 <sup>98</sup>	59.829 <sup>59</sup>	25.19 <sup>141</sup>	37.639 <sup>20</sup>	51.72 <sup>336</sup>
May 9.0	22.672 <sup>97</sup>	51.30 <sup>279</sup>	33.968 <sup>134</sup>	38.73 <sup>74</sup>	59.931 <sup>102</sup>	23.60 <sup>159</sup>	37.724 <sup>85</sup>	48.28 <sup>344</sup>
18.9	22.818 <sup>146</sup>	48.44 <sup>286</sup>	34.154 <sup>186</sup>	38.26 <sup>47</sup>	60.079 <sup>148</sup>	21.82 <sup>178</sup>	37.872 <sup>148</sup>	44.84 <sup>344</sup>
28.9	23.009 <sup>191</sup>	45.56 <sup>283</sup>	34.387 <sup>233</sup>	38.10 <sup>16</sup>	60.267 <sup>188</sup>	19.88 <sup>194</sup>	37.872 <sup>209</sup>	44.84 <sup>336</sup>
June 7.9	23.240 <sup>231</sup>	42.73 <sup>268</sup>	34.661 <sup>274</sup>	38.25 <sup>15</sup>	60.490 <sup>223</sup>	17.88 <sup>200</sup>	38.081 <sup>264</sup>	41.48 <sup>319</sup>
17.9	23.506 <sup>266</sup>	40.04 <sup>269</sup>	34.968 <sup>307</sup>	38.25 <sup>45</sup>	60.490 <sup>252</sup>	17.88 <sup>206</sup>	38.345 <sup>313</sup>	38.29 <sup>296</sup>
27.8	23.800 <sup>294</sup>	37.54 <sup>250</sup>	35.300 <sup>332</sup>	38.70 <sup>76</sup>	60.742 <sup>276</sup>	15.82 <sup>206</sup>	38.658 <sup>354</sup>	35.33 <sup>264</sup>
July 7.8	24.113 <sup>313</sup>	35.31 <sup>223</sup>	35.648 <sup>348</sup>	39.46 <sup>103</sup>	61.018 <sup>292</sup>	13.76 <sup>198</sup>	39.012 <sup>384</sup>	32.69 <sup>225</sup>
17.8	24.437 <sup>324</sup>	33.39 <sup>192</sup>	36.002 <sup>354</sup>	40.49 <sup>128</sup>	61.310 <sup>299</sup>	11.78 <sup>187</sup>	39.396 <sup>405</sup>	30.44 <sup>179</sup>
27.7	24.765 <sup>328</sup>	33.39 <sup>158</sup>	36.002 <sup>352</sup>	41.77 <sup>148</sup>	61.609 <sup>301</sup>	9.91 <sup>169</sup>	39.801 <sup>413</sup>	28.65 <sup>130</sup>
Aug. 6.7	25.087 <sup>322</sup>	31.86 <sup>111</sup>	36.354 <sup>345</sup>	43.25 <sup>166</sup>	61.910 <sup>293</sup>	8.22 <sup>147</sup>	40.214 <sup>411</sup>	27.35 <sup>75</sup>
16.7	25.394 <sup>307</sup>	30.75 <sup>64</sup>	36.699 <sup>329</sup>	44.91 <sup>178</sup>	62.203 <sup>281</sup>	6.75 <sup>120</sup>	40.625 <sup>366</sup>	26.60 <sup>19</sup>
26.7	25.682 <sup>288</sup>	30.11 <sup>18</sup>	37.028 <sup>306</sup>	46.69 <sup>186</sup>	62.484 <sup>263</sup>	5.55 <sup>91</sup>	41.021 <sup>373</sup>	26.41 <sup>38</sup>
Sept. 5.6	25.942 <sup>260</sup>	29.93 <sup>30</sup>	37.334 <sup>281</sup>	48.55 <sup>190</sup>	62.747 <sup>239</sup>	4.64 <sup>63</sup>	41.394 <sup>339</sup>	26.79 <sup>97</sup>
15.6	26.171 <sup>229</sup>	30.23 <sup>77</sup>	37.615 <sup>250</sup>	50.45 <sup>190</sup>	62.986 <sup>211</sup>	4.01 <sup>26</sup>	41.733 <sup>298</sup>	27.76 <sup>148</sup>
25.6	26.364 <sup>193</sup>	31.00 <sup>120</sup>	37.865 <sup>218</sup>	52.35 <sup>186</sup>	63.197 <sup>183</sup>	3.75 <sup>3</sup>	42.031 <sup>248</sup>	29.24 <sup>196</sup>
Oct. 5.6	26.520 <sup>156</sup>	32.20 <sup>157</sup>	38.083 <sup>185</sup>	54.21 <sup>179</sup>	63.380 <sup>152</sup>	3.78 <sup>35</sup>	42.279 <sup>194</sup>	31.20 <sup>235</sup>
15.5	26.637 <sup>117</sup>	33.77 <sup>188</sup>	38.268 <sup>150</sup>	56.00 <sup>169</sup>	63.532 <sup>123</sup>	4.13 <sup>60</sup>	42.473 <sup>137</sup>	33.55 <sup>269</sup>
25.5	26.714 <sup>77</sup>	35.65 <sup>212</sup>	38.418 <sup>114</sup>	57.69 <sup>158</sup>	63.655 <sup>88</sup>	4.73 <sup>85</sup>	42.610 <sup>79</sup>	36.24 <sup>290</sup>
Nov. 4.5	26.714 <sup>39</sup>	37.77 <sup>226</sup>	38.532 <sup>80</sup>	59.27 <sup>143</sup>	63.743 <sup>60</sup>	5.58 <sup>102</sup>	42.689 <sup>20</sup>	39.14 <sup>300</sup>
14.4	26.753 <sup>2</sup>	40.03 <sup>232</sup>	38.612 <sup>45</sup>	60.70 <sup>127</sup>	63.803 <sup>27</sup>	6.60 <sup>113</sup>	42.709 <sup>86</sup>	42.14 <sup>299</sup>
24.4	26.755 <sup>35</sup>	42.35 <sup>228</sup>	38.657 <sup>9</sup>	61.97 <sup>107</sup>	63.830 <sup>0</sup>	7.73 <sup>122</sup>	42.673 <sup>91</sup>	45.13 <sup>286</sup>
Dec. 4.4	26.720 <sup>67</sup>	44.63 <sup>195</sup>	38.666 <sup>26</sup>	63.04 <sup>88</sup>	63.830 <sup>26</sup>	8.95 <sup>120</sup>	42.582 <sup>140</sup>	47.99 <sup>262</sup>
14.4	26.853 <sup>98</sup>	46.77 <sup>155</sup>	38.640 <sup>61</sup>	63.92 <sup>64</sup>	63.804 <sup>55</sup>	10.18 <sup>120</sup>	42.442 <sup>184</sup>	50.61 <sup>229</sup>
24.3	26.555 <sup>126</sup>	48.72 <sup>166</sup>	38.579 <sup>91</sup>	64.56 <sup>40</sup>	63.749 <sup>80</sup>	11.38 <sup>113</sup>	42.258 <sup>223</sup>	52.90 <sup>189</sup>
34.3	26.429 <sup>148</sup>	50.38 <sup>134</sup>	38.488 <sup>123</sup>	64.96 <sup>14</sup>	63.669 <sup>105</sup>	12.51 <sup>101</sup>	42.035 <sup>255</sup>	54.79 <sup>141</sup>
34.3	26.281 <sup>148</sup>	51.72 <sup>134</sup>	38.365 <sup>123</sup>	65.10 <sup>14</sup>	63.564 <sup>105</sup>	13.52 <sup>101</sup>	41.780 <sup>255</sup>	56.20 <sup>141</sup>
Mean Place	22.820	56.29	33.169	40.44	59.506	25.06	38.979	55.76
Sec $\delta$ , Tan $\delta$	1.168	-0.603	1.199	+0.661	1.007	-0.119	1.620	-1.274
$D\alpha$ , $D_{\alpha\alpha}$	+0.063	+0.034	+0.071	-0.037	+0.060	+0.007	+0.043	+0.071
$D\delta$ , $D_{\delta\delta}$	+0.34	+0.54	+0.33	+0.55	+0.33	+0.55	+0.33	+0.55

# APPARENT PLACES OF STARS, 1920.

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FOR THE UPPER TRANSIT AT WASHINGTON.

Washington Mean Time.	$\alpha$ Ceti. (Mira.) Var. 1.7-9.6		$\kappa$ Fornacis. Mag. 5.4		$\delta$ Hydri. Mag. 4.3		$\iota$ Cassiopeie. Mag. 4.6	
	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.
	h m 2 15	° ' " - 3 20	h m 2 18	° ' " - 24 10	h m 2 20	° ' " - 69 0	h m 2 22	° ' " + 67 2
	s	"	s	"	s	"	s	"
Jan. 0.3	19.656	25.66	54.158	53.67	20.32	99.66	30.99	54.69
10.3	19.546 <sup>110</sup>	26.55 <sup>89</sup>	54.021 <sup>137</sup>	54.81 <sup>114</sup>	19.77 <sup>55</sup>	100.63 <sup>97</sup>	30.61 <sup>89</sup>	55.76 <sup>107</sup>
20.3	19.419 <sup>127</sup>	27.32 <sup>77</sup>	53.866 <sup>155</sup>	55.64 <sup>86</sup>	19.19 <sup>56</sup>	101.00 <sup>87</sup>	30.18 <sup>43</sup>	56.31 <sup>55</sup>
30.2	19.280 <sup>139</sup>	27.94 <sup>62</sup>	53.698 <sup>166</sup>	56.12 <sup>48</sup>	18.61 <sup>56</sup>	100.77 <sup>23</sup>	29.73 <sup>45</sup>	56.30 <sup>1</sup>
Feb. 9.2	19.134 <sup>146</sup>	28.42 <sup>48</sup>	53.528 <sup>172</sup>	56.24 <sup>12</sup>	18.02 <sup>59</sup>	99.95 <sup>82</sup>	29.26 <sup>47</sup>	55.76 <sup>54</sup>
19.2	18.988 <sup>146</sup>	28.71 <sup>39</sup>	53.354 <sup>172</sup>	56.00 <sup>24</sup>	17.46 <sup>56</sup>	98.58 <sup>137</sup>	28.80 <sup>46</sup>	54.69 <sup>107</sup>
29.2	18.851 <sup>137</sup>	28.83 <sup>12</sup>	53.193 <sup>161</sup>	55.41 <sup>59</sup>	16.94 <sup>52</sup>	96.69 <sup>189</sup>	28.37 <sup>43</sup>	53.14 <sup>155</sup>
Mar. 10.1	18.731 <sup>98</sup>	28.76 <sup>7</sup>	53.049 <sup>144</sup>	54.48 <sup>93</sup>	16.47 <sup>47</sup>	94.33 <sup>236</sup>	28.01 <sup>36</sup>	51.19 <sup>195</sup>
20.1	18.633 <sup>98</sup>	28.46 <sup>30</sup>	52.930 <sup>119</sup>	53.22 <sup>126</sup>	16.06 <sup>41</sup>	91.57 <sup>276</sup>	27.70 <sup>31</sup>	48.91 <sup>228</sup>
30.1	18.568 <sup>65</sup>	27.95 <sup>51</sup>	52.844 <sup>86</sup>	51.64 <sup>158</sup>	15.73 <sup>33</sup>	88.48 <sup>300</sup>	27.48 <sup>22</sup>	46.39 <sup>282</sup>
Apr. 9.0	18.540 <sup>28</sup>	27.20 <sup>75</sup>	52.795 <sup>49</sup>	49.80 <sup>184</sup>	15.49 <sup>24</sup>	85.14 <sup>334</sup>	27.36 <sup>12</sup>	43.76 <sup>263</sup>
19.0	18.554 <sup>14</sup>	26.23 <sup>97</sup>	52.791 <sup>4</sup>	47.70 <sup>210</sup>	15.49 <sup>16</sup>	81.59 <sup>355</sup>	27.34 <sup>2</sup>	41.10 <sup>266</sup>
29.0	18.612 <sup>56</sup>	25.08 <sup>130</sup>	52.833 <sup>42</sup>	45.40 <sup>230</sup>	15.34 <sup>4</sup>	81.59 <sup>364</sup>	27.45 <sup>11</sup>	38.53 <sup>257</sup>
May 9.0	18.715 <sup>168</sup>	23.64 <sup>139</sup>	52.922 <sup>89</sup>	42.92 <sup>243</sup>	15.30 <sup>6</sup>	77.95 <sup>367</sup>	27.45 <sup>21</sup>	36.12 <sup>241</sup>
18.9	18.861 <sup>146</sup>	22.04 <sup>160</sup>	53.068 <sup>136</sup>	40.32 <sup>260</sup>	15.36 <sup>16</sup>	74.28 <sup>362</sup>	27.66 <sup>81</sup>	36.12 <sup>215</sup>
28.9	18.861 <sup>166</sup>	22.04 <sup>175</sup>	53.068 <sup>180</sup>	40.32 <sup>264</sup>	15.52 <sup>26</sup>	70.66 <sup>348</sup>	27.97 <sup>41</sup>	33.97 <sup>183</sup>
June 7.9	19.047 <sup>223</sup>	20.29 <sup>196</sup>	53.238 <sup>220</sup>	37.68 <sup>264</sup>	15.78 <sup>36</sup>	67.18 <sup>326</sup>	28.38 <sup>48</sup>	32.14 <sup>143</sup>
17.9	19.270 <sup>253</sup>	18.43 <sup>196</sup>	53.458 <sup>220</sup>	35.04 <sup>264</sup>	16.14 <sup>44</sup>	63.92 <sup>326</sup>	28.86 <sup>56</sup>	30.71 <sup>101</sup>
27.8	19.523 <sup>276</sup>	16.50 <sup>196</sup>	53.712 <sup>254</sup>	32.47 <sup>257</sup>	16.58 <sup>51</sup>	60.96 <sup>296</sup>	29.42 <sup>62</sup>	29.70 <sup>55</sup>
July 7.8	19.799 <sup>292</sup>	14.54 <sup>196</sup>	53.991 <sup>279</sup>	30.04 <sup>243</sup>	17.09 <sup>51</sup>	58.37 <sup>259</sup>	30.04 <sup>62</sup>	29.15 <sup>55</sup>
17.8	20.001 <sup>296</sup>	12.61 <sup>196</sup>	54.291 <sup>300</sup>	27.81 <sup>223</sup>	17.67 <sup>58</sup>	56.24 <sup>213</sup>	30.69 <sup>65</sup>	29.06 <sup>9</sup>
27.7	20.389 <sup>290</sup>	10.78 <sup>183</sup>	54.602 <sup>311</sup>	25.84 <sup>197</sup>	18.28 <sup>61</sup>	54.61 <sup>163</sup>	31.35 <sup>66</sup>	29.42 <sup>36</sup>
Aug. 6.7	20.688 <sup>290</sup>	9.10 <sup>188</sup>	54.916 <sup>314</sup>	24.20 <sup>164</sup>	18.91 <sup>63</sup>	53.53 <sup>168</sup>	32.02 <sup>67</sup>	30.24 <sup>82</sup>
16.7	20.982 <sup>284</sup>	7.59 <sup>151</sup>	55.224 <sup>306</sup>	22.93 <sup>137</sup>	19.56 <sup>65</sup>	53.05 <sup>48</sup>	32.69 <sup>67</sup>	31.49 <sup>125</sup>
26.7	21.263 <sup>261</sup>	6.31 <sup>126</sup>	55.522 <sup>296</sup>	22.07 <sup>96</sup>	20.19 <sup>63</sup>	53.15 <sup>10</sup>	33.33 <sup>64</sup>	33.14 <sup>165</sup>
Sept. 5.6	21.524 <sup>240</sup>	5.29 <sup>102</sup>	55.802 <sup>280</sup>	21.64 <sup>43</sup>	20.78 <sup>59</sup>	53.86 <sup>71</sup>	33.93 <sup>60</sup>	35.14 <sup>200</sup>
15.6	21.764 <sup>213</sup>	4.58 <sup>43</sup>	56.057 <sup>255</sup>	21.64 <sup>0</sup>	20.78 <sup>55</sup>	53.86 <sup>131</sup>	33.93 <sup>55</sup>	35.14 <sup>232</sup>
25.6	21.977 <sup>184</sup>	4.15 <sup>18</sup>	56.283 <sup>226</sup>	22.09 <sup>45</sup>	21.33 <sup>48</sup>	55.17 <sup>186</sup>	34.48 <sup>51</sup>	37.46 <sup>259</sup>
Oct. 5.6	22.161 <sup>154</sup>	4.02 <sup>17</sup>	56.479 <sup>196</sup>	22.95 <sup>86</sup>	21.81 <sup>39</sup>	57.03 <sup>233</sup>	34.99 <sup>45</sup>	40.05 <sup>290</sup>
15.5	22.315 <sup>123</sup>	4.19 <sup>42</sup>	56.639 <sup>160</sup>	24.20 <sup>125</sup>	22.20 <sup>31</sup>	59.36 <sup>274</sup>	35.44 <sup>38</sup>	42.85 <sup>296</sup>
25.5	22.438 <sup>98</sup>	4.61 <sup>64</sup>	56.764 <sup>125</sup>	25.75 <sup>155</sup>	22.51 <sup>21</sup>	62.10 <sup>305</sup>	35.82 <sup>31</sup>	45.81 <sup>307</sup>
Nov. 4.5	22.581 <sup>62</sup>	5.25 <sup>82</sup>	56.855 <sup>91</sup>	27.54 <sup>179</sup>	22.72 <sup>9</sup>	65.15 <sup>823</sup>	36.13 <sup>23</sup>	48.88 <sup>310</sup>
14.4	22.593 <sup>33</sup>	6.07 <sup>82</sup>	56.909 <sup>54</sup>	27.54 <sup>196</sup>	22.81 <sup>0</sup>	68.38 <sup>329</sup>	36.36 <sup>14</sup>	51.98 <sup>306</sup>
24.4	22.625 <sup>5</sup>	7.03 <sup>96</sup>	56.928 <sup>19</sup>	29.50 <sup>206</sup>	22.81 <sup>12</sup>	71.67 <sup>324</sup>	36.50 <sup>6</sup>	55.04 <sup>297</sup>
Dec. 4.4	22.630 <sup>24</sup>	8.07 <sup>104</sup>	56.914 <sup>14</sup>	31.56 <sup>205</sup>	22.69 <sup>22</sup>	74.91 <sup>305</sup>	36.56 <sup>2</sup>	58.01 <sup>250</sup>
14.4	22.606 <sup>59</sup>	9.14 <sup>107</sup>	56.870 <sup>44</sup>	33.61 <sup>198</sup>	22.47 <sup>31</sup>	77.96 <sup>275</sup>	36.54 <sup>11</sup>	60.81 <sup>255</sup>
24.3	22.556 <sup>77</sup>	10.21 <sup>103</sup>	56.795 <sup>101</sup>	35.56 <sup>183</sup>	22.16 <sup>40</sup>	80.71 <sup>236</sup>	36.43 <sup>19</sup>	63.36 <sup>222</sup>
34.3	22.479 <sup>98</sup>	11.24 <sup>96</sup>	56.694 <sup>127</sup>	37.42 <sup>160</sup>	21.76 <sup>46</sup>	83.07 <sup>188</sup>	36.24 <sup>27</sup>	65.58 <sup>183</sup>
	22.381 <sup>98</sup>	12.19 <sup>96</sup>	56.567 <sup>135</sup>	39.02 <sup>135</sup>	21.90 <sup>51</sup>	84.95 <sup>133</sup>	35.97 <sup>36</sup>	67.41 <sup>183</sup>
				40.87 <sup>135</sup>	20.79 <sup>51</sup>	86.28 <sup>133</sup>	35.61 <sup>36</sup>	68.80 <sup>139</sup>
Mean Place	18.289	24.54	52.880	46.99	19.195	83.21	27.232	37.44
Sec $\delta$ , Tan $\delta$	1.002	-0.058	1.096	-0.449	2.793	-2.608	2.564	+2.361
$D\alpha, D_{\alpha}$	+0.060	+0.003	+0.054	+0.025	+0.022	+0.142	+0.096	-0.128
$D\delta, D_{\delta}$	+0.33	+0.56	+0.33	+0.57	+0.33	+0.57	+0.32	+0.58

FOR THE UPPER TRANSIT AT WASHINGTON.

Washington Mean Time.	♄ Ceti. Mag. 4.3		♋ Ceti. Mag. 4.8		♄ H. Cassiopeæ. Mag. 5.3		♄ Ceti. Mag. 5.0	
	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.
	h m 2 28	° ' " + 8 6	h m 2 28	° ' " -15 35	h m 2 30	° ' " +72 28	h m 2 31	° ' " + 5 14
Jan. 0.3	55.757	10.07	19.029	47.07	28.38	27.78	41.991	42.74
10.3	55.652 106	9.41 66	18.909 120	48.19 112	27.88 50	29.10 133	41.891 100	42.01 73
20.3	55.527 135	8.75 66	18.771 138	49.07 88	27.31 57	29.88 78	41.768 123	41.33 68
30.2	55.388 139	8.10 65	18.619 152	49.67 60	26.70 61	30.09 21	41.630 138	40.68 65
Feb. 9.2	55.240 148	7.50 60	18.459 160	49.99 32	26.07 63	29.72 37	41.482 148	40.10 58
19.2	55.092 148	6.94 56	18.297 162	50.03 4	25.44 68	28.77 96	41.332 150	39.61 49
29.2	54.952 140	6.47 47	18.143 154	49.77 26	24.86 68	27.31 146	41.187 145	39.22 39
Mar. 10.1	54.826 126	6.08 39	18.004 139	49.23 54	24.34 52	25.41 130	41.056 131	38.96 26
20.1	54.725 101	5.83 25	17.888 116	48.39 84	23.91 43	23.12 229	40.949 107	38.84 12
30.1	54.654 71	5.76 7	17.803 86	47.27 112	23.59 22	20.54 268	40.872 77	38.89 5
Apr. 9.1	54.623 31	5.83 7	17.753 50	46.89 138	23.41 18	17.89 274	40.832 40	39.14 25
19.0	54.633 10	6.11 28	17.746 7	44.26 163	23.36 5	15.00 280	40.832 0	39.58 44
29.0	54.690 57	6.63 62	17.784 38	42.40 186	23.44 8	12.23 277	40.879 47	40.25 67
May 9.0	54.791 101	7.35 72	17.867 88	40.35 205	23.68 24	9.61 283	40.970 91	41.13 88
18.9	54.938 147	8.31 96	17.995 128	38.16 219	24.04 36	7.21 240	41.107 137	42.22 109
28.9	55.125 187	9.45 114	18.166 171	35.86 280	24.52 48	5.13 208	41.286 179	43.49 137
June 7.9	55.348 223	10.79 134	18.377 211	33.52 234	25.11 59	3.42 171	41.501 215	44.93 144
17.9	55.603 255	12.29 150	18.619 243	31.18 234	25.80 69	2.13 129	41.749 248	46.52 159
27.8	55.881 278	13.86 157	18.889 270	28.90 298	26.55 75	1.30 83	42.022 273	48.19 167
July 7.8	56.176 295	15.52 166	19.176 287	26.76 214	27.36 81	0.94 36	42.311 289	49.90 171
17.8	56.479 303	17.19 167	19.474 298	24.81 195	28.19 83	1.06 19	42.609 298	51.60 170
27.8	56.784 306	18.85 166	19.777 308	23.10 171	29.04 86	1.65 59	42.911 302	53.23 163
Aug. 6.7	57.083 299	20.42 157	20.076 299	21.69 141	29.88 84	2.70 106	43.209 298	54.78 155
16.7	57.370 287	21.88 146	20.364 288	20.62 107	30.70 82	4.19 149	43.497 288	56.18 140
26.7	57.640 270	23.15 127	20.637 273	19.92 70	31.49 79	6.06 187	43.768 271	57.39 121
Sept. 5.6	57.890 250	24.26 111	20.887 250	19.61 81	32.21 72	8.31 225	44.018 250	58.39 100
15.6	58.111 221	25.16 90	21.113 226	19.69 8	32.87 66	10.86 265	44.245 227	59.15 76
25.6	58.307 196	25.85 69	21.309 196	20.18 44	33.46 59	13.67 281	44.444 199	59.68 53
Oct. 5.6	58.474 167	26.30 45	21.474 165	20.98 80	33.96 50	16.69 302	44.615 171	59.96 28
15.5	58.610 136	26.54 24	21.608 134	22.04 111	34.37 41	19.85 316	44.759 144	60.01 5
25.5	58.719 109	26.57 3	21.709 101	23.39 125	34.68 31	23.09 334	44.871 112	59.85 16
Nov. 4.5	58.797 78	26.43 14	21.777 68	24.93 154	34.88 20	26.33 334	44.954 83	59.52 33
14.5	58.843 46	26.12 31	21.813 38	26.60 167	34.97 9	29.51 318	45.009 55	59.05 47
24.4	58.863 20	25.73 39	21.819 6	28.30 170	34.94 3	32.54 303	45.083 24	58.46 59
Dec. 4.4	58.860 13	25.23 50	21.794 26	29.98 168	34.80 14	35.35 281	45.028 5	57.79 67
14.4	58.811 39	24.65 58	21.740 54	31.57 159	34.54 26	37.84 249	44.993 35	57.06 73
24.3	58.744 67	24.03 62	21.658 82	33.01 144	34.18 36	39.94 210	44.932 61	56.33 73
34.3	58.651 93	23.38 66	21.562 106	34.26 126	33.73 45	41.58 164	44.843 89	55.59 74
Mean Place	54.178	7.85	17.641	41.77	23.564	10.42	40.408	41.75
Sec δ, Tan δ	1.010	+0.142	1.038	-0.279	8.820	+3.166	1.004	+0.092
D <sub>ψ</sub> α, D <sub>ω</sub> α	+0.063	-0.008	+0.057	+0.015	+0.112	-0.167	+0.063	-0.005
D <sub>ψ</sub> δ, D <sub>ω</sub> δ	+0.32	+0.59	+0.32	+0.60	+0.32	+0.61	+0.31	+0.61

# APPARENT PLACES OF STARS, 1920.

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FOR THE UPPER TRANSIT AT WASHINGTON.

Washington Mean Time.	μ Hydri. Mag. 5.3		ν Arietis. Mag. 5.4		δ Ceti. Mag. 4.0		ε Hydri. Mag. 4.3	
	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.
	h m 2 33	° ' " -79 27	h m 2 34	° ' " +21 36	h m 2 35	° ' " - 0 0	h m 2 38	° ' " -63 36
	s	"	s	"	s	"	s	"
Jan. 0.3	21.28	48.11	18.035	64.15	24.381	57.67	22.58	50.72
10.3	20.11 <sup>117</sup>	49.09 <sup>98</sup>	17.928 <sup>107</sup>	63.87 <sup>26</sup>	24.278 <sup>108</sup>	58.51 <sup>94</sup>	22.06 <sup>82</sup>	51.96 <sup>124</sup>
20.3	18.89 <sup>123</sup>	49.46 <sup>37</sup>	17.798 <sup>130</sup>	63.46 <sup>41</sup>	24.156 <sup>122</sup>	59.29 <sup>78</sup>	21.50 <sup>86</sup>	52.61 <sup>65</sup>
30.2	17.64 <sup>125</sup>	49.23 <sup>23</sup>	17.649 <sup>149</sup>	62.91 <sup>55</sup>	24.017 <sup>139</sup>	59.95 <sup>66</sup>	20.91 <sup>80</sup>	52.65 <sup>4</sup>
Feb. 9.2	16.39 <sup>125</sup>	48.40 <sup>83</sup>	17.489 <sup>160</sup>	62.26 <sup>65</sup>	23.867 <sup>150</sup>	60.48 <sup>53</sup>	20.33 <sup>58</sup>	52.11 <sup>54</sup>
19.2	15.19 <sup>120</sup>	47.00 <sup>140</sup>	17.325 <sup>164</sup>	61.51 <sup>75</sup>	23.716 <sup>151</sup>	60.87 <sup>39</sup>	19.76 <sup>57</sup>	51.00 <sup>111</sup>
29.2	14.06 <sup>113</sup>	45.10 <sup>190</sup>	17.168 <sup>157</sup>	60.69 <sup>82</sup>	23.571 <sup>145</sup>	61.11 <sup>24</sup>	19.21 <sup>55</sup>	49.35 <sup>165</sup>
Mar. 10.1	13.02 <sup>104</sup>	42.74 <sup>236</sup>	17.026 <sup>142</sup>	59.85 <sup>84</sup>	23.437 <sup>134</sup>	61.16 <sup>5</sup>	18.71 <sup>80</sup>	47.23 <sup>212</sup>
20.1	12.12 <sup>90</sup>	39.97 <sup>277</sup>	16.910 <sup>116</sup>	59.03 <sup>82</sup>	23.327 <sup>110</sup>	61.07 <sup>9</sup>	18.27 <sup>44</sup>	44.67 <sup>256</sup>
30.1	11.35 <sup>77</sup>	36.87 <sup>310</sup>	16.827 <sup>83</sup>	58.26 <sup>77</sup>	23.246 <sup>81</sup>	60.74 <sup>33</sup>	17.90 <sup>37</sup>	41.75 <sup>292</sup>
Apr. 9.1	10.76 <sup>60</sup>	33.52 <sup>335</sup>	16.785 <sup>42</sup>	57.62 <sup>64</sup>	23.201 <sup>45</sup>	60.21 <sup>53</sup>	17.61 <sup>29</sup>	38.54 <sup>321</sup>
19.0	10.33 <sup>43</sup>	29.98 <sup>354</sup>	16.788 <sup>3</sup>	57.11 <sup>51</sup>	23.197 <sup>4</sup>	59.47 <sup>74</sup>	17.43 <sup>18</sup>	35.10 <sup>344</sup>
29.0	10.10 <sup>23</sup>	26.34 <sup>364</sup>	16.839 <sup>51</sup>	56.79 <sup>32</sup>	23.236 <sup>39</sup>	58.49 <sup>98</sup>	17.34 <sup>9</sup>	31.51 <sup>359</sup>
May 9.0	10.06 <sup>4</sup>	22.68 <sup>366</sup>	16.940 <sup>101</sup>	56.68 <sup>11</sup>	23.321 <sup>85</sup>	57.29 <sup>120</sup>	17.34 <sup>0</sup>	27.86 <sup>365</sup>
18.9	10.22 <sup>16</sup>	19.08 <sup>360</sup>	17.088 <sup>148</sup>	56.82 <sup>14</sup>	23.451 <sup>130</sup>	55.93 <sup>136</sup>	17.45 <sup>11</sup>	24.23 <sup>363</sup>
28.9	10.57 <sup>35</sup>	15.63 <sup>345</sup>	17.281 <sup>193</sup>	57.19 <sup>37</sup>	23.623 <sup>172</sup>	54.38 <sup>155</sup>	17.67 <sup>22</sup>	20.70 <sup>353</sup>
June 7.9	11.11 <sup>54</sup>	12.39 <sup>324</sup>	17.513 <sup>232</sup>	57.82 <sup>63</sup>	23.833 <sup>210</sup>	52.68 <sup>170</sup>	17.67 <sup>21</sup>	17.34 <sup>336</sup>
17.9	11.81 <sup>70</sup>	9.47 <sup>292</sup>	17.779 <sup>266</sup>	58.66 <sup>84</sup>	24.072 <sup>239</sup>	50.90 <sup>178</sup>	18.38 <sup>40</sup>	14.26 <sup>308</sup>
27.8	12.66 <sup>85</sup>	6.92 <sup>255</sup>	18.071 <sup>292</sup>	59.70 <sup>104</sup>	24.339 <sup>267</sup>	49.09 <sup>181</sup>	18.85 <sup>47</sup>	11.53 <sup>273</sup>
July 7.8	13.65 <sup>99</sup>	4.82 <sup>210</sup>	18.381 <sup>310</sup>	60.94 <sup>124</sup>	24.625 <sup>296</sup>	47.25 <sup>184</sup>	19.39 <sup>64</sup>	9.21 <sup>232</sup>
17.8	14.73 <sup>108</sup>	3.22 <sup>160</sup>	18.701 <sup>320</sup>	62.31 <sup>137</sup>	24.920 <sup>295</sup>	45.49 <sup>176</sup>	19.97 <sup>58</sup>	7.37 <sup>184</sup>
27.8	15.88 <sup>115</sup>	2.17 <sup>105</sup>	19.024 <sup>323</sup>	63.78 <sup>147</sup>	25.219 <sup>299</sup>	43.81 <sup>168</sup>	20.59 <sup>62</sup>	6.07 <sup>130</sup>
Aug. 6.7	17.06 <sup>118</sup>	1.73 <sup>44</sup>	19.343 <sup>319</sup>	65.30 <sup>152</sup>	25.516 <sup>297</sup>	42.30 <sup>151</sup>	21.22 <sup>68</sup>	5.35 <sup>72</sup>
16.7	18.23 <sup>117</sup>	1.88 <sup>15</sup>	19.649 <sup>306</sup>	66.84 <sup>154</sup>	25.802 <sup>286</sup>	40.99 <sup>131</sup>	21.85 <sup>63</sup>	5.23 <sup>12</sup>
26.7	19.36 <sup>113</sup>	2.63 <sup>75</sup>	19.940 <sup>291</sup>	68.36 <sup>152</sup>	26.073 <sup>271</sup>	39.90 <sup>109</sup>	22.45 <sup>60</sup>	5.74 <sup>51</sup>
Sept. 5.6	20.40 <sup>104</sup>	3.98 <sup>135</sup>	20.210 <sup>270</sup>	69.82 <sup>146</sup>	26.323 <sup>250</sup>	39.06 <sup>84</sup>	22.45 <sup>57</sup>	6.84 <sup>110</sup>
15.6	21.34 <sup>94</sup>	5.88 <sup>190</sup>	20.454 <sup>244</sup>	71.19 <sup>137</sup>	26.550 <sup>227</sup>	38.50 <sup>56</sup>	23.02 <sup>50</sup>	8.52 <sup>168</sup>
25.6	22.13 <sup>79</sup>	8.26 <sup>238</sup>	20.672 <sup>218</sup>	72.44 <sup>125</sup>	26.750 <sup>200</sup>	38.23 <sup>27</sup>	23.52 <sup>48</sup>	10.71 <sup>219</sup>
Oct. 5.6	22.73 <sup>60</sup>	11.04 <sup>278</sup>	20.861 <sup>189</sup>	73.55 <sup>111</sup>	26.924 <sup>174</sup>	38.23 <sup>0</sup>	23.95 <sup>43</sup>	13.34 <sup>263</sup>
15.5	23.14 <sup>41</sup>	14.13 <sup>309</sup>	21.019 <sup>158</sup>	74.52 <sup>97</sup>	26.924 <sup>144</sup>	38.48 <sup>25</sup>	24.30 <sup>36</sup>	16.31 <sup>297</sup>
25.5	23.33 <sup>19</sup>	17.40 <sup>327</sup>	21.147 <sup>128</sup>	75.34 <sup>82</sup>	27.068 <sup>114</sup>	38.48 <sup>45</sup>	24.54 <sup>15</sup>	18.31 <sup>321</sup>
Nov. 4.5	23.33 <sup>2</sup>	17.40 <sup>335</sup>	21.147 <sup>98</sup>	75.34 <sup>68</sup>	27.182 <sup>86</sup>	38.93 <sup>66</sup>	24.69 <sup>4</sup>	19.52 <sup>332</sup>
14.5	23.31 <sup>25</sup>	20.75 <sup>323</sup>	21.245 <sup>64</sup>	76.02 <sup>52</sup>	27.268 <sup>54</sup>	39.59 <sup>80</sup>	24.73 <sup>7</sup>	22.84 <sup>331</sup>
24.4	23.06 <sup>46</sup>	24.03 <sup>300</sup>	21.309 <sup>33</sup>	76.54 <sup>39</sup>	27.322 <sup>24</sup>	40.39 <sup>90</sup>	24.66 <sup>18</sup>	26.15 <sup>318</sup>
Dec. 4.4	22.60 <sup>65</sup>	27.12 <sup>280</sup>	21.342 <sup>1</sup>	76.93 <sup>23</sup>	27.346 <sup>5</sup>	41.29 <sup>96</sup>	24.48 <sup>26</sup>	29.33 <sup>291</sup>
14.4	21.95 <sup>85</sup>	29.92 <sup>238</sup>	21.343 <sup>32</sup>	77.16 <sup>10</sup>	27.341 <sup>34</sup>	42.24 <sup>98</sup>	24.23 <sup>37</sup>	32.24 <sup>256</sup>
24.3	21.10 <sup>98</sup>	32.30 <sup>191</sup>	21.311 <sup>63</sup>	77.26 <sup>4</sup>	27.307 <sup>62</sup>	43.22 <sup>95</sup>	23.86 <sup>42</sup>	34.80 <sup>210</sup>
34.3	20.12 <sup>109</sup>	34.21 <sup>133</sup>	21.248 <sup>92</sup>	77.22 <sup>20</sup>	27.245 <sup>88</sup>	44.17 <sup>90</sup>	23.44 <sup>49</sup>	36.90 <sup>158</sup>
34.3	19.03 <sup>100</sup>	35.54 <sup>133</sup>	21.156 <sup>92</sup>	77.02 <sup>20</sup>	27.157 <sup>88</sup>	45.07 <sup>90</sup>	22.95 <sup>49</sup>	38.48 <sup>158</sup>
Mean Place	19.692	31.06	16.216	58.26	22.827	56.89	21.207	34.38
Sec δ, Tan δ	5.467	-5.375	1.076	+0.396	1.000	0.000	2.742	-2.553
D <sub>μ</sub> α, D <sub>μ</sub> α	-0.027	+0.282	+0.068	-0.021	+0.061	-0.060	+0.016	+0.191
D <sub>μ</sub> δ, D <sub>μ</sub> δ	+0.31	+0.62	+0.31	+0.62	+0.31	+0.63	+0.31	+0.64

FOR THE UPPER TRANSIT AT WASHINGTON.

Washington Mean Time.	♄ Persei. Mag. 4.2		γ Ceti seq. Mag. 3.7		τ Ceti. Mag. 4.4		μ Ceti. Mag. 4.4	
	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.
	h m 2 38	° ' " +48 53	h m 2 39	° ' " + 2 53	h m 2 40	° ' " -14 11	h m 2 40	° ' " + 9 46
Jan. 0.3	46.190	40.53	10.796	57.70	20.296	53.70	38.580	40.01
10.3	46.016 <sup>174</sup>	41.17 <sup>64</sup>	10.699 <sup>97</sup>	56.91 <sup>79</sup>	20.179 <sup>117</sup>	54.86 <sup>116</sup>	38.463 <sup>97</sup>	39.40 <sup>61</sup>
20.3	45.806 <sup>210</sup>	41.42 <sup>25</sup>	10.577 <sup>122</sup>	56.18 <sup>73</sup>	20.046 <sup>138</sup>	55.78 <sup>92</sup>	38.342 <sup>121</sup>	38.78 <sup>62</sup>
30.3	45.572 <sup>234</sup>	41.28 <sup>14</sup>	10.439 <sup>138</sup>	55.53 <sup>65</sup>	19.896 <sup>150</sup>	56.45 <sup>67</sup>	38.204 <sup>138</sup>	38.16 <sup>62</sup>
Feb. 9.2	45.322 <sup>250</sup>	40.74 <sup>54</sup>	10.290 <sup>149</sup>	54.96 <sup>149</sup>	19.734 <sup>162</sup>	56.84 <sup>39</sup>	38.055 <sup>149</sup>	37.56 <sup>60</sup>
19.2	45.069 <sup>253</sup>	39.83 <sup>91</sup>	10.137 <sup>153</sup>	54.51 <sup>45</sup>	19.569 <sup>165</sup>	56.96 <sup>12</sup>	37.901 <sup>154</sup>	37.00 <sup>56</sup>
29.2	44.827 <sup>242</sup>	38.58 <sup>125</sup>	9.989 <sup>148</sup>	54.18 <sup>33</sup>	19.409 <sup>160</sup>	56.80 <sup>16</sup>	37.751 <sup>150</sup>	36.49 <sup>51</sup>
Mar. 10.1	44.609 <sup>218</sup>	37.04 <sup>154</sup>	9.853 <sup>136</sup>	54.00 <sup>18</sup>	19.264 <sup>145</sup>	56.35 <sup>45</sup>	37.614 <sup>137</sup>	36.07 <sup>42</sup>
20.1	44.429 <sup>180</sup>	35.29 <sup>175</sup>	9.740 <sup>113</sup>	53.98 <sup>2</sup>	19.140 <sup>124</sup>	55.62 <sup>73</sup>	37.500 <sup>114</sup>	35.75 <sup>32</sup>
30.1	44.297 <sup>132</sup>	33.40 <sup>189</sup>	9.656 <sup>84</sup>	54.15 <sup>17</sup>	19.045 <sup>95</sup>	54.62 <sup>100</sup>	37.417 <sup>83</sup>	35.58 <sup>17</sup>
Apr. 9.1	44.223 <sup>74</sup>	31.44 <sup>196</sup>	9.607 <sup>49</sup>	54.51 <sup>38</sup>	18.986 <sup>59</sup>	53.35 <sup>127</sup>	37.369 <sup>48</sup>	35.57 <sup>1</sup>
19.0	44.212 <sup>11</sup>	29.51 <sup>193</sup>	9.600 <sup>7</sup>	55.08 <sup>57</sup>	18.968 <sup>18</sup>	51.83 <sup>152</sup>	37.364 <sup>5</sup>	35.75 <sup>13</sup>
29.0	44.270 <sup>58</sup>	27.68 <sup>183</sup>	9.637 <sup>37</sup>	55.87 <sup>79</sup>	18.995 <sup>27</sup>	50.09 <sup>174</sup>	37.405 <sup>41</sup>	36.12 <sup>37</sup>
May 9.0	44.395 <sup>125</sup>	26.03 <sup>165</sup>	9.720 <sup>83</sup>	56.86 <sup>99</sup>	19.067 <sup>72</sup>	48.13 <sup>196</sup>	37.492 <sup>87</sup>	36.71 <sup>59</sup>
19.0	44.587 <sup>192</sup>	24.62 <sup>141</sup>	9.848 <sup>128</sup>	58.06 <sup>120</sup>	19.185 <sup>118</sup>	46.03 <sup>210</sup>	37.624 <sup>132</sup>	37.52 <sup>81</sup>
28.9	44.838 <sup>251</sup>	23.50 <sup>112</sup>	10.019 <sup>171</sup>	59.44 <sup>138</sup>	19.347 <sup>162</sup>	43.80 <sup>222</sup>	37.799 <sup>175</sup>	38.52 <sup>100</sup>
June 7.9	45.143 <sup>305</sup>	22.71 <sup>79</sup>	10.227 <sup>208</sup>	60.97 <sup>153</sup>	19.546 <sup>199</sup>	41.51 <sup>229</sup>	38.013 <sup>214</sup>	39.72 <sup>120</sup>
17.9	45.494 <sup>351</sup>	22.26 <sup>45</sup>	10.467 <sup>240</sup>	62.62 <sup>165</sup>	19.781 <sup>235</sup>	39.20 <sup>231</sup>	38.259 <sup>246</sup>	41.07 <sup>135</sup>
27.8	45.880 <sup>396</sup>	22.19 <sup>7</sup>	10.733 <sup>266</sup>	64.34 <sup>172</sup>	20.043 <sup>262</sup>	36.95 <sup>225</sup>	38.531 <sup>220</sup>	42.54 <sup>147</sup>
July 7.8	46.291 <sup>411</sup>	22.47 <sup>28</sup>	11.018 <sup>285</sup>	66.09 <sup>175</sup>	20.324 <sup>281</sup>	34.80 <sup>215</sup>	38.821 <sup>290</sup>	44.09 <sup>155</sup>
17.8	46.718 <sup>427</sup>	23.11 <sup>64</sup>	11.314 <sup>296</sup>	67.81 <sup>172</sup>	20.617 <sup>293</sup>	32.84 <sup>196</sup>	39.124 <sup>303</sup>	45.68 <sup>159</sup>
27.8	47.150 <sup>432</sup>	24.07 <sup>96</sup>	11.614 <sup>300</sup>	69.45 <sup>164</sup>	20.918 <sup>301</sup>	31.10 <sup>174</sup>	39.429 <sup>305</sup>	47.26 <sup>158</sup>
Aug. 6.7	47.578 <sup>428</sup>	25.35 <sup>128</sup>	11.911 <sup>297</sup>	70.97 <sup>152</sup>	21.218 <sup>300</sup>	29.65 <sup>145</sup>	39.731 <sup>302</sup>	48.78 <sup>152</sup>
16.7	47.995 <sup>417</sup>	26.89 <sup>154</sup>	12.199 <sup>288</sup>	72.33 <sup>136</sup>	21.508 <sup>290</sup>	28.52 <sup>113</sup>	40.024 <sup>298</sup>	50.21 <sup>143</sup>
26.7	48.390 <sup>395</sup>	28.66 <sup>177</sup>	12.472 <sup>273</sup>	73.48 <sup>115</sup>	21.784 <sup>276</sup>	27.76 <sup>76</sup>	40.303 <sup>279</sup>	51.49 <sup>128</sup>
Sept. 5.7	48.760 <sup>370</sup>	30.62 <sup>196</sup>	12.724 <sup>252</sup>	74.39 <sup>91</sup>	22.040 <sup>256</sup>	27.37 <sup>39</sup>	40.562 <sup>259</sup>	52.60 <sup>111</sup>
15.6	49.097 <sup>337</sup>	32.73 <sup>211</sup>	12.955 <sup>231</sup>	75.05 <sup>66</sup>	22.272 <sup>232</sup>	27.35 <sup>2</sup>	40.798 <sup>236</sup>	53.52 <sup>92</sup>
25.6	49.400 <sup>303</sup>	34.95 <sup>222</sup>	13.159 <sup>204</sup>	75.45 <sup>40</sup>	22.477 <sup>205</sup>	27.72 <sup>37</sup>	41.008 <sup>210</sup>	54.22 <sup>70</sup>
Oct. 5.6	49.664 <sup>264</sup>	37.23 <sup>228</sup>	13.336 <sup>177</sup>	75.59 <sup>14</sup>	22.653 <sup>176</sup>	28.43 <sup>71</sup>	41.192 <sup>184</sup>	54.72 <sup>50</sup>
15.5	49.887 <sup>223</sup>	39.53 <sup>230</sup>	13.484 <sup>148</sup>	75.49 <sup>10</sup>	22.798 <sup>145</sup>	29.46 <sup>108</sup>	41.346 <sup>154</sup>	55.00 <sup>28</sup>
25.5	50.067 <sup>180</sup>	41.82 <sup>229</sup>	13.602 <sup>118</sup>	75.17 <sup>32</sup>	22.912 <sup>114</sup>	30.75 <sup>129</sup>	41.472 <sup>126</sup>	55.10 <sup>10</sup>
Nov. 4.5	50.201 <sup>134</sup>	44.05 <sup>223</sup>	13.692 <sup>90</sup>	74.68 <sup>49</sup>	22.994 <sup>82</sup>	32.23 <sup>148</sup>	41.568 <sup>96</sup>	55.03 <sup>7</sup>
14.5	50.289 <sup>88</sup>	46.15 <sup>210</sup>	13.751 <sup>59</sup>	74.04 <sup>64</sup>	23.044 <sup>50</sup>	33.85 <sup>162</sup>	41.634 <sup>66</sup>	54.82 <sup>21</sup>
24.4	50.328 <sup>39</sup>	48.11 <sup>196</sup>	13.781 <sup>30</sup>	73.29 <sup>75</sup>	23.063 <sup>19</sup>	35.52 <sup>167</sup>	41.689 <sup>35</sup>	54.48 <sup>34</sup>
Dec. 4.4	50.317 <sup>11</sup>	49.87 <sup>176</sup>	13.781 <sup>0</sup>	72.47 <sup>80</sup>	23.060 <sup>13</sup>	37.18 <sup>166</sup>	41.675 <sup>6</sup>	54.05 <sup>43</sup>
14.4	50.257 <sup>60</sup>	51.88 <sup>151</sup>	13.751 <sup>20</sup>	71.63 <sup>84</sup>	23.006 <sup>44</sup>	38.77 <sup>159</sup>	41.649 <sup>26</sup>	53.54 <sup>51</sup>
24.4	50.149 <sup>108</sup>	52.59 <sup>121</sup>	13.693 <sup>58</sup>	70.79 <sup>84</sup>	22.934 <sup>72</sup>	40.24 <sup>147</sup>	41.594 <sup>55</sup>	52.98 <sup>56</sup>
34.3	49.996 <sup>153</sup>	53.46 <sup>87</sup>	13.608 <sup>85</sup>	69.97 <sup>83</sup>	22.836 <sup>98</sup>	41.52 <sup>128</sup>	41.511 <sup>83</sup>	52.39 <sup>59</sup>
Mean Place	43.616	27.79	9.195	57.73	18.830	48.52	36.873	37.99
Sec δ, Tan δ	1.521	+1.146	1.001	+0.051	1.032	-0.252	1.015	+0.172
D <sub>α</sub> , D <sub>ω</sub>	+0.061	-0.059	+0.062	-0.003	+0.057	+0.013	+0.064	-0.009
D <sub>δ</sub> , D <sub>ε</sub>	+0.31	+0.64	+0.31	+0.64	+0.30	+0.64	+0.30	+0.64



# APPARENT PLACES OF STARS, 1920.

FOR THE UPPER TRANSIT AT WASHINGTON.

Washington Mean Time.	γ Persel. Mag. 3.9		41 Arietis. Mag. 3.7		β Fornacis. Mag. 4.5		σ Arietis. Mag. 5.5	
	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.
	h m 2 44	° ' " +55 33	h m 2 45	° ' " +26 55	h m 2 45	° ' " -32 44	h m 2 47	° ' " +14 45
Jan. 0.3	54.001	65.95	18.185	60.79	45.942	39.22	6.138	14.30
10.3	53.791 <sup>210</sup>	66.88 <sup>93</sup>	18.077 <sup>106</sup>	60.73 <sup>6</sup>	45.788 <sup>154</sup>	40.66 <sup>144</sup>	6.042 <sup>96</sup>	13.82 <sup>48</sup>
20.3	53.538 <sup>253</sup>	67.38 <sup>50</sup>	17.943 <sup>134</sup>	60.47 <sup>26</sup>	45.612 <sup>176</sup>	41.72 <sup>106</sup>	5.922 <sup>130</sup>	13.30 <sup>52</sup>
30.3	53.254 <sup>284</sup>	67.43 <sup>5</sup>	17.788 <sup>156</sup>	60.05 <sup>42</sup>	45.419 <sup>193</sup>	42.32 <sup>60</sup>	5.780 <sup>142</sup>	12.73 <sup>57</sup>
Feb. 9.2	52.951 <sup>303</sup>	67.03 <sup>40</sup>	17.617 <sup>171</sup>	59.45 <sup>60</sup>	45.215 <sup>204</sup>	42.52 <sup>20</sup>	5.627 <sup>153</sup>	12.13 <sup>60</sup>
19.2	52.645 <sup>306</sup>	66.19 <sup>84</sup>	17.442 <sup>175</sup>	58.69 <sup>76</sup>	45.009 <sup>206</sup>	42.27 <sup>25</sup>	5.467 <sup>160</sup>	11.50 <sup>63</sup>
29.2	52.350 <sup>295</sup>	64.94 <sup>125</sup>	17.272 <sup>170</sup>	57.82 <sup>87</sup>	44.808 <sup>201</sup>	41.60 <sup>67</sup>	5.311 <sup>156</sup>	10.91 <sup>59</sup>
Mar. 10.1	52.084 <sup>266</sup>	63.35 <sup>159</sup>	17.117 <sup>155</sup>	56.86 <sup>96</sup>	44.623 <sup>185</sup>	40.52 <sup>108</sup>	5.169 <sup>142</sup>	10.33 <sup>58</sup>
20.1	51.859 <sup>225</sup>	61.48 <sup>187</sup>	16.986 <sup>131</sup>	55.86 <sup>100</sup>	44.462 <sup>161</sup>	39.06 <sup>146</sup>	5.047 <sup>122</sup>	9.80 <sup>58</sup>
30.1	51.689 <sup>170</sup>	59.40 <sup>208</sup>	16.889 <sup>97</sup>	54.87 <sup>99</sup>	44.333 <sup>129</sup>	37.24 <sup>182</sup>	4.968 <sup>89</sup>	9.39 <sup>41</sup>
Apr. 9.1	51.586 <sup>103</sup>	57.22 <sup>218</sup>	16.834 <sup>55</sup>	53.95 <sup>92</sup>	44.242 <sup>91</sup>	35.10 <sup>214</sup>	4.905 <sup>53</sup>	9.12 <sup>27</sup>
19.0	51.557 <sup>29</sup>	55.02 <sup>220</sup>	16.826 <sup>8</sup>	53.14 <sup>61</sup>	44.198 <sup>44</sup>	32.71 <sup>239</sup>	4.894 <sup>11</sup>	9.01 <sup>11</sup>
29.0	51.605 <sup>48</sup>	52.89 <sup>213</sup>	16.868 <sup>42</sup>	52.50 <sup>64</sup>	44.200 <sup>2</sup>	30.08 <sup>263</sup>	4.929 <sup>35</sup>	9.09 <sup>8</sup>
May 9.0	51.732 <sup>127</sup>	50.91 <sup>198</sup>	16.962 <sup>94</sup>	52.05 <sup>45</sup>	44.255 <sup>55</sup>	27.29 <sup>279</sup>	5.011 <sup>82</sup>	9.36 <sup>27</sup>
19.0	51.934 <sup>202</sup>	49.13 <sup>178</sup>	17.105 <sup>143</sup>	51.83 <sup>22</sup>	44.361 <sup>106</sup>	24.37 <sup>292</sup>	5.142 <sup>131</sup>	9.85 <sup>49</sup>
28.9	52.206 <sup>272</sup>	47.64 <sup>149</sup>	17.296 <sup>191</sup>	51.85 <sup>2</sup>	44.514 <sup>153</sup>	21.41 <sup>296</sup>	5.316 <sup>174</sup>	10.55 <sup>70</sup>
June 7.9	52.542 <sup>336</sup>	46.49 <sup>115</sup>	17.528 <sup>232</sup>	52.14 <sup>29</sup>	44.712 <sup>198</sup>	18.47 <sup>294</sup>	5.527 <sup>211</sup>	11.47 <sup>92</sup>
17.9	52.931 <sup>389</sup>	45.71 <sup>78</sup>	17.797 <sup>269</sup>	52.66 <sup>52</sup>	44.949 <sup>237</sup>	15.63 <sup>284</sup>	5.775 <sup>248</sup>	12.56 <sup>109</sup>
27.8	53.362 <sup>431</sup>	45.31 <sup>40</sup>	18.094 <sup>297</sup>	53.44 <sup>78</sup>	45.220 <sup>271</sup>	12.95 <sup>268</sup>	6.049 <sup>274</sup>	13.83 <sup>127</sup>
July 7.8	53.824 <sup>462</sup>	45.29 <sup>2</sup>	18.411 <sup>317</sup>	54.41 <sup>97</sup>	45.517 <sup>297</sup>	10.51 <sup>294</sup>	6.343 <sup>242</sup>	15.19 <sup>136</sup>
17.8	54.305 <sup>481</sup>	45.29 <sup>39</sup>	18.411 <sup>329</sup>	54.41 <sup>117</sup>	45.517 <sup>314</sup>	10.51 <sup>212</sup>	6.343 <sup>306</sup>	15.19 <sup>144</sup>
27.8	54.305 <sup>490</sup>	45.68 <sup>76</sup>	18.740 <sup>334</sup>	55.58 <sup>131</sup>	45.831 <sup>325</sup>	8.39 <sup>175</sup>	6.649 <sup>310</sup>	16.63 <sup>151</sup>
Aug. 6.7	54.795 <sup>487</sup>	46.44 <sup>111</sup>	19.074 <sup>334</sup>	56.89 <sup>131</sup>	46.156 <sup>326</sup>	6.64 <sup>132</sup>	6.959 <sup>307</sup>	18.14 <sup>147</sup>
16.7	55.282 <sup>475</sup>	47.55 <sup>143</sup>	19.406 <sup>322</sup>	58.31 <sup>142</sup>	46.482 <sup>326</sup>	5.32 <sup>85</sup>	7.266 <sup>307</sup>	19.81 <sup>144</sup>
26.7	55.757 <sup>454</sup>	48.98 <sup>173</sup>	19.728 <sup>306</sup>	59.80 <sup>149</sup>	46.803 <sup>321</sup>	4.47 <sup>35</sup>	7.566 <sup>300</sup>	21.05 <sup>133</sup>
Sept. 5.7	56.211 <sup>427</sup>	50.71 <sup>198</sup>	20.034 <sup>287</sup>	61.32 <sup>151</sup>	47.109 <sup>285</sup>	4.12 <sup>13</sup>	7.852 <sup>286</sup>	22.38 <sup>123</sup>
15.6	56.638 <sup>392</sup>	52.69 <sup>217</sup>	20.321 <sup>262</sup>	62.83 <sup>147</sup>	47.394 <sup>259</sup>	4.25 <sup>63</sup>	8.120 <sup>244</sup>	23.61 <sup>107</sup>
25.6	57.030 <sup>353</sup>	54.86 <sup>234</sup>	20.583 <sup>236</sup>	64.30 <sup>141</sup>	47.653 <sup>228</sup>	4.88 <sup>111</sup>	8.364 <sup>220</sup>	24.68 <sup>90</sup>
Oct. 5.6	57.383 <sup>310</sup>	57.20 <sup>246</sup>	20.819 <sup>207</sup>	65.71 <sup>132</sup>	47.881 <sup>194</sup>	5.99 <sup>154</sup>	8.584 <sup>192</sup>	25.58 <sup>72</sup>
15.5	57.693 <sup>263</sup>	59.66 <sup>253</sup>	21.026 <sup>177</sup>	67.03 <sup>121</sup>	48.075 <sup>168</sup>	7.53 <sup>190</sup>	8.776 <sup>165</sup>	26.30 <sup>55</sup>
25.5	57.956 <sup>212</sup>	62.19 <sup>255</sup>	21.203 <sup>147</sup>	68.24 <sup>109</sup>	48.233 <sup>118</sup>	9.43 <sup>219</sup>	8.941 <sup>194</sup>	26.85 <sup>37</sup>
Nov. 4.5	58.168 <sup>159</sup>	64.74 <sup>253</sup>	21.350 <sup>114</sup>	69.33 <sup>97</sup>	48.351 <sup>79</sup>	11.62 <sup>240</sup>	9.075 <sup>106</sup>	27.22 <sup>23</sup>
14.5	58.327 <sup>103</sup>	67.27 <sup>245</sup>	21.464 <sup>80</sup>	70.30 <sup>84</sup>	48.430 <sup>40</sup>	14.02 <sup>251</sup>	9.181 <sup>74</sup>	27.45 <sup>10</sup>
24.4	58.430 <sup>45</sup>	69.72 <sup>231</sup>	21.544 <sup>47</sup>	71.14 <sup>69</sup>	48.470 <sup>2</sup>	16.53 <sup>260</sup>	9.255 <sup>43</sup>	27.55 <sup>7</sup>
Dec. 4.4	58.475 <sup>14</sup>	72.03 <sup>210</sup>	21.591 <sup>24</sup>	71.83 <sup>39</sup>	48.472 <sup>38</sup>	19.03 <sup>242</sup>	9.298 <sup>13</sup>	27.48 <sup>15</sup>
14.4	58.461 <sup>73</sup>	74.13 <sup>186</sup>	21.603 <sup>24</sup>	72.37 <sup>39</sup>	48.434 <sup>72</sup>	21.45 <sup>224</sup>	9.311 <sup>30</sup>	27.33 <sup>27</sup>
24.4	58.388 <sup>130</sup>	75.99 <sup>154</sup>	21.579 <sup>59</sup>	72.76 <sup>22</sup>	48.362 <sup>107</sup>	23.69 <sup>197</sup>	9.291 <sup>50</sup>	27.06 <sup>34</sup>
34.3	58.258 <sup>186</sup>	77.53 <sup>118</sup>	21.520 <sup>91</sup>	72.98 <sup>5</sup>	48.255 <sup>138</sup>	25.66 <sup>166</sup>	9.241 <sup>83</sup>	26.72 <sup>39</sup>
34.3	58.072 <sup>186</sup>	78.71 <sup>118</sup>	21.429 <sup>91</sup>	73.03 <sup>5</sup>	48.117 <sup>138</sup>	27.32 <sup>166</sup>	9.158 <sup>83</sup>	26.33 <sup>39</sup>
Mean Place	51.025	52.32	16.209	54.00	44.553	23.99	4.353	11.07
Sec δ, Tan δ	1.769	+1.459	1.122	+0.508	1.189	-0.643	1.094	+0.263
D <sub>α</sub> , D <sub>ω</sub>	+0.067	-0.073	+0.070	-0.026	+0.050	+0.032	+0.066	-0.013
D <sub>δ</sub> , D <sub>ω</sub>	+0.30	+0.66	+0.30	+0.66	+0.30	+0.66	+0.30	+0.67

APPARENT PLACES OF STARS, 1920.

FOR THE UPPER TRANSIT AT WASHINGTON.

Washington Mean Time.	$\gamma^2$ Eridani. Mag. 4.8		$\tau$ Persei. Mag. 4.1		$\eta$ Eridani. Mag. 4.0		$\epsilon$ Arietis (mean). Mag. 4.6	
	Right Ascension.	Declination.	Right Ascension.	Declination.	Right Ascension.	Declination.	Right Ascension.	Declination.
	h m	° '	h m	° '	h m	° '	h m	° '
	2 47	-21 19	2 48	+52 26	2 52	- 9 12	2 54	+21 1
	s	"	s	"	s	"	s	"
Jan. 0.3	25.946	66.19	37.350	22.80	32.680.	60.91	39.932	20.77
10.3	25.824 <sup>122</sup>	67.51 <sup>132</sup>	37.165 <sup>185</sup>	23.64 <sup>84</sup>	32.579 <sup>101</sup>	62.02 <sup>111</sup>	39.837 <sup>96</sup>	20.53 <sup>24</sup>
20.3	25.679 <sup>145</sup>	68.53 <sup>102</sup>	36.939 <sup>226</sup>	24.09 <sup>45</sup>	32.453 <sup>126</sup>	62.96 <sup>94</sup>	39.712 <sup>125</sup>	20.18 <sup>35</sup>
30.3	25.515 <sup>164</sup>	69.22 <sup>60</sup>	36.681 <sup>258</sup>	24.12 <sup>3</sup>	32.310 <sup>143</sup>	63.69 <sup>73</sup>	39.567 <sup>145</sup>	19.72 <sup>46</sup>
Feb. 9.2	25.341 <sup>174</sup>	69.58 <sup>36</sup>	36.405 <sup>276</sup>	23.72 <sup>40</sup>	32.153 <sup>157</sup>	64.20 <sup>51</sup>	39.407 <sup>160</sup>	19.16 <sup>56</sup>
19.2	25.163 <sup>178</sup>	69.60 <sup>2</sup>	36.123 <sup>282</sup>	23.72 <sup>81</sup>	32.153 <sup>162</sup>	64.20 <sup>26</sup>	39.407 <sup>167</sup>	19.16 <sup>65</sup>
29.2	24.990 <sup>173</sup>	69.27 <sup>33</sup>	35.851 <sup>272</sup>	22.91 <sup>119</sup>	31.991 <sup>160</sup>	64.46 <sup>3</sup>	39.240 <sup>165</sup>	18.51 <sup>73</sup>
Mar. 10.2	24.830 <sup>160</sup>	68.59 <sup>68</sup>	35.604 <sup>247</sup>	21.72 <sup>151</sup>	31.831 <sup>148</sup>	64.49 <sup>22</sup>	39.075 <sup>153</sup>	17.78 <sup>74</sup>
20.1	24.690 <sup>140</sup>	67.60 <sup>99</sup>	35.394 <sup>210</sup>	20.21 <sup>177</sup>	31.683 <sup>128</sup>	63.27 <sup>48</sup>	38.922 <sup>132</sup>	17.04 <sup>74</sup>
30.1	24.581 <sup>109</sup>	66.28 <sup>132</sup>	35.236 <sup>158</sup>	18.44 <sup>195</sup>	31.555 <sup>101</sup>	63.79 <sup>73</sup>	38.790 <sup>100</sup>	16.30 <sup>68</sup>
Apr. 9.1	24.508 <sup>73</sup>	64.68 <sup>160</sup>	35.236 <sup>97</sup>	16.49 <sup>205</sup>	31.454 <sup>65</sup>	63.06 <sup>97</sup>	38.690 <sup>62</sup>	15.62 <sup>61</sup>
19.0	24.476 <sup>32</sup>	62.82 <sup>186</sup>	35.139 <sup>30</sup>	14.44 <sup>206</sup>	31.389 <sup>26</sup>	62.09 <sup>123</sup>	38.628 <sup>17</sup>	15.01 <sup>47</sup>
29.0	24.490 <sup>14</sup>	60.71 <sup>211</sup>	35.109 <sup>43</sup>	12.38 <sup>200</sup>	31.363 <sup>18</sup>	60.86 <sup>144</sup>	38.611 <sup>80</sup>	14.54 <sup>31</sup>
May 9.0	24.550 <sup>60</sup>	58.42 <sup>229</sup>	35.152 <sup>115</sup>	10.38 <sup>185</sup>	31.381 <sup>64</sup>	59.42 <sup>166</sup>	38.641 <sup>80</sup>	14.23 <sup>12</sup>
19.0	24.657 <sup>107</sup>	55.98 <sup>244</sup>	35.267 <sup>187</sup>	8.53 <sup>162</sup>	31.445 <sup>109</sup>	57.76 <sup>183</sup>	38.721 <sup>80</sup>	14.11 <sup>10</sup>
28.9	24.657 <sup>152</sup>	55.98 <sup>253</sup>	35.454 <sup>252</sup>	6.91 <sup>137</sup>	31.554 <sup>151</sup>	55.93 <sup>197</sup>	38.849 <sup>174</sup>	14.21 <sup>33</sup>
June 7.9	24.809 <sup>193</sup>	53.45 <sup>258</sup>	35.706 <sup>311</sup>	5.54 <sup>103</sup>	31.705 <sup>191</sup>	53.96 <sup>207</sup>	39.023 <sup>215</sup>	14.54 <sup>54</sup>
17.9	25.002 <sup>229</sup>	50.87 <sup>253</sup>	36.017 <sup>362</sup>	4.51 <sup>68</sup>	31.896 <sup>226</sup>	51.89 <sup>211</sup>	39.238 <sup>251</sup>	15.08 <sup>77</sup>
27.9	25.231 <sup>260</sup>	48.34 <sup>244</sup>	36.379 <sup>403</sup>	3.83 <sup>31</sup>	32.122 <sup>254</sup>	49.78 <sup>210</sup>	39.489 <sup>280</sup>	15.85 <sup>96</sup>
July 7.8	25.772 <sup>281</sup>	45.90 <sup>229</sup>	36.782 <sup>431</sup>	3.52 <sup>6</sup>	32.376 <sup>275</sup>	47.68 <sup>203</sup>	39.769 <sup>301</sup>	16.81 <sup>113</sup>
17.8	25.772 <sup>297</sup>	43.61 <sup>205</sup>	37.213 <sup>451</sup>	3.58 <sup>41</sup>	32.651 <sup>296</sup>	45.65 <sup>192</sup>	40.070 <sup>313</sup>	17.94 <sup>125</sup>
27.8	26.069 <sup>306</sup>	41.56 <sup>176</sup>	37.664 <sup>459</sup>	3.99 <sup>79</sup>	32.940 <sup>297</sup>	43.73 <sup>172</sup>	40.383 <sup>319</sup>	19.19 <sup>135</sup>
Aug. 6.7	26.375 <sup>305</sup>	39.80 <sup>144</sup>	38.123 <sup>457</sup>	4.78 <sup>111</sup>	33.237 <sup>296</sup>	42.01 <sup>149</sup>	40.702 <sup>318</sup>	20.54 <sup>140</sup>
16.7	26.680 <sup>298</sup>	38.36 <sup>104</sup>	38.580 <sup>446</sup>	5.89 <sup>140</sup>	33.533 <sup>289</sup>	40.52 <sup>121</sup>	41.020 <sup>311</sup>	21.94 <sup>142</sup>
26.7	26.978 <sup>286</sup>	37.32 <sup>63</sup>	39.026 <sup>429</sup>	7.29 <sup>167</sup>	33.822 <sup>278</sup>	39.31 <sup>55</sup>	41.331 <sup>297</sup>	23.36 <sup>139</sup>
Sept. 5.7	27.264 <sup>265</sup>	36.69 <sup>20</sup>	39.455 <sup>402</sup>	8.96 <sup>190</sup>	34.100 <sup>259</sup>	38.40 <sup>192</sup>	41.628 <sup>280</sup>	24.75 <sup>133</sup>
15.6	27.529 <sup>243</sup>	36.49 <sup>21</sup>	39.857 <sup>372</sup>	10.86 <sup>209</sup>	34.359 <sup>239</sup>	37.85 <sup>20</sup>	41.908 <sup>257</sup>	26.08 <sup>124</sup>
25.6	27.772 <sup>215</sup>	36.73 <sup>66</sup>	40.229 <sup>335</sup>	12.95 <sup>222</sup>	34.598 <sup>213</sup>	37.65 <sup>15</sup>	42.165 <sup>284</sup>	27.32 <sup>112</sup>
Oct. 5.6	27.987 <sup>186</sup>	37.39 <sup>105</sup>	40.564 <sup>296</sup>	15.17 <sup>233</sup>	34.811 <sup>187</sup>	37.80 <sup>47</sup>	42.399 <sup>206</sup>	28.44 <sup>100</sup>
15.6	28.173 <sup>153</sup>	38.44 <sup>133</sup>	40.860 <sup>252</sup>	17.50 <sup>239</sup>	34.998 <sup>157</sup>	38.27 <sup>78</sup>	42.605 <sup>176</sup>	29.44 <sup>87</sup>
25.5	28.326 <sup>119</sup>	39.82 <sup>167</sup>	41.112 <sup>206</sup>	19.89 <sup>240</sup>	35.155 <sup>127</sup>	39.05 <sup>103</sup>	42.783 <sup>140</sup>	30.31 <sup>71</sup>
Nov. 4.5	28.445 <sup>86</sup>	41.49 <sup>187</sup>	41.318 <sup>158</sup>	22.29 <sup>237</sup>	35.282 <sup>98</sup>	40.08 <sup>124</sup>	42.932 <sup>118</sup>	31.02 <sup>58</sup>
14.5	28.531 <sup>53</sup>	43.36 <sup>200</sup>	41.476 <sup>106</sup>	24.66 <sup>229</sup>	35.380 <sup>65</sup>	41.32 <sup>138</sup>	43.050 <sup>87</sup>	31.60 <sup>46</sup>
24.4	28.584 <sup>17</sup>	45.36 <sup>204</sup>	41.582 <sup>53</sup>	26.95 <sup>215</sup>	35.445 <sup>34</sup>	42.70 <sup>146</sup>	43.137 <sup>64</sup>	32.06 <sup>32</sup>
Dec. 4.4	28.601 <sup>16</sup>	47.40 <sup>201</sup>	41.635 <sup>3</sup>	29.10 <sup>197</sup>	35.479 <sup>4</sup>	44.16 <sup>148</sup>	43.191 <sup>21</sup>	32.38 <sup>19</sup>
14.4	28.585 <sup>48</sup>	49.41 <sup>190</sup>	41.632 <sup>57</sup>	31.07 <sup>172</sup>	35.483 <sup>28</sup>	45.64 <sup>144</sup>	43.212 <sup>14</sup>	32.57 <sup>8</sup>
24.4	28.537 <sup>80</sup>	51.31 <sup>171</sup>	41.575 <sup>111</sup>	32.79 <sup>144</sup>	35.455 <sup>60</sup>	47.08 <sup>135</sup>	43.198 <sup>46</sup>	32.65 <sup>3</sup>
34.3	28.457 <sup>109</sup>	53.02 <sup>149</sup>	41.464 <sup>161</sup>	34.23 <sup>108</sup>	35.396 <sup>86</sup>	48.43 <sup>123</sup>	43.152 <sup>80</sup>	32.62 <sup>17</sup>
34.3	28.348 <sup>109</sup>	54.51 <sup>149</sup>	41.303 <sup>161</sup>	35.31 <sup>108</sup>	35.310 <sup>86</sup>	49.66 <sup>123</sup>	43.072 <sup>80</sup>	32.45 <sup>17</sup>
Mean Place	24.493	58.86	34.528	10.03	31.120	56.83	38.013	18.16
Sec $\delta$ , Tan $\delta$	1.074	-0.391	1.640	+1.300	1.013	-0.162	1.071	+0.384
$D\alpha$ , $D\omega$	+0.064	+0.019	+0.064	-0.064	+0.058	+0.008	+0.068	-0.019
$D\delta$ , $D\omega$	+0.30	+0.67	+0.30	+0.67	+0.29	+0.68	+0.29	+0.69

# APPARENT PLACES OF STARS, 1920.

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FOR THE UPPER TRANSIT AT WASHINGTON.

Washington Mean Time.	$\theta$ Eridani. Mag. 3.4		47 H. Cephei. Mag. 5.7		$\alpha$ Ceti. Mag. 2.8		$\gamma^3$ Eridani. Mag. 4.2	
	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.
	h m 2 55	° ' " -40 37	h m 2 55	° ' " +79 6	h m 2 58	° ' " + 3 46	h m 2 58	° ' " -23 55
	s	"	s	"	s	"	s	"
Jan. 0.3	15.219 <sup>181</sup>	40.89 <sup>150</sup>	31.12 <sup>78</sup>	31.91 <sup>180</sup>	7.429 <sup>02</sup>	35.45 <sup>80</sup>	53.379 <sup>194</sup>	82.35 <sup>144</sup>
10.3	15.038 <sup>206</sup>	42.48 <sup>113</sup>	30.34 <sup>91</sup>	33.71 <sup>123</sup>	7.337 <sup>116</sup>	34.65 <sup>73</sup>	53.255 <sup>147</sup>	83.79 <sup>111</sup>
20.3	14.830 <sup>237</sup>	43.61 <sup>08</sup>	29.43 <sup>100</sup>	34.96 <sup>08</sup>	7.221 <sup>137</sup>	33.92 <sup>67</sup>	53.108 <sup>169</sup>	84.90 <sup>77</sup>
30.3	14.603 <sup>240</sup>	44.29 <sup>17</sup>	28.43 <sup>105</sup>	35.64 <sup>0</sup>	7.084 <sup>150</sup>	33.25 <sup>58</sup>	52.939 <sup>181</sup>	85.67 <sup>41</sup>
Feb. 9.2	14.363 <sup>242</sup>	44.46 <sup>31</sup>	27.38 <sup>105</sup>	35.70 <sup>55</sup>	6.934 <sup>156</sup>	32.67 <sup>47</sup>	52.758 <sup>186</sup>	86.08 <sup>4</sup>
19.2	14.121 <sup>236</sup>	44.15 <sup>78</sup>	26.33 <sup>102</sup>	35.15 <sup>112</sup>	6.778 <sup>157</sup>	32.20 <sup>35</sup>	52.572 <sup>185</sup>	86.12 <sup>33</sup>
29.2	13.885 <sup>230</sup>	43.37 <sup>125</sup>	25.31 <sup>92</sup>	34.03 <sup>165</sup>	6.621 <sup>144</sup>	31.85 <sup>21</sup>	52.387 <sup>172</sup>	85.79 <sup>60</sup>
Mar. 10.2	13.665 <sup>197</sup>	42.12 <sup>165</sup>	24.39 <sup>79</sup>	32.38 <sup>211</sup>	6.477 <sup>127</sup>	31.64 <sup>5</sup>	52.215 <sup>153</sup>	85.10 <sup>105</sup>
20.1	13.468 <sup>182</sup>	40.47 <sup>205</sup>	23.60 <sup>63</sup>	30.27 <sup>248</sup>	6.350 <sup>90</sup>	31.59 <sup>10</sup>	52.062 <sup>123</sup>	84.05 <sup>136</sup>
30.1	13.306 <sup>122</sup>	38.42 <sup>238</sup>	22.97 <sup>44</sup>	27.79 <sup>273</sup>	6.251 <sup>64</sup>	31.69 <sup>31</sup>	51.939 <sup>88</sup>	82.69 <sup>167</sup>
Apr. 9.1	13.184 <sup>72</sup>	36.04 <sup>266</sup>	22.53 <sup>24</sup>	25.06 <sup>290</sup>	6.187 <sup>23</sup>	32.00 <sup>50</sup>	51.851 <sup>49</sup>	81.02 <sup>194</sup>
19.0	13.112 <sup>21</sup>	33.38 <sup>288</sup>	22.29 <sup>2</sup>	22.16 <sup>294</sup>	6.164 <sup>18</sup>	32.50 <sup>68</sup>	51.803 <sup>2</sup>	79.08 <sup>230</sup>
29.0	13.091 <sup>35</sup>	30.50 <sup>289</sup>	22.27 <sup>41</sup>	19.22 <sup>299</sup>	6.182 <sup>67</sup>	33.18 <sup>61</sup>	51.801 <sup>46</sup>	76.88 <sup>238</sup>
May 9.0	13.126 <sup>88</sup>	27.43 <sup>316</sup>	22.48 <sup>21</sup>	16.33 <sup>273</sup>	6.249 <sup>110</sup>	34.09 <sup>111</sup>	51.847 <sup>94</sup>	74.50 <sup>264</sup>
19.0	13.214 <sup>142</sup>	24.27 <sup>319</sup>	22.90 <sup>63</sup>	13.60 <sup>243</sup>	6.359 <sup>155</sup>	35.20 <sup>128</sup>	51.941 <sup>139</sup>	71.96 <sup>262</sup>
28.9	13.356 <sup>193</sup>	21.08 <sup>314</sup>	23.53 <sup>79</sup>	11.12 <sup>215</sup>	6.514 <sup>194</sup>	36.48 <sup>144</sup>	52.080 <sup>183</sup>	69.34 <sup>266</sup>
June 7.9	13.549 <sup>237</sup>	17.94 <sup>304</sup>	24.32 <sup>96</sup>	8.97 <sup>179</sup>	6.708 <sup>226</sup>	37.92 <sup>158</sup>	52.263 <sup>221</sup>	66.68 <sup>262</sup>
17.9	13.786 <sup>277</sup>	14.90 <sup>282</sup>	25.28 <sup>109</sup>	7.18 <sup>135</sup>	6.934 <sup>266</sup>	39.50 <sup>161</sup>	52.484 <sup>264</sup>	64.06 <sup>262</sup>
27.9	14.063 <sup>306</sup>	12.08 <sup>254</sup>	26.37 <sup>118</sup>	5.83 <sup>88</sup>	7.190 <sup>276</sup>	41.11 <sup>169</sup>	52.738 <sup>277</sup>	61.54 <sup>236</sup>
July 7.8	14.369 <sup>331</sup>	9.54 <sup>220</sup>	27.55 <sup>127</sup>	4.95 <sup>41</sup>	7.466 <sup>294</sup>	42.80 <sup>167</sup>	53.015 <sup>294</sup>	59.18 <sup>210</sup>
17.8	14.700 <sup>344</sup>	7.34 <sup>177</sup>	28.82 <sup>130</sup>	4.54 <sup>9</sup>	7.760 <sup>297</sup>	44.47 <sup>160</sup>	53.309 <sup>306</sup>	57.08 <sup>182</sup>
27.8	15.044 <sup>349</sup>	5.57 <sup>130</sup>	30.12 <sup>132</sup>	4.63 <sup>57</sup>	8.057 <sup>298</sup>	46.07 <sup>147</sup>	53.614 <sup>308</sup>	55.26 <sup>146</sup>
Aug. 6.7	15.393 <sup>346</sup>	4.27 <sup>78</sup>	31.44 <sup>130</sup>	5.20 <sup>104</sup>	8.355 <sup>291</sup>	47.54 <sup>132</sup>	53.922 <sup>302</sup>	53.80 <sup>106</sup>
16.7	15.739 <sup>332</sup>	3.49 <sup>26</sup>	32.74 <sup>127</sup>	6.24 <sup>148</sup>	8.646 <sup>280</sup>	48.86 <sup>113</sup>	54.224 <sup>292</sup>	52.74 <sup>63</sup>
26.7	16.071 <sup>313</sup>	3.23 <sup>29</sup>	34.01 <sup>121</sup>	7.72 <sup>189</sup>	8.926 <sup>262</sup>	49.99 <sup>91</sup>	54.516 <sup>275</sup>	52.11 <sup>17</sup>
Sept. 5.7	16.384 <sup>286</sup>	3.52 <sup>83</sup>	35.22 <sup>112</sup>	9.61 <sup>228</sup>	9.188 <sup>244</sup>	50.90 <sup>66</sup>	54.791 <sup>261</sup>	51.94 <sup>20</sup>
15.6	16.670 <sup>253</sup>	4.35 <sup>134</sup>	36.34 <sup>101</sup>	11.89 <sup>261</sup>	9.432 <sup>219</sup>	51.56 <sup>41</sup>	55.042 <sup>227</sup>	52.23 <sup>73</sup>
25.6	16.923 <sup>217</sup>	5.69 <sup>180</sup>	37.35 <sup>89</sup>	14.50 <sup>288</sup>	9.651 <sup>193</sup>	51.97 <sup>13</sup>	55.269 <sup>196</sup>	52.96 <sup>114</sup>
Oct. 5.6	17.140 <sup>175</sup>	7.49 <sup>220</sup>	38.24 <sup>76</sup>	17.38 <sup>311</sup>	9.844 <sup>167</sup>	52.15 <sup>8</sup>	55.465 <sup>164</sup>	54.10 <sup>150</sup>
15.6	17.315 <sup>132</sup>	9.69 <sup>250</sup>	39.00 <sup>58</sup>	20.49 <sup>326</sup>	10.011 <sup>138</sup>	52.07 <sup>30</sup>	55.629 <sup>130</sup>	55.60 <sup>179</sup>
25.5	17.447 <sup>88</sup>	12.19 <sup>271</sup>	39.58 <sup>43</sup>	23.75 <sup>336</sup>	10.149 <sup>110</sup>	51.77 <sup>49</sup>	55.759 <sup>97</sup>	57.39 <sup>201</sup>
Nov. 4.5	17.535 <sup>42</sup>	14.90 <sup>282</sup>	40.01 <sup>24</sup>	27.11 <sup>336</sup>	10.259 <sup>79</sup>	51.28 <sup>64</sup>	55.856 <sup>61</sup>	59.40 <sup>216</sup>
14.5	17.577 <sup>3</sup>	17.72 <sup>281</sup>	40.25 <sup>4</sup>	30.47 <sup>329</sup>	10.338 <sup>49</sup>	50.64 <sup>73</sup>	55.917 <sup>26</sup>	61.56 <sup>220</sup>
24.4	17.574 <sup>47</sup>	20.53 <sup>270</sup>	40.29 <sup>14</sup>	33.76 <sup>312</sup>	10.387 <sup>17</sup>	49.91 <sup>80</sup>	55.943 <sup>9</sup>	63.76 <sup>217</sup>
Dec. 4.4	17.527 <sup>88</sup>	23.23 <sup>250</sup>	40.15 <sup>34</sup>	36.88 <sup>288</sup>	10.404 <sup>14</sup>	49.11 <sup>84</sup>	55.934 <sup>42</sup>	65.93 <sup>204</sup>
14.4	17.439 <sup>128</sup>	25.73 <sup>219</sup>	39.81 <sup>53</sup>	39.76 <sup>253</sup>	10.390 <sup>46</sup>	48.27 <sup>84</sup>	55.892 <sup>77</sup>	67.97 <sup>186</sup>
24.4	17.311 <sup>162</sup>	27.92 <sup>184</sup>	39.28 <sup>70</sup>	42.29 <sup>211</sup>	10.344 <sup>73</sup>	47.43 <sup>79</sup>	55.815 <sup>107</sup>	69.83 <sup>161</sup>
34.3	17.149	29.76	38.58	44.40	10.271	46.64	55.708	71.44
Mean Place	13.794	28.86	23.204	15.96	5.723	35.96	51.880	74.14
Sec $\delta$ , Tan $\delta$	1.318	-0.858	5.291	+5.196	1.002	+0.066	1.094	-0.444
$D_{\alpha}$ , $D_{\omega}$	+0.046	+0.041	+0.156	-0.250	+0.062	-0.003	+0.053	+0.021
$D_{\delta}$ , $D_{\omega}$	+0.29	+0.69	+0.29	+0.69	+0.28	+0.70	+0.28	+0.70

FOR THE UPPER TRANSIT AT WASHINGTON.

Washington Mean Time.	γ Persei. Mag. 3.1		β Persei. Var. 3.4-4.2		μ Horologii. Mag. 5.2		θ Hydri. Mag. 5.5	
	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.
	h m 2 58 s	° +53 11 "	h m 3 0 s	° +38 31 "	h m 3 1 s	° -60 2 "	h m 3 1 s	° -72 12 "
Jan. 0.3	62.478 <sup>181</sup>	51.56 <sup>97</sup>	4.970 <sup>121</sup>	60.99 <sup>48</sup>	44.94 <sup>34</sup>	66.06 <sup>162</sup>	66.44 <sup>62</sup>	69.88 <sup>152</sup>
10.3	62.297 <sup>225</sup>	52.53 <sup>58</sup>	4.849 <sup>155</sup>	61.42 <sup>14</sup>	44.60 <sup>37</sup>	67.68 <sup>112</sup>	65.82 <sup>68</sup>	71.40 <sup>94</sup>
20.3	62.072 <sup>259</sup>	53.11 <sup>15</sup>	4.694 <sup>181</sup>	61.56 <sup>15</sup>	44.23 <sup>41</sup>	68.80 <sup>52</sup>	65.14 <sup>72</sup>	72.34 <sup>35</sup>
30.3	61.813 <sup>281</sup>	53.26 <sup>27</sup>	4.513 <sup>201</sup>	61.41 <sup>42</sup>	43.82 <sup>41</sup>	69.32 <sup>5</sup>	64.42 <sup>78</sup>	72.69 <sup>25</sup>
Feb. 9.2	61.532 <sup>290</sup>	52.99 <sup>68</sup>	4.312 <sup>209</sup>	60.99 <sup>71</sup>	43.41 <sup>42</sup>	69.27 <sup>62</sup>	63.69 <sup>78</sup>	72.44 <sup>82</sup>
19.2	61.242 <sup>284</sup>	52.31 <sup>110</sup>	4.103 <sup>206</sup>	60.28 <sup>95</sup>	42.99 <sup>40</sup>	68.65 <sup>114</sup>	62.96 <sup>70</sup>	71.62 <sup>138</sup>
29.2	60.958 <sup>261</sup>	51.21 <sup>142</sup>	3.897 <sup>191</sup>	59.33 <sup>116</sup>	42.59 <sup>38</sup>	67.61 <sup>165</sup>	62.26 <sup>66</sup>	70.24 <sup>188</sup>
Mar. 10.2	60.697 <sup>225</sup>	49.79 <sup>171</sup>	3.706 <sup>165</sup>	58.17 <sup>131</sup>	42.21 <sup>34</sup>	65.86 <sup>212</sup>	61.60 <sup>60</sup>	68.36 <sup>234</sup>
20.1	60.472 <sup>175</sup>	48.08 <sup>192</sup>	3.541 <sup>127</sup>	56.86 <sup>141</sup>	41.87 <sup>29</sup>	63.74 <sup>253</sup>	61.00 <sup>51</sup>	66.02 <sup>273</sup>
30.1	60.297 <sup>115</sup>	46.16 <sup>203</sup>	3.414 <sup>82</sup>	55.45 <sup>144</sup>	41.58 <sup>24</sup>	61.21 <sup>286</sup>	60.49 <sup>43</sup>	63.29 <sup>306</sup>
Apr. 9.1	60.182 <sup>47</sup>	44.13 <sup>208</sup>	3.332 <sup>28</sup>	54.01 <sup>140</sup>	41.34 <sup>16</sup>	58.35 <sup>316</sup>	60.06 <sup>32</sup>	60.23 <sup>331</sup>
19.0	60.135 <sup>28</sup>	42.05 <sup>204</sup>	3.304 <sup>27</sup>	52.61 <sup>130</sup>	41.18 <sup>10</sup>	55.19 <sup>326</sup>	59.74 <sup>20</sup>	56.92 <sup>351</sup>
29.0	60.161 <sup>101</sup>	40.01 <sup>190</sup>	3.331 <sup>86</sup>	51.31 <sup>114</sup>	41.08 <sup>1</sup>	51.83 <sup>351</sup>	59.54 <sup>9</sup>	53.41 <sup>360</sup>
May 9.0	60.262 <sup>172</sup>	38.11 <sup>171</sup>	3.417 <sup>144</sup>	50.17 <sup>94</sup>	41.07 <sup>6</sup>	48.32 <sup>356</sup>	59.45 <sup>4</sup>	49.81 <sup>363</sup>
19.0	60.434 <sup>243</sup>	36.40 <sup>147</sup>	3.561 <sup>197</sup>	49.23 <sup>70</sup>	41.13 <sup>14</sup>	44.76 <sup>353</sup>	59.49 <sup>16</sup>	46.18 <sup>356</sup>
28.9	60.677 <sup>302</sup>	34.93 <sup>114</sup>	3.758 <sup>246</sup>	48.53 <sup>43</sup>	41.27 <sup>21</sup>	41.23 <sup>342</sup>	59.65 <sup>28</sup>	42.62 <sup>343</sup>
June 7.9	60.979 <sup>357</sup>	33.79 <sup>83</sup>	4.004 <sup>287</sup>	48.10 <sup>13</sup>	41.48 <sup>29</sup>	37.81 <sup>324</sup>	59.93 <sup>40</sup>	39.19 <sup>319</sup>
17.9	61.336 <sup>399</sup>	32.96 <sup>44</sup>	4.291 <sup>321</sup>	47.97 <sup>17</sup>	41.77 <sup>34</sup>	34.57 <sup>296</sup>	60.33 <sup>48</sup>	36.00 <sup>298</sup>
27.9	61.735 <sup>432</sup>	32.52 <sup>8</sup>	4.612 <sup>347</sup>	48.14 <sup>43</sup>	42.11 <sup>40</sup>	31.61 <sup>261</sup>	60.81 <sup>57</sup>	33.12 <sup>249</sup>
July 7.8	62.167 <sup>454</sup>	32.44 <sup>29</sup>	4.959 <sup>363</sup>	48.57 <sup>72</sup>	42.51 <sup>43</sup>	29.00 <sup>217</sup>	61.38 <sup>65</sup>	30.63 <sup>204</sup>
17.8	62.621 <sup>464</sup>	32.73 <sup>62</sup>	5.322 <sup>372</sup>	49.29 <sup>95</sup>	42.94 <sup>47</sup>	26.83 <sup>167</sup>	62.03 <sup>69</sup>	28.59 <sup>151</sup>
27.8	63.085 <sup>466</sup>	33.35 <sup>97</sup>	5.694 <sup>371</sup>	50.24 <sup>117</sup>	43.41 <sup>47</sup>	25.16 <sup>112</sup>	62.72 <sup>78</sup>	27.08 <sup>94</sup>
Aug. 6.7	63.551 <sup>458</sup>	34.32 <sup>127</sup>	6.065 <sup>365</sup>	51.41 <sup>135</sup>	43.88 <sup>40</sup>	24.04 <sup>58</sup>	63.45 <sup>74</sup>	26.14 <sup>34</sup>
16.7	64.009 <sup>441</sup>	35.59 <sup>155</sup>	6.430 <sup>350</sup>	52.76 <sup>149</sup>	44.37 <sup>47</sup>	23.51 <sup>8</sup>	64.19 <sup>72</sup>	25.80 <sup>27</sup>
26.7	64.450 <sup>418</sup>	37.14 <sup>179</sup>	6.780 <sup>331</sup>	54.25 <sup>161</sup>	44.84 <sup>44</sup>	23.59 <sup>68</sup>	64.91 <sup>69</sup>	26.07 <sup>89</sup>
Sept. 5.7	64.868 <sup>388</sup>	38.93 <sup>199</sup>	7.111 <sup>307</sup>	55.86 <sup>168</sup>	45.28 <sup>41</sup>	24.27 <sup>126</sup>	65.60 <sup>63</sup>	26.96 <sup>150</sup>
15.6	65.256 <sup>355</sup>	40.92 <sup>215</sup>	7.418 <sup>281</sup>	57.54 <sup>172</sup>	45.69 <sup>36</sup>	25.53 <sup>183</sup>	66.23 <sup>56</sup>	28.46 <sup>203</sup>
25.6	65.611 <sup>316</sup>	43.07 <sup>226</sup>	7.699 <sup>249</sup>	59.26 <sup>172</sup>	46.05 <sup>30</sup>	27.36 <sup>232</sup>	66.79 <sup>46</sup>	30.49 <sup>252</sup>
Oct. 5.6	65.927 <sup>273</sup>	45.33 <sup>235</sup>	7.948 <sup>217</sup>	60.98 <sup>171</sup>	46.35 <sup>24</sup>	29.68 <sup>272</sup>	67.25 <sup>34</sup>	33.01 <sup>290</sup>
15.6	66.200 <sup>228</sup>	47.68 <sup>238</sup>	8.165 <sup>184</sup>	62.69 <sup>167</sup>	46.59 <sup>17</sup>	32.40 <sup>303</sup>	67.59 <sup>23</sup>	35.91 <sup>318</sup>
25.5	66.426 <sup>177</sup>	50.06 <sup>237</sup>	8.349 <sup>146</sup>	64.36 <sup>159</sup>	46.76 <sup>9</sup>	35.43 <sup>324</sup>	67.82 <sup>11</sup>	39.09 <sup>335</sup>
Nov. 4.5	66.603 <sup>125</sup>	52.43 <sup>231</sup>	8.495 <sup>108</sup>	65.95 <sup>150</sup>	46.85 <sup>2</sup>	38.67 <sup>331</sup>	67.93 <sup>4</sup>	42.44 <sup>339</sup>
14.5	66.728 <sup>71</sup>	54.74 <sup>219</sup>	8.603 <sup>68</sup>	67.45 <sup>138</sup>	46.87 <sup>5</sup>	41.98 <sup>324</sup>	67.89 <sup>15</sup>	45.83 <sup>330</sup>
24.4	66.799 <sup>14</sup>	56.93 <sup>203</sup>	8.671 <sup>25</sup>	68.83 <sup>122</sup>	46.82 <sup>13</sup>	45.22 <sup>308</sup>	67.74 <sup>27</sup>	49.13 <sup>309</sup>
Dec. 4.4	66.813 <sup>43</sup>	58.96 <sup>180</sup>	8.696 <sup>17</sup>	70.05 <sup>104</sup>	46.69 <sup>19</sup>	48.30 <sup>279</sup>	67.47 <sup>39</sup>	52.22 <sup>277</sup>
14.4	66.770 <sup>101</sup>	60.76 <sup>154</sup>	8.679 <sup>59</sup>	71.09 <sup>84</sup>	46.50 <sup>26</sup>	51.09 <sup>242</sup>	67.08 <sup>50</sup>	54.99 <sup>235</sup>
24.4	66.669 <sup>154</sup>	62.30 <sup>119</sup>	8.620 <sup>101</sup>	71.93 <sup>58</sup>	46.24 <sup>31</sup>	53.51 <sup>195</sup>	66.58 <sup>58</sup>	57.34 <sup>185</sup>
34.3	66.515	63.49	8.519	72.51	45.93	55.46	66.00	59.19
Mean Place	59.526	39.46	2.626	52.13	43.402	50.83	64.632	53.51
Sec δ, Tan δ	1.669	+1.337	1.278	+0.796	2.008	-1.735	3.274	-3.117
D <sub>ψ</sub> α, D <sub>ω</sub> α	+0.086	-0.063	+0.076	-0.038	+0.028	+0.081	+0.002	+0.146
D <sub>ψ</sub> δ, D <sub>ω</sub> δ	+0.28	+0.70	+0.28	+0.71	+0.28	+0.71	+0.28	+0.71

# APPARENT PLACES OF STARS, 1920.

843

## FOR THE UPPER TRANSIT AT WASHINGTON.

Washington Mean Time.	$\beta$ Persei. (Algol.) Var. 2.1-3.2		$\delta$ Arietis. Mag. 4.5		18 Eridani. Mag. 4.0		48 H. Cephei. Mag. 5.5	
	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.
	h m 3 2	° ' " +40 38	h m 3 7	° ' " +19 25	h m 3 8	° ' " -29 17	h m 3 10	° ' " +77 26
Jan. 0.4	59.838	63.57 50	5.025	33.90	41.827	76.29	14.19	48.40 190
10.3	59.711 127	64.07 22	4.937 88	33.63 27	41.695 132	77.86 157	13.56 63	50.30 137
20.3	59.551 160	64.29 22	4.821 116	33.27 26	41.535 160	79.08 123	12.82 74	51.67 83
30.3	59.362 189	64.22 7	4.678 143	32.83 44	41.355 180	79.90 82	11.98 84	52.50 23
Feb. 9.2	59.153 209	63.84 28	4.520 158	32.30 53	41.159 196	80.38 43	11.09 89	52.73 23
19.2	58.935 218	63.16 68	4.352 168	31.70 60	40.957 202	80.34 1	10.18 91	52.37 36
29.2	58.720 215	62.20 96	4.184 168	31.07 63	40.755 202	79.93 41	9.29 89	51.42 95
Mar. 10.2	58.520 200	61.04 116	4.027 157	30.40 67	40.564 191	79.12 81	8.46 83	49.94 148
20.1	58.348 172	59.70 124	3.889 138	29.76 64	40.394 170	77.93 119	7.74 72	48.00 194
30.1	58.214 134	58.22 143	3.781 108	29.17 59	40.251 143	76.39 154	7.15 59	45.67 233
Apr. 9.1	58.125 89	56.70 152	3.709 73	28.68 49	40.145 106	74.52 187	6.72 43	43.05 262
19.1	58.091 34	55.21 149	3.681 28	28.28 40	40.081 64	72.35 217	6.47 25	40.24 281
29.0	58.115 24	53.81 140	3.699 18	28.05 23	40.063 18	69.94 241	6.40 7	37.36 288
May 9.0	58.201 86	52.53 128	3.766 67	28.00 5	40.094 31	67.32 262	6.52 12	34.50 296
19.0	58.344 143	51.47 106	3.880 114	28.16 16	40.175 81	64.56 276	6.84 32	31.76 274
28.9	58.542 198	50.64 83	4.040 100	28.54 38	40.304 129	61.72 284	7.33 49	29.25 251
June 7.9	58.789 247	50.09 55	4.244 204	29.12 58	40.478 174	58.85 287	7.99 66	27.01 224
17.9	59.080 291	49.84 25	4.483 239	29.90 73	40.693 215	56.04 281	8.80 81	25.13 188
27.9	59.406 326	49.89 5	4.752 269	30.87 97	40.943 250	53.35 269	9.72 92	23.66 147
July 7.8	59.760 354	50.24 35	5.043 291	31.98 111	41.220 277	50.86 249	10.74 102	22.62 104
17.8	60.132 372	50.86 62	5.351 306	33.21 123	41.520 300	48.64 222	11.83 109	22.06 56
27.8	60.512 390	51.72 86	5.667 316	34.51 130	41.831 311	46.74 190	12.97 114	21.96 10
Aug. 6.8	60.893 381	52.82 110	5.983 316	35.85 124	42.147 316	45.24 150	14.13 116	22.34 88
16.7	61.267 374	54.14 132	6.293 310	37.18 133	42.461 314	44.19 105	15.29 116	23.17 83
26.7	61.628 361	55.62 143	6.593 300	38.45 127	42.765 304	43.59 60	16.43 114	24.46 129
Sept. 5.7	61.970 342	57.23 161	6.877 284	39.71 126	43.054 289	43.49 10	17.52 109	26.15 169
15.6	62.289 319	58.94 171	7.140 263	40.85 114	43.321 267	43.88 39	18.55 103	28.23 208
25.6	62.580 291	60.72 178	7.381 241	41.88 103	43.562 241	44.75 87	19.49 94	30.63 240
Oct. 5.6	62.839 259	62.51 179	7.596 215	42.72 84	43.774 212	46.07 132	20.32 83	33.34 271
15.6	63.064 225	64.31 180	7.784 183	43.46 74	43.952 178	47.77 170	21.04 72	36.28 294
25.5	63.255 191	66.07 176	7.944 160	44.04 58	44.096 144	49.79 202	21.64 60	39.41 313
Nov. 4.5	63.409 154	67.77 170	8.075 131	44.48 44	44.202 106	52.04 225	22.09 45	42.65 324
14.5	63.523 114	69.39 162	8.174 99	44.80 32	44.271 69	54.43 239	22.37 28	45.92 327
24.5	63.594 71	70.88 149	8.241 67	45.01 21	44.302 31	56.88 245	22.49 12	49.16 324
Dec. 4.4	63.622 28	72.22 124	8.275 34	45.11 10	44.295 7	59.29 241	22.45 4	52.25 309
14.4	63.607 15	73.40 118	8.275 1	45.11 1	44.295 43	59.29 227	22.45 28	52.25 260
24.4	63.547 60	74.35 95	8.237 87	45.00 10	44.171 81	63.61 205	21.83 89	57.72 257
34.3	63.444 103	75.05 70	8.167 70	44.81 19	44.057 114	65.38 177	21.29 64	59.91 219
Mean Place	57.408	54.40	3.069	30.40	40.295	66.65	6.901	33.89
Sec $\delta$ , Tan $\delta$	1.318	+0.859	1.060	+0.353	1.147	-0.562	4.600	+4.490
$D\alpha$ , $D\omega$	+0.077	-0.040	+0.068	-0.016	+0.050	+0.025	+0.149	-0.202
$D\delta$ , $D\omega\delta$	+0.28	+0.72	+0.27	+0.73	+0.27	+0.73	+0.27	+0.74

APPARENT PLACES OF STARS, 1920.

FOR THE UPPER TRANSIT AT WASHINGTON.

Washington Mean Time.	♄ Arietis. Mag. 5.0		♁ G. Horologii. Mag. 5.7				♁ Eridani. Mag. 4.9		♄ Arietis. Mag. 5.2	
	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.		
	h m 3 10	° ' " +20 44	h m 3 10	° ' " -57 36	h m 3 11	° ' " - 9 6	h m 3 16	° ' " +20 51		
Jan. 0.4	19.956 <sup>85</sup>	59.26	32.932	89.92	58.421	62.30	38.334	37.58		
10.3	19.870	59.05	32.633	91.68	58.329	63.49	38.251	37.38		
20.3	19.753 <sup>117</sup>	58.74	32.295	92.93	58.209	64.49	38.137	37.10		
30.3	19.611 <sup>142</sup>	58.34	31.929	93.61	58.066	65.29	37.997	36.72		
Feb. 9.2	19.451 <sup>160</sup>	57.84	31.547	93.73	57.908	65.86	37.837	36.25		
19.2	19.281	57.25	31.160	93.27	57.742	66.19	37.666	35.69		
29.2	19.110 <sup>171</sup>	56.61	30.781	92.29	57.574	66.29	37.493	35.07		
Mar. 10.2	18.950 <sup>160</sup>	55.93	30.424	90.79	57.416	66.12	37.330	34.41		
20.1	18.808 <sup>142</sup>	55.25	30.099	88.82	57.274	65.70	37.184	33.75		
30.1	18.696 <sup>112</sup>	54.60	29.817	86.45	57.159	65.02	37.067	33.11		
Apr. 9.1	18.621	54.03	29.589	83.70	57.075	64.09	36.986	32.55		
19.1	18.588 <sup>88</sup>	53.57	29.423	80.64	57.032	62.91	36.948	32.09		
29.0	18.602 <sup>14</sup>	53.27	29.326	77.36	57.031	61.52	36.956	31.76		
May 9.0	18.666 <sup>64</sup>	53.13	29.301	73.93	57.076	59.91	37.013	31.62		
19.0	18.778 <sup>112</sup>	53.20	29.351	70.40	57.166	58.12	37.119	31.67		
28.9	18.937	53.48	29.473	66.89	57.300	56.18	37.273	31.93		
June 7.9	19.139 <sup>202</sup>	53.97	29.666	63.46	57.474	54.14	37.469	32.38		
17.9	19.377 <sup>238</sup>	54.67	29.926	60.19	57.685	52.05	37.703	33.04		
27.9	19.648 <sup>271</sup>	55.55	30.243	57.18	57.925	49.95	37.970	33.88		
July 7.8	19.940 <sup>292</sup>	56.59	30.609	54.50	58.191	47.91	38.259	34.88		
17.8	20.248 <sup>308</sup>	57.76	31.015	52.24	58.472	45.98	38.564	36.00		
27.8	20.563 <sup>315</sup>	59.00	31.449	50.45	58.765	44.23	38.879	37.21		
Aug. 6.8	20.881 <sup>318</sup>	60.31	31.900	49.19	59.060	42.72	39.197	38.48		
16.7	21.195 <sup>314</sup>	61.63	32.354	48.52	59.350	41.47	39.511	39.76		
26.7	21.496 <sup>301</sup>	62.92	32.798	48.44	59.631	40.55	39.814	41.01		
Sept. 5.7	21.782	64.15	33.223	48.99	59.898	39.95	40.104	42.20		
15.6	22.048 <sup>266</sup>	65.29	33.616	50.12	60.147	39.71	40.375	43.32		
25.6	22.293 <sup>245</sup>	66.32	33.966	51.82	60.374	39.85	40.623	44.33		
Oct. 5.6	22.512 <sup>219</sup>	67.23	34.265	54.02	60.575	40.31	40.849	45.21		
15.6	22.706 <sup>194</sup>	68.01	34.507	56.65	60.751	41.08	41.047	45.96		
25.5	22.870	68.64	34.684	59.62	60.896	42.12	41.218	46.59		
Nov. 4.5	23.005 <sup>135</sup>	69.16	34.794	62.80	61.012	43.37	41.361	47.09		
14.5	23.108 <sup>103</sup>	69.55	34.834	66.08	61.097	44.80	41.471	47.48		
24.5	23.179 <sup>71</sup>	69.83	34.806	69.33	61.150	46.30	41.548	47.75		
Dec. 4.4	23.215 <sup>36</sup>	70.00	34.709	72.44	61.171	47.84	41.592	47.92		
14.4	23.216	70.06	34.549	75.31	61.159	49.34	41.599	48.00		
24.4	23.183 <sup>33</sup>	70.03	34.330	77.81	61.114	50.75	41.570	47.98		
34.3	23.114 <sup>69</sup>	69.90	34.058	79.87	61.038	52.04	41.506	47.86		
Mean Place	17.963	55.60	31.338	75.09	56.766	57.71	36.308	34.24		
Sec δ, Tan δ	1.069	+0.379	1.887	-1.577	1.013	-0.160	1.070	+0.381		
D <sub>γ</sub> α, D <sub>ω</sub> α	+0.069	-0.017	+0.030	+0.071	+0.058	+0.007	+0.069	-0.017		
D <sub>γ</sub> δ, D <sub>ω</sub> δ	+0.27	+0.74	+0.27	+0.74	+0.27	+0.74	+0.26	+0.76		

# APPARENT PLACES OF STARS, 1920.

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FOR THE UPPER TRANSIT AT WASHINGTON.

Washington Mean Time.	ε Eridani. Mag. 4.3		ι Hydri. Mag. 5.5		α Persel. Mag. 1.9		ο Tauri. Mag. 3.8	
	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.
	h m s 16	° ' " -43 22	h m s 17	° ' " -77 40	h m s 18	° ' " +49 34	h m s 20	° ' " + 8 44
	s	"	s	"	s	"	s	"
Jan. 0.4	45.515	42.58	57.91	68.85	39.041	49.16	32.208	53.61
10.3	45.339 <sup>176</sup>	44.38 <sup>180</sup>	57.00 <sup>91</sup>	70.51 <sup>166</sup>	38.896 <sup>145</sup>	50.14 <sup>98</sup>	32.130 <sup>78</sup>	52.96 <sup>65</sup>
20.3	45.131 <sup>208</sup>	45.73 <sup>138</sup>	55.99 <sup>101</sup>	71.62 <sup>111</sup>	38.709 <sup>187</sup>	50.78 <sup>64</sup>	32.023 <sup>137</sup>	52.34 <sup>62</sup>
30.3	44.899 <sup>232</sup>	46.59 <sup>86</sup>	54.93 <sup>106</sup>	72.11 <sup>49</sup>	38.483 <sup>226</sup>	51.01 <sup>23</sup>	31.890 <sup>193</sup>	51.75 <sup>59</sup>
Feb. 9.3	44.650 <sup>249</sup>	46.95 <sup>36</sup>	53.83 <sup>110</sup>	72.02 <sup>9</sup>	38.231 <sup>262</sup>	50.89 <sup>12</sup>	31.739 <sup>151</sup>	51.19 <sup>56</sup>
	258	15	109	66	266	50	162	50
19.2	44.392	46.80	52.74	71.36	37.965	50.39	31.577	50.69
29.2	44.137 <sup>255</sup>	46.15 <sup>65</sup>	51.67 <sup>107</sup>	70.12 <sup>124</sup>	37.700 <sup>265</sup>	49.52 <sup>87</sup>	31.413 <sup>164</sup>	50.25 <sup>44</sup>
Mar. 10.2	43.894 <sup>243</sup>	45.04 <sup>111</sup>	50.66 <sup>101</sup>	68.39 <sup>173</sup>	37.448 <sup>252</sup>	48.34 <sup>118</sup>	31.255 <sup>158</sup>	49.90 <sup>35</sup>
20.1	43.674 <sup>220</sup>	43.47 <sup>157</sup>	49.73 <sup>93</sup>	66.20 <sup>219</sup>	37.228 <sup>220</sup>	46.87 <sup>147</sup>	31.114 <sup>141</sup>	49.65 <sup>25</sup>
30.1	43.486 <sup>188</sup>	41.50 <sup>197</sup>	48.91 <sup>82</sup>	63.58 <sup>262</sup>	37.049 <sup>179</sup>	45.21 <sup>166</sup>	30.999 <sup>115</sup>	49.54 <sup>11</sup>
	148	232	70	294	128	179	83	3
Apr. 9.1	43.338	39.18	48.21	60.64	36.921	43.42	30.916	49.57
19.1	43.238 <sup>100</sup>	36.52 <sup>266</sup>	47.66 <sup>55</sup>	57.43 <sup>321</sup>	36.854 <sup>67</sup>	41.56 <sup>186</sup>	30.873 <sup>43</sup>	49.77 <sup>20</sup>
29.0	43.191 <sup>47</sup>	33.62 <sup>300</sup>	47.26 <sup>40</sup>	54.02 <sup>341</sup>	36.853 <sup>1</sup>	39.74 <sup>182</sup>	30.874 <sup>1</sup>	50.16 <sup>39</sup>
May 9.0	43.199 <sup>8</sup>	30.52 <sup>310</sup>	47.03 <sup>23</sup>	50.47 <sup>355</sup>	36.923 <sup>70</sup>	37.97 <sup>177</sup>	30.921 <sup>47</sup>	50.72 <sup>56</sup>
19.0	43.265 <sup>66</sup>	27.29 <sup>323</sup>	46.97 <sup>6</sup>	46.86 <sup>361</sup>	37.060 <sup>137</sup>	36.39 <sup>158</sup>	31.015 <sup>94</sup>	51.47 <sup>75</sup>
	122	328	12	353	202	137	138	94
29.0	43.387	24.01	47.09	43.33	37.262	35.02	31.153	52.41
June 7.9	43.565 <sup>178</sup>	20.76 <sup>325</sup>	47.37 <sup>28</sup>	39.91 <sup>342</sup>	37.525 <sup>263</sup>	33.93 <sup>109</sup>	31.332 <sup>179</sup>	53.51 <sup>110</sup>
17.9	43.789 <sup>224</sup>	17.61 <sup>315</sup>	47.82 <sup>45</sup>	36.71 <sup>320</sup>	37.838 <sup>313</sup>	33.11 <sup>82</sup>	31.548 <sup>216</sup>	54.77 <sup>126</sup>
27.9	44.058 <sup>269</sup>	14.65 <sup>296</sup>	48.42 <sup>60</sup>	33.78 <sup>293</sup>	38.195 <sup>357</sup>	32.61 <sup>50</sup>	31.794 <sup>246</sup>	56.13 <sup>136</sup>
July 7.8	44.363 <sup>305</sup>	11.95 <sup>270</sup>	49.14 <sup>72</sup>	31.23 <sup>255</sup>	38.585 <sup>390</sup>	32.46 <sup>15</sup>	32.064 <sup>270</sup>	57.57 <sup>144</sup>
	333	237	85	212	416	16	288	147
17.8	44.696	9.58	49.99	29.11	39.001	32.62	32.352	59.04
27.8	45.060 <sup>354</sup>	7.63 <sup>195</sup>	50.92 <sup>93</sup>	27.49 <sup>162</sup>	39.431 <sup>430</sup>	33.10 <sup>48</sup>	32.648 <sup>296</sup>	60.48 <sup>144</sup>
Aug. 6.8	45.413 <sup>363</sup>	6.16 <sup>147</sup>	51.90 <sup>98</sup>	26.47 <sup>102</sup>	39.869 <sup>438</sup>	33.88 <sup>78</sup>	32.948 <sup>300</sup>	61.87 <sup>139</sup>
16.7	45.777 <sup>364</sup>	5.21 <sup>95</sup>	52.92 <sup>102</sup>	26.02 <sup>45</sup>	40.301 <sup>432</sup>	34.93 <sup>105</sup>	33.246 <sup>298</sup>	63.14 <sup>127</sup>
26.7	46.133 <sup>356</sup>	4.80 <sup>41</sup>	53.94 <sup>102</sup>	26.15 <sup>13</sup>	40.723 <sup>422</sup>	36.23 <sup>130</sup>	33.535 <sup>289</sup>	64.27 <sup>113</sup>
	342	16	98	78	405	151	274	97
Sept. 5.7	46.475	4.96	54.92	26.93	41.128	37.74	33.809	65.24
15.7	46.792 <sup>317</sup>	5.69 <sup>73</sup>	55.83 <sup>91</sup>	28.34 <sup>141</sup>	41.507 <sup>379</sup>	39.47 <sup>173</sup>	34.067 <sup>258</sup>	66.01 <sup>77</sup>
25.6	47.081 <sup>289</sup>	6.96 <sup>127</sup>	56.65 <sup>82</sup>	30.26 <sup>192</sup>	41.859 <sup>352</sup>	41.34 <sup>187</sup>	34.304 <sup>237</sup>	66.56 <sup>55</sup>
Oct. 5.6	47.333 <sup>252</sup>	8.73 <sup>177</sup>	57.34 <sup>69</sup>	32.69 <sup>243</sup>	42.176 <sup>317</sup>	43.31 <sup>197</sup>	34.518 <sup>214</sup>	66.89 <sup>33</sup>
15.6	47.546 <sup>213</sup>	10.92 <sup>219</sup>	57.88 <sup>54</sup>	35.53 <sup>284</sup>	42.459 <sup>283</sup>	45.37 <sup>206</sup>	34.707 <sup>189</sup>	67.02 <sup>13</sup>
	168	254	37	314	243	209	163	8
25.5	47.714 <sup>123</sup>	13.46 <sup>279</sup>	58.25 <sup>18</sup>	38.67 <sup>333</sup>	42.702 <sup>196</sup>	47.46 <sup>209</sup>	34.870 <sup>134</sup>	66.94 <sup>24</sup>
Nov. 4.5	47.837 <sup>74</sup>	16.25 <sup>293</sup>	58.43 <sup>0</sup>	42.00 <sup>340</sup>	42.898 <sup>150</sup>	49.55 <sup>206</sup>	35.004 <sup>106</sup>	66.70 <sup>38</sup>
14.5	47.911 <sup>26</sup>	19.18 <sup>296</sup>	58.43 <sup>20</sup>	45.40 <sup>336</sup>	43.048 <sup>101</sup>	51.61 <sup>199</sup>	35.110 <sup>73</sup>	66.32 <sup>49</sup>
24.5	47.937 <sup>22</sup>	22.14 <sup>288</sup>	58.23 <sup>38</sup>	48.76 <sup>315</sup>	43.149 <sup>46</sup>	53.60 <sup>186</sup>	35.183 <sup>42</sup>	65.83 <sup>57</sup>
Dec. 4.4	47.915 <sup>68</sup>	25.02 <sup>269</sup>	57.85 <sup>56</sup>	51.91 <sup>286</sup>	43.195 <sup>7</sup>	55.46 <sup>169</sup>	35.225 <sup>8</sup>	65.26 <sup>61</sup>
14.4	47.847	27.71	57.29	54.77	43.188	57.15	35.233	64.65
24.4	47.734 <sup>113</sup>	30.13 <sup>242</sup>	56.59 <sup>70</sup>	57.24 <sup>247</sup>	43.126 <sup>62</sup>	58.58 <sup>143</sup>	35.207 <sup>26</sup>	64.03 <sup>62</sup>
34.4	47.580 <sup>164</sup>	32.18 <sup>205</sup>	55.74 <sup>85</sup>	59.23 <sup>199</sup>	43.009 <sup>117</sup>	59.77 <sup>119</sup>	35.147 <sup>60</sup>	63.39 <sup>64</sup>
Mean Place	43.950	30.02	55.394	52.49	36.147	39.32	30.341	53.68
Sec δ, Tan δ	1.376	-0.945	4.687	-4.579	1.542	+1.174	1.012	+0.154
D <sub>α</sub> , D <sub>ωα</sub>	+0.042	+0.041	-0.031	+0.198	+0.085	-0.051	+0.064	-0.007
D <sub>δ</sub> , D <sub>ωδ</sub>	+0.26	+0.76	+0.26	+0.76	+0.26	+0.76	+0.26	+0.77

FOR THE UPPER TRANSIT AT WASHINGTON.

Washington Mean Time.	β H. Camelop. Mag. 4.4		ξ Tauri. Mag. 3.8		ζ Tauri. Mag. 4.3		ε Eridani. Mag. 3.8	
	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.
	h m 3 22	° ' +59 39	h m 3 22	° ' + 9 27	h m 3 26	° ' +12 39	h m 3 29	° ' - 9 43
	s	"	s	"	s	"	s	"
Jan. 0.4	38.372	57.56	51.758	16.27	29.176	49.15	11.332	46.68
10.3	38.172 <sup>200</sup>	58.98 <sup>140</sup>	51.683 <sup>75</sup>	15.65 <sup>62</sup>	29.101 <sup>75</sup>	48.66 <sup>49</sup>	11.243 <sup>89</sup>	47.97 <sup>129</sup>
20.3	37.912 <sup>260</sup>	59.95 <sup>99</sup>	51.577 <sup>106</sup>	15.05 <sup>60</sup>	28.996 <sup>106</sup>	48.15 <sup>51</sup>	11.126 <sup>117</sup>	49.03 <sup>106</sup>
30.3	37.605 <sup>307</sup>	60.50 <sup>55</sup>	51.446 <sup>131</sup>	14.48 <sup>57</sup>	28.864 <sup>132</sup>	47.66 <sup>49</sup>	10.984 <sup>142</sup>	49.88 <sup>85</sup>
Feb. 9.3	37.265 <sup>340</sup>	60.59 <sup>9</sup>	51.296 <sup>150</sup>	13.93 <sup>55</sup>	28.712 <sup>152</sup>	47.14 <sup>52</sup>	10.823 <sup>161</sup>	50.49 <sup>61</sup>
19.2	36.906 <sup>359</sup>	60.21 <sup>38</sup>	51.133 <sup>163</sup>	13.43 <sup>50</sup>	28.547 <sup>165</sup>	46.63 <sup>51</sup>	10.652 <sup>171</sup>	50.85 <sup>36</sup>
29.2	36.549 <sup>357</sup>	59.37 <sup>84</sup>	50.989 <sup>164</sup>	13.00 <sup>43</sup>	28.380 <sup>167</sup>	46.15 <sup>48</sup>	10.478 <sup>174</sup>	50.97 <sup>12</sup>
Mar. 10.2	36.211 <sup>338</sup>	58.11 <sup>126</sup>	50.810 <sup>159</sup>	12.63 <sup>37</sup>	28.219 <sup>161</sup>	45.71 <sup>44</sup>	10.311 <sup>167</sup>	50.82 <sup>15</sup>
20.1	35.911 <sup>300</sup>	56.49 <sup>162</sup>	50.667 <sup>143</sup>	12.37 <sup>26</sup>	28.076 <sup>143</sup>	45.34 <sup>37</sup>	10.157 <sup>154</sup>	50.40 <sup>42</sup>
30.1	35.663 <sup>248</sup>	54.59 <sup>190</sup>	50.550 <sup>117</sup>	12.23 <sup>14</sup>	27.955 <sup>121</sup>	45.07 <sup>27</sup>	10.028 <sup>129</sup>	49.70 <sup>70</sup>
Apr. 9.1	35.483 <sup>180</sup>	52.47 <sup>212</sup>	50.466 <sup>84</sup>	12.22 <sup>1</sup>	27.869 <sup>86</sup>	44.89 <sup>18</sup>	9.932 <sup>96</sup>	48.78 <sup>92</sup>
19.1	35.380 <sup>103</sup>	50.23 <sup>224</sup>	50.421 <sup>45</sup>	12.38 <sup>16</sup>	27.821 <sup>48</sup>	44.88 <sup>1</sup>	9.873 <sup>59</sup>	47.61 <sup>117</sup>
29.0	35.359 <sup>21</sup>	47.96 <sup>227</sup>	50.420 <sup>1</sup>	12.71 <sup>33</sup>	27.818 <sup>3</sup>	45.05 <sup>17</sup>	9.858 <sup>15</sup>	46.20 <sup>141</sup>
May 9.0	35.426 <sup>67</sup>	45.74 <sup>222</sup>	50.465 <sup>45</sup>	13.22 <sup>51</sup>	27.861 <sup>43</sup>	45.38 <sup>33</sup>	9.886 <sup>28</sup>	44.60 <sup>160</sup>
19.0	35.579 <sup>153</sup>	43.66 <sup>208</sup>	50.557 <sup>92</sup>	13.94 <sup>72</sup>	27.953 <sup>92</sup>	45.87 <sup>49</sup>	9.962 <sup>76</sup>	42.81 <sup>179</sup>
29.0	35.815 <sup>236</sup>	41.77 <sup>189</sup>	50.694 <sup>137</sup>	14.83 <sup>99</sup>	28.088 <sup>135</sup>	46.59 <sup>72</sup>	10.082 <sup>130</sup>	40.87 <sup>194</sup>
June 7.9	36.125 <sup>310</sup>	40.16 <sup>161</sup>	50.873 <sup>179</sup>	15.89 <sup>106</sup>	28.266 <sup>178</sup>	47.47 <sup>88</sup>	10.241 <sup>159</sup>	38.85 <sup>202</sup>
17.9	36.503 <sup>878</sup>	38.85 <sup>131</sup>	51.088 <sup>215</sup>	17.10 <sup>121</sup>	28.479 <sup>213</sup>	48.49 <sup>102</sup>	10.438 <sup>197</sup>	36.75 <sup>210</sup>
27.9	36.936 <sup>433</sup>	37.89 <sup>96</sup>	51.334 <sup>246</sup>	18.42 <sup>132</sup>	28.726 <sup>247</sup>	49.65 <sup>116</sup>	10.666 <sup>228</sup>	34.65 <sup>210</sup>
July 7.8	37.414 <sup>478</sup>	37.30 <sup>59</sup>	51.604 <sup>270</sup>	19.82 <sup>140</sup>	29.000 <sup>274</sup>	50.90 <sup>125</sup>	10.923 <sup>257</sup>	32.60 <sup>206</sup>
17.8	37.924 <sup>510</sup>	37.09 <sup>21</sup>	51.890 <sup>286</sup>	21.26 <sup>144</sup>	29.287 <sup>287</sup>	52.23 <sup>133</sup>	11.198 <sup>275</sup>	30.69 <sup>191</sup>
27.8	38.456 <sup>532</sup>	37.27 <sup>18</sup>	52.187 <sup>297</sup>	22.69 <sup>143</sup>	29.586 <sup>299</sup>	53.57 <sup>134</sup>	11.484 <sup>286</sup>	28.95 <sup>174</sup>
Aug. 6.8	38.998 <sup>542</sup>	37.81 <sup>54</sup>	52.488 <sup>301</sup>	24.06 <sup>137</sup>	29.890 <sup>304</sup>	54.89 <sup>132</sup>	11.776 <sup>292</sup>	27.43 <sup>152</sup>
16.7	39.537 <sup>539</sup>	38.70 <sup>89</sup>	52.786 <sup>298</sup>	25.34 <sup>128</sup>	30.193 <sup>303</sup>	56.12 <sup>123</sup>	12.066 <sup>290</sup>	26.21 <sup>122</sup>
26.7	40.065 <sup>528</sup>	39.93 <sup>123</sup>	53.076 <sup>290</sup>	26.47 <sup>113</sup>	30.487 <sup>294</sup>	57.26 <sup>114</sup>	12.350 <sup>284</sup>	25.31 <sup>90</sup>
Sept. 5.7	40.574 <sup>509</sup>	41.47 <sup>154</sup>	53.353 <sup>277</sup>	27.44 <sup>97</sup>	30.768 <sup>281</sup>	58.29 <sup>103</sup>	12.620 <sup>270</sup>	24.73 <sup>58</sup>
15.7	41.054 <sup>480</sup>	43.26 <sup>179</sup>	53.612 <sup>259</sup>	28.21 <sup>77</sup>	31.034 <sup>266</sup>	59.14 <sup>85</sup>	12.873 <sup>253</sup>	24.52 <sup>21</sup>
25.6	41.499 <sup>445</sup>	45.29 <sup>203</sup>	53.851 <sup>239</sup>	28.78 <sup>57</sup>	31.278 <sup>244</sup>	59.82 <sup>68</sup>	13.106 <sup>233</sup>	24.69 <sup>17</sup>
Oct. 5.6	41.904 <sup>405</sup>	47.51 <sup>222</sup>	54.067 <sup>216</sup>	29.14 <sup>36</sup>	31.500 <sup>222</sup>	60.31 <sup>49</sup>	13.318 <sup>212</sup>	25.17 <sup>48</sup>
15.6	42.262 <sup>358</sup>	49.88 <sup>237</sup>	54.260 <sup>193</sup>	29.28 <sup>14</sup>	31.698 <sup>198</sup>	60.61 <sup>30</sup>	13.501 <sup>188</sup>	26.00 <sup>83</sup>
25.5	42.568 <sup>306</sup>	52.37 <sup>249</sup>	54.425 <sup>165</sup>	29.28 <sup>3</sup>	31.872 <sup>174</sup>	60.74 <sup>13</sup>	13.658 <sup>157</sup>	27.12 <sup>112</sup>
Nov. 4.5	42.817 <sup>249</sup>	54.90 <sup>253</sup>	54.563 <sup>138</sup>	29.25 <sup>21</sup>	32.017 <sup>145</sup>	60.73 <sup>1</sup>	13.858 <sup>127</sup>	27.12 <sup>133</sup>
14.5	43.002 <sup>185</sup>	57.45 <sup>255</sup>	54.671 <sup>108</sup>	28.70 <sup>34</sup>	32.132 <sup>115</sup>	60.59 <sup>24</sup>	13.881 <sup>96</sup>	28.45 <sup>150</sup>
24.5	43.122 <sup>120</sup>	59.94 <sup>249</sup>	54.747 <sup>76</sup>	28.25 <sup>45</sup>	32.214 <sup>82</sup>	60.33 <sup>16</sup>	13.945 <sup>64</sup>	29.95 <sup>160</sup>
Dec. 4.4	43.172 <sup>50</sup>	62.32 <sup>238</sup>	54.792 <sup>45</sup>	27.73 <sup>52</sup>	32.263 <sup>49</sup>	60.00 <sup>33</sup>	13.978 <sup>33</sup>	31.55 <sup>162</sup>
14.4	43.150 <sup>22</sup>	64.51 <sup>219</sup>	54.802 <sup>10</sup>	27.15 <sup>58</sup>	32.278 <sup>15</sup>	59.60 <sup>40</sup>	13.978 <sup>5</sup>	33.17 <sup>166</sup>
24.4	43.054 <sup>96</sup>	66.46 <sup>195</sup>	54.778 <sup>24</sup>	26.55 <sup>60</sup>	32.257 <sup>21</sup>	59.15 <sup>45</sup>	13.934 <sup>39</sup>	34.76 <sup>151</sup>
34.4	42.889 <sup>165</sup>	68.09 <sup>163</sup>	54.720 <sup>58</sup>	25.94 <sup>61</sup>	32.201 <sup>56</sup>	58.67 <sup>48</sup>	13.864 <sup>70</sup>	36.27 <sup>151</sup>
34.4	42.889 <sup>165</sup>	68.09 <sup>163</sup>	54.720 <sup>58</sup>	25.94 <sup>61</sup>	32.201 <sup>56</sup>	58.67 <sup>48</sup>	13.864 <sup>70</sup>	37.64 <sup>137</sup>
Mean Place	34.759	46.30	49.874	16.26	27.233	48.47	9.618	41.33
Sec δ, Tan δ	1.980	+1.709	1.014	+0.167	1.025	+0.225	1.015	-0.171
Dψα, Dωα	+0.096	-0.072	+0.065	-0.007	+0.066	-0.009	+0.058	+0.007
Dψδ, Dωδ	+0.25	+0.77	+0.25	+0.77	+0.25	+0.78	+0.24	+0.79



# APPARENT PLACES OF STARS, 1920.

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FOR THE UPPER TRANSIT AT WASHINGTON.

Washington Mean Time.	$\gamma^1$ Eridani. Mag. 4.3		$\delta$ Persei. Mag. 3.1		$\delta$ Eridani. Mag. 3.7		$\nu$ Persei. Mag. 3.9	
	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.
	h m 3 30	° ' " -21 53	h m 3 37	° ' " +47 31	h m 3 39	° ' " -10 1	h m 3 39	° ' " +42 19
	s	"	s	"	s	"	s	"
Jan. 0.4	16.813	70.14	16.195	66.61	26.684	66.28	47.875	44.23
10.3	16.710 <sup>108</sup>	71.75 <sup>161</sup>	16.079 <sup>116</sup>	67.62 <sup>101</sup>	26.606 <sup>78</sup>	67.59 <sup>131</sup>	47.778 <sup>97</sup>	45.05 <sup>82</sup>
20.3	16.578 <sup>132</sup>	73.07 <sup>132</sup>	15.915 <sup>164</sup>	68.33 <sup>71</sup>	26.496 <sup>110</sup>	68.70 <sup>111</sup>	47.637 <sup>141</sup>	45.60 <sup>56</sup>
30.3	16.420 <sup>158</sup>	74.06 <sup>99</sup>	15.712 <sup>203</sup>	68.70 <sup>37</sup>	26.361 <sup>135</sup>	69.60 <sup>90</sup>	47.457 <sup>180</sup>	45.86 <sup>26</sup>
Feb. 9.3	16.243 <sup>177</sup>	74.70 <sup>64</sup>	15.476 <sup>236</sup>	68.73 <sup>3</sup>	26.203 <sup>158</sup>	70.25 <sup>65</sup>	47.247 <sup>65</sup>	45.82 <sup>4</sup>
	188	29	253	34	171	41	227	35
19.2	16.055	74.99	15.223	68.39	26.032	70.66	47.020	45.47
29.2	15.863 <sup>192</sup>	74.91 <sup>8</sup>	14.962 <sup>261</sup>	67.72 <sup>67</sup>	25.856 <sup>176</sup>	70.80 <sup>14</sup>	46.786 <sup>234</sup>	44.83 <sup>64</sup>
Mar. 10.2	15.677 <sup>186</sup>	74.48 <sup>43</sup>	14.711 <sup>251</sup>	66.72 <sup>100</sup>	25.683 <sup>173</sup>	70.68 <sup>12</sup>	46.559 <sup>227</sup>	43.93 <sup>90</sup>
20.2	15.508 <sup>169</sup>	73.70 <sup>78</sup>	14.487 <sup>224</sup>	65.48 <sup>124</sup>	25.525 <sup>158</sup>	70.31 <sup>37</sup>	46.354 <sup>205</sup>	42.79 <sup>114</sup>
30.1	15.362 <sup>146</sup>	72.58 <sup>112</sup>	14.297 <sup>190</sup>	64.01 <sup>147</sup>	25.388 <sup>137</sup>	69.66 <sup>65</sup>	46.180 <sup>174</sup>	41.48 <sup>131</sup>
	113	141	142	164	106	90	120	142
Apr. 9.1	15.249	71.17	14.155	62.37	25.282	68.76	46.050	40.06
19.1	15.174 <sup>75</sup>	69.45 <sup>172</sup>	14.068 <sup>87</sup>	60.65 <sup>172</sup>	25.213 <sup>69</sup>	67.62 <sup>114</sup>	45.971 <sup>79</sup>	38.59 <sup>147</sup>
29.0	15.143 <sup>31</sup>	67.48 <sup>197</sup>	14.045 <sup>23</sup>	58.93 <sup>172</sup>	25.184 <sup>29</sup>	66.24 <sup>138</sup>	45.949 <sup>22</sup>	37.13 <sup>146</sup>
May 9.0	15.158 <sup>15</sup>	65.23 <sup>220</sup>	14.086 <sup>41</sup>	57.29 <sup>164</sup>	25.202 <sup>18</sup>	64.64 <sup>160</sup>	45.988 <sup>39</sup>	35.74 <sup>139</sup>
19.0	15.221 <sup>63</sup>	62.91 <sup>237</sup>	14.196 <sup>110</sup>	55.76 <sup>153</sup>	25.264 <sup>62</sup>	62.85 <sup>179</sup>	46.089 <sup>101</sup>	34.49 <sup>125</sup>
	109	249	172	139	108	194	159	107
29.0	15.330	60.42	14.368	54.40	25.372	60.91	46.248	33.42
June 7.9	15.483 <sup>153</sup>	57.84 <sup>258</sup>	14.599 <sup>231</sup>	53.28 <sup>112</sup>	25.522 <sup>150</sup>	58.87 <sup>204</sup>	46.461 <sup>213</sup>	32.57 <sup>85</sup>
17.9	15.677 <sup>194</sup>	55.27 <sup>257</sup>	14.883 <sup>284</sup>	52.46 <sup>82</sup>	25.709 <sup>187</sup>	56.75 <sup>212</sup>	46.723 <sup>209</sup>	31.97 <sup>60</sup>
27.9	15.906 <sup>229</sup>	52.76 <sup>251</sup>	15.213 <sup>330</sup>	51.89 <sup>57</sup>	25.931 <sup>222</sup>	54.63 <sup>212</sup>	47.028 <sup>305</sup>	31.63 <sup>34</sup>
July 7.9	16.163 <sup>257</sup>	50.38 <sup>238</sup>	15.577 <sup>364</sup>	51.62 <sup>27</sup>	26.180 <sup>249</sup>	52.56 <sup>207</sup>	47.365 <sup>337</sup>	31.56 <sup>7</sup>
	276	217	392	3	268	196	368	20
17.8	16.439	48.21	15.969	51.65	26.448	50.60	47.728	31.76
27.8	16.731 <sup>292</sup>	46.29 <sup>192</sup>	16.379 <sup>410</sup>	51.98 <sup>33</sup>	26.730 <sup>282</sup>	48.80 <sup>180</sup>	48.106 <sup>378</sup>	32.21 <sup>45</sup>
Aug. 6.8	17.031 <sup>300</sup>	44.70 <sup>159</sup>	16.798 <sup>419</sup>	52.57 <sup>59</sup>	27.021 <sup>291</sup>	47.24 <sup>156</sup>	48.493 <sup>357</sup>	32.90 <sup>69</sup>
16.7	17.332 <sup>301</sup>	43.49 <sup>121</sup>	17.219 <sup>421</sup>	53.45 <sup>88</sup>	27.312 <sup>291</sup>	45.94 <sup>130</sup>	48.881 <sup>388</sup>	33.80 <sup>90</sup>
26.7	17.627 <sup>295</sup>	42.70 <sup>79</sup>	17.632 <sup>413</sup>	54.52 <sup>107</sup>	27.598 <sup>286</sup>	44.97 <sup>97</sup>	49.263 <sup>382</sup>	34.90 <sup>110</sup>
	284	36	400	129	275	62	369	124
Sept. 5.7	17.911	42.34	18.032	55.81	27.873	44.35	49.632	36.14
15.7	18.177 <sup>266</sup>	42.43 <sup>9</sup>	18.412 <sup>380</sup>	57.30 <sup>149</sup>	28.134 <sup>261</sup>	44.09 <sup>26</sup>	49.983 <sup>351</sup>	37.51 <sup>137</sup>
25.6	18.422 <sup>245</sup>	42.98 <sup>55</sup>	18.769 <sup>357</sup>	58.93 <sup>163</sup>	28.377 <sup>243</sup>	44.21 <sup>12</sup>	50.313 <sup>330</sup>	38.98 <sup>147</sup>
Oct. 5.6	18.642 <sup>220</sup>	43.97 <sup>99</sup>	19.096 <sup>327</sup>	60.67 <sup>174</sup>	28.598 <sup>221</sup>	44.69 <sup>48</sup>	50.617 <sup>304</sup>	40.52 <sup>154</sup>
15.6	18.835 <sup>193</sup>	45.33 <sup>136</sup>	19.391 <sup>295</sup>	62.49 <sup>182</sup>	28.795 <sup>197</sup>	45.50 <sup>81</sup>	50.892 <sup>275</sup>	42.12 <sup>160</sup>
	162	168	261	187	170	109	242	162
25.6	18.997 <sup>190</sup>	47.01 <sup>194</sup>	19.652 <sup>219</sup>	64.36 <sup>189</sup>	28.965 <sup>143</sup>	46.59 <sup>133</sup>	51.134 <sup>206</sup>	43.74 <sup>161</sup>
Nov. 4.5	19.127 <sup>96</sup>	48.95 <sup>213</sup>	19.871 <sup>173</sup>	66.25 <sup>187</sup>	29.108 <sup>111</sup>	47.92 <sup>150</sup>	51.340 <sup>166</sup>	45.35 <sup>159</sup>
14.5	19.223 <sup>61</sup>	51.08 <sup>221</sup>	20.044 <sup>126</sup>	68.12 <sup>185</sup>	29.219 <sup>79</sup>	49.42 <sup>162</sup>	51.506 <sup>128</sup>	46.94 <sup>154</sup>
24.5	19.284 <sup>25</sup>	53.29 <sup>221</sup>	20.170 <sup>76</sup>	69.97 <sup>173</sup>	29.298 <sup>47</sup>	51.04 <sup>165</sup>	51.629 <sup>77</sup>	48.48 <sup>144</sup>
Dec. 4.4	19.309 <sup>12</sup>	55.50 <sup>213</sup>	20.246 <sup>21</sup>	71.70 <sup>161</sup>	29.345 <sup>10</sup>	52.69 <sup>162</sup>	51.706 <sup>28</sup>	49.92 <sup>132</sup>
	83	176	86	118	60	141	71	9
14.4	19.297	57.63	20.267	73.31	29.355	54.31	51.734	51.24
24.4	19.248 <sup>49</sup>	59.62 <sup>199</sup>	20.234 <sup>33</sup>	74.74 <sup>143</sup>	29.330 <sup>25</sup>	55.85 <sup>154</sup>	51.713 <sup>21</sup>	52.39 <sup>115</sup>
34.4	19.165 <sup>83</sup>	61.38 <sup>176</sup>	20.148 <sup>86</sup>	75.92 <sup>118</sup>	29.270 <sup>60</sup>	57.26 <sup>141</sup>	51.641 <sup>72</sup>	53.36 <sup>9</sup>
Mean Place	15.147	61.98	13.289	58.67	24.914	60.74	45.181	37.51
Sec $\delta$ , Tan $\delta$	1.078	-0.402	1.481	+1.093	1.016	-0.177	1.353	+0.911
$D_{\alpha}$ , $D_{\omega}$	+0.053	+0.016	+0.085	-0.043	+0.057	+0.007	+0.081	-0.035
$D_{\delta}$ , $D_{\omega}$	+0.24	+0.79	+0.23	+0.81	+0.23	+0.82	+0.23	+0.82

APPARENT PLACES OF STARS, 1920.

FOR THE UPPER TRANSIT AT WASHINGTON.

Washington Mean Time.	5 H. Camelop. Mag. 4.7		7 Tauri. (Alcyon.) Mag. 3.0		7 <sup>o</sup> Eridani. Mag. 4.3		9 Eridani. Mag. 4.2	
	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.
	h m s	° ' "	h m s	° ' "	h m s	° ' "	h m s	° ' "
	3 41	+71 5	3 42	+23 51	3 48	-23 28	3 46	-36 26
Jan. 0.4	58.85	25.43	45.725	34.01	26.060	73.02	29.387	41.07
10.4	58.53	27.41	45.657	34.01	25.962	74.77	29.253	43.10
20.3	58.11	28.95	45.554	33.91	25.831	76.23	29.084	44.74
30.3	57.61	30.01	45.418	33.68	25.672	77.34	28.886	45.96
Feb. 9.3	57.05	30.54	45.258	33.34	25.492	78.09	28.663	46.72
19.2	56.46	30.52	45.082	32.91	25.298	78.47	28.427	47.01
29.2	55.86	29.96	44.900	32.36	25.098	78.48	28.186	46.83
Mar. 10.2	55.29	28.88	44.721	31.75	24.903	78.11	27.950	46.20
20.2	54.76	27.33	44.556	31.08	24.721	77.37	27.730	45.12
30.1	54.33	25.37	44.420	30.41	24.563	76.29	27.534	43.63
Apr. 9.1	53.97	23.11	44.315	29.76	24.435	74.89	27.372	41.78
19.1	53.73	20.61	44.251	29.17	24.346	73.18	27.251	39.58
29.1	53.62	17.98	44.233	28.70	24.298	71.20	27.178	37.08
May 9.0	53.64	15.32	44.265	28.34	24.298	68.99	27.155	34.36
19.0	53.79	12.74	44.349	28.12	24.346	66.59	27.184	31.45
29.0	54.06	10.28	44.479	28.11	24.440	64.06	27.266	28.42
June 7.9	54.46	8.06	44.655	28.30	24.580	61.44	27.398	25.36
17.9	54.96	6.11	44.872	28.66	24.761	58.83	27.578	22.34
27.9	55.55	4.52	45.124	29.22	24.978	56.28	27.799	19.42
July 7.9	56.22	3.30	45.404	29.93	25.226	53.85	28.057	16.69
17.8	56.94	2.48	45.702	30.79	25.497	51.62	28.343	14.25
27.8	57.72	2.09	46.018	31.73	25.785	49.66	28.652	12.14
Aug. 6.8	58.52	2.12	46.337	32.77	26.083	48.03	28.974	10.44
16.8	59.33	2.56	46.658	33.84	26.386	46.78	29.302	9.20
26.7	60.13	3.43	46.975	34.93	26.684	45.95	29.629	8.48
Sept. 5.7	60.92	4.68	47.279	35.99	26.973	45.58	29.947	8.29
15.7	61.67	6.30	47.570	37.02	27.247	45.67	30.249	8.66
25.6	62.38	8.24	47.844	37.98	27.501	46.24	30.530	9.56
Oct. 5.6	63.04	10.48	48.094	38.85	27.733	47.25	30.784	10.97
15.6	63.62	12.98	48.322	39.61	27.937	48.66	31.006	12.84
25.6	64.13	15.67	48.523	40.29	28.112	50.42	31.194	15.10
Nov. 4.5	64.55	18.52	48.698	40.86	28.256	52.46	31.343	17.66
14.5	64.86	21.46	48.840	41.35	28.365	54.69	31.451	20.41
24.5	65.07	24.40	48.949	41.76	28.438	57.02	31.516	23.26
Dec. 4.5	65.16	27.28	49.019	42.07	28.473	59.36	31.537	26.11
14.4	65.14	30.04	49.053	42.32	28.471	61.64	31.513	28.84
24.4	64.99	32.56	49.045	42.47	28.430	63.76	31.445	31.37
34.4	64.73	34.78	48.999	42.54	28.352	65.68	31.335	33.60
Mean Place	53.330	14.49	43.529	31.49	24.337	64.37	27.659	29.87
Sec δ, Tan δ	3.085	+2.919	1.093	+0.442	1.090	-0.434	1.243	-0.738
D <sub>α</sub> , D <sub>δ</sub>	+0.125	-0.110	+0.071	-0.017	+0.052	+0.016	+0.045	+0.027
D <sub>γ</sub> , D <sub>δ</sub>	+0.23	+0.82	+0.22	+0.83	+0.22	+0.83	+0.22	+0.84

# APPARENT PLACES OF STARS, 1920.

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FOR THE UPPER TRANSIT AT WASHINGTON.

Washington Mean Time.	γ Hydr. Mag. 3.2		ζ Perse. Mag. 2.9		θ H. Camelop. Mag. 5.2		ε Perse. Mag. 3.0	
	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.
	h m s 48	° ' " -74 28	h m s 49	° ' " +31 38	h m s 50	° ' " +60 52	h m s 52	° ' " +39 46
Jan. 0.4	90.37	79.42 <sup>213</sup>	8.934	53.57	22.17	42.28	31.507	53.17 <sup>75</sup>
10.4	29.72 <sup>65</sup>	81.55 <sup>158</sup>	8.266 <sup>68</sup>	53.91 <sup>21</sup>	21.99 <sup>18</sup>	43.94 <sup>129</sup>	31.425 <sup>82</sup>	53.92 <sup>53</sup>
20.3	28.97	83.13 <sup>108</sup>	8.154 <sup>112</sup>	54.12	21.75 <sup>24</sup>	45.23 <sup>88</sup>	31.301 <sup>124</sup>	54.45 <sup>26</sup>
30.3	28.18	84.16 <sup>146</sup>	8.008 <sup>146</sup>	54.15 <sup>3</sup>	21.45 <sup>30</sup>	46.11 <sup>88</sup>	31.137 <sup>164</sup>	54.71 <sup>26</sup>
Feb. 9.3	27.30 <sup>86</sup>	84.62 <sup>46</sup>	7.837 <sup>171</sup>	53.97 <sup>18</sup>	21.11 <sup>34</sup>	46.53 <sup>42</sup>	30.941 <sup>196</sup>	54.73 <sup>2</sup>
19.2	26.42	84.48	7.645	53.61	20.74	46.49	30.725	54.47 <sup>26</sup>
29.2	25.55 <sup>87</sup>	83.80 <sup>66</sup>	7.446 <sup>190</sup>	53.07 <sup>54</sup>	20.36 <sup>38</sup>	45.98 <sup>51</sup>	30.500 <sup>235</sup>	53.94 <sup>53</sup>
Mar. 10.2	24.70 <sup>85</sup>	82.53 <sup>127</sup>	7.250 <sup>196</sup>	52.37 <sup>70</sup>	19.99 <sup>37</sup>	45.04 <sup>94</sup>	30.279 <sup>221</sup>	53.15 <sup>79</sup>
20.2	23.90 <sup>80</sup>	80.78 <sup>175</sup>	7.071 <sup>179</sup>	51.54 <sup>83</sup>	19.64 <sup>35</sup>	43.68 <sup>136</sup>	30.075 <sup>204</sup>	52.17 <sup>98</sup>
30.1	23.18 <sup>72</sup>	78.60 <sup>218</sup>	6.915 <sup>156</sup>	50.63 <sup>91</sup>	19.35 <sup>29</sup>	41.99 <sup>169</sup>	29.902 <sup>173</sup>	51.02 <sup>115</sup>
Apr. 9.1	22.54	76.01	6.797	49.68	19.12	40.03	29.765	49.75 <sup>127</sup>
19.1	22.01 <sup>58</sup>	73.09 <sup>292</sup>	6.722 <sup>75</sup>	48.73 <sup>95</sup>	18.97 <sup>15</sup>	37.88 <sup>215</sup>	29.674 <sup>91</sup>	48.44 <sup>131</sup>
29.1	21.60 <sup>41</sup>	69.90 <sup>319</sup>	6.695 <sup>27</sup>	47.82 <sup>91</sup>	18.89 <sup>8</sup>	35.63 <sup>225</sup>	29.641 <sup>33</sup>	47.14 <sup>130</sup>
May 9.0	21.33 <sup>27</sup>	66.49 <sup>341</sup>	6.724 <sup>29</sup>	47.00 <sup>82</sup>	18.90 <sup>1</sup>	33.37 <sup>226</sup>	29.666 <sup>25</sup>	45.90 <sup>124</sup>
19.0	21.19 <sup>1</sup>	62.98 <sup>354</sup>	6.804 <sup>80</sup>	46.33 <sup>80</sup>	19.01 <sup>11</sup>	31.18 <sup>219</sup>	29.748 <sup>82</sup>	44.78 <sup>114</sup>
29.0	21.18	59.44	6.936	45.85	19.20	29.13	29.887	43.80 <sup>96</sup>
June 7.9	21.33 <sup>15</sup>	55.96 <sup>348</sup>	7.118 <sup>182</sup>	45.53 <sup>32</sup>	19.48 <sup>28</sup>	27.29 <sup>184</sup>	30.082 <sup>195</sup>	43.01 <sup>79</sup>
17.9	21.60 <sup>27</sup>	52.58 <sup>338</sup>	7.344 <sup>226</sup>	45.45 <sup>8</sup>	19.82 <sup>34</sup>	25.71 <sup>158</sup>	30.324 <sup>242</sup>	42.45 <sup>56</sup>
27.9	22.01 <sup>41</sup>	49.44 <sup>314</sup>	7.607 <sup>263</sup>	45.56 <sup>11</sup>	20.23 <sup>41</sup>	24.43 <sup>128</sup>	30.607 <sup>283</sup>	42.14 <sup>31</sup>
July 7.9	22.53 <sup>52</sup>	46.61 <sup>283</sup>	7.899 <sup>292</sup>	45.90 <sup>34</sup>	20.70 <sup>47</sup>	23.48 <sup>95</sup>	30.923 <sup>316</sup>	42.07 <sup>7</sup>
17.8	23.16	44.16 <sup>198</sup>	8.215	46.41	21.20	22.90	31.266	42.24 <sup>17</sup>
27.8	23.86	42.18 <sup>147</sup>	8.549 <sup>334</sup>	47.09 <sup>68</sup>	21.74 <sup>54</sup>	22.68 <sup>22</sup>	31.627 <sup>361</sup>	42.65 <sup>41</sup>
Aug. 6.8	24.65 <sup>79</sup>	40.71 <sup>90</sup>	8.888 <sup>339</sup>	47.92 <sup>83</sup>	22.29 <sup>55</sup>	22.81 <sup>13</sup>	32.000 <sup>373</sup>	43.26 <sup>61</sup>
16.8	25.45 <sup>80</sup>	39.82 <sup>80</sup>	9.233 <sup>345</sup>	48.86 <sup>94</sup>	22.85 <sup>56</sup>	23.31 <sup>50</sup>	32.376 <sup>376</sup>	44.04 <sup>78</sup>
26.7	26.28 <sup>83</sup>	39.54 <sup>28</sup>	9.570 <sup>337</sup>	49.90 <sup>104</sup>	23.41 <sup>56</sup>	24.15 <sup>84</sup>	32.746 <sup>370</sup>	45.00 <sup>96</sup>
Sept. 5.7	27.10	39.88	9.897	50.96	23.95 <sup>54</sup>	25.31 <sup>116</sup>	33.109 <sup>363</sup>	46.12 <sup>112</sup>
15.7	27.88 <sup>78</sup>	40.88 <sup>100</sup>	10.210 <sup>313</sup>	52.11 <sup>115</sup>	24.48 <sup>53</sup>	26.75 <sup>144</sup>	33.455 <sup>346</sup>	47.31 <sup>119</sup>
25.6	28.60 <sup>72</sup>	42.44 <sup>156</sup>	10.510 <sup>300</sup>	53.22 <sup>111</sup>	24.98 <sup>50</sup>	28.46 <sup>171</sup>	33.784 <sup>329</sup>	48.62 <sup>131</sup>
Oct. 5.6	29.24 <sup>64</sup>	44.56 <sup>212</sup>	10.784 <sup>274</sup>	54.34 <sup>112</sup>	25.44 <sup>46</sup>	30.40 <sup>194</sup>	34.089 <sup>305</sup>	49.97 <sup>135</sup>
15.6	29.77 <sup>53</sup>	47.16 <sup>260</sup>	11.035 <sup>251</sup>	55.40 <sup>106</sup>	25.86 <sup>42</sup>	32.55 <sup>215</sup>	34.366 <sup>277</sup>	51.36 <sup>139</sup>
25.6	30.18 <sup>41</sup>	50.14 <sup>298</sup>	11.259	56.45	26.22 <sup>36</sup>	34.85	34.613	52.76 <sup>140</sup>
Nov. 4.5	30.45 <sup>27</sup>	53.39 <sup>325</sup>	11.453 <sup>194</sup>	57.44 <sup>99</sup>	26.53 <sup>31</sup>	37.26 <sup>241</sup>	34.826 <sup>213</sup>	54.18 <sup>142</sup>
14.5	30.57 <sup>12</sup>	56.82 <sup>343</sup>	11.609 <sup>156</sup>	58.38 <sup>94</sup>	26.77 <sup>24</sup>	39.73 <sup>247</sup>	35.006 <sup>180</sup>	55.56 <sup>138</sup>
24.5	30.54 <sup>3</sup>	60.28 <sup>346</sup>	11.732 <sup>123</sup>	59.24 <sup>86</sup>	26.96 <sup>19</sup>	42.22 <sup>249</sup>	35.144 <sup>188</sup>	56.92 <sup>136</sup>
Dec. 4.5	30.86 <sup>18</sup>	63.65 <sup>337</sup>	11.816 <sup>84</sup>	60.04 <sup>80</sup>	27.06 <sup>10</sup>	44.65 <sup>243</sup>	35.236 <sup>92</sup>	58.18 <sup>126</sup>
14.4	30.03	66.79	11.857	60.75	27.09 <sup>3</sup>	46.96	35.282	59.38 <sup>120</sup>
24.4	29.57 <sup>46</sup>	69.62 <sup>283</sup>	11.853 <sup>4</sup>	61.33 <sup>58</sup>	27.04 <sup>5</sup>	49.08 <sup>212</sup>	35.276 <sup>6</sup>	60.41 <sup>103</sup>
34.4	28.98 <sup>59</sup>	72.04 <sup>242</sup>	11.807 <sup>46</sup>	61.80 <sup>47</sup>	26.92 <sup>12</sup>	50.95 <sup>187</sup>	35.225 <sup>51</sup>	61.31 <sup>90</sup>
Mean Place	27.629	63.95	5.935	49.72	18.223	33.36	28.846	47.92
Sec δ, Tan δ	3.738	-3.602	1.175	+0.616	2.054	+1.795	1.301	+0.833
D <sub>α</sub> , D <sub>β</sub>	-0.019	+0.131	+0.075	-0.022	+0.101	-0.064	+0.060	-0.029
D <sub>γ</sub> , D <sub>δ</sub>	+0.22	+0.84	+0.22	+0.84	+0.21	+0.84	+0.21	+0.85

FOR THE UPPER TRANSIT AT WASHINGTON.

Washington Mean Time.	ξ Persei. Mag. 4.0		γ Eridani. Mag. 3.2		λ Tauri. Var. 3.3-4.2		δ Reticuli. Mag. 4.4	
	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.
	h m 3 58	° ' " +35 33	h m 3 54	° ' " -13 43	h m 3 56	° ' " +12 15	h m 3 57	° ' " -61 37
Jan. 0.4	48.723	47.42	19.505	73.60	16.826	54.19	30.49	46.14
10.4	48.652 71	47.98 56	19.520 75	75.12 152	16.772 54	53.69 50	30.19 30	48.46 232
20.3	48.538 114	48.36 38	19.412 108	76.42 130	16.683 89	53.18 51	29.83 36	50.30 184
30.3	48.386 152	48.52 16	19.274 138	77.46 104	16.561 122	52.70 48	29.42 44	51.61 131
Feb. 9.3	48.205 181	48.46 6	19.115 159	78.25 79	16.415 146	52.23 47	28.98 44	52.35 74
19.3	48.003 202	48.17 29	18.941 174	78.73 48	16.250 165	51.78 45	28.51 47	52.52 17
29.2	47.792 211	47.66 51	18.758 183	78.91 18	16.077 173	51.37 41	28.05 46	52.12 40
Mar. 10.2	47.584 203	46.94 72	18.576 182	78.81 10	15.904 173	50.99 38	27.59 46	51.17 95
20.2	47.391 198	46.06 88	18.405 171	78.41 40	15.744 160	50.68 31	27.16 43	49.72 145
30.1	47.225 166	45.05 101	18.256 149	77.71 70	15.604 140	50.46 22	26.76 40	47.79 193
Apr. 9.1	47.096 129	43.95 110	18.136 120	76.72 99	15.495 109	50.34 12	26.42 34	45.44 235
19.1	47.013 83	42.83 112	18.051 85	75.48 124	15.422 73	50.33 1	26.14 28	42.73 271
29.1	46.980 33	41.73 110	18.008 43	74.00 148	15.392 30	50.47 14	25.92 22	39.70 308
May 9.0	47.003 23	40.70 103	18.009 1	72.28 174	15.407 15	50.78 31	25.79 13	36.43 327
19.0	47.081 78	39.81 89	18.054 45	70.33 193	15.469 62	51.25 47	25.74 5	33.01 342
29.0	47.213 132	39.08 73	18.145 91	68.29 204	15.577 108	51.89 64	25.77 3	29.50 351
June 7.9	47.397 184	38.53 55	18.278 133	66.11 218	15.729 152	52.68 79	25.88 11	26.00 350
17.9	47.628 231	38.21 32	18.452 174	63.88 223	15.918 189	53.62 94	26.07 19	22.58 342
27.9	47.897 269	38.09 12	18.661 209	61.65 223	16.143 225	54.67 105	26.33 26	19.33 325
July 7.9	48.199 302	38.20 32	18.898 237	59.50 215	16.396 215	55.83 116	26.65 32	16.36 297
17.8	48.526 327	38.52 32	19.159 261	57.46 204	16.670 274	57.03 120	27.04 39	13.74 262
27.8	48.869 343	39.04 52	19.436 277	55.62 184	16.959 297	58.25 122	27.47 43	11.55 219
Aug. 6.8	49.224 355	39.74 70	19.725 289	54.04 158	17.256 289	59.43 118	27.94 47	9.85 170
16.8	49.580 356	40.59 85	20.016 291	52.73 131	17.556 300	60.55 112	28.44 50	8.70 115
26.7	49.932 352	41.55 96	20.305 289	51.78 95	17.853 297	61.57 102	28.93 49	8.16 54
Sept. 5.7	50.275 343	42.61 106	20.586 281	51.21 57	18.142 289	62.45 88	29.41 48	8.25 9
15.7	50.605 330	43.75 114	20.856 270	51.04 17	18.419 277	63.16 71	29.89 48	8.96 71
25.6	50.916 311	44.94 119	21.108 252	51.27 23	18.681 262	63.70 54	30.33 44	10.28 132
Oct. 5.6	51.207 291	46.14 120	21.341 233	51.90 63	18.924 243	64.06 36	30.72 39	12.18 190
15.6	51.472 265	47.34 120	21.551 210	52.86 96	19.147 223	64.22 16	31.06 34	14.59 241
25.6	51.709 237	48.55 121	21.734 183	54.17 131	19.345 198	64.23 1	31.34 28	17.42 283
Nov. 4.5	51.915 206	49.72 117	21.892 158	55.73 156	19.516 171	64.08 15	31.55 21	20.58 316
14.5	52.086 171	50.86 114	22.017 125	57.47 174	19.661 145	63.82 26	31.68 12	23.94 336
24.5	52.219 133	51.95 109	22.107 90	59.35 188	19.773 112	63.46 36	31.72 4	27.37 348
Dec. 4.5	52.311 92	52.98 103	22.165 58	61.27 192	19.852 79	63.03 43	31.68 4	30.77 340
14.4	52.358 47	53.91 98	22.185 20	63.15 188	19.895 43	62.56 47	31.57 11	34.01 324
24.4	52.358 0	54.73 82	22.169 16	64.94 179	19.899 4	62.07 49	31.37 20	36.96 285
34.4	52.312 46	55.40 67	22.114 55	66.58 164	19.866 33	61.57 50	31.11 26	39.55 259
Mean Place	46.193	43.11	17.785	66.89	14.768	55.08	28.393	31.73
Sec δ, Tan δ	1.229	+0.715	1.029	-0.244	1.023	+0.217	2.104	-1.851
D <sub>α</sub> , D <sub>ω</sub>	+0.077	-0.025	+0.056	+0.009	+0.066	-0.007	+0.019	+0.063
D <sub>δ</sub> , D <sub>ε</sub>	+0.21	+0.85	+0.21	+0.85	+0.20	+0.86	+0.20	+0.86

FOR THE UPPER TRANSIT AT WASHINGTON.

Washington Mean Time.	♌ Tauri. Mag. 3.9		♋ Tauri. Mag. 4.5		♌ Persei. Mag. 4.0		♌ Tauri. Mag. 5.6	
	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.
	h m 3 56	° ' " + 5 45	h m 3 59	° ' " +21 51	h m 4 2	° ' " +47 29	h m 4 5	° ' " +26 16
Jan. 0.4	55.938	63.35	59.997	52.90	53.924	66.51	59.664	25.24
10.4	55.883 <sup>55</sup>	62.55 <sup>80</sup>	59.944 <sup>53</sup>	52.84 <sup>6</sup>	53.837 <sup>87</sup>	67.66 <sup>115</sup>	59.615 <sup>49</sup>	25.40 <sup>16</sup>
20.3	55.795 <sup>88</sup>	61.83 <sup>72</sup>	59.853 <sup>91</sup>	52.70 <sup>14</sup>	53.695 <sup>142</sup>	68.56 <sup>90</sup>	59.524 <sup>91</sup>	25.46 <sup>6</sup>
30.3	55.675 <sup>120</sup>	61.18 <sup>65</sup>	59.728 <sup>125</sup>	52.48 <sup>22</sup>	53.508 <sup>187</sup>	69.15 <sup>89</sup>	59.396 <sup>128</sup>	25.40 <sup>6</sup>
Feb. 9.3	55.530 <sup>145</sup>	60.61 <sup>57</sup>	59.576 <sup>152</sup>	52.19 <sup>26</sup>	53.282 <sup>226</sup>	69.41 <sup>7</sup>	59.238 <sup>156</sup>	25.22 <sup>18</sup>
19.3	55.367 <sup>168</sup>	60.14 <sup>47</sup>	59.402 <sup>174</sup>	51.82 <sup>87</sup>	53.032 <sup>250</sup>	69.34 <sup>7</sup>	59.059 <sup>179</sup>	24.92 <sup>30</sup>
29.2	55.196 <sup>171</sup>	59.77 <sup>37</sup>	59.220 <sup>182</sup>	51.38 <sup>44</sup>	52.768 <sup>264</sup>	68.92 <sup>42</sup>	58.869 <sup>190</sup>	24.50 <sup>42</sup>
Mar. 10.2	55.025 <sup>171</sup>	59.51 <sup>26</sup>	59.039 <sup>181</sup>	50.88 <sup>50</sup>	52.508 <sup>266</sup>	68.17 <sup>75</sup>	58.679 <sup>190</sup>	23.97 <sup>53</sup>
20.2	54.865 <sup>160</sup>	59.37 <sup>14</sup>	58.869 <sup>170</sup>	50.34 <sup>54</sup>	52.264 <sup>244</sup>	67.14 <sup>103</sup>	58.500 <sup>179</sup>	23.36 <sup>61</sup>
30.1	54.724 <sup>141</sup>	59.37 <sup>0</sup>	58.720 <sup>149</sup>	49.79 <sup>56</sup>	52.052 <sup>212</sup>	65.85 <sup>129</sup>	58.343 <sup>157</sup>	22.69 <sup>67</sup>
Apr. 9.1	54.613 <sup>111</sup>	59.53 <sup>16</sup>	58.604 <sup>116</sup>	49.26 <sup>38</sup>	51.882 <sup>170</sup>	64.38 <sup>147</sup>	58.218 <sup>125</sup>	22.01 <sup>68</sup>
19.1	54.537 <sup>78</sup>	59.84 <sup>31</sup>	58.526 <sup>78</sup>	48.79 <sup>47</sup>	51.765 <sup>117</sup>	62.79 <sup>159</sup>	58.132 <sup>96</sup>	21.84 <sup>67</sup>
29.1	54.503 <sup>34</sup>	60.33 <sup>49</sup>	58.493 <sup>33</sup>	48.41 <sup>38</sup>	51.708 <sup>57</sup>	61.13 <sup>166</sup>	58.092 <sup>40</sup>	20.74 <sup>60</sup>
May 9.0	54.513 <sup>10</sup>	61.00 <sup>67</sup>	58.508 <sup>15</sup>	48.16 <sup>25</sup>	51.717 <sup>9</sup>	59.50 <sup>163</sup>	58.101 <sup>9</sup>	20.23 <sup>51</sup>
19.0	54.568 <sup>55</sup>	61.84 <sup>84</sup>	58.572 <sup>64</sup>	48.05 <sup>11</sup>	51.791 <sup>74</sup>	57.94 <sup>156</sup>	58.161 <sup>60</sup>	19.85 <sup>38</sup>
29.0	54.669 <sup>101</sup>	62.85 <sup>101</sup>	58.684 <sup>112</sup>	48.10 <sup>5</sup>	51.930 <sup>139</sup>	56.51 <sup>143</sup>	58.271 <sup>110</sup>	19.63 <sup>22</sup>
June 8.0	54.811 <sup>142</sup>	64.01 <sup>116</sup>	58.842 <sup>158</sup>	48.33 <sup>23</sup>	52.130 <sup>200</sup>	55.27 <sup>124</sup>	58.428 <sup>157</sup>	19.57 <sup>6</sup>
17.9	54.994 <sup>183</sup>	65.28 <sup>127</sup>	59.043 <sup>201</sup>	48.72 <sup>39</sup>	52.385 <sup>255</sup>	54.24 <sup>103</sup>	58.629 <sup>201</sup>	19.68 <sup>11</sup>
27.9	55.210 <sup>316</sup>	66.65 <sup>137</sup>	59.279 <sup>236</sup>	49.27 <sup>55</sup>	52.689 <sup>304</sup>	53.47 <sup>77</sup>	58.868 <sup>239</sup>	19.98 <sup>30</sup>
July 7.9	55.454 <sup>344</sup>	68.07 <sup>142</sup>	59.544 <sup>265</sup>	49.97 <sup>70</sup>	53.033 <sup>344</sup>	52.96 <sup>51</sup>	59.138 <sup>270</sup>	20.44 <sup>46</sup>
17.8	55.720 <sup>266</sup>	69.49 <sup>142</sup>	59.830 <sup>266</sup>	49.97 <sup>81</sup>	53.033 <sup>375</sup>	52.96 <sup>22</sup>	59.138 <sup>291</sup>	20.44 <sup>59</sup>
27.8	56.001 <sup>261</sup>	69.49 <sup>139</sup>	59.830 <sup>266</sup>	50.78 <sup>91</sup>	53.408 <sup>400</sup>	52.74 <sup>4</sup>	59.429 <sup>311</sup>	21.08 <sup>73</sup>
Aug. 6.8	56.291 <sup>390</sup>	70.88 <sup>139</sup>	60.134 <sup>304</sup>	51.69 <sup>91</sup>	53.808 <sup>400</sup>	52.78 <sup>4</sup>	59.740 <sup>321</sup>	21.76 <sup>73</sup>
16.8	56.291 <sup>390</sup>	72.19 <sup>137</sup>	60.447 <sup>313</sup>	52.65 <sup>96</sup>	54.220 <sup>412</sup>	53.09 <sup>31</sup>	60.061 <sup>321</sup>	22.57 <sup>81</sup>
26.7	56.584 <sup>390</sup>	73.36 <sup>101</sup>	60.762 <sup>313</sup>	53.64 <sup>96</sup>	54.639 <sup>417</sup>	53.64 <sup>55</sup>	60.386 <sup>326</sup>	23.45 <sup>88</sup>
26.7	56.874 <sup>384</sup>	74.37 <sup>80</sup>	61.075 <sup>304</sup>	54.62 <sup>98</sup>	55.056 <sup>410</sup>	54.43 <sup>99</sup>	60.709 <sup>317</sup>	24.36 <sup>92</sup>
Sept. 5.7	57.158 <sup>372</sup>	75.17 <sup>58</sup>	61.379 <sup>304</sup>	55.55 <sup>87</sup>	55.466 <sup>304</sup>	55.42 <sup>119</sup>	61.026 <sup>304</sup>	25.28 <sup>89</sup>
15.7	57.430 <sup>356</sup>	75.75 <sup>34</sup>	61.673 <sup>278</sup>	56.42 <sup>78</sup>	55.860 <sup>278</sup>	56.61 <sup>133</sup>	61.330 <sup>291</sup>	26.17 <sup>85</sup>
25.7	57.686 <sup>239</sup>	76.09 <sup>10</sup>	61.951 <sup>269</sup>	57.20 <sup>68</sup>	56.238 <sup>252</sup>	57.94 <sup>147</sup>	61.621 <sup>278</sup>	27.02 <sup>80</sup>
Oct. 5.6	57.925 <sup>218</sup>	76.19 <sup>13</sup>	62.210 <sup>238</sup>	57.88 <sup>56</sup>	56.590 <sup>325</sup>	59.41 <sup>168</sup>	61.894 <sup>250</sup>	27.82 <sup>74</sup>
15.6	58.143 <sup>195</sup>	76.06 <sup>34</sup>	62.448 <sup>214</sup>	58.46 <sup>48</sup>	56.915 <sup>391</sup>	61.00 <sup>168</sup>	62.144 <sup>228</sup>	28.56 <sup>66</sup>
25.6	58.338 <sup>169</sup>	75.72 <sup>52</sup>	62.662 <sup>188</sup>	58.94 <sup>39</sup>	57.206 <sup>254</sup>	62.68 <sup>173</sup>	62.372 <sup>199</sup>	29.22 <sup>60</sup>
Nov. 4.5	58.507 <sup>141</sup>	75.20 <sup>67</sup>	62.850 <sup>157</sup>	59.33 <sup>30</sup>	57.460 <sup>212</sup>	64.40 <sup>176</sup>	62.571 <sup>169</sup>	29.82 <sup>54</sup>
14.5	58.648 <sup>110</sup>	74.53 <sup>76</sup>	63.007 <sup>125</sup>	59.63 <sup>22</sup>	57.672 <sup>165</sup>	66.16 <sup>175</sup>	62.740 <sup>137</sup>	30.36 <sup>48</sup>
24.5	58.758 <sup>77</sup>	73.77 <sup>86</sup>	63.132 <sup>90</sup>	59.85 <sup>16</sup>	57.837 <sup>113</sup>	67.91 <sup>163</sup>	62.877 <sup>96</sup>	30.84 <sup>42</sup>
Dec. 4.5	58.835 <sup>43</sup>	72.94 <sup>38</sup>	63.222 <sup>50</sup>	60.01 <sup>10</sup>	57.950 <sup>59</sup>	69.62 <sup>163</sup>	62.975 <sup>58</sup>	31.26 <sup>37</sup>
14.4	58.877 <sup>3</sup>	72.08 <sup>85</sup>	63.272 <sup>11</sup>	60.11 <sup>4</sup>	58.009 <sup>0</sup>	71.24 <sup>149</sup>	63.033 <sup>16</sup>	31.63 <sup>29</sup>
24.4	58.880 <sup>33</sup>	71.23 <sup>81</sup>	63.283 <sup>31</sup>	60.15 <sup>1</sup>	58.009 <sup>56</sup>	72.73 <sup>131</sup>	63.049 <sup>28</sup>	31.92 <sup>21</sup>
34.4	58.847	70.42	63.252	60.14	57.953	74.04	63.021	32.13
Mean Place	53.951	65.83	57.770	51.88	50.889	60.74	57.327	23.68
Sec δ, Tan δ	1.005	+0.101	1.078	+0.401	1.480	+1.091	1.115	+0.494
D <sub>α</sub> , D <sub>αα</sub>	+0.063	-0.003	+0.070	-0.013	+0.086	-0.036	+0.073	-0.016
D <sub>δ</sub> , D <sub>δδ</sub>	+0.20	+0.86	+0.20	+0.87	+0.20	+0.87	+0.19	+0.88

FOR THE UPPER TRANSIT AT WASHINGTON.

Washington Mean Time.	♄ Eridani. Mag. 4.1		♃ Tauri. Mag. 4.3		♈ Horologii. Mag. 3.8		♌ Retiuli. Mag. 3.4	
	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.
	h m 4 7	° ' " - 7 2	h m 4 11	° ' " + 8 41	h m 4 11	° ' " -42 29	h m 4 18	° ' " -62 40
	s	"	s	"	s	"	s	"
Jan. 0.4	59.476	48.32	13.377	32.45	22.923	40.86	25.64	39.92
10.4	59.418 58	49.66 134	13.335 42	31.77 68	22.784 139	43.22 236	25.35 29	42.43 261
20.3	59.325 93	50.83 117	13.252 83	31.14 63	22.603 181	45.18 196	24.99 36	44.48 206
30.3	59.203 122	51.81 98	13.137 115	30.56 58	22.385 218	46.69 151	24.57 42	45.99 151
Feb. 9.3	59.053 150	52.58 77	12.996 141	30.05 51	22.138 247	47.72 103	24.11 46	46.96 97
	168	52	162	45	267	53	48	40
19.3	58.885	53.10 31	12.834	29.60 38	21.871	48.25 3	23.63	47.36 13
29.2	58.709 176	53.41 5	12.661 173	29.22 30	21.594 277	48.28 46	23.14 49	47.18 71
Mar. 10.2	58.530 179	53.46 19	12.486 165	28.92 19	21.319 275	48.22 95	22.66 47	46.47 126
20.2	58.360 170	53.27 19	12.321 165	28.73 9	21.056 263	46.87 140	22.19 43	45.21 173
30.2	58.210 150	52.86 41	12.174 147	28.64 2	20.815 241	45.47 182	21.76 38	43.48 218
	124	67	120	80	208	182	38	218
Apr. 9.1	58.086 89	52.19 90	12.054 85	28.66 18	20.607 167	43.65 219	21.38 32	41.30 257
19.1	57.997 51	51.29 90	11.969 85	28.84 30	20.440 119	41.46 251	21.06 26	38.73 291
29.1	57.946 6	50.15 114	11.925 44	29.14 49	20.321 69	38.95 279	20.80 17	35.82 317
May 9.0	57.940 36	48.82 133	11.924 46	29.63 65	20.252 10	36.16 279	20.63 9	32.65 336
19.0	57.976 83	47.28 154	11.970 92	30.28 80	20.242 44	33.17 314	20.54 1	29.29 348
29.0	58.059	45.57	12.062	31.08 95	20.286 100	30.03 319	20.53 8	25.81 351
June 8.0	58.185 126	43.75 182	12.196 134	32.03 107	20.356 153	26.84 319	20.61 16	22.30 344
17.9	58.348 163	41.86 189	12.371 175	33.10 119	20.539 201	23.65 307	20.77 24	18.86 331
27.9	58.549 201	39.92 194	12.582 211	34.29 125	20.740 244	20.58 291	21.01 31	15.55 306
July 7.9	58.777 228	38.00 186	12.821 239	35.54 127	20.984 280	17.67 265	21.32 37	12.49 274
17.9	59.031 271	36.14 172	13.082 278	36.81 126	21.264 208	15.02 223	21.69 43	9.75 233
27.8	59.302 282	34.42 151	13.360 289	38.07 119	21.572 330	12.74 187	22.12 46	7.42 187
Aug. 6.8	59.584 288	32.91 127	13.649 294	39.26 110	21.902 343	10.87 140	22.58 50	5.55 130
16.8	59.872 287	31.64 100	13.943 293	40.36 97	22.245 348	9.47 85	23.08 51	4.25 72
26.7	60.159 281	30.64 67	14.236 287	41.33 78	22.593 345	8.62 30	23.59 51	3.53 10
Sept. 5.7	60.440	29.97 33	14.523 278	42.11 60	22.938 332	8.32 30	24.10 49	3.43 55
15.7	60.711 258	29.64 2	14.801 265	42.71 39	23.270 316	8.62 86	24.59 47	3.98 117
25.7	60.969 240	29.66 72	15.066 248	43.10 16	23.586 291	9.48 143	25.06 43	5.15 176
Oct. 5.6	61.209 220	30.03 37	15.314 229	43.26 4	23.877 260	10.91 193	25.49 38	6.91 230
15.6	61.429 185	30.75 98	15.543 207	43.22 23	24.137 225	12.84 236	25.87 31	9.21 275
25.6	61.624 171	31.73 123	15.750 183	42.99 39	24.362 184	15.20 272	26.18 24	11.96 311
Nov. 4.6	61.795 140	32.96 142	15.933 154	42.60 53	24.546 138	17.92 296	26.42 16	15.07 336
14.5	61.935 109	34.38 153	16.087 124	42.07 63	24.684 90	20.88 310	26.58 8	18.43 348
24.5	62.044 75	35.91 159	16.211 92	41.44 69	24.774 41	23.98 314	26.66 1	21.91 347
Dec. 4.5	62.119 40	37.50 160	16.303 55	40.75 72	24.815 10	27.12 303	26.65 9	25.38 334
14.4	62.159 3	39.10 153	16.358 16	40.03 71	24.805 61	30.15 286	26.56 18	28.72 310
24.4	62.162 34	40.63 141	16.374 22	39.32 67	24.744 109	33.01 257	26.38 26	31.82 276
34.4	62.128	42.04	16.352	38.65	24.635	35.58	26.12	34.58
Mean Place	57.571	42.74	11.312	34.83	21.034	28.93	23.368	25.89
Sec δ, Tan δ	1.008	-0.124	1.012	+0.153	1.356	-0.916	2.178	-1.935
D <sub>α</sub> , D <sub>ω</sub>	+0.058	+0.004	+0.065	-0.005	+0.041	+0.028	+0.015	+0.058
D <sub>δ</sub> , D <sub>ωδ</sub>	+0.19	+0.88	+0.18	+0.89	+0.18	+0.89	+0.18	+0.89

# APPARENT PLACES OF STARS, 1920.

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FOR THE UPPER TRANSIT AT WASHINGTON.

Washington Mean Time.	γ Tau.ri. Mag. 3.9		δ Tau.ri. Mag. 3.9		ν Eridani. Mag. 4.1		δ Menss. Mag. 5.6	
	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.
	h m 4 15	° ' " +15 26	h m 4 18	° ' " +17 21	h m 4 21	° ' " -34 11	h m 4 23	° ' " -80 23
	s	"	s	"	s	"	s	"
Jan. 0.4	16.483	6.66	21.330	20.47	3.792	77.89	25.28	83.41
10.4	16.444 <sup>28</sup>	6.24 <sup>36</sup>	21.391 <sup>38</sup>	20.39 <sup>37</sup>	3.698 <sup>99</sup>	80.17 <sup>228</sup>	24.23 <sup>100</sup>	85.89 <sup>248</sup>
20.3	16.366 <sup>78</sup>	5.87 <sup>37</sup>	21.224 <sup>77</sup>	19.92 <sup>36</sup>	3.554 <sup>130</sup>	82.10 <sup>193</sup>	23.12 <sup>116</sup>	87.88 <sup>199</sup>
30.3	16.252 <sup>114</sup>	5.50 <sup>37</sup>	21.111 <sup>113</sup>	19.62 <sup>36</sup>	3.378 <sup>170</sup>	83.63 <sup>143</sup>	21.62 <sup>130</sup>	89.35 <sup>147</sup>
Feb. 9.3	16.110 <sup>142</sup>	5.13 <sup>37</sup>	20.968 <sup>143</sup>	19.29 <sup>36</sup>	3.173 <sup>205</sup>	84.73 <sup>119</sup>	20.42 <sup>140</sup>	90.26 <sup>91</sup>
	165	30	166	26	236	65	145	36
19.3	15.945	4.74	20.802	18.94	2.947	85.38	18.97	90.62
29.2	15.769 <sup>176</sup>	4.37 <sup>37</sup>	20.633 <sup>176</sup>	18.56 <sup>36</sup>	2.709 <sup>238</sup>	85.57 <sup>19</sup>	17.49 <sup>148</sup>	90.41 <sup>21</sup>
Mar. 10.2	15.590 <sup>179</sup>	4.00 <sup>37</sup>	20.442 <sup>181</sup>	18.18 <sup>36</sup>	2.470 <sup>238</sup>	85.31 <sup>36</sup>	16.02 <sup>147</sup>	89.67 <sup>74</sup>
20.2	15.419 <sup>171</sup>	3.65 <sup>35</sup>	20.269 <sup>173</sup>	17.80 <sup>35</sup>	2.239 <sup>231</sup>	84.61 <sup>70</sup>	14.61 <sup>141</sup>	88.41 <sup>126</sup>
30.2	15.268 <sup>181</sup>	3.35 <sup>36</sup>	20.115 <sup>154</sup>	17.45 <sup>35</sup>	2.027 <sup>312</sup>	83.49 <sup>112</sup>	13.29 <sup>132</sup>	86.66 <sup>175</sup>
	184	33	126	31	184	182	119	217
Apr. 9.1	15.144	3.12	19.989	17.14	1.843	81.97	12.10	84.49
19.1	15.056 <sup>86</sup>	2.97 <sup>15</sup>	19.897 <sup>92</sup>	16.92 <sup>22</sup>	1.696 <sup>147</sup>	80.10 <sup>157</sup>	11.04 <sup>106</sup>	81.94 <sup>255</sup>
29.1	15.008 <sup>48</sup>	2.94 <sup>3</sup>	19.848 <sup>49</sup>	16.78 <sup>14</sup>	1.592 <sup>104</sup>	77.90 <sup>230</sup>	10.16 <sup>68</sup>	79.05 <sup>286</sup>
May 9.0	15.007 <sup>1</sup>	3.05 <sup>9</sup>	19.845 <sup>3</sup>	16.77 <sup>1</sup>	1.535 <sup>57</sup>	75.42 <sup>243</sup>	9.48 <sup>68</sup>	75.97 <sup>311</sup>
19.0	15.058 <sup>46</sup>	3.23 <sup>26</sup>	19.869 <sup>44</sup>	16.89 <sup>12</sup>	1.523 <sup>7</sup>	72.74 <sup>265</sup>	9.00 <sup>48</sup>	72.63 <sup>329</sup>
	98	30	91	28	46	285	26	340
29.0	15.146	3.67	19.960	17.17	1.573	69.69	8.74	69.28
June 8.0	15.268 <sup>137</sup>	4.21 <sup>54</sup>	20.116 <sup>136</sup>	17.59 <sup>42</sup>	1.668 <sup>95</sup>	66.95 <sup>294</sup>	8.71 <sup>3</sup>	65.37 <sup>341</sup>
17.9	15.461 <sup>173</sup>	4.91 <sup>79</sup>	20.293 <sup>177</sup>	18.16 <sup>57</sup>	1.811 <sup>143</sup>	63.96 <sup>297</sup>	8.90 <sup>19</sup>	62.50 <sup>337</sup>
27.9	15.676 <sup>215</sup>	5.72 <sup>81</sup>	20.507 <sup>214</sup>	18.87 <sup>71</sup>	1.997 <sup>186</sup>	61.06 <sup>292</sup>	9.30 <sup>40</sup>	59.29 <sup>321</sup>
July 7.9	15.919 <sup>243</sup>	6.64 <sup>89</sup>	20.751 <sup>244</sup>	19.68 <sup>81</sup>	2.222 <sup>235</sup>	58.23 <sup>273</sup>	9.92 <sup>62</sup>	56.32 <sup>297</sup>
	260	90	270	89	256	254	80	264
17.9	16.188	7.63	21.021	20.57	2.478	55.74	10.72	53.68
27.8	16.473 <sup>285</sup>	8.65 <sup>108</sup>	21.307 <sup>286</sup>	21.51 <sup>94</sup>	2.760 <sup>282</sup>	53.48 <sup>226</sup>	11.68 <sup>96</sup>	51.42 <sup>226</sup>
Aug. 6.8	16.770 <sup>297</sup>	9.68 <sup>106</sup>	21.696 <sup>299</sup>	22.47 <sup>96</sup>	3.062 <sup>302</sup>	51.57 <sup>191</sup>	12.78 <sup>110</sup>	49.66 <sup>176</sup>
16.8	17.071 <sup>301</sup>	10.67 <sup>99</sup>	21.911 <sup>305</sup>	23.41 <sup>94</sup>	3.375 <sup>313</sup>	50.10 <sup>147</sup>	13.96 <sup>120</sup>	48.42 <sup>124</sup>
26.7	17.373 <sup>302</sup>	11.58 <sup>91</sup>	22.215 <sup>304</sup>	24.29 <sup>88</sup>	3.694 <sup>319</sup>	49.12 <sup>98</sup>	15.25 <sup>127</sup>	47.76 <sup>66</sup>
	297	81	300	89	316	46	130	3
Sept. 5.7	17.670	12.39	23.515	25.09	4.010	48.66	16.55	47.73
15.7	17.958 <sup>298</sup>	13.07 <sup>86</sup>	22.807 <sup>282</sup>	25.77 <sup>86</sup>	4.318 <sup>308</sup>	45.74 <sup>8</sup>	17.82 <sup>127</sup>	48.33 <sup>60</sup>
25.7	18.232 <sup>274</sup>	13.60 <sup>53</sup>	23.066 <sup>279</sup>	26.34 <sup>57</sup>	4.612 <sup>294</sup>	49.37 <sup>63</sup>	19.04 <sup>122</sup>	49.54 <sup>121</sup>
Oct. 5.6	18.490 <sup>258</sup>	13.98 <sup>39</sup>	23.349 <sup>263</sup>	26.77 <sup>43</sup>	4.886 <sup>274</sup>	50.52 <sup>115</sup>	20.14 <sup>110</sup>	51.30 <sup>176</sup>
15.6	18.730 <sup>246</sup>	14.20 <sup>29</sup>	23.595 <sup>246</sup>	27.05 <sup>29</sup>	5.135 <sup>249</sup>	52.16 <sup>144</sup>	21.11 <sup>97</sup>	53.62 <sup>232</sup>
	213	9	234	17	219	207	78	275
25.6	18.948	14.29	23.819	27.22	5.354	54.23	21.69	56.37
Nov. 4.6	19.142 <sup>194</sup>	14.25 <sup>4</sup>	24.017 <sup>195</sup>	27.27 <sup>5</sup>	5.540 <sup>186</sup>	56.64 <sup>241</sup>	22.45 <sup>56</sup>	59.47 <sup>310</sup>
14.5	19.307 <sup>165</sup>	14.11 <sup>14</sup>	24.188 <sup>171</sup>	27.23 <sup>4</sup>	5.688 <sup>148</sup>	59.32 <sup>268</sup>	22.99 <sup>25</sup>	62.81 <sup>334</sup>
24.5	19.442 <sup>185</sup>	13.87 <sup>24</sup>	24.328 <sup>140</sup>	27.12 <sup>11</sup>	5.796 <sup>108</sup>	62.15 <sup>263</sup>	22.88 <sup>8</sup>	66.27 <sup>346</sup>
Dec. 4.5	19.542 <sup>109</sup>	13.60 <sup>37</sup>	24.483 <sup>105</sup>	26.98 <sup>16</sup>	5.900 <sup>64</sup>	65.94 <sup>269</sup>	22.72 <sup>16</sup>	69.71 <sup>344</sup>
	68	33	67	20	19	233	42	321
14.4	19.605	13.28	24.500	26.78	5.879	67.87	22.39	73.02
24.4	19.629 <sup>24</sup>	12.94 <sup>34</sup>	24.527 <sup>27</sup>	26.54 <sup>28</sup>	5.852 <sup>37</sup>	70.56 <sup>269</sup>	21.66 <sup>64</sup>	76.07 <sup>305</sup>
34.4	19.611 <sup>15</sup>	12.60 <sup>34</sup>	24.512 <sup>15</sup>	26.29 <sup>25</sup>	5.778 <sup>74</sup>	73.00 <sup>244</sup>	20.89 <sup>86</sup>	78.76 <sup>269</sup>
Mean Place	14.313	-7.80	19.127	21.45	1.898	67.26	20.563	69.00
Sec δ, Tan δ	1.087	+0.276	1.048	+0.313	1.209	-0.680	5.993	-5.914
D <sub>α</sub> , D <sub>β</sub>	+0.068	-0.008	+0.068	-0.009	+0.045	+0.919	-0.081	+0.162
D <sub>γ</sub> , D <sub>δ</sub>	+0.18	+0.90	+0.17	+0.90	+0.17	+0.91	+0.16	+0.91

FOR THE UPPER TRANSIT AT WASHINGTON.

Washington Mean Time.	ε Tauri. Mag. 3.6		m Persei. Mag. 6.1		α Tauri. (Aldbaran.) Mag. 1.1		α Doradus. Mag. 3.5	
	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.
	h m 4 23	° ' " +19 0	h m 4 27	° ' " +42 53	h m 4 31	° ' " +16 20	h m 4 32	° ' " -55 12
Jan. 0.4	58.844	13.84	49.823	42.47	21.913	56.56	18.194	49.31
10.4	58.813 31	13.67 17	49.774 49	43.51 104	21.886 37	56.24 33	17.999 195	52.01 270
20.4	58.738 75	13.46 21	49.672 102	44.37 86	21.818 68	55.91 33	17.747 252	54.28 227
30.3	58.625 118	13.24 22	49.522 150	44.99 62	21.712 106	55.59 31	17.446 301	56.07 179
Feb. 9.3	58.493 169	12.96 22	49.332 222	45.35 36	21.575 137	55.23 32	17.106 340	57.34 127
19.3	58.315	12.63	49.110	45.44	21.413	54.96	16.738	58.06
29.2	58.136 179	12.28 35	48.870 240	45.24 20	21.236 177	54.60 36	16.354 384	58.24 18
Mar. 10.2	57.963 183	11.89 39	48.626 244	44.76 45	21.062 184	54.25 35	15.969 385	57.83 41
20.2	57.776 177	11.49 40	48.392 224	44.00 78	20.875 177	53.93 32	15.594 375	56.97 86
30.2	57.618 158	11.11 38	48.181 311	43.03 97	20.715 160	53.63 30	15.244 350	55.59 138
Apr. 9.1	57.486 95	10.75 29	48.004 131	41.88 131	20.581 100	53.38 19	14.931 270	53.74 227
19.1	57.391 52	10.46 23	47.873 78	40.57 136	20.481 60	53.19 7	14.661 211	51.47 262
29.1	57.339 9	10.23 10	47.795 20	39.21 136	20.421 17	53.12 3	14.455 150	48.85 293
May 9.1	57.330 38	10.13 2	47.775 49	37.84 137	20.404 62	53.15 17	14.300 83	45.92 317
19.0	57.368 88	10.15 18	47.815 102	36.51 124	20.436 77	53.32 30	14.217 14	42.75 333
29.0	57.456	10.33	47.917	35.27	20.513	53.62	14.203	39.42
June 8.0	57.589 133	10.65 32	48.075 158	34.19 106	20.637 134	54.04 42	14.259 56	36.02 340
17.9	57.762 173	11.09 40	48.288 213	33.26 93	20.799 162	54.63 69	14.383 124	32.62 340
27.9	57.974 212	11.69 60	48.549 261	32.55 71	21.002 208	55.31 68	14.571 188	29.31 331
July 7.9	58.214 240	12.37 68	48.847 296	32.05 50	21.233 231	56.10 79	14.818 247	26.19 312
17.9	58.483	13.16	49.180	31.77	21.493	56.99	15.119	23.33
27.8	58.770 287	14.00 84	49.538 338	31.71 6	21.771 278	57.88 89	15.462 343	20.83 250
Aug. 6.8	59.069 299	14.39 89	49.912 374	31.87 16	22.063 292	58.80 92	15.841 379	18.76 207
16.8	59.374 306	15.75 96	50.297 388	32.23 86	22.360 297	59.68 95	16.246 405	17.22 154
26.8	59.681 307	16.60 85	50.686 399	32.77 54	22.662 302	60.48 80	16.667 421	16.23 99
Sept. 5.7	59.987 306	17.38 78	51.072 386	33.49 72	22.965 308	61.20 73	16.667 425	15.85 38
15.7	60.283 296	18.04 66	51.449 377	34.34 85	23.259 294	61.80 60	17.092 419	15.85 25
25.7	60.567 284	18.60 56	51.813 364	35.33 99	23.542 288	62.26 46	17.912 401	16.10 88
Oct. 5.6	60.837 270	19.07 47	52.158 245	36.42 109	23.811 269	62.58 32	18.286 374	18.46 148
15.6	61.091 254	19.39 32	52.482 324	37.61 119	24.065 264	62.77 19	18.624 338	20.51 205
25.6	61.321 230	19.60 21	52.780 296	38.87 126	24.297 232	62.83 6	18.624 293	20.51 253
Nov. 4.6	61.528 207	19.71 11	53.047 267	40.20 133	24.507 210	62.73 10	18.917 239	23.04 298
14.5	61.706 178	19.76 5	53.277 230	41.56 136	24.688 181	62.59 14	19.156 180	25.97 298
24.5	61.853 147	19.72 4	53.466 189	42.94 138	24.882 154	62.36 29	19.386 117	29.18 321
Dec. 4.5	61.966 118	19.63 0	53.609 143	44.32 133	24.842 118	62.36 26	19.453 48	32.58 340
14.5	62.037 71	19.63 12	53.609 91	44.32 138	24.900 78	62.68 39	19.501 20	36.03 345
24.4	62.070 33	19.51 13	53.700 36	45.67 127	25.038 39	61.78 31	19.481 89	39.41 319
34.4	62.060 10	19.38 15	53.738 18	46.94 114	25.077 7	61.47 31	19.392 166	42.60 291
Mean Place	58.589	14.82	46.904	39.58	19.679	58.45	15.994	36.43
Sec δ, Tan δ	1.058	+0.344	1.365	+0.929	1.042	+0.293	1.753	-1.439
D <sub>α</sub> , D <sub>β</sub>	+0.060	-0.069	+0.064	-0.024	+0.068	-0.007	+0.026	+0.036
D <sub>γ</sub> δ, D <sub>ε</sub> δ	+0.16	+0.31	+0.16	+0.32	+0.15	+0.33	+0.15	+0.63



FOR THE UPPER TRANSIT AT WASHINGTON.

Washington Mean Time.	γ Eridani. Mag. 4.1		δ Eridani. Mag. 4.0		τ Tauri. Mag. 4.3		α Coeli. Mag. 4.5	
	Right Ascension.	Declination.	Right Ascension.	Declination.	Right Ascension.	Declination.	Right Ascension.	Declination.
	h m	° '	h m	° '	h m	° '	h m	° '
	4 32	- 8 30	4 34	-14 27	4 37	+22 48	4 37	-42 0
	s	"	s	"	s	"	s	"
Jan. 0.4	21.231	59.50	32.841	41.45	28.854	15.41	60.937	69.95
10.4	21.196 <sup>25</sup>	60.78 <sup>128</sup>	32.795 <sup>46</sup>	43.20 <sup>175</sup>	28.882 <sup>23</sup>	15.48 <sup>2</sup>	60.826 <sup>111</sup>	72.54 <sup>250</sup>
20.4	21.122 <sup>74</sup>	61.90 <sup>113</sup>	32.700 <sup>86</sup>	44.74 <sup>154</sup>	28.765 <sup>67</sup>	15.40 <sup>3</sup>	60.667 <sup>159</sup>	74.75 <sup>221</sup>
30.3	21.012 <sup>110</sup>	62.87 <sup>97</sup>	32.589 <sup>120</sup>	46.00 <sup>136</sup>	28.658 <sup>107</sup>	15.32 <sup>8</sup>	60.466 <sup>204</sup>	76.54 <sup>179</sup>
Feb. 9.3	20.874 <sup>138</sup>	63.64 <sup>77</sup>	32.438 <sup>151</sup>	47.00 <sup>100</sup>	28.520 <sup>138</sup>	15.18 <sup>14</sup>	60.231 <sup>235</sup>	77.86 <sup>132</sup>
19.3	20.711 <sup>168</sup>	64.23 <sup>59</sup>	32.264 <sup>174</sup>	47.60 <sup>60</sup>	28.352 <sup>168</sup>	15.00 <sup>18</sup>	59.970 <sup>261</sup>	78.70 <sup>84</sup>
29.3	20.535 <sup>178</sup>	64.62 <sup>30</sup>	32.075 <sup>180</sup>	48.08 <sup>30</sup>	28.166 <sup>196</sup>	14.71 <sup>20</sup>	59.694 <sup>276</sup>	79.04 <sup>34</sup>
Mar. 10.2	20.354 <sup>181</sup>	64.78 <sup>16</sup>	31.883 <sup>192</sup>	48.16 <sup>8</sup>	27.976 <sup>107</sup>	14.36 <sup>25</sup>	59.413 <sup>281</sup>	78.88 <sup>16</sup>
20.2	20.178 <sup>176</sup>	64.75 <sup>3</sup>	31.696 <sup>187</sup>	47.94 <sup>23</sup>	27.789 <sup>187</sup>	13.97 <sup>30</sup>	59.139 <sup>274</sup>	78.23 <sup>65</sup>
30.2	20.017 <sup>161</sup>	64.49 <sup>26</sup>	31.523 <sup>173</sup>	47.41 <sup>83</sup>	27.621 <sup>168</sup>	13.51 <sup>46</sup>	58.884 <sup>255</sup>	77.12 <sup>111</sup>
Apr. 9.1	19.861 <sup>136</sup>	64.03 <sup>44</sup>	31.374 <sup>149</sup>	46.60 <sup>81</sup>	27.479 <sup>142</sup>	13.04 <sup>47</sup>	58.655 <sup>229</sup>	75.57 <sup>155</sup>
19.1	19.796 <sup>104</sup>	63.85 <sup>66</sup>	31.257 <sup>117</sup>	45.50 <sup>110</sup>	27.370 <sup>109</sup>	12.61 <sup>43</sup>	58.463 <sup>192</sup>	73.63 <sup>194</sup>
29.1	19.708 <sup>67</sup>	62.46 <sup>80</sup>	31.177 <sup>80</sup>	44.14 <sup>136</sup>	27.304 <sup>66</sup>	12.23 <sup>38</sup>	58.315 <sup>148</sup>	71.34 <sup>220</sup>
May 9.1	19.668 <sup>26</sup>	61.37 <sup>109</sup>	31.139 <sup>38</sup>	42.54 <sup>100</sup>	27.261 <sup>23</sup>	11.90 <sup>33</sup>	58.218 <sup>97</sup>	69.73 <sup>261</sup>
19.0	19.702 <sup>19</sup>	60.10 <sup>127</sup>	31.146 <sup>7</sup>	40.72 <sup>163</sup>	27.311 <sup>80</sup>	11.68 <sup>22</sup>	58.176 <sup>42</sup>	65.89 <sup>284</sup>
29.0	19.765 <sup>63</sup>	58.67 <sup>143</sup>	31.197 <sup>51</sup>	38.73 <sup>199</sup>	27.385 <sup>74</sup>	11.61 <sup>7</sup>	58.187 <sup>11</sup>	62.86 <sup>303</sup>
June 8.0	19.871 <sup>163</sup>	57.10 <sup>157</sup>	31.293 <sup>96</sup>	36.62 <sup>211</sup>	27.508 <sup>123</sup>	11.65 <sup>4</sup>	58.253 <sup>66</sup>	59.73 <sup>313</sup>
18.0	20.017 <sup>148</sup>	55.42 <sup>166</sup>	31.430 <sup>137</sup>	34.42 <sup>220</sup>	27.673 <sup>165</sup>	11.33 <sup>18</sup>	58.373 <sup>130</sup>	56.56 <sup>317</sup>
27.9	20.199 <sup>183</sup>	53.70 <sup>172</sup>	31.604 <sup>174</sup>	32.21 <sup>221</sup>	27.879 <sup>206</sup>	12.15 <sup>23</sup>	58.543 <sup>170</sup>	53.45 <sup>311</sup>
July 7.9	20.413 <sup>214</sup>	51.97 <sup>173</sup>	31.812 <sup>208</sup>	30.04 <sup>217</sup>	28.115 <sup>217</sup>	12.59 <sup>44</sup>	58.758 <sup>215</sup>	50.49 <sup>296</sup>
17.9	20.652 <sup>230</sup>	50.29 <sup>166</sup>	32.047 <sup>236</sup>	27.97 <sup>207</sup>	28.381 <sup>266</sup>	13.14 <sup>55</sup>	59.011 <sup>253</sup>	47.74 <sup>275</sup>
27.8	20.912 <sup>269</sup>	48.71 <sup>153</sup>	32.304 <sup>257</sup>	26.07 <sup>190</sup>	28.670 <sup>299</sup>	13.77 <sup>68</sup>	59.296 <sup>285</sup>	45.30 <sup>244</sup>
Aug. 6.8	21.135 <sup>273</sup>	47.28 <sup>142</sup>	32.576 <sup>272</sup>	24.41 <sup>166</sup>	28.969 <sup>299</sup>	14.45 <sup>68</sup>	59.608 <sup>313</sup>	43.25 <sup>205</sup>
16.8	21.465 <sup>280</sup>	46.06 <sup>123</sup>	32.858 <sup>282</sup>	23.04 <sup>157</sup>	29.280 <sup>311</sup>	15.17 <sup>73</sup>	59.938 <sup>330</sup>	41.64 <sup>161</sup>
26.8	21.750 <sup>285</sup>	45.07 <sup>99</sup>	33.144 <sup>286</sup>	22.00 <sup>104</sup>	29.594 <sup>314</sup>	15.86 <sup>69</sup>	60.278 <sup>340</sup>	40.55 <sup>100</sup>
Sept. 5.7	22.083 <sup>283</sup>	44.39 <sup>68</sup>	33.430 <sup>286</sup>	21.35 <sup>65</sup>	29.906 <sup>313</sup>	16.54 <sup>68</sup>	60.620 <sup>342</sup>	40.02 <sup>53</sup>
15.7	22.310 <sup>277</sup>	44.01 <sup>38</sup>	33.710 <sup>280</sup>	21.10 <sup>28</sup>	30.214 <sup>306</sup>	17.15 <sup>61</sup>	60.958 <sup>338</sup>	40.08 <sup>6</sup>
25.7	22.577 <sup>267</sup>	43.95 <sup>6</sup>	33.979 <sup>269</sup>	21.28 <sup>18</sup>	30.512 <sup>298</sup>	17.71 <sup>56</sup>	61.284 <sup>326</sup>	40.72 <sup>64</sup>
Oct. 5.7	22.829 <sup>252</sup>	44.22 <sup>27</sup>	34.235 <sup>258</sup>	21.37 <sup>80</sup>	30.795 <sup>288</sup>	18.19 <sup>48</sup>	61.590 <sup>306</sup>	41.94 <sup>122</sup>
15.6	23.066 <sup>237</sup>	44.80 <sup>58</sup>	34.474 <sup>230</sup>	22.34 <sup>97</sup>	31.064 <sup>260</sup>	18.57 <sup>38</sup>	61.871 <sup>281</sup>	43.69 <sup>175</sup>
25.6	23.282 <sup>218</sup>	45.65 <sup>85</sup>	34.690 <sup>216</sup>	24.16 <sup>133</sup>	31.312 <sup>248</sup>	18.89 <sup>33</sup>	62.120 <sup>249</sup>	43.89 <sup>222</sup>
Nov. 4.6	23.475 <sup>193</sup>	46.75 <sup>110</sup>	34.882 <sup>192</sup>	25.78 <sup>163</sup>	31.536 <sup>234</sup>	19.36 <sup>37</sup>	62.383 <sup>213</sup>	45.91 <sup>263</sup>
14.5	23.641 <sup>166</sup>	48.02 <sup>127</sup>	35.046 <sup>164</sup>	27.62 <sup>184</sup>	31.732 <sup>196</sup>	19.36 <sup>30</sup>	62.564 <sup>171</sup>	48.63 <sup>292</sup>
24.5	23.777 <sup>138</sup>	49.42 <sup>140</sup>	35.178 <sup>139</sup>	29.62 <sup>193</sup>	31.898 <sup>164</sup>	19.51 <sup>18</sup>	62.729 <sup>126</sup>	51.45 <sup>311</sup>
Dec. 4.5	23.879 <sup>102</sup>	50.89 <sup>147</sup>	35.274 <sup>106</sup>	31.68 <sup>207</sup>	32.027 <sup>131</sup>	19.63 <sup>13</sup>	62.829 <sup>75</sup>	54.56 <sup>318</sup>
14.5	23.945 <sup>66</sup>	52.67 <sup>145</sup>	35.382 <sup>66</sup>	33.74 <sup>206</sup>	32.115 <sup>81</sup>	19.63 <sup>9</sup>	62.764 <sup>24</sup>	57.74 <sup>315</sup>
24.4	23.972 <sup>27</sup>	53.80 <sup>143</sup>	35.350 <sup>18</sup>	35.74 <sup>200</sup>	32.164 <sup>49</sup>	19.72 <sup>8</sup>	62.728 <sup>20</sup>	60.89 <sup>299</sup>
34.4	23.980 <sup>13</sup>	55.14 <sup>134</sup>	35.327 <sup>23</sup>	37.60 <sup>186</sup>	32.165 <sup>1</sup>	19.80 <sup>6</sup>	62.699 <sup>81</sup>	63.88 <sup>277</sup>
34.4	23.980	55.14	35.327	37.60	32.165	19.86	62.618	66.65
Mean Place	19.219	53.95	30.884	33.95	26.489	16.50	58.916	58.58
Sec δ, Tan δ	1.002	-0.061	1.033	-0.256	1.085	+0.420	1.346	-0.901
D <sub>γ</sub> , D <sub>δ</sub>	+0.060	+0.002	+0.055	+0.006	+0.072	-0.010	+0.039	+0.021
D <sub>γ</sub> , D <sub>δ</sub>	+0.15	+0.83	+0.16	+0.93	+0.14	+0.94	+0.14	+0.94

FOR THE UPPER TRANSIT AT WASHINGTON.

Washington Mean Time.	Groombridge 848. Mag. 6.0		4 Camelop. Mag. 5.4		μ Eridani. Mag. 4.2		τ <sup>3</sup> Orionis. Mag. 3.3	
	Right Ascension.	Declination.	Right Ascension.	Declination.	Right Ascension.	Declination.	Right Ascension.	Declination.
	h m	° '	h m	° '	h m	° '	h m	° '
	4 38	+75 47	4 41	+56 36	4 41	- 3 23	4 45	+ 6 49
	s	"	s	"	s	"	s	"
Jan. 0.4	10.12	58.38	23.768	63.65	32.128	66.70	31.893	17.81
10.4	9.85 <sup>27</sup>	60.91 <sup>258</sup>	23.701 <sup>67</sup>	65.41 <sup>176</sup>	32.100 <sup>28</sup>	68.00 <sup>130</sup>	31.876 <sup>17</sup>	16.99 <sup>82</sup>
20.4	9.42 <sup>43</sup>	63.11 <sup>220</sup>	23.560 <sup>141</sup>	66.92 <sup>151</sup>	32.032 <sup>63</sup>	69.15 <sup>115</sup>	31.818 <sup>58</sup>	16.26 <sup>73</sup>
30.3	8.86 <sup>56</sup>	64.90 <sup>179</sup>	23.354 <sup>206</sup>	68.13 <sup>121</sup>	31.928 <sup>104</sup>	70.14 <sup>90</sup>	31.723 <sup>95</sup>	15.62 <sup>64</sup>
Feb. 9.3	8.18 <sup>68</sup>	66.21 <sup>131</sup>	23.092 <sup>302</sup>	68.99 <sup>86</sup>	31.794 <sup>134</sup>	70.94 <sup>80</sup>	31.594 <sup>129</sup>	15.06 <sup>56</sup>
19.3	7.43 <sup>75</sup>	67.00 <sup>79</sup>	22.787 <sup>305</sup>	69.46 <sup>47</sup>	31.634 <sup>160</sup>	71.54 <sup>60</sup>	31.440 <sup>154</sup>	14.60 <sup>46</sup>
29.3	6.62 <sup>81</sup>	67.22 <sup>23</sup>	22.457 <sup>330</sup>	69.52 <sup>6</sup>	31.458 <sup>176</sup>	71.94 <sup>40</sup>	31.268 <sup>172</sup>	14.24 <sup>36</sup>
Mar. 10.2	5.80 <sup>82</sup>	66.88 <sup>34</sup>	22.117 <sup>340</sup>	69.15 <sup>37</sup>	31.276 <sup>178</sup>	72.13 <sup>19</sup>	31.069 <sup>179</sup>	14.00 <sup>24</sup>
20.2	5.01 <sup>79</sup>	65.99 <sup>80</sup>	21.787 <sup>330</sup>	68.39 <sup>78</sup>	31.098 <sup>178</sup>	72.12 <sup>1</sup>	30.913 <sup>176</sup>	13.86 <sup>14</sup>
30.2	4.29 <sup>73</sup>	64.60 <sup>139</sup>	21.485 <sup>302</sup>	67.27 <sup>112</sup>	30.934 <sup>164</sup>	71.88 <sup>24</sup>	30.751 <sup>162</sup>	13.83 <sup>3</sup>
Apr. 9.1	3.66 <sup>63</sup>	62.77 <sup>183</sup>	21.225 <sup>260</sup>	65.84 <sup>143</sup>	30.791 <sup>143</sup>	71.45 <sup>43</sup>	30.611 <sup>140</sup>	13.92 <sup>9</sup>
19.1	3.16 <sup>80</sup>	60.56 <sup>231</sup>	21.022 <sup>203</sup>	64.15 <sup>169</sup>	30.679 <sup>112</sup>	70.80 <sup>65</sup>	30.502 <sup>100</sup>	14.16 <sup>24</sup>
29.1	2.80 <sup>36</sup>	58.09 <sup>247</sup>	20.886 <sup>136</sup>	62.29 <sup>186</sup>	30.605 <sup>74</sup>	69.94 <sup>86</sup>	30.430 <sup>72</sup>	14.54 <sup>38</sup>
May 9.1	2.59 <sup>21</sup>	55.42 <sup>267</sup>	20.823 <sup>63</sup>	60.32 <sup>197</sup>	30.572 <sup>33</sup>	68.89 <sup>106</sup>	30.400 <sup>30</sup>	15.06 <sup>52</sup>
19.0	2.56 <sup>3</sup>	52.67 <sup>278</sup>	20.839 <sup>18</sup>	58.32 <sup>200</sup>	30.582 <sup>10</sup>	67.65 <sup>124</sup>	30.415 <sup>15</sup>	15.75 <sup>69</sup>
29.0	2.69 <sup>13</sup>	49.91 <sup>276</sup>	20.933 <sup>94</sup>	56.36 <sup>196</sup>	30.636 <sup>54</sup>	66.25 <sup>140</sup>	30.474 <sup>59</sup>	16.57 <sup>82</sup>
June 8.0	2.98 <sup>20</sup>	47.24 <sup>267</sup>	21.101 <sup>168</sup>	54.49 <sup>187</sup>	30.734 <sup>98</sup>	64.72 <sup>158</sup>	30.577 <sup>103</sup>	17.52 <sup>95</sup>
18.0	3.43 <sup>45</sup>	44.73 <sup>251</sup>	21.342 <sup>241</sup>	52.79 <sup>170</sup>	30.872 <sup>138</sup>	63.07 <sup>165</sup>	30.720 <sup>143</sup>	18.59 <sup>107</sup>
27.9	4.03 <sup>60</sup>	42.45 <sup>238</sup>	21.646 <sup>304</sup>	51.28 <sup>151</sup>	31.047 <sup>175</sup>	61.38 <sup>169</sup>	30.902 <sup>182</sup>	19.76 <sup>117</sup>
July 7.9	4.74 <sup>71</sup>	40.45 <sup>200</sup>	22.006 <sup>360</sup>	50.03 <sup>125</sup>	31.254 <sup>207</sup>	59.68 <sup>170</sup>	31.115 <sup>212</sup>	20.97 <sup>121</sup>
17.9	5.56 <sup>83</sup>	38.80 <sup>165</sup>	22.414 <sup>408</sup>	49.03 <sup>100</sup>	31.487 <sup>233</sup>	58.03 <sup>165</sup>	31.352 <sup>237</sup>	22.19 <sup>122</sup>
27.8	6.48 <sup>92</sup>	37.52 <sup>128</sup>	22.859 <sup>445</sup>	48.32 <sup>71</sup>	31.742 <sup>255</sup>	56.45 <sup>168</sup>	31.612 <sup>260</sup>	23.39 <sup>120</sup>
Aug. 6.8	7.46 <sup>98</sup>	36.63 <sup>80</sup>	23.331 <sup>473</sup>	47.90 <sup>43</sup>	32.012 <sup>379</sup>	55.03 <sup>142</sup>	31.887 <sup>275</sup>	24.51 <sup>112</sup>
16.8	8.49 <sup>103</sup>	36.14 <sup>49</sup>	23.823 <sup>492</sup>	47.78 <sup>12</sup>	32.291 <sup>370</sup>	53.82 <sup>121</sup>	32.171 <sup>284</sup>	25.52 <sup>101</sup>
26.8	9.56 <sup>107</sup>	36.08 <sup>6</sup>	24.324 <sup>501</sup>	47.96 <sup>18</sup>	32.574 <sup>283</sup>	52.84 <sup>96</sup>	32.460 <sup>289</sup>	26.38 <sup>86</sup>
Sept. 5.7	10.62 <sup>106</sup>	36.44 <sup>86</sup>	24.827 <sup>508</sup>	48.42 <sup>46</sup>	32.857 <sup>283</sup>	52.16 <sup>68</sup>	32.749 <sup>289</sup>	27.06 <sup>67</sup>
15.7	11.67 <sup>106</sup>	37.22 <sup>78</sup>	25.324 <sup>497</sup>	49.15 <sup>73</sup>	33.135 <sup>378</sup>	51.79 <sup>37</sup>	33.033 <sup>284</sup>	27.51 <sup>46</sup>
25.7	12.70 <sup>103</sup>	38.39 <sup>117</sup>	25.807 <sup>483</sup>	50.14 <sup>99</sup>	33.405 <sup>270</sup>	51.73 <sup>6</sup>	33.310 <sup>277</sup>	27.74 <sup>23</sup>
Oct. 5.7	13.69 <sup>99</sup>	39.93 <sup>154</sup>	26.271 <sup>464</sup>	51.36 <sup>122</sup>	33.662 <sup>257</sup>	52.01 <sup>28</sup>	33.575 <sup>265</sup>	27.74 <sup>0</sup>
15.6	14.61 <sup>93</sup>	41.82 <sup>190</sup>	26.707 <sup>436</sup>	52.80 <sup>144</sup>	33.903 <sup>241</sup>	52.59 <sup>58</sup>	33.825 <sup>250</sup>	27.50 <sup>24</sup>
25.6	15.45 <sup>84</sup>	44.04 <sup>222</sup>	27.110 <sup>408</sup>	54.45 <sup>165</sup>	34.126 <sup>223</sup>	53.45 <sup>86</sup>	34.058 <sup>233</sup>	27.08 <sup>42</sup>
Nov. 4.6	16.18 <sup>73</sup>	46.53 <sup>249</sup>	27.472 <sup>362</sup>	56.25 <sup>180</sup>	34.326 <sup>300</sup>	54.56 <sup>111</sup>	34.268 <sup>310</sup>	26.43 <sup>60</sup>
14.5	16.79 <sup>61</sup>	49.23 <sup>270</sup>	27.786 <sup>314</sup>	58.19 <sup>194</sup>	34.500 <sup>174</sup>	55.85 <sup>129</sup>	34.455 <sup>187</sup>	25.73 <sup>75</sup>
24.5	17.27 <sup>49</sup>	52.10 <sup>287</sup>	28.044 <sup>258</sup>	60.23 <sup>204</sup>	34.645 <sup>145</sup>	57.27 <sup>142</sup>	34.611 <sup>156</sup>	24.88 <sup>85</sup>
Dec. 4.5	17.60 <sup>33</sup>	55.06 <sup>296</sup>	28.238 <sup>184</sup>	62.33 <sup>210</sup>	34.756 <sup>111</sup>	58.76 <sup>149</sup>	34.735 <sup>124</sup>	23.99 <sup>89</sup>
14.5	17.76 <sup>16</sup>	58.08 <sup>297</sup>	28.363 <sup>125</sup>	64.42 <sup>209</sup>	34.881 <sup>76</sup>	60.26 <sup>150</sup>	34.823 <sup>88</sup>	23.08 <sup>91</sup>
24.4	17.75 <sup>1</sup>	60.92 <sup>289</sup>	28.414 <sup>51</sup>	66.44 <sup>202</sup>	34.867 <sup>35</sup>	61.71 <sup>145</sup>	34.871 <sup>48</sup>	22.18 <sup>90</sup>
34.4	17.58 <sup>17</sup>	63.63 <sup>271</sup>	28.390 <sup>24</sup>	68.34 <sup>190</sup>	34.863 <sup>4</sup>	63.08 <sup>137</sup>	34.877 <sup>6</sup>	21.34 <sup>84</sup>
Mean Place	2.441	52.83	19.974	60.16	30.088	60.91	29.748	22.04
Sec δ, Tan δ	4.076	+3.952	1.817	+1.518	1.092	-0.059	1.007	+0.120
D <sub>μ</sub> , D <sub>ω</sub>	+0.150	-0.092	+0.099	-0.094	+0.060	+0.001	+0.064	-0.003
D <sub>δ</sub> , D <sub>δ'</sub>	+0.14	+0.94	+0.13	+0.94	+0.13	+0.94	+0.13	+0.95

# APPARENT PLACES OF STARS, 1920.

357

FOR THE UPPER TRANSIT AT WASHINGTON.

Washington Mean Time.	♄ Camelopard. Mag. 4.4		♃ Tauri. Mag. 5.1		♈ Orionis. Mag. 3.9		♈ Aurigae. Mag. 2.9	
	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.
	h m 4 46	° ' " +66 12	h m 4 46	° ' " +18 42	h m 4 50	° ' " + 2 18	h m 4 51	° ' " +33 2
	s	"	s	"	s	"	s	"
Jan. 0.4	10.27	35.34	43.850	15.12	7.112	33.79	49.512	25.98
10.4	10.16	37.54	43.833	14.92	7.095	32.74	49.500	26.59
20.4	9.94	39.48	43.777	14.72	7.037	31.79	49.435	27.07
30.3	9.64	41.06	43.678	14.51	6.942	30.97	49.325	27.45
Feb. 9.3	9.27	42.23	43.544	14.29	6.813	30.30	49.176	27.70
19.3	8.84	42.95	43.365	14.05	6.657	29.76	48.993	27.76
29.3	8.37	43.17	43.207	13.76	6.485	29.37	48.791	27.67
Mar. 10.2	7.89	42.89	43.020	13.47	6.305	29.14	48.580	27.36
20.2	7.42	42.14	42.836	13.15	6.127	29.06	48.373	26.90
30.2	6.99	40.94	42.668	12.84	5.962	29.12	48.180	26.32
Apr. 9.2	6.61	39.35	42.523	12.54	5.817	29.37	48.010	25.59
19.1	6.31	37.45	42.410	12.30	5.703	29.77	47.879	24.79
29.1	6.11	35.29	42.339	12.10	5.626	30.35	47.792	23.95
May 9.1	5.99	32.96	42.308	12.02	5.589	31.11	47.755	23.12
19.0	5.97	30.58	42.326	12.02	5.596	32.02	47.768	22.35
29.0	6.06	28.18	42.391	12.17	5.647	33.08	47.834	21.65
June 8.0	6.25	25.87	42.501	12.41	5.741	34.29	47.953	21.05
18.0	6.55	23.71	42.653	12.81	5.876	35.60	48.118	20.57
27.9	6.93	21.74	42.844	13.30	6.047	36.98	48.328	20.26
July 7.9	7.38	20.04	43.069	13.89	6.252	38.39	48.574	20.07
17.9	7.90	18.62	43.320	14.59	6.482	39.80	48.854	20.03
27.9	8.48	17.53	43.594	15.32	6.735	41.16	49.157	20.15
Aug. 6.8	9.09	16.78	43.883	16.06	7.003	42.40	49.480	20.40
16.8	9.74	16.39	44.182	16.82	7.282	43.50	49.815	20.74
26.8	10.40	16.35	44.486	17.50	7.566	44.40	50.154	21.17
Sept. 5.7	11.07	16.67	44.790	18.13	7.851	45.07	50.496	21.69
15.7	11.74	17.34	45.091	18.65	8.132	45.48	50.836	22.25
25.7	12.38	18.33	45.385	19.09	8.406	45.61	51.166	22.84
Oct. 5.7	13.01	19.65	45.686	19.40	8.670	45.48	51.488	23.46
15.6	13.60	21.27	45.931	19.60	8.919	45.09	51.791	24.08
25.6	14.14	23.14	46.180	19.68	9.151	44.45	52.076	24.74
Nov. 4.6	14.68	25.26	46.404	19.67	9.361	43.61	52.336	25.41
14.5	15.04	27.57	46.604	19.58	9.548	42.60	52.566	26.11
24.5	15.38	30.08	46.776	19.44	9.705	41.49	52.763	26.81
Dec. 4.5	15.68	32.57	46.911	19.28	9.828	40.29	52.920	27.52
14.5	15.78	35.12	47.007	19.11	9.915	39.10	53.083	28.23
24.4	15.84	37.62	47.062	18.93	9.964	37.94	53.097	28.91
34.4	15.79	39.98	47.074	18.74	9.971	36.84	53.113	29.55
Mean Place	5.289	31.38	41.584	17.44	5.001	38.91	46.869	26.49
Sec δ, Tan δ	2.479	+2.268	1.056	+0.339	1.601	+0.040	1.193	+0.650
D <sub>1/2</sub> , D <sub>1/4</sub>	+0.118	-0.048	+0.070	-0.007	+0.062	-0.001	+0.078	-0.013
D <sub>1/2</sub> , D <sub>1/4</sub>	+0.13	+0.95	+0.13	+0.95	+0.12	+0.95	+0.12	+0.96

FOR THE UPPER TRANSIT AT WASHINGTON.

Washington Mean Time.	ε Aurigæ. Var. 3.0-4.5		β Camelopardalis. Mag. 4.2		ζ Aurigæ. Mag. 3.9		ε Tauri. Mag. 4.7	
	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.
	h m 4 56	° ' +48 42	h m 4 56	° ' +60 19	h m 4 56	° ' +40 57	h m 4 56	° ' +21 28
	s "	"	s "	"	s "	"	s "	"
Jan. 0.4	16.560	23.16	21.86	39.97	55.892	37.91	21.151	33.70
10.4	16.543 <sup>17</sup>	24.33 <sup>117</sup>	21.80 <sup>6</sup>	41.96 <sup>190</sup>	55.879 <sup>13</sup>	38.93 <sup>102</sup>	21.148 <sup>3</sup>	33.65 <sup>5</sup>
20.4	16.467 <sup>76</sup>	25.36 <sup>103</sup>	21.66 <sup>14</sup>	43.72 <sup>176</sup>	55.810 <sup>60</sup>	39.83 <sup>90</sup>	21.100 <sup>48</sup>	33.60 <sup>5</sup>
30.3	16.338 <sup>129</sup>	26.19 <sup>88</sup>	21.44 <sup>23</sup>	45.20 <sup>148</sup>	55.689 <sup>121</sup>	40.55 <sup>72</sup>	21.008 <sup>92</sup>	33.53 <sup>7</sup>
Feb. 9.3	16.161 <sup>177</sup>	26.79 <sup>60</sup>	21.15 <sup>29</sup>	46.31 <sup>111</sup>	55.522 <sup>167</sup>	41.08 <sup>86</sup>	20.878 <sup>130</sup>	33.42 <sup>11</sup>
19.3	15.947 <sup>214</sup>	27.12 <sup>23</sup>	20.82 <sup>33</sup>	47.01 <sup>70</sup>	55.319 <sup>208</sup>	41.36 <sup>28</sup>	20.718 <sup>160</sup>	33.27 <sup>15</sup>
29.3	15.707 <sup>240</sup>	27.18 <sup>6</sup>	20.45 <sup>37</sup>	47.29 <sup>28</sup>	55.093 <sup>236</sup>	41.39 <sup>3</sup>	20.539 <sup>179</sup>	33.07 <sup>20</sup>
Mar. 10.2	15.456 <sup>251</sup>	26.95 <sup>23</sup>	20.07 <sup>38</sup>	47.11 <sup>18</sup>	54.854 <sup>230</sup>	41.16 <sup>23</sup>	20.349 <sup>190</sup>	32.81 <sup>26</sup>
20.2	15.208 <sup>248</sup>	26.45 <sup>50</sup>	19.69 <sup>38</sup>	46.50 <sup>61</sup>	54.618 <sup>236</sup>	40.68 <sup>48</sup>	20.159 <sup>190</sup>	32.51 <sup>20</sup>
30.2	14.977 <sup>231</sup>	25.69 <sup>76</sup>	19.34 <sup>35</sup>	45.49 <sup>101</sup>	54.397 <sup>221</sup>	39.96 <sup>72</sup>	19.982 <sup>177</sup>	32.17 <sup>24</sup>
Apr. 9.2	14.778 <sup>199</sup>	24.70 <sup>99</sup>	19.04 <sup>30</sup>	44.13 <sup>136</sup>	54.206 <sup>191</sup>	39.06 <sup>90</sup>	19.829 <sup>153</sup>	31.83 <sup>24</sup>
19.1	14.618 <sup>160</sup>	23.55 <sup>115</sup>	18.78 <sup>26</sup>	42.45 <sup>168</sup>	54.053 <sup>183</sup>	38.01 <sup>105</sup>	19.708 <sup>121</sup>	31.83 <sup>34</sup>
29.1	14.507 <sup>111</sup>	22.27 <sup>128</sup>	18.60 <sup>18</sup>	40.55 <sup>190</sup>	53.948 <sup>105</sup>	36.84 <sup>117</sup>	19.624 <sup>84</sup>	31.49 <sup>30</sup>
May 9.1	14.454 <sup>53</sup>	20.94 <sup>133</sup>	18.50 <sup>10</sup>	38.50 <sup>205</sup>	53.897 <sup>51</sup>	35.63 <sup>121</sup>	19.585 <sup>39</sup>	31.19 <sup>23</sup>
19.0	14.460 <sup>6</sup>	19.59 <sup>135</sup>	18.48 <sup>2</sup>	36.37 <sup>213</sup>	53.904 <sup>7</sup>	34.41 <sup>122</sup>	19.592 <sup>7</sup>	30.96 <sup>15</sup>
29.0	14.525 <sup>65</sup>	18.27 <sup>132</sup>	18.55 <sup>7</sup>	34.22 <sup>215</sup>	53.967 <sup>63</sup>	33.26 <sup>115</sup>	19.647 <sup>55</sup>	30.81 <sup>5</sup>
June 8.0	14.649 <sup>124</sup>	17.05 <sup>122</sup>	18.71 <sup>16</sup>	32.15 <sup>207</sup>	54.087 <sup>120</sup>	32.19 <sup>107</sup>	19.748 <sup>101</sup>	30.76 <sup>6</sup>
18.0	14.829 <sup>180</sup>	15.95 <sup>110</sup>	18.94 <sup>23</sup>	30.19 <sup>196</sup>	54.262 <sup>175</sup>	31.24 <sup>95</sup>	19.748 <sup>145</sup>	30.82 <sup>19</sup>
27.9	15.059 <sup>230</sup>	15.02 <sup>93</sup>	19.24 <sup>30</sup>	28.42 <sup>177</sup>	54.486 <sup>224</sup>	30.44 <sup>80</sup>	19.893 <sup>184</sup>	31.01 <sup>29</sup>
July 7.9	15.334 <sup>275</sup>	14.27 <sup>75</sup>	19.61 <sup>37</sup>	26.87 <sup>155</sup>	54.751 <sup>265</sup>	29.83 <sup>61</sup>	20.077 <sup>219</sup>	31.30 <sup>40</sup>
17.9	15.646 <sup>312</sup>	13.70 <sup>57</sup>	19.43 <sup>43</sup>	25.59 <sup>128</sup>	54.900 <sup>299</sup>	29.38 <sup>45</sup>	20.296 <sup>249</sup>	31.70 <sup>48</sup>
27.9	15.988 <sup>342</sup>	13.33 <sup>37</sup>	20.04 <sup>47</sup>	25.59 <sup>102</sup>	55.050 <sup>327</sup>	29.38 <sup>26</sup>	20.545 <sup>271</sup>	32.18 <sup>55</sup>
Aug. 6.8	16.352 <sup>364</sup>	13.16 <sup>17</sup>	20.51 <sup>50</sup>	24.57 <sup>71</sup>	55.377 <sup>350</sup>	29.12 <sup>8</sup>	20.816 <sup>280</sup>	32.73 <sup>59</sup>
16.8	16.733 <sup>381</sup>	13.18 <sup>2</sup>	21.01 <sup>53</sup>	23.86 <sup>40</sup>	55.727 <sup>366</sup>	29.04 <sup>10</sup>	21.105 <sup>280</sup>	33.32 <sup>59</sup>
26.8	17.122 <sup>389</sup>	13.18 <sup>20</sup>	21.54 <sup>53</sup>	23.46 <sup>9</sup>	56.093 <sup>366</sup>	29.14 <sup>10</sup>	21.407 <sup>302</sup>	33.91 <sup>59</sup>
Sept. 5.7	17.122 <sup>392</sup>	13.38 <sup>30</sup>	22.09 <sup>55</sup>	23.37 <sup>28</sup>	56.467 <sup>374</sup>	29.39 <sup>25</sup>	21.714 <sup>307</sup>	34.49 <sup>58</sup>
15.7	17.514 <sup>399</sup>	13.77 <sup>30</sup>	22.85 <sup>56</sup>	23.00 <sup>28</sup>	56.843 <sup>376</sup>	29.78 <sup>39</sup>	22.023 <sup>300</sup>	35.03 <sup>54</sup>
25.7	17.903 <sup>389</sup>	14.30 <sup>53</sup>	23.20 <sup>55</sup>	24.11 <sup>51</sup>	57.216 <sup>373</sup>	30.30 <sup>52</sup>	22.331 <sup>308</sup>	35.03 <sup>47</sup>
Oct. 5.7	18.284 <sup>381</sup>	14.98 <sup>68</sup>	23.74 <sup>54</sup>	24.93 <sup>82</sup>	57.583 <sup>367</sup>	30.93 <sup>63</sup>	22.630 <sup>299</sup>	35.50 <sup>38</sup>
15.6	18.653 <sup>399</sup>	15.77 <sup>79</sup>	24.27 <sup>53</sup>	26.02 <sup>109</sup>	57.936 <sup>363</sup>	31.68 <sup>75</sup>	22.921 <sup>291</sup>	35.88 <sup>30</sup>
25.6	19.004 <sup>351</sup>	16.69 <sup>92</sup>	24.77 <sup>50</sup>	27.37 <sup>135</sup>	58.274 <sup>388</sup>	32.51 <sup>83</sup>	22.921 <sup>278</sup>	36.18 <sup>21</sup>
Nov. 4.6	19.334 <sup>330</sup>	17.73 <sup>104</sup>	25.23 <sup>46</sup>	28.97 <sup>160</sup>	58.591 <sup>317</sup>	32.51 <sup>92</sup>	23.199 <sup>260</sup>	36.39 <sup>13</sup>
14.6	19.635 <sup>301</sup>	18.86 <sup>113</sup>	25.65 <sup>42</sup>	30.77 <sup>180</sup>	58.881 <sup>260</sup>	33.43 <sup>100</sup>	23.459 <sup>241</sup>	36.52 <sup>7</sup>
24.5	19.904 <sup>269</sup>	20.06 <sup>120</sup>	26.02 <sup>37</sup>	32.75 <sup>198</sup>	58.881 <sup>260</sup>	34.43 <sup>100</sup>	23.700 <sup>241</sup>	36.59 <sup>1</sup>
Dec. 4.5	20.132 <sup>228</sup>	21.34 <sup>128</sup>	26.33 <sup>31</sup>	34.89 <sup>214</sup>	59.139 <sup>268</sup>	35.50 <sup>107</sup>	23.914 <sup>214</sup>	36.60 <sup>2</sup>
14.5	20.319 <sup>187</sup>	22.66 <sup>132</sup>	26.57 <sup>24</sup>	37.10 <sup>221</sup>	59.360 <sup>221</sup>	36.62 <sup>112</sup>	24.100 <sup>186</sup>	36.58 <sup>4</sup>
24.4	20.446 <sup>127</sup>	24.01 <sup>135</sup>	26.73 <sup>16</sup>	39.36 <sup>236</sup>	59.537 <sup>177</sup>	37.79 <sup>117</sup>	24.250 <sup>150</sup>	36.54 <sup>4</sup>
34.4	20.521 <sup>75</sup>	25.32 <sup>131</sup>	26.80 <sup>7</sup>	41.58 <sup>222</sup>	59.665 <sup>128</sup>	38.95 <sup>116</sup>	24.361 <sup>111</sup>	36.50 <sup>4</sup>
Mean Place	18.526	22.61	17.657	37.59	52.972	37.75	18.762	36.30
Sec δ, Tan δ	1.383	+0.956	2.020	+1.755	1.324	+0.868	1.075	+0.393
D <sub>α</sub> , D <sub>ω</sub>	+0.085	-0.018	+0.106	-0.032	+0.083	-0.016	+0.071	-0.007
D <sub>β</sub> , D <sub>δ</sub>	+0.11	+0.96	+0.11	+0.96	+0.11	+0.96	+0.11	+0.96

# APPARENT PLACES OF STARS, 1920.

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## FOR THE UPPER TRANSIT AT WASHINGTON.

Washington Mean Time.	11 Orionis. Mag. 4.6		γ Aurigae. Mag. 3.3		ε Leporis. Mag. 3.3		β Eridani. Mag. 2.9	
	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.
	h m 4 50	° ' "	h m 5 0	° ' "	h m 5 2	° ' "	h m 5 3	° ' "
		+15 17		+41 7		-22 28		- 5 11
		"		"		"		"
Jan. 0.4	02.073	34.19	57.076	39.31	6.456	49.20	57.082	26.29
10.4	02.072 <sup>1</sup>	33.80 <sup>30</sup>	57.066 <sup>10</sup>	40.34 <sup>108</sup>	6.421 <sup>35</sup>	50.40 <sup>230</sup>	57.070 <sup>12</sup>	27.75 <sup>146</sup>
20.4	02.025 <sup>47</sup>	33.44 <sup>26</sup>	57.001 <sup>65</sup>	41.28 <sup>92</sup>	6.343 <sup>76</sup>	52.36 <sup>196</sup>	57.017 <sup>53</sup>	29.06 <sup>131</sup>
30.4	01.987 <sup>38</sup>	33.12 <sup>23</sup>	56.863 <sup>118</sup>	42.01 <sup>75</sup>	6.224 <sup>119</sup>	54.01 <sup>165</sup>	56.923 <sup>94</sup>	30.18 <sup>112</sup>
Feb. 9.3	01.812 <sup>126</sup>	32.82 <sup>20</sup>	56.718 <sup>165</sup>	42.56 <sup>55</sup>	6.070 <sup>154</sup>	55.32 <sup>121</sup>	56.795 <sup>123</sup>	31.10 <sup>92</sup>
19.3	01.656 <sup>144</sup>	32.54 <sup>28</sup>	56.517 <sup>201</sup>	42.87 <sup>31</sup>	5.893 <sup>182</sup>	56.23 <sup>96</sup>	56.639 <sup>156</sup>	31.81 <sup>71</sup>
29.3	01.483 <sup>173</sup>	32.27 <sup>27</sup>	56.289 <sup>228</sup>	42.93 <sup>6</sup>	5.687 <sup>201</sup>	56.36 <sup>58</sup>	56.467 <sup>172</sup>	32.27 <sup>46</sup>
Mar. 10.2	01.301 <sup>184</sup>	32.02 <sup>25</sup>	56.050 <sup>260</sup>	42.74 <sup>19</sup>	5.476 <sup>211</sup>	57.06 <sup>20</sup>	56.282 <sup>185</sup>	32.51 <sup>24</sup>
20.2	01.118 <sup>183</sup>	31.80 <sup>23</sup>	55.812 <sup>285</sup>	42.29 <sup>45</sup>	5.267 <sup>209</sup>	56.88 <sup>18</sup>	56.099 <sup>183</sup>	32.55 <sup>4</sup>
30.2	00.948 <sup>172</sup>	31.60 <sup>20</sup>	55.590 <sup>232</sup>	41.61 <sup>68</sup>	5.063 <sup>199</sup>	56.35 <sup>58</sup>	55.925 <sup>174</sup>	32.33 <sup>23</sup>
Apr. 9.2	00.795 <sup>161</sup>	31.44 <sup>16</sup>	55.395 <sup>195</sup>	40.73 <sup>88</sup>	4.890 <sup>178</sup>	55.45 <sup>90</sup>	55.769 <sup>156</sup>	31.89 <sup>44</sup>
19.1	00.676 <sup>119</sup>	31.35 <sup>9</sup>	55.239 <sup>156</sup>	39.68 <sup>105</sup>	4.741 <sup>149</sup>	54.23 <sup>122</sup>	55.643 <sup>126</sup>	31.23 <sup>66</sup>
29.1	00.593 <sup>83</sup>	31.33 <sup>2</sup>	55.190 <sup>100</sup>	38.53 <sup>115</sup>	4.627 <sup>114</sup>	52.68 <sup>155</sup>	55.550 <sup>93</sup>	30.35 <sup>88</sup>
May 9.1	00.552 <sup>41</sup>	31.40 <sup>7</sup>	55.076 <sup>54</sup>	37.32 <sup>121</sup>	4.554 <sup>73</sup>	50.87 <sup>181</sup>	55.495 <sup>55</sup>	29.27 <sup>108</sup>
19.1	00.556 <sup>4</sup>	31.59 <sup>19</sup>	55.077 <sup>1</sup>	36.11 <sup>121</sup>	4.525 <sup>29</sup>	48.81 <sup>206</sup>	55.484 <sup>11</sup>	28.01 <sup>126</sup>
29.0	00.606 <sup>50</sup>	31.90 <sup>31</sup>	55.187 <sup>60</sup>	34.94 <sup>117</sup>	4.543 <sup>18</sup>	46.56 <sup>225</sup>	55.519 <sup>35</sup>	28.58 <sup>143</sup>
June 8.0	00.700 <sup>94</sup>	32.32 <sup>42</sup>	55.253 <sup>126</sup>	33.84 <sup>110</sup>	4.604 <sup>61</sup>	44.16 <sup>260</sup>	55.593 <sup>74</sup>	25.02 <sup>156</sup>
18.0	00.833 <sup>138</sup>	32.85 <sup>48</sup>	55.423 <sup>170</sup>	32.87 <sup>97</sup>	4.710 <sup>106</sup>	41.68 <sup>245</sup>	55.711 <sup>118</sup>	23.34 <sup>168</sup>
27.9	01.015 <sup>177</sup>	33.49 <sup>64</sup>	55.641 <sup>213</sup>	32.04 <sup>83</sup>	4.857 <sup>147</sup>	39.17 <sup>251</sup>	55.862 <sup>151</sup>	21.63 <sup>171</sup>
July 7.9	01.225 <sup>210</sup>	34.22 <sup>73</sup>	55.900 <sup>259</sup>	31.38 <sup>96</sup>	5.041 <sup>184</sup>	36.72 <sup>245</sup>	56.050 <sup>188</sup>	19.90 <sup>173</sup>
17.9	01.461 <sup>236</sup>	34.99 <sup>77</sup>	56.197 <sup>297</sup>	30.90 <sup>48</sup>	5.257 <sup>216</sup>	34.33 <sup>234</sup>	56.267 <sup>217</sup>	18.21 <sup>169</sup>
27.9	01.722 <sup>261</sup>	35.79 <sup>80</sup>	56.524 <sup>337</sup>	30.60 <sup>30</sup>	5.498 <sup>241</sup>	32.24 <sup>214</sup>	56.505 <sup>233</sup>	16.61 <sup>160</sup>
Aug. 6.8	01.999 <sup>277</sup>	36.58 <sup>79</sup>	56.873 <sup>349</sup>	30.47 <sup>13</sup>	5.762 <sup>264</sup>	30.36 <sup>196</sup>	56.763 <sup>258</sup>	15.18 <sup>143</sup>
16.8	02.287 <sup>288</sup>	37.33 <sup>75</sup>	57.237 <sup>364</sup>	30.50 <sup>3</sup>	6.040 <sup>278</sup>	28.80 <sup>156</sup>	57.084 <sup>271</sup>	13.95 <sup>123</sup>
26.8	02.583 <sup>295</sup>	38.00 <sup>67</sup>	57.611 <sup>374</sup>	30.69 <sup>19</sup>	6.329 <sup>289</sup>	27.63 <sup>117</sup>	57.314 <sup>280</sup>	12.97 <sup>98</sup>
Sept. 5.8	02.880 <sup>297</sup>	38.57 <sup>57</sup>	57.968 <sup>377</sup>	31.04 <sup>25</sup>	6.621 <sup>292</sup>	26.90 <sup>73</sup>	57.596 <sup>282</sup>	12.29 <sup>68</sup>
15.7	03.176 <sup>296</sup>	39.02 <sup>45</sup>	58.363 <sup>375</sup>	31.50 <sup>46</sup>	6.912 <sup>291</sup>	26.63 <sup>27</sup>	57.877 <sup>281</sup>	12.29 <sup>37</sup>
25.7	03.466 <sup>290</sup>	39.31 <sup>29</sup>	58.731 <sup>368</sup>	32.10 <sup>60</sup>	7.197 <sup>285</sup>	26.84 <sup>21</sup>	58.152 <sup>275</sup>	11.92 <sup>2</sup>
Oct. 5.7	03.746 <sup>280</sup>	39.46 <sup>15</sup>	59.089 <sup>348</sup>	32.80 <sup>79</sup>	7.472 <sup>275</sup>	27.53 <sup>69</sup>	58.418 <sup>266</sup>	12.23 <sup>33</sup>
15.6	04.014 <sup>268</sup>	39.46 <sup>0</sup>	59.431 <sup>342</sup>	33.61 <sup>81</sup>	7.733 <sup>261</sup>	28.67 <sup>114</sup>	58.671 <sup>253</sup>	12.89 <sup>66</sup>
25.6	04.264 <sup>250</sup>	39.33 <sup>13</sup>	59.752 <sup>321</sup>	34.50 <sup>89</sup>	7.974 <sup>241</sup>	28.16 <sup>156</sup>	58.918 <sup>237</sup>	12.89 <sup>97</sup>
Nov. 4.6	04.496 <sup>223</sup>	39.07 <sup>26</sup>	60.047 <sup>295</sup>	35.46 <sup>96</sup>	8.190 <sup>216</sup>	30.23 <sup>103</sup>	58.908 <sup>218</sup>	13.86 <sup>122</sup>
14.6	04.702 <sup>206</sup>	38.74 <sup>38</sup>	60.311 <sup>264</sup>	36.51 <sup>105</sup>	8.379 <sup>189</sup>	32.16 <sup>193</sup>	59.126 <sup>218</sup>	15.08 <sup>143</sup>
24.5	04.880 <sup>178</sup>	38.35 <sup>39</sup>	60.538 <sup>227</sup>	37.63 <sup>112</sup>	8.535 <sup>166</sup>	34.37 <sup>231</sup>	59.319 <sup>193</sup>	16.51 <sup>143</sup>
Dec. 4.5	05.026 <sup>146</sup>	37.92 <sup>43</sup>	60.721 <sup>188</sup>	38.78 <sup>115</sup>	8.653 <sup>118</sup>	36.77 <sup>240</sup>	59.483 <sup>164</sup>	18.06 <sup>155</sup>
14.5	05.133 <sup>107</sup>	37.48 <sup>44</sup>	60.855 <sup>124</sup>	39.96 <sup>118</sup>	8.732 <sup>79</sup>	39.29 <sup>242</sup>	59.614 <sup>131</sup>	19.74 <sup>168</sup>
24.5	05.199 <sup>66</sup>	37.06 <sup>42</sup>	60.935 <sup>80</sup>	41.11 <sup>115</sup>	8.767 <sup>35</sup>	39.29 <sup>253</sup>	59.614 <sup>95</sup>	19.74 <sup>166</sup>
34.4	05.222 <sup>28</sup>	36.67 <sup>39</sup>	60.960 <sup>26</sup>	42.22 <sup>111</sup>	8.757 <sup>10</sup>	41.82 <sup>247</sup>	59.762 <sup>53</sup>	23.02 <sup>162</sup>
Mean Place	59.784	37.78	54.140	39.46	4.427	39.37	54.995	19.66
Sec δ, Tan δ	1.087	+0.273	1.323	+0.873	1.062	-0.414	1.004	-0.691
D <sub>12</sub> ; D <sub>22</sub>	+0.068	-0.005	+0.063	-0.015	+0.051	+0.007	+0.059	+0.001
D <sub>13</sub> ; D <sub>23</sub>	+0.19	+0.97	+0.10	+0.97	+0.10	+0.97	+0.10	+0.97

FOR THE UPPER TRANSIT AT WASHINGTON.

Washington Mean Time.	$\mu$ Aurigæ. Mag. 4.8		19 H. Camelopard. Mag. 5.2		$\mu$ Leporis. Mag. 3.3		$\beta$ Orionis. (Rigel.) Mag. 0.3	
	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.
	h m 5 7	° +88 23	h m 5 9	° +79 8	h m 5 9	° -16 17	h m 5 10	° - 8 17
Jan. 0.4	59.898 <sup>1</sup>	26.77	80.70	85.25	22.299	65.47	48.625	42.16
10.4	59.896 <sup>54</sup>	27.67	80.47	85.05 <sup>280</sup>	22.290 <sup>19</sup>	67.46 <sup>199</sup>	48.615 <sup>10</sup>	43.80 <sup>164</sup>
20.4	59.842 <sup>54</sup>	28.49	80.01	84.59 <sup>264</sup>	22.217 <sup>63</sup>	69.24 <sup>173</sup>	48.564 <sup>51</sup>	45.27 <sup>147</sup>
30.4	59.735 <sup>107</sup>	29.16	29.37	84.27 <sup>219</sup>	22.114 <sup>108</sup>	70.75 <sup>151</sup>	48.471 <sup>93</sup>	46.52 <sup>125</sup>
Feb. 9.3	59.583 <sup>152</sup>	29.66	28.54	84.53 <sup>178</sup>	21.976 <sup>188</sup>	71.96 <sup>121</sup>	48.344 <sup>127</sup>	47.53 <sup>101</sup>
19.3	59.395 <sup>188</sup>	29.96	27.59	84.57 <sup>124</sup>	21.809 <sup>167</sup>	72.88 <sup>92</sup>	48.190 <sup>154</sup>	48.31 <sup>78</sup>
29.3	59.179 <sup>216</sup>	30.04	26.56	84.46 <sup>99</sup>	21.622 <sup>187</sup>	73.46 <sup>58</sup>	48.014 <sup>176</sup>	48.83 <sup>52</sup>
Mar. 10.2	58.950 <sup>229</sup>	29.89	25.48	84.67 <sup>11</sup>	21.424 <sup>198</sup>	73.71 <sup>25</sup>	42.926 <sup>188</sup>	49.09 <sup>26</sup>
20.2	58.721 <sup>229</sup>	29.52	24.40	84.09 <sup>108</sup>	21.226 <sup>48</sup>	73.65 <sup>6</sup>	42.639 <sup>187</sup>	49.09 <sup>0</sup>
30.2	58.506 <sup>215</sup>	28.94	23.38	84.07 <sup>102</sup>	21.036 <sup>190</sup>	73.26 <sup>39</sup>	42.460 <sup>179</sup>	48.86 <sup>23</sup>
Apr. 9.2	58.315 <sup>191</sup>	28.16	22.46	83.55 <sup>153</sup>	20.866 <sup>170</sup>	72.56 <sup>70</sup>	42.299 <sup>161</sup>	48.36 <sup>50</sup>
19.1	58.160 <sup>155</sup>	27.26	21.68	83.85 <sup>195</sup>	20.723 <sup>143</sup>	71.56 <sup>100</sup>	42.166 <sup>133</sup>	47.62 <sup>74</sup>
29.1	58.050 <sup>110</sup>	26.25	21.06	83.29 <sup>231</sup>	20.614 <sup>109</sup>	70.29 <sup>127</sup>	42.068 <sup>98</sup>	46.63 <sup>99</sup>
May 9.1	57.990 <sup>60</sup>	25.19	20.64	83.70 <sup>259</sup>	20.545 <sup>69</sup>	68.75 <sup>154</sup>	42.005 <sup>63</sup>	45.45 <sup>118</sup>
19.1	57.985 <sup>5</sup>	24.12	20.42	83.93 <sup>277</sup>	20.518 <sup>27</sup>	67.00 <sup>175</sup>	41.987 <sup>18</sup>	44.05 <sup>140</sup>
29.0	58.036 <sup>51</sup>	23.10	20.42	83.08 <sup>285</sup>	20.536 <sup>18</sup>	65.05 <sup>165</sup>	42.010 <sup>23</sup>	42.48 <sup>157</sup>
June 8.0	58.141 <sup>106</sup>	22.14	20.62	83.23 <sup>265</sup>	20.597 <sup>51</sup>	62.94 <sup>211</sup>	42.077 <sup>67</sup>	40.76 <sup>172</sup>
18.0	58.297 <sup>156</sup>	21.30	21.04	82.97 <sup>276</sup>	20.701 <sup>104</sup>	60.75 <sup>219</sup>	42.185 <sup>103</sup>	38.94 <sup>182</sup>
27.9	58.501 <sup>204</sup>	20.60	21.64	82.87 <sup>269</sup>	20.845 <sup>144</sup>	58.51 <sup>224</sup>	42.329 <sup>144</sup>	37.10 <sup>184</sup>
July 7.9	58.746 <sup>245</sup>	20.03	22.42	82.49 <sup>238</sup>	21.024 <sup>179</sup>	56.30 <sup>231</sup>	42.511 <sup>182</sup>	35.23 <sup>187</sup>
17.9	59.027 <sup>281</sup>	19.62	23.36	82.00 <sup>208</sup>	21.232 <sup>208</sup>	54.18 <sup>213</sup>	42.720 <sup>209</sup>	33.42 <sup>181</sup>
27.9	59.337 <sup>310</sup>	19.38	24.44	81.76 <sup>176</sup>	21.466 <sup>264</sup>	52.21 <sup>197</sup>	42.953 <sup>283</sup>	31.72 <sup>170</sup>
Aug. 6.8	59.669 <sup>332</sup>	19.27	25.62	81.52 <sup>140</sup>	21.722 <sup>256</sup>	50.46 <sup>177</sup>	43.206 <sup>253</sup>	30.20 <sup>152</sup>
16.8	60.017 <sup>348</sup>	19.32	26.90	81.23 <sup>101</sup>	21.992 <sup>270</sup>	48.99 <sup>145</sup>	43.475 <sup>269</sup>	28.90 <sup>130</sup>
26.8	60.375 <sup>356</sup>	19.50	28.23	80.58 <sup>58</sup>	22.272 <sup>280</sup>	47.86 <sup>113</sup>	43.751 <sup>276</sup>	27.89 <sup>101</sup>
Sept. 5.8	60.738 <sup>363</sup>	19.79	28.23	80.16 <sup>16</sup>	22.557 <sup>285</sup>	47.86 <sup>74</sup>	43.751 <sup>282</sup>	27.89 <sup>70</sup>
15.7	61.101 <sup>363</sup>	20.18	29.62	79.49 <sup>137</sup>	22.842 <sup>285</sup>	46.80 <sup>82</sup>	44.083 <sup>280</sup>	27.19 <sup>36</sup>
25.7	61.458 <sup>387</sup>	20.67	30.99	78.76 <sup>27</sup>	23.122 <sup>280</sup>	46.80 <sup>11</sup>	44.313 <sup>278</sup>	26.83 <sup>1</sup>
Oct. 5.7	61.805 <sup>347</sup>	21.24	32.36	78.45 <sup>99</sup>	23.394 <sup>272</sup>	46.91 <sup>55</sup>	44.591 <sup>269</sup>	26.84 <sup>39</sup>
15.6	62.139 <sup>384</sup>	21.89	33.70	77.15 <sup>111</sup>	23.653 <sup>259</sup>	47.46 <sup>96</sup>	44.860 <sup>257</sup>	27.23 <sup>75</sup>
25.6	62.455 <sup>316</sup>	22.62	34.97	76.17 <sup>188</sup>	23.896 <sup>243</sup>	48.42 <sup>135</sup>	45.117 <sup>242</sup>	27.98 <sup>107</sup>
Nov. 4.6	62.746 <sup>291</sup>	23.41	36.15	75.18 <sup>223</sup>	23.896 <sup>219</sup>	49.77 <sup>169</sup>	45.359 <sup>224</sup>	29.05 <sup>186</sup>
14.6	63.008 <sup>262</sup>	24.26	37.21	74.18 <sup>223</sup>	24.115 <sup>195</sup>	51.46 <sup>194</sup>	45.583 <sup>199</sup>	30.41 <sup>158</sup>
24.5	63.235 <sup>227</sup>	25.18	38.13	73.07 <sup>223</sup>	24.310 <sup>165</sup>	53.40 <sup>214</sup>	45.782 <sup>170</sup>	31.99 <sup>174</sup>
Dec. 4.5	63.422 <sup>187</sup>	26.13	38.88	72.47 <sup>277</sup>	24.475 <sup>165</sup>	55.54 <sup>214</sup>	45.952 <sup>185</sup>	33.73 <sup>184</sup>
14.5	63.422 <sup>138</sup>	26.13	39.44	71.86 <sup>263</sup>	24.604 <sup>139</sup>	57.78 <sup>224</sup>	46.087 <sup>185</sup>	35.57 <sup>184</sup>
24.5	63.560 <sup>87</sup>	27.12	39.44	71.34 <sup>204</sup>	24.696 <sup>92</sup>	60.04 <sup>226</sup>	46.186 <sup>99</sup>	37.42 <sup>185</sup>
34.4	63.647 <sup>33</sup>	28.11	39.78	70.82 <sup>208</sup>	24.746 <sup>80</sup>	62.26 <sup>222</sup>	46.243 <sup>57</sup>	39.23 <sup>181</sup>
Mean Place	57.048	27.83	20.713	82.94	20.243	57.35	41.539	34.99
Sec $\delta$ , Tan $\delta$	1.276	+0.792	5.308	+5.213	1.042	-0.292	1.011	-0.146
$D\mu\alpha$ , $D\mu\delta$	+0.062	-0.012	+0.196	-0.077	+0.054	+0.004	+0.057	+0.002
$D\mu\delta$ , $D\mu\delta$	+0.09	+0.97	+0.09	+0.98	+0.09	+0.98	+0.08	+0.98

FOR THE UPPER TRANSIT AT WASHINGTON.

Washington Mean Time.	α Auriga. (Capella.) Mag. 0.2		λ Auriga. Mag. 4.8		γ Orionis. Mag. 3.7		ο Columbae. Mag. 4.9	
	Right Ascension.	Declination.	Right Ascension.	Declination.	Right Ascension.	Declination.	Right Ascension.	Declination.
	h m 5 10	° ' " +45 54	h m 5 13	° ' " +40 1	h m 5 13	° ' " - 6 55	h m 5 14	° ' " -34 58
Jan. 0.4	49.760	64.79	33.590	44.44	45.285	54.47	37.883	32.57
10.4	49.757	66.07	33.597	45.43	45.284	56.05	37.852	35.26
20.4	49.691	67.25	33.543	46.32	45.387	57.47	37.733	37.67
30.4	49.567	68.25	33.445	47.07	45.249	58.67	37.588	39.71
Feb. 9.3	49.332	69.02	33.294	47.66	45.125	59.87	37.405	41.35
19.3	49.176	69.52	33.104	48.03	44.971	60.42	37.190	42.55
29.3	48.982	69.75	32.886	48.16	44.797	60.95	36.953	43.30
Mar. 10.3	48.672	69.64	32.653	48.06	44.612	61.27	36.703	43.59
20.2	48.411	69.24	32.418	47.30	44.424	61.25	36.452	43.42
30.2	48.165	68.55	32.195	47.12	44.245	61.04	36.212	42.81
Apr. 9.2	47.946	67.61	31.996	46.33	44.085	60.59	35.992	41.77
19.1	47.765	66.47	31.836	45.39	43.950	59.91	35.800	40.33
29.1	47.635	65.19	31.718	44.33	43.849	59.00	35.646	38.53
May 9.1	47.559	63.78	31.652	43.19	43.787	57.87	35.534	36.39
19.1	47.544	62.33	31.641	42.03	43.766	56.56	35.469	33.97
29.0	47.591	60.89	31.687	40.90	43.788	55.06	35.453	31.32
June 8.0	47.639	59.51	31.788	39.83	43.854	53.44	35.457	28.52
18.0	47.803	58.21	31.942	38.85	43.961	51.72	35.570	25.62
28.0	48.087	57.06	32.146	38.00	44.104	49.93	35.699	22.71
July 7.9	48.354	56.08	32.393	37.31	44.284	48.13	35.870	19.86
17.9	48.602	55.28	32.674	36.76	44.493	46.38	36.080	17.14
27.9	48.903	54.66	32.987	36.37	44.725	44.74	36.323	14.67
Aug. 6.8	49.269	54.25	33.324	36.15	44.978	43.25	36.593	12.51
16.8	49.754	54.02	33.679	36.08	45.244	41.98	36.885	10.73
26.8	50.163	54.00	34.044	36.15	45.519	40.97	37.192	9.40
Sept. 5.8	50.558	54.19	34.415	36.35	45.800	40.28	37.506	8.58
15.7	50.982	54.53	34.786	36.67	46.080	39.98	37.824	8.30
25.7	51.363	55.05	35.154	37.10	46.358	39.98	38.138	8.58
Oct. 5.7	51.753	55.71	35.513	37.62	46.628	40.29	38.441	9.43
15.6	52.123	56.52	35.857	38.24	46.885	41.01	38.729	10.81
25.6	52.484	57.48	36.185	38.96	47.129	42.08	38.996	12.68
Nov. 4.6	52.818	58.57	36.488	39.76	47.354	43.34	39.235	14.99
14.6	53.108	59.77	36.763	40.63	47.554	44.88	39.442	17.64
24.5	53.362	61.08	37.002	41.58	47.726	46.56	39.610	20.53
Dec. 4.5	53.570	62.46	37.199	42.59	47.866	48.32	39.737	23.57
14.5	53.723	63.87	37.349	43.64	47.969	50.12	39.816	26.63
24.5	53.818	65.29	37.445	44.71	48.062	51.87	39.846	29.62
34.4	53.853	66.66	37.484	45.75	48.052	53.51	39.826	32.45
Mean Place	48.594	65.23	30.675	45.78	48.289	47.41	35.769	22.56
Sec δ, Tan δ	1.487	+1.083	1.806	+0.840	1.007	-0.122	1.220	-0.700
D <sub>α</sub> , D <sub>αα</sub>	+0.088	-0.015	+0.083	-0.011	+0.058	+0.062	+0.043	+0.009
D <sub>δ</sub> , D <sub>δδ</sub>	+0.08	+0.98	+0.06	+0.98	+0.08	+0.98	+0.08	+0.98

FOR THE UPPER TRANSIT AT WASHINGTON.

Washington Mean Time.	$\gamma$ Orionis. (Bellatrix.) Mag. 1.7		$\beta$ Tauri. Mag. 1.8		17 Camelop. Mag. 5.8		$\beta$ Leporis. Mag. 3.0	
	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.
	h m 5 20	° ' " + 6 16	h m 5 21	° ' " + 28 32	h m 5 22	° ' " + 63 59	h m 5 24	° ' " - 20 49
Jan. 0.4	52.578	36.06	16.500	24.96	41.90	67.89	51.143	28.87
10.4	52.590 <sup>12</sup>	35.13 <sup>03</sup>	16.606 <sup>16</sup>	25.31 <sup>35</sup>	41.18 <sup>2</sup>	70.00 <sup>220</sup>	51.190 <sup>13</sup>	31.13 <sup>226</sup>
20.4	52.557 <sup>33</sup>	34.31 <sup>32</sup>	16.574 <sup>32</sup>	25.63 <sup>32</sup>	41.07 <sup>11</sup>	72.11 <sup>208</sup>	51.073 <sup>57</sup>	33.15 <sup>202</sup>
30.4	52.483 <sup>74</sup>	33.60 <sup>71</sup>	16.492 <sup>83</sup>	25.90 <sup>37</sup>	40.87 <sup>30</sup>	73.88 <sup>177</sup>	50.972 <sup>107</sup>	34.89 <sup>174</sup>
Feb. 9.3	52.370 <sup>118</sup>	33.00 <sup>60</sup>	16.370 <sup>122</sup>	26.10 <sup>122</sup>	40.59 <sup>28</sup>	75.32 <sup>144</sup>	50.835 <sup>131</sup>	36.39 <sup>144</sup>
19.3	52.228 <sup>142</sup>	32.52 <sup>48</sup>	16.299 <sup>161</sup>	26.23 <sup>18</sup>	40.24 <sup>35</sup>	76.37 <sup>105</sup>	50.685 <sup>170</sup>	37.41 <sup>108</sup>
29.3	52.060 <sup>186</sup>	32.17 <sup>35</sup>	16.023 <sup>186</sup>	26.24 <sup>1</sup>	39.85 <sup>39</sup>	76.99 <sup>63</sup>	50.478 <sup>192</sup>	38.14 <sup>73</sup>
Mar. 10.3	51.881 <sup>178</sup>	31.93 <sup>24</sup>	15.824 <sup>199</sup>	26.11 <sup>13</sup>	39.43 <sup>42</sup>	77.15 <sup>16</sup>	50.267 <sup>206</sup>	38.50 <sup>36</sup>
20.2	51.698 <sup>183</sup>	31.80 <sup>13</sup>	15.620 <sup>204</sup>	25.89 <sup>23</sup>	39.01 <sup>43</sup>	76.86 <sup>29</sup>	50.058 <sup>209</sup>	38.51 <sup>1</sup>
30.2	51.522 <sup>176</sup>	31.78 <sup>2</sup>	15.426 <sup>194</sup>	25.54 <sup>35</sup>	38.80 <sup>41</sup>	76.12 <sup>74</sup>	49.866 <sup>202</sup>	38.15 <sup>36</sup>
Apr. 9.2	51.365 <sup>187</sup>	31.89 <sup>11</sup>	15.251 <sup>175</sup>	25.08 <sup>46</sup>	38.23 <sup>37</sup>	74.97 <sup>115</sup>	49.670 <sup>186</sup>	37.44 <sup>71</sup>
19.1	51.234 <sup>131</sup>	32.13 <sup>24</sup>	15.105 <sup>146</sup>	24.56 <sup>52</sup>	37.92 <sup>31</sup>	73.46 <sup>151</sup>	49.511 <sup>159</sup>	36.41 <sup>103</sup>
29.1	51.135 <sup>99</sup>	32.50 <sup>37</sup>	14.999 <sup>106</sup>	24.00 <sup>56</sup>	37.68 <sup>24</sup>	71.67 <sup>179</sup>	49.384 <sup>127</sup>	35.07 <sup>134</sup>
May 9.1	51.076 <sup>59</sup>	33.00 <sup>50</sup>	14.934 <sup>65</sup>	23.45 <sup>55</sup>	37.51 <sup>17</sup>	69.65 <sup>202</sup>	49.296 <sup>88</sup>	33.44 <sup>163</sup>
19.1	51.057 <sup>19</sup>	33.66 <sup>66</sup>	14.921 <sup>13</sup>	22.92 <sup>53</sup>	37.44 <sup>7</sup>	67.48 <sup>217</sup>	49.248 <sup>43</sup>	31.58 <sup>186</sup>
29.0	51.083 <sup>26</sup>	34.42 <sup>76</sup>	14.954 <sup>33</sup>	22.44 <sup>48</sup>	37.46 <sup>2</sup>	65.24 <sup>224</sup>	49.246 <sup>2</sup>	29.49 <sup>209</sup>
June 8.0	51.152 <sup>69</sup>	35.32 <sup>60</sup>	15.037 <sup>88</sup>	22.93 <sup>41</sup>	37.56 <sup>10</sup>	62.99 <sup>225</sup>	49.288 <sup>42</sup>	27.25 <sup>224</sup>
18.0	51.263 <sup>111</sup>	36.31 <sup>99</sup>	15.167 <sup>130</sup>	21.73 <sup>30</sup>	37.76 <sup>20</sup>	60.82 <sup>219</sup>	49.378 <sup>85</sup>	24.89 <sup>236</sup>
28.0	51.410 <sup>147</sup>	37.40 <sup>109</sup>	15.338 <sup>171</sup>	21.52 <sup>31</sup>	38.03 <sup>27</sup>	58.78 <sup>204</sup>	49.499 <sup>126</sup>	22.51 <sup>238</sup>
July 7.9	51.563 <sup>183</sup>	38.51 <sup>111</sup>	15.549 <sup>211</sup>	21.41 <sup>11</sup>	38.38 <sup>25</sup>	56.90 <sup>138</sup>	49.682 <sup>163</sup>	20.12 <sup>239</sup>
17.9	51.805 <sup>212</sup>	39.63 <sup>112</sup>	15.793 <sup>244</sup>	21.40 <sup>1</sup>	38.80 <sup>42</sup>	55.26 <sup>164</sup>	49.859 <sup>197</sup>	17.83 <sup>229</sup>
27.9	52.042 <sup>237</sup>	40.72 <sup>109</sup>	15.064 <sup>271</sup>	21.47 <sup>7</sup>	39.28 <sup>48</sup>	55.26 <sup>141</sup>	49.859 <sup>224</sup>	17.83 <sup>212</sup>
Aug. 6.8	52.298 <sup>266</sup>	41.74 <sup>102</sup>	16.354 <sup>290</sup>	21.64 <sup>17</sup>	39.28 <sup>52</sup>	53.85 <sup>111</sup>	50.088 <sup>248</sup>	15.71 <sup>190</sup>
16.8	52.567 <sup>299</sup>	42.64 <sup>99</sup>	16.664 <sup>310</sup>	21.84 <sup>29</sup>	39.80 <sup>55</sup>	52.74 <sup>81</sup>	50.331 <sup>266</sup>	13.81 <sup>150</sup>
26.8	52.846 <sup>379</sup>	43.40 <sup>78</sup>	16.961 <sup>317</sup>	22.10 <sup>36</sup>	40.35 <sup>58</sup>	51.93 <sup>52</sup>	50.597 <sup>278</sup>	12.22 <sup>128</sup>
Sept. 5.8	53.130 <sup>284</sup>	43.96 <sup>56</sup>	17.306 <sup>235</sup>	22.38 <sup>28</sup>	40.93 <sup>60</sup>	51.41 <sup>18</sup>	50.875 <sup>287</sup>	10.99 <sup>81</sup>
15.7	53.416 <sup>296</sup>	44.31 <sup>34</sup>	17.632 <sup>326</sup>	22.67 <sup>29</sup>	41.53 <sup>60</sup>	51.23 <sup>13</sup>	51.182 <sup>289</sup>	10.18 <sup>37</sup>
25.7	53.699 <sup>283</sup>	44.42 <sup>11</sup>	17.967 <sup>326</sup>	22.96 <sup>29</sup>	42.13 <sup>60</sup>	51.36 <sup>44</sup>	51.451 <sup>288</sup>	9.81 <sup>11</sup>
Oct. 5.7	53.977 <sup>278</sup>	44.30 <sup>12</sup>	18.274 <sup>317</sup>	23.23 <sup>27</sup>	42.73 <sup>60</sup>	51.80 <sup>75</sup>	51.739 <sup>281</sup>	9.92 <sup>58</sup>
15.7	54.244 <sup>267</sup>	43.94 <sup>26</sup>	18.580 <sup>306</sup>	23.49 <sup>26</sup>	43.32 <sup>56</sup>	52.56 <sup>105</sup>	52.020 <sup>270</sup>	10.50 <sup>104</sup>
25.6	54.499 <sup>256</sup>	43.57 <sup>57</sup>	18.873 <sup>293</sup>	23.49 <sup>24</sup>	43.88 <sup>54</sup>	53.61 <sup>184</sup>	52.290 <sup>264</sup>	11.54 <sup>146</sup>
Nov. 4.6	54.736 <sup>237</sup>	43.37 <sup>76</sup>	18.873 <sup>274</sup>	23.73 <sup>23</sup>	44.42 <sup>50</sup>	54.95 <sup>160</sup>	52.544 <sup>226</sup>	13.00 <sup>182</sup>
14.6	54.962 <sup>216</sup>	42.61 <sup>89</sup>	19.147 <sup>249</sup>	23.96 <sup>28</sup>	44.92 <sup>43</sup>	56.55 <sup>184</sup>	52.780 <sup>207</sup>	14.82 <sup>214</sup>
24.5	55.140 <sup>188</sup>	41.72 <sup>99</sup>	19.396 <sup>220</sup>	24.22 <sup>28</sup>	45.35 <sup>38</sup>	58.39 <sup>205</sup>	52.987 <sup>178</sup>	16.96 <sup>235</sup>
Dec. 4.5	55.298 <sup>130</sup>	40.73 <sup>105</sup>	19.616 <sup>181</sup>	24.50 <sup>28</sup>	45.73 <sup>31</sup>	60.44 <sup>220</sup>	53.165 <sup>144</sup>	19.31 <sup>248</sup>
14.5	55.498 <sup>120</sup>	39.68 <sup>106</sup>	19.797 <sup>142</sup>	24.79 <sup>39</sup>	46.04 <sup>21</sup>	62.64 <sup>201</sup>	53.309 <sup>103</sup>	21.79 <sup>262</sup>
24.5	55.534 <sup>80</sup>	38.63 <sup>102</sup>	19.939 <sup>97</sup>	25.12 <sup>36</sup>	46.26 <sup>14</sup>	64.95 <sup>233</sup>	53.412 <sup>60</sup>	24.31 <sup>249</sup>
34.4	55.584 <sup>36</sup>	37.61 <sup>102</sup>	20.036 <sup>48</sup>	25.48 <sup>37</sup>	46.40 <sup>4</sup>	67.28 <sup>230</sup>	53.472 <sup>15</sup>	26.80 <sup>235</sup>
34.4	55.584 <sup>36</sup>	36.66 <sup>96</sup>	20.084 <sup>48</sup>	25.85 <sup>37</sup>	46.44 <sup>4</sup>	69.57 <sup>230</sup>	53.487 <sup>15</sup>	29.15 <sup>235</sup>
Mean Place	50.362	41.76	14.010	23.14	38.625	67.99	49.051	20.24
Sec $\delta$ , Tan $\delta$	1.006	+0.110	1.138	+0.544	2.203	+1.963	1.070	-0.390
$D_{\alpha}$ , $D_{\omega}$	+0.064	-0.001	+0.075	-0.006	+0.113	-0.021	+0.051	+0.004
$D_{\beta}$ , $D_{\omega}$	+0.07	+0.99	+0.07	+0.99	+0.06	+0.99	+0.06	+0.99



# APPARENT PLACES OF STARS, 1920.

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## FOR THE UPPER TRANSIT AT WASHINGTON.

Washington Mean Time.	$\chi$ Auriga. Mag. 4.9		$\delta$ Orionis. Mag. 2.5		Greenbridge 888. Mag. 6.4		$\alpha$ Leporis. Mag. 2.7	
	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.
	h m 5 27	° ' " +32 7	h m 5 27	° ' " - 0 21	h m 5 29	° ' " +74 59	h m 5 29	° ' " -17 52
Jan. 0.5	33.863	59.55	57.299	32.94	8.61	36.56	14.197	51.55
10.4	33.886	60.12	57.311	32.94	8.53	39.28	14.192	53.71
20.4	33.857	60.66	57.282	35.41	8.29	41.80	14.144	55.64
30.4	33.776	61.14	57.206	38.41	7.91	44.03	14.062	57.33
Feb. 9.3	33.681	61.50	57.095	37.24	7.37	45.87	13.920	58.71
19.3	33.489	61.76	56.954	37.89	6.73	47.26	13.758	59.76
29.3	33.297	61.89	56.796	38.36	6.01	48.14	13.570	60.49
Mar. 10.3	33.088	61.82	56.607	38.63	5.25	48.48	13.371	60.88
20.2	32.877	61.62	56.423	38.75	4.47	48.27	13.163	60.92
30.2	32.672	61.26	56.246	38.68	3.72	47.53	12.971	60.61
Apr. 9.2	32.488	60.76	56.083	38.42	3.03	46.29	12.790	59.99
19.2	32.332	60.19	55.947	37.98	2.43	44.60	12.635	59.06
29.1	32.217	59.51	55.841	37.35	1.96	42.53	12.510	57.82
May 9.1	32.146	58.80	55.773	36.56	1.60	40.18	12.423	56.32
19.1	32.124	58.09	55.747	35.61	1.39	37.61	12.377	54.57
29.0	32.153	57.41	55.763	34.50	1.35	34.93	12.373	52.63
June 8.0	32.229	56.79	55.818	33.26	1.45	32.20	12.413	50.52
18.0	32.357	56.26	55.918	31.90	1.70	29.51	12.497	48.30
28.0	32.527	55.80	56.063	30.49	2.11	26.94	12.621	46.04
July 7.9	32.737	55.47	56.224	29.04	2.64	24.54	12.781	43.77
17.9	32.984	55.22	56.426	27.62	3.29	22.39	12.974	41.61
27.9	33.258	55.12	56.651	26.27	4.06	20.51	13.193	39.58
Aug. 6.9	33.556	55.09	56.898	25.03	4.90	18.96	13.437	37.77
16.8	33.871	55.13	57.162	23.95	5.81	17.76	13.700	36.22
26.8	34.198	55.28	57.434	23.07	6.78	16.94	13.975	35.03
Sept. 5.8	34.535	55.44	57.715	22.45	7.79	16.50	14.258	34.23
15.7	34.872	55.65	57.997	22.10	8.81	16.47	14.544	33.85
25.7	35.210	55.91	58.276	22.06	9.83	16.84	14.830	33.92
Oct. 5.7	35.539	56.17	58.552	22.32	10.84	17.61	15.110	34.43
15.7	35.861	56.48	58.818	22.88	11.81	18.77	15.379	35.37
25.6	36.168	56.80	59.071	23.70	12.72	20.30	15.635	36.74
Nov. 4.6	36.454	57.17	59.309	24.74	13.55	22.17	15.872	38.47
14.6	36.718	57.56	59.525	25.99	14.30	24.36	16.085	40.48
24.6	36.951	58.02	59.715	27.35	14.94	26.81	16.267	42.70
Dec. 4.5	37.146	58.52	59.872	28.80	15.44	29.49	16.415	45.06
14.5	37.300	59.06	59.994	30.26	15.79	32.29	16.525	47.46
24.5	37.408	59.64	60.075	31.68	15.98	35.14	16.593	49.83
34.4	37.462	60.21	60.114	33.03	16.01	37.96	16.617	52.06
Mean Place	31.183	62.80	55.190	26.29	1.098	36.64	12.094	43.18
Sec $\delta$ , Tan $\delta$	1.181	+0.628	1.000	-0.006	3.862	+3.730	1.061	-0.323
$D_{\alpha}$ , $D_{\delta}$	+0.078	-0.006	+0.061	0.000	+0.159	-0.034	+0.053	+0.003
$D_{\delta}$ , $D_{\alpha}$	+0.06	+0.99	+0.06	+0.99	+0.05	+0.99	+0.05	+0.99

APPARENT PLACES OF STARS, 1920.

FOR THE UPPER TRANSIT AT WASHINGTON.

Washington Mean Time.	♄ <sup>1</sup> Orionis. Mag. 4.5		♄ Orionis. Mag. 2.9		ε Orionis. Mag. 1.8		ζ Tauri. Mag. 3.0	
	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.
	h m 5 30	° ' " + 9 26	h m 5 31	° ' " - 5 57	h m 5 32	° ' " - 1 15	h m 5 32	° ' " +21 5
Jan. 0.5	27.921 <sup>22</sup>	5.29	33.303	48.49	11.377 <sup>15</sup>	13.74	54.213 <sup>30</sup>	36.72
10.4	27.943 <sup>23</sup>	4.53 <sup>76</sup>	33.314 <sup>11</sup>	50.10 <sup>161</sup>	11.392 <sup>15</sup>	15.11 <sup>137</sup>	54.243 <sup>30</sup>	36.63 <sup>9</sup>
20.4	27.920 <sup>23</sup>	3.87 <sup>66</sup>	33.282 <sup>32</sup>	51.54 <sup>144</sup>	11.364 <sup>26</sup>	16.93 <sup>132</sup>	54.224 <sup>19</sup>	36.57 <sup>6</sup>
30.4	27.853 <sup>67</sup>	3.29 <sup>58</sup>	33.206 <sup>76</sup>	52.77 <sup>123</sup>	11.291 <sup>73</sup>	17.88 <sup>106</sup>	54.157 <sup>67</sup>	36.54 <sup>3</sup>
Feb. 9.3	27.747 <sup>106</sup>	2.81 <sup>48</sup>	33.093 <sup>113</sup>	53.80 <sup>103</sup>	11.181 <sup>110</sup>	18.25 <sup>87</sup>	54.047 <sup>110</sup>	36.51 <sup>3</sup>
19.3	27.608 <sup>130</sup>	2.43 <sup>38</sup>	32.947 <sup>146</sup>	54.60 <sup>80</sup>	11.041 <sup>140</sup>	18.92 <sup>87</sup>	53.903 <sup>144</sup>	36.46 <sup>5</sup>
29.3	27.443 <sup>166</sup>	2.12 <sup>31</sup>	32.778 <sup>169</sup>	55.16 <sup>56</sup>	10.974 <sup>167</sup>	19.43 <sup>61</sup>	53.732 <sup>171</sup>	36.38 <sup>8</sup>
Mar. 10.3	27.264 <sup>179</sup>	1.91 <sup>21</sup>	32.594 <sup>184</sup>	55.49 <sup>33</sup>	10.695 <sup>179</sup>	19.72 <sup>29</sup>	53.544 <sup>188</sup>	36.27 <sup>11</sup>
20.2	27.080 <sup>184</sup>	1.77 <sup>14</sup>	32.406 <sup>188</sup>	55.59 <sup>10</sup>	10.511 <sup>184</sup>	19.83 <sup>11</sup>	53.352 <sup>192</sup>	36.11 <sup>16</sup>
30.2	26.901 <sup>179</sup>	1.72 <sup>5</sup>	32.224 <sup>182</sup>	55.45 <sup>14</sup>	10.332 <sup>179</sup>	19.75 <sup>8</sup>	53.166 <sup>196</sup>	35.93 <sup>18</sup>
Apr. 9.2	26.740 <sup>161</sup>	1.75 <sup>3</sup>	32.059 <sup>165</sup>	55.08 <sup>37</sup>	10.167 <sup>165</sup>	19.48 <sup>37</sup>	52.995 <sup>171</sup>	35.70 <sup>23</sup>
19.2	26.603 <sup>137</sup>	1.88 <sup>13</sup>	31.916 <sup>143</sup>	54.48 <sup>60</sup>	10.029 <sup>138</sup>	19.02 <sup>46</sup>	52.852 <sup>143</sup>	35.47 <sup>23</sup>
29.1	26.499 <sup>104</sup>	2.13 <sup>25</sup>	31.805 <sup>111</sup>	53.66 <sup>82</sup>	9.923 <sup>106</sup>	18.37 <sup>65</sup>	52.745 <sup>107</sup>	35.26 <sup>21</sup>
May 9.1	26.434 <sup>66</sup>	2.47 <sup>34</sup>	31.731 <sup>74</sup>	52.64 <sup>102</sup>	9.850 <sup>73</sup>	17.56 <sup>81</sup>	52.676 <sup>69</sup>	35.06 <sup>20</sup>
19.1	26.409 <sup>25</sup>	2.93 <sup>46</sup>	31.696 <sup>35</sup>	51.42 <sup>122</sup>	9.819 <sup>31</sup>	16.56 <sup>100</sup>	52.651 <sup>25</sup>	34.93 <sup>13</sup>
29.0	26.429 <sup>20</sup>	3.51 <sup>58</sup>	31.704 <sup>8</sup>	50.04 <sup>138</sup>	9.830 <sup>11</sup>	15.41 <sup>115</sup>	52.673 <sup>22</sup>	34.86 <sup>7</sup>
June 8.0	26.491 <sup>63</sup>	4.20 <sup>69</sup>	31.754 <sup>50</sup>	48.50 <sup>154</sup>	9.882 <sup>52</sup>	14.12 <sup>139</sup>	52.740 <sup>67</sup>	34.87 <sup>1</sup>
18.0	26.595 <sup>104</sup>	4.99 <sup>79</sup>	31.843 <sup>89</sup>	46.88 <sup>162</sup>	9.977 <sup>96</sup>	12.74 <sup>128</sup>	52.851 <sup>111</sup>	34.97 <sup>10</sup>
28.0	26.737 <sup>142</sup>	5.85 <sup>86</sup>	31.973 <sup>130</sup>	45.18 <sup>170</sup>	10.107 <sup>130</sup>	11.29 <sup>145</sup>	53.062 <sup>151</sup>	35.16 <sup>19</sup>
July 7.9	26.915 <sup>178</sup>	6.75 <sup>90</sup>	32.138 <sup>165</sup>	43.47 <sup>171</sup>	10.274 <sup>167</sup>	9.84 <sup>145</sup>	53.190 <sup>188</sup>	35.40 <sup>24</sup>
17.9	27.123 <sup>203</sup>	7.69 <sup>94</sup>	32.332 <sup>194</sup>	41.79 <sup>168</sup>	10.471 <sup>197</sup>	8.37 <sup>147</sup>	53.411 <sup>221</sup>	35.73 <sup>33</sup>
27.9	27.355 <sup>232</sup>	8.61 <sup>92</sup>	32.553 <sup>221</sup>	40.22 <sup>167</sup>	10.693 <sup>222</sup>	6.99 <sup>138</sup>	53.658 <sup>247</sup>	36.09 <sup>36</sup>
Aug. 6.9	27.609 <sup>254</sup>	9.49 <sup>88</sup>	32.795 <sup>242</sup>	38.78 <sup>144</sup>	10.937 <sup>244</sup>	5.71 <sup>126</sup>	53.927 <sup>269</sup>	36.48 <sup>39</sup>
16.8	27.877 <sup>263</sup>	10.27 <sup>78</sup>	33.053 <sup>268</sup>	37.55 <sup>123</sup>	11.197 <sup>260</sup>	4.62 <sup>106</sup>	54.212 <sup>285</sup>	36.86 <sup>38</sup>
26.8	28.156 <sup>279</sup>	10.91 <sup>64</sup>	33.323 <sup>270</sup>	36.57 <sup>98</sup>	11.469 <sup>272</sup>	3.73 <sup>89</sup>	54.507 <sup>295</sup>	37.22 <sup>36</sup>
Sept. 5.8	28.441 <sup>285</sup>	11.40 <sup>49</sup>	33.599 <sup>276</sup>	35.88 <sup>69</sup>	11.747 <sup>278</sup>	3.10 <sup>63</sup>	54.810 <sup>303</sup>	37.53 <sup>31</sup>
15.7	28.790 <sup>289</sup>	11.70 <sup>30</sup>	33.879 <sup>280</sup>	35.52 <sup>36</sup>	12.028 <sup>281</sup>	2.76 <sup>34</sup>	55.116 <sup>306</sup>	37.75 <sup>22</sup>
25.7	29.017 <sup>287</sup>	11.80 <sup>10</sup>	34.159 <sup>280</sup>	35.51 <sup>1</sup>	12.308 <sup>280</sup>	2.72 <sup>4</sup>	55.422 <sup>306</sup>	37.90 <sup>15</sup>
Oct. 5.7	29.299 <sup>282</sup>	11.70 <sup>10</sup>	34.434 <sup>275</sup>	35.86 <sup>25</sup>	12.585 <sup>277</sup>	3.00 <sup>28</sup>	55.723 <sup>301</sup>	37.96 <sup>6</sup>
15.7	29.574 <sup>275</sup>	11.89 <sup>31</sup>	34.701 <sup>267</sup>	36.54 <sup>68</sup>	12.852 <sup>267</sup>	3.60 <sup>60</sup>	56.017 <sup>294</sup>	37.93 <sup>3</sup>
25.6	29.836 <sup>262</sup>	10.90 <sup>49</sup>	34.957 <sup>256</sup>	37.55 <sup>101</sup>	13.107 <sup>255</sup>	4.45 <sup>85</sup>	56.299 <sup>282</sup>	37.83 <sup>10</sup>
Nov. 4.6	30.083 <sup>247</sup>	10.24 <sup>66</sup>	35.195 <sup>238</sup>	38.84 <sup>129</sup>	13.348 <sup>241</sup>	5.54 <sup>109</sup>	56.564 <sup>265</sup>	37.67 <sup>16</sup>
14.6	30.309 <sup>226</sup>	9.47 <sup>77</sup>	35.410 <sup>215</sup>	40.35 <sup>161</sup>	13.566 <sup>218</sup>	6.82 <sup>128</sup>	56.808 <sup>244</sup>	37.47 <sup>20</sup>
24.6	30.508 <sup>199</sup>	8.63 <sup>84</sup>	35.599 <sup>189</sup>	42.03 <sup>168</sup>	13.759 <sup>196</sup>	8.27 <sup>145</sup>	57.026 <sup>218</sup>	37.26 <sup>21</sup>
Dec. 4.5	30.677 <sup>169</sup>	7.74 <sup>89</sup>	35.757 <sup>158</sup>	48.79 <sup>176</sup>	13.919 <sup>160</sup>	9.78 <sup>151</sup>	57.210 <sup>184</sup>	37.06 <sup>20</sup>
14.5	30.809 <sup>132</sup>	6.85 <sup>89</sup>	35.877 <sup>120</sup>	45.58 <sup>179</sup>	14.044 <sup>125</sup>	11.30 <sup>152</sup>	57.357 <sup>147</sup>	36.88 <sup>18</sup>
24.5	30.902 <sup>93</sup>	5.99 <sup>86</sup>	35.958 <sup>81</sup>	47.34 <sup>176</sup>	14.130 <sup>86</sup>	12.78 <sup>148</sup>	57.461 <sup>104</sup>	36.76 <sup>12</sup>
34.4	30.980 <sup>48</sup>	5.20 <sup>79</sup>	35.995 <sup>37</sup>	48.99 <sup>165</sup>	14.170 <sup>49</sup>	14.18 <sup>160</sup>	57.518 <sup>57</sup>	36.67 <sup>9</sup>
Mean Place	25.656	11.05	31.162	41.20	9.206	6.89	51.775	41.43
Sec δ, Tan δ	1.014	+0.166	1.005	-0.104	1.000	-0.022	1.072	+0.386
D <sub>♄a</sub> , D <sub>♄b</sub>	+0.065	-0.001	+0.058	+0.001	+0.061	0.000	+0.071	-0.003
D <sub>♄δ</sub> , D <sub>♄ε</sub>	+0.05	+0.99	+0.05	+0.29	+0.05	+0.99	+0.05	+0.99

# APPARENT PLACES OF STARS, 1920.

365

FOR THE UPPER TRANSIT AT WASHINGTON.

Washington Mean Time.	ζ Orionis. Mag. 2.0		α Columbae. Mag. 2.8		ο Aurigae. Mag. 5.5		ζ Leporis. Mag. 3.7	
	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.
	h m 5 36	° ' " - 1 58	h m 5 36	° ' " -34 6	h m 5 39	° ' " +49 47	h m 5 48	° ' " -14 50
Jan. 0.5	45.483 <sup>20</sup>	69.45 <sup>141</sup>	47.305 <sup>26</sup>	67.51 <sup>280</sup>	45.447 <sup>34</sup>	30.93 <sup>157</sup>	21.933 <sup>13</sup>	71.10 <sup>208</sup>
10.4	45.503 <sup>25</sup>	70.86 <sup>124</sup>	47.279 <sup>78</sup>	70.31 <sup>267</sup>	45.481 <sup>35</sup>	32.50 <sup>149</sup>	21.946 <sup>33</sup>	73.18 <sup>188</sup>
20.4	45.478 <sup>28</sup>	72.10 <sup>111</sup>	47.201 <sup>123</sup>	72.88 <sup>219</sup>	45.445 <sup>36</sup>	33.99 <sup>134</sup>	21.913 <sup>77</sup>	75.06 <sup>164</sup>
30.4	45.410 <sup>68</sup>	73.21 <sup>91</sup>	47.078 <sup>108</sup>	75.07 <sup>181</sup>	45.340 <sup>165</sup>	35.33 <sup>112</sup>	21.836 <sup>118</sup>	76.70 <sup>138</sup>
Feb. 9.8	45.303 <sup>107</sup>	74.12 <sup>70</sup>	46.912 <sup>202</sup>	76.88 <sup>143</sup>	45.175 <sup>216</sup>	36.45 <sup>87</sup>	21.718 <sup>150</sup>	78.08 <sup>106</sup>
19.3	45.163 <sup>105</sup>	74.82 <sup>52</sup>	46.710 <sup>239</sup>	78.31 <sup>96</sup>	44.959 <sup>245</sup>	37.32 <sup>56</sup>	21.568 <sup>177</sup>	79.14 <sup>76</sup>
29.3	44.998 <sup>180</sup>	75.34 <sup>31</sup>	46.481 <sup>245</sup>	79.27 <sup>50</sup>	44.704 <sup>279</sup>	37.88 <sup>23</sup>	21.391 <sup>192</sup>	79.90 <sup>45</sup>
Mar. 10.3	44.818 <sup>186</sup>	75.65 <sup>11</sup>	46.236 <sup>248</sup>	79.77 <sup>6</sup>	44.425 <sup>288</sup>	38.11 <sup>11</sup>	21.199 <sup>199</sup>	80.35 <sup>13</sup>
20.2	44.632 <sup>181</sup>	75.76 <sup>8</sup>	45.988 <sup>243</sup>	79.83 <sup>39</sup>	44.137 <sup>281</sup>	38.00 <sup>43</sup>	21.000 <sup>195</sup>	80.48 <sup>19</sup>
30.2	44.451 <sup>145</sup>	75.68 <sup>28</sup>	45.745 <sup>227</sup>	79.44 <sup>83</sup>	43.856 <sup>257</sup>	37.57 <sup>75</sup>	20.805 <sup>181</sup>	80.29 <sup>48</sup>
Apr. 9.2	44.286 <sup>142</sup>	75.40 <sup>48</sup>	45.518 <sup>200</sup>	78.61 <sup>122</sup>	43.599 <sup>222</sup>	36.82 <sup>102</sup>	20.624 <sup>159</sup>	79.81 <sup>78</sup>
19.2	44.144 <sup>112</sup>	74.94 <sup>67</sup>	45.318 <sup>168</sup>	77.89 <sup>163</sup>	43.377 <sup>174</sup>	35.80 <sup>126</sup>	20.465 <sup>128</sup>	79.03 <sup>107</sup>
29.1	44.032 <sup>76</sup>	74.27 <sup>83</sup>	45.150 <sup>127</sup>	75.76 <sup>195</sup>	43.203 <sup>119</sup>	34.54 <sup>142</sup>	20.337 <sup>93</sup>	77.96 <sup>131</sup>
May 9.1	43.956 <sup>35</sup>	73.44 <sup>101</sup>	45.023 <sup>86</sup>	73.81 <sup>235</sup>	43.084 <sup>58</sup>	33.12 <sup>154</sup>	20.244 <sup>54</sup>	76.65 <sup>156</sup>
19.1	43.921 <sup>7</sup>	72.43 <sup>113</sup>	44.938 <sup>37</sup>	71.56 <sup>250</sup>	43.026 <sup>7</sup>	31.58 <sup>161</sup>	20.190 <sup>11</sup>	75.09 <sup>175</sup>
29.0	43.928	71.35 <sup>130</sup>	44.901	69.06 <sup>271</sup>	43.083 <sup>70</sup>	29.97 <sup>160</sup>	20.179	73.34 <sup>192</sup>
June 8.0	43.976 <sup>48</sup>	69.95 <sup>147</sup>	44.912 <sup>11</sup>	66.35 <sup>283</sup>	43.103 <sup>134</sup>	28.37 <sup>157</sup>	20.210 <sup>31</sup>	71.42 <sup>208</sup>
18.0	44.066 <sup>90</sup>	68.55 <sup>140</sup>	44.971 <sup>59</sup>	63.52 <sup>287</sup>	43.237 <sup>192</sup>	26.80 <sup>148</sup>	20.283 <sup>73</sup>	69.39 <sup>211</sup>
28.0	44.195 <sup>129</sup>	67.08 <sup>150</sup>	45.077 <sup>106</sup>	60.65 <sup>284</sup>	43.430 <sup>183</sup>	25.32 <sup>137</sup>	20.396 <sup>113</sup>	67.28 <sup>209</sup>
July 7.9	44.358 <sup>163</sup>	65.58 <sup>148</sup>	45.224 <sup>147</sup>	57.81 <sup>273</sup>	43.676 <sup>293</sup>	23.95 <sup>120</sup>	20.545 <sup>190</sup>	65.19 <sup>206</sup>
17.9	44.549 <sup>219</sup>	64.10 <sup>141</sup>	45.412 <sup>228</sup>	55.08 <sup>252</sup>	43.969 <sup>333</sup>	22.75 <sup>103</sup>	20.725 <sup>210</sup>	63.14 <sup>192</sup>
27.9	44.768 <sup>240</sup>	62.69 <sup>128</sup>	45.635 <sup>250</sup>	52.58 <sup>234</sup>	44.302 <sup>367</sup>	21.72 <sup>84</sup>	20.935 <sup>283</sup>	61.22 <sup>173</sup>
Aug. 6.9	45.008 <sup>257</sup>	61.41 <sup>111</sup>	45.885 <sup>277</sup>	50.32 <sup>188</sup>	44.669 <sup>393</sup>	20.88 <sup>64</sup>	21.168 <sup>258</sup>	59.49 <sup>149</sup>
16.8	45.265 <sup>269</sup>	60.30 <sup>90</sup>	46.162 <sup>295</sup>	48.44 <sup>146</sup>	45.062 <sup>413</sup>	20.24 <sup>44</sup>	21.421 <sup>267</sup>	58.00 <sup>117</sup>
26.8	45.534 <sup>277</sup>	59.40 <sup>63</sup>	46.457 <sup>307</sup>	46.98 <sup>97</sup>	45.475 <sup>426</sup>	19.80 <sup>23</sup>	21.688 <sup>276</sup>	56.83 <sup>80</sup>
Sept. 5.8	45.811 <sup>279</sup>	58.77 <sup>33</sup>	46.764 <sup>314</sup>	46.01 <sup>45</sup>	45.901 <sup>438</sup>	19.57 <sup>3</sup>	21.964 <sup>283</sup>	56.03 <sup>41</sup>
15.7	46.090 <sup>280</sup>	58.44 <sup>3</sup>	47.078 <sup>315</sup>	45.55 <sup>11</sup>	46.334 <sup>434</sup>	19.54 <sup>18</sup>	22.247 <sup>284</sup>	55.62 <sup>0</sup>
25.7	46.370 <sup>277</sup>	58.41 <sup>30</sup>	47.393 <sup>310</sup>	45.66 <sup>69</sup>	46.768 <sup>420</sup>	19.72 <sup>87</sup>	22.531 <sup>281</sup>	55.62 <sup>45</sup>
Oct. 5.7	46.647 <sup>270</sup>	58.71 <sup>60</sup>	47.703 <sup>298</sup>	46.35 <sup>124</sup>	47.198 <sup>420</sup>	20.09 <sup>56</sup>	22.812 <sup>273</sup>	56.07 <sup>87</sup>
15.7	46.917 <sup>257</sup>	59.31 <sup>88</sup>	48.001 <sup>280</sup>	47.59 <sup>170</sup>	47.618 <sup>402</sup>	20.65 <sup>77</sup>	23.085 <sup>262</sup>	56.94 <sup>136</sup>
25.6	47.174 <sup>242</sup>	60.19 <sup>114</sup>	48.281 <sup>260</sup>	49.29 <sup>219</sup>	48.020 <sup>380</sup>	21.42 <sup>95</sup>	23.347 <sup>245</sup>	58.20 <sup>160</sup>
Nov. 4.6	47.416 <sup>221</sup>	61.33 <sup>148</sup>	48.541 <sup>236</sup>	51.48 <sup>256</sup>	48.400 <sup>347</sup>	22.37 <sup>113</sup>	23.592 <sup>225</sup>	59.80 <sup>188</sup>
14.6	47.637 <sup>198</sup>	62.66 <sup>148</sup>	48.767 <sup>193</sup>	54.04 <sup>283</sup>	48.747 <sup>308</sup>	23.50 <sup>129</sup>	23.817 <sup>196</sup>	61.68 <sup>211</sup>
24.6	47.833 <sup>165</sup>	64.14 <sup>155</sup>	48.960 <sup>153</sup>	56.87 <sup>303</sup>	49.055 <sup>280</sup>	24.79 <sup>143</sup>	24.013 <sup>163</sup>	63.79 <sup>223</sup>
Dec. 4.5	47.998 <sup>129</sup>	65.69 <sup>158</sup>	49.113 <sup>105</sup>	59.90 <sup>308</sup>	49.315 <sup>204</sup>	26.22 <sup>154</sup>	24.176 <sup>126</sup>	66.02 <sup>226</sup>
14.5	48.127 <sup>89</sup>	67.27 <sup>155</sup>	49.218 <sup>57</sup>	62.98 <sup>308</sup>	49.519 <sup>141</sup>	27.76 <sup>161</sup>	24.302 <sup>85</sup>	68.31 <sup>235</sup>
24.5	48.216 <sup>47</sup>	68.82 <sup>147</sup>	49.275 <sup>5</sup>	66.01 <sup>291</sup>	49.660 <sup>74</sup>	29.37 <sup>161</sup>	24.387 <sup>39</sup>	70.56 <sup>215</sup>
34.4	48.263	70.29	49.280	68.92	49.734	30.98	24.426	72.71
Mean Place	43.309	62.40	45.127	58.01	42.044	33.69	19.798	62.94
Sec δ, Tan δ	1.001	-0.035	1.208	-0.677	1.549	+1.183	1.035	-0.265
D <sub>α</sub> , D <sub>δ</sub>	+0.060	0.000	+0.043	+0.005	+0.092	-0.007	+0.054	+0.001
D <sub>β</sub> , D <sub>γ</sub>	+0.04	+0.99	+0.04	+0.90	+0.04	+1.00	+0.03	+1.00

FOR THE UPPER TRANSIT AT WASHINGTON.

Washington Mean Time.	κ Orionis. Mag. 2.2		δ Doradus. Mag. 4.5		γ Auriga. Mag. 4.2		δ Leporis. Mag. 3.9	
	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.
	h m 5 48	° ' " - 9 41	h m 5 44	° ' " -65 45	h m 5 45	° ' " +89 7	h m 5 47	° ' " -20 52
	s	"	s	"	s	"	s	"
Jan. 0.5	59.869 <sup>18</sup>	57.23 <sup>184</sup>	40.83 <sup>18</sup>	66.32 <sup>337</sup>	59.581 <sup>45</sup>	31.34 <sup>96</sup>	54.963 <sup>14</sup>	74.43 <sup>239</sup>
10.4	59.887 <sup>28</sup>	59.07 <sup>166</sup>	40.65 <sup>27</sup>	69.69 <sup>306</sup>	59.626 <sup>14</sup>	32.32 <sup>96</sup>	54.977 <sup>27</sup>	76.82 <sup>216</sup>
20.4	59.859 <sup>68</sup>	60.73 <sup>145</sup>	40.38 <sup>36</sup>	72.75 <sup>208</sup>	59.612 <sup>71</sup>	33.27 <sup>87</sup>	54.940 <sup>82</sup>	78.98 <sup>159</sup>
30.4	59.791 <sup>111</sup>	62.18 <sup>93</sup>	40.02 <sup>44</sup>	75.43 <sup>223</sup>	59.541 <sup>170</sup>	34.14 <sup>75</sup>	54.856 <sup>126</sup>	80.89 <sup>181</sup>
Feb. 9.4	59.680 <sup>144</sup>	63.37 <sup>98</sup>	39.58 <sup>49</sup>	77.66 <sup>172</sup>	59.417 <sup>170</sup>	34.89 <sup>80</sup>	54.733 <sup>150</sup>	82.48 <sup>126</sup>
19.3	59.536 <sup>169</sup>	64.30 <sup>68</sup>	39.09 <sup>54</sup>	79.38 <sup>119</sup>	59.247 <sup>208</sup>	35.48 <sup>36</sup>	54.574 <sup>184</sup>	83.74 <sup>91</sup>
29.3	59.367 <sup>186</sup>	64.98 <sup>40</sup>	38.55 <sup>57</sup>	80.57 <sup>65</sup>	59.044 <sup>226</sup>	35.87 <sup>16</sup>	54.390 <sup>206</sup>	84.65 <sup>54</sup>
Mar. 10.3	59.181 <sup>192</sup>	65.38 <sup>14</sup>	37.98 <sup>57</sup>	81.22 <sup>9</sup>	58.818 <sup>235</sup>	36.03 <sup>6</sup>	54.187 <sup>209</sup>	85.19 <sup>17</sup>
20.2	58.989 <sup>187</sup>	65.52 <sup>12</sup>	37.41 <sup>56</sup>	81.31 <sup>44</sup>	58.683 <sup>230</sup>	35.97 <sup>30</sup>	53.978 <sup>206</sup>	85.36 <sup>18</sup>
30.2	58.802 <sup>174</sup>	65.40 <sup>40</sup>	36.85 <sup>54</sup>	80.87 <sup>98</sup>	58.563 <sup>212</sup>	35.67 <sup>30</sup>	53.772 <sup>193</sup>	85.18 <sup>53</sup>
Apr. 9.2	58.628 <sup>152</sup>	65.00 <sup>66</sup>	36.31 <sup>50</sup>	79.89 <sup>146</sup>	58.141 <sup>184</sup>	35.17 <sup>60</sup>	53.579 <sup>171</sup>	84.65 <sup>87</sup>
19.2	58.476 <sup>121</sup>	63.34 <sup>87</sup>	35.81 <sup>45</sup>	78.43 <sup>192</sup>	57.957 <sup>144</sup>	34.48 <sup>85</sup>	53.408 <sup>141</sup>	83.78 <sup>120</sup>
29.1	58.355 <sup>88</sup>	62.47 <sup>113</sup>	35.36 <sup>37</sup>	76.51 <sup>232</sup>	57.813 <sup>96</sup>	33.63 <sup>95</sup>	53.267 <sup>105</sup>	82.58 <sup>147</sup>
May 9.1	58.267 <sup>47</sup>	62.34 <sup>124</sup>	34.99 <sup>30</sup>	74.19 <sup>269</sup>	57.715 <sup>46</sup>	32.68 <sup>102</sup>	53.162 <sup>66</sup>	81.11 <sup>174</sup>
19.1	58.220 <sup>5</sup>	61.00 <sup>154</sup>	34.69 <sup>22</sup>	71.50 <sup>297</sup>	57.669 <sup>6</sup>	31.66 <sup>106</sup>	53.096 <sup>28</sup>	79.37 <sup>197</sup>
29.1	58.215 <sup>34</sup>	59.46 <sup>165</sup>	34.47 <sup>13</sup>	68.53 <sup>318</sup>	57.675 <sup>61</sup>	30.60 <sup>104</sup>	53.073 <sup>31</sup>	77.40 <sup>214</sup>
June 8.0	58.249 <sup>76</sup>	57.81 <sup>179</sup>	34.34 <sup>4</sup>	65.35 <sup>332</sup>	57.736 <sup>113</sup>	29.56 <sup>99</sup>	53.094 <sup>64</sup>	75.26 <sup>227</sup>
18.0	58.325 <sup>116</sup>	56.02 <sup>185</sup>	34.30 <sup>5</sup>	62.03 <sup>337</sup>	57.849 <sup>163</sup>	28.57 <sup>92</sup>	53.158 <sup>104</sup>	72.99 <sup>234</sup>
28.0	58.441 <sup>148</sup>	54.17 <sup>188</sup>	34.35 <sup>16</sup>	58.66 <sup>333</sup>	58.012 <sup>207</sup>	27.65 <sup>83</sup>	53.262 <sup>141</sup>	70.65 <sup>233</sup>
July 7.9	58.589 <sup>183</sup>	52.29 <sup>183</sup>	34.51 <sup>23</sup>	55.33 <sup>319</sup>	58.219 <sup>247</sup>	26.82 <sup>70</sup>	53.403 <sup>176</sup>	68.32 <sup>227</sup>
17.9	58.772 <sup>210</sup>	50.46 <sup>171</sup>	34.74 <sup>31</sup>	52.14 <sup>296</sup>	58.466 <sup>280</sup>	26.12 <sup>58</sup>	53.579 <sup>207</sup>	66.05 <sup>212</sup>
27.9	58.982 <sup>232</sup>	48.75 <sup>156</sup>	35.05 <sup>38</sup>	49.18 <sup>262</sup>	58.746 <sup>306</sup>	25.54 <sup>47</sup>	53.786 <sup>282</sup>	63.93 <sup>192</sup>
Aug. 6.9	59.214 <sup>252</sup>	47.19 <sup>133</sup>	35.43 <sup>45</sup>	46.56 <sup>221</sup>	59.064 <sup>308</sup>	25.07 <sup>35</sup>	54.018 <sup>254</sup>	62.01 <sup>163</sup>
16.8	59.466 <sup>265</sup>	45.86 <sup>108</sup>	35.88 <sup>49</sup>	44.35 <sup>171</sup>	59.384 <sup>347</sup>	24.72 <sup>23</sup>	54.272 <sup>269</sup>	60.38 <sup>128</sup>
26.8	59.731 <sup>275</sup>	44.78 <sup>74</sup>	36.37 <sup>54</sup>	42.64 <sup>115</sup>	59.731 <sup>358</sup>	24.50 <sup>12</sup>	54.541 <sup>281</sup>	59.10 <sup>89</sup>
Sept. 5.8	60.006 <sup>281</sup>	44.04 <sup>38</sup>	36.91 <sup>55</sup>	41.49 <sup>82</sup>	60.089 <sup>364</sup>	24.38 <sup>1</sup>	54.822 <sup>287</sup>	58.21 <sup>44</sup>
15.8	60.287 <sup>282</sup>	43.66 <sup>0</sup>	37.46 <sup>57</sup>	40.97 <sup>12</sup>	60.453 <sup>366</sup>	24.37 <sup>8</sup>	55.109 <sup>290</sup>	57.77 <sup>3</sup>
25.7	60.569 <sup>279</sup>	43.66 <sup>39</sup>	38.03 <sup>56</sup>	41.09 <sup>77</sup>	60.819 <sup>364</sup>	24.45 <sup>17</sup>	55.399 <sup>288</sup>	57.80 <sup>51</sup>
Oct. 5.7	60.848 <sup>271</sup>	44.05 <sup>76</sup>	38.59 <sup>53</sup>	41.86 <sup>142</sup>	61.183 <sup>355</sup>	24.62 <sup>29</sup>	55.687 <sup>281</sup>	58.31 <sup>97</sup>
15.7	61.119 <sup>262</sup>	44.81 <sup>113</sup>	39.12 <sup>49</sup>	43.28 <sup>202</sup>	61.538 <sup>344</sup>	24.91 <sup>38</sup>	55.968 <sup>269</sup>	59.28 <sup>142</sup>
25.6	61.381 <sup>245</sup>	45.94 <sup>142</sup>	39.61 <sup>44</sup>	45.30 <sup>235</sup>	61.882 <sup>327</sup>	25.29 <sup>48</sup>	56.237 <sup>280</sup>	60.70 <sup>180</sup>
Nov. 4.6	61.626 <sup>224</sup>	47.36 <sup>168</sup>	40.05 <sup>36</sup>	47.85 <sup>269</sup>	62.209 <sup>302</sup>	25.77 <sup>88</sup>	56.487 <sup>280</sup>	62.50 <sup>214</sup>
14.6	61.850 <sup>201</sup>	49.04 <sup>189</sup>	40.41 <sup>29</sup>	50.84 <sup>338</sup>	62.511 <sup>270</sup>	26.35 <sup>71</sup>	56.717 <sup>200</sup>	64.64 <sup>236</sup>
24.6	62.051 <sup>165</sup>	50.93 <sup>196</sup>	40.70 <sup>19</sup>	54.17 <sup>356</sup>	62.781 <sup>237</sup>	27.06 <sup>86</sup>	56.917 <sup>166</sup>	67.00 <sup>252</sup>
Dec. 4.5	62.216 <sup>130</sup>	52.89 <sup>202</sup>	40.89 <sup>8</sup>	57.73 <sup>306</sup>	63.013 <sup>182</sup>	27.86 <sup>89</sup>	57.063 <sup>128</sup>	69.52 <sup>261</sup>
14.5	62.346 <sup>91</sup>	54.91 <sup>201</sup>	40.97 <sup>1</sup>	61.39 <sup>364</sup>	63.200 <sup>135</sup>	28.75 <sup>96</sup>	57.211 <sup>84</sup>	72.13 <sup>257</sup>
24.5	62.437 <sup>46</sup>	56.92 <sup>188</sup>	40.96 <sup>12</sup>	65.03 <sup>350</sup>	63.335 <sup>79</sup>	29.71 <sup>99</sup>	57.295 <sup>37</sup>	74.70 <sup>247</sup>
34.5	62.483	58.80	40.84	68.53	63.414	30.70	57.332	77.17
Mean Place	57.721	49.44	37.620	55.97	56.671	35.44	52.823	65.87
Sec δ, Tan δ	1.014	-0.171	2.436	-2.222	1.289	+0.813	1.070	-0.362
Dψa, Dωa	+0.057	+0.001	+0.002	+0.010	+0.063	-0.003	+0.051	+0.001
Dψδ, Dωδ	+0.03	+1.00	+0.03	+1.00	+0.02	+1.00	+0.02	+1.00

# APPARENT PLACES OF STARS, 1920.

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FOR THE UPPER TRANSIT AT WASHINGTON.

Washington Mean Time.	$\alpha$ Orionis. ( <i>Belgeux.</i> ) Var. 1.0-1.4		$\gamma$ Leporis. Mag. 3.8		$\delta$ Aurigae. Mag. 3.9		$\beta$ Aurigae. Mag. 2.1	
	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.
	h m 5 50	+ 7 23	h m 5 52	-14 10	h m 5 52	+54 16	h m 5 53	+44 56
Jan. 0.5	52.695 <sup>38</sup>	29.07 <sup>04</sup>	47.808 <sup>33</sup>	61.11 <sup>207</sup>	60.106 <sup>51</sup>	45.48 <sup>182</sup>	42.819 <sup>54</sup>	22.54 <sup>132</sup>
10.4	52.733 <sup>7</sup>	28.13 <sup>22</sup>	47.831 <sup>24</sup>	63.18 <sup>190</sup>	60.217 <sup>27</sup>	47.30 <sup>174</sup>	42.878 <sup>12</sup>	23.86 <sup>127</sup>
20.4	52.726 <sup>53</sup>	27.31 <sup>00</sup>	47.807 <sup>06</sup>	65.06 <sup>165</sup>	60.190 <sup>108</sup>	49.04 <sup>160</sup>	42.861 <sup>76</sup>	25.13 <sup>118</sup>
30.4	52.673 <sup>94</sup>	26.62 <sup>57</sup>	47.759 <sup>111</sup>	66.73 <sup>130</sup>	60.087 <sup>173</sup>	50.04 <sup>130</sup>	42.785 <sup>132</sup>	26.31 <sup>102</sup>
Feb. 9.4	52.579 <sup>120</sup>	26.05 <sup>46</sup>	47.628 <sup>144</sup>	68.12 <sup>108</sup>	59.914 <sup>231</sup>	52.03 <sup>110</sup>	42.653 <sup>185</sup>	27.33 <sup>82</sup>
19.3	52.450 <sup>158</sup>	25.50 <sup>33</sup>	47.484 <sup>172</sup>	69.21 <sup>79</sup>	59.683 <sup>279</sup>	53.13 <sup>78</sup>	42.468 <sup>231</sup>	28.15 <sup>59</sup>
29.3	52.292 <sup>175</sup>	25.26 <sup>22</sup>	47.312 <sup>190</sup>	70.00 <sup>49</sup>	59.404 <sup>308</sup>	53.01 <sup>43</sup>	42.247 <sup>248</sup>	28.74 <sup>29</sup>
Mar. 10.3	52.117 <sup>184</sup>	25.03 <sup>13</sup>	47.122 <sup>197</sup>	70.49 <sup>17</sup>	59.096 <sup>321</sup>	54.34 <sup>4</sup>	41.999 <sup>259</sup>	29.03 <sup>2</sup>
20.3	51.983 <sup>166</sup>	24.90 <sup>8</sup>	46.925 <sup>184</sup>	70.66 <sup>43</sup>	58.775 <sup>298</sup>	54.38 <sup>69</sup>	41.740 <sup>240</sup>	29.05 <sup>55</sup>
30.2	51.751 <sup>145</sup>	24.80 <sup>20</sup>	46.730 <sup>161</sup>	70.58 <sup>72</sup>	58.458 <sup>265</sup>	54.04 <sup>108</sup>	41.485 <sup>206</sup>	28.79 <sup>78</sup>
Apr. 9.2	51.585 <sup>118</sup>	24.97 <sup>30</sup>	46.546 <sup>134</sup>	70.10 <sup>90</sup>	58.182 <sup>212</sup>	53.85 <sup>130</sup>	41.245 <sup>170</sup>	28.24 <sup>101</sup>
19.2	51.440 <sup>91</sup>	25.17 <sup>44</sup>	46.365 <sup>98</sup>	69.38 <sup>136</sup>	57.904 <sup>158</sup>	52.33 <sup>151</sup>	41.039 <sup>119</sup>	27.46 <sup>117</sup>
29.1	51.322 <sup>80</sup>	25.47 <sup>84</sup>	46.251 <sup>69</sup>	68.39 <sup>145</sup>	57.692 <sup>97</sup>	51.08 <sup>170</sup>	40.869 <sup>64</sup>	26.45 <sup>124</sup>
May 9.1	51.242 <sup>1</sup>	25.91 <sup>67</sup>	46.153 <sup>20</sup>	67.13 <sup>170</sup>	57.539 <sup>170</sup>	49.52 <sup>120</sup>	40.750 <sup>10</sup>	25.31 <sup>134</sup>
19.1	51.201 <sup>42</sup>	26.45 <sup>76</sup>	46.093 <sup>65</sup>	66.65 <sup>197</sup>	57.452 <sup>187</sup>	47.32 <sup>164</sup>	40.638 <sup>211</sup>	24.04 <sup>107</sup>
29.1	51.202 <sup>84</sup>	27.12 <sup>83</sup>	46.073 <sup>105</sup>	63.95 <sup>204</sup>	57.433 <sup>187</sup>	46.03 <sup>165</sup>	40.676 <sup>255</sup>	22.70 <sup>185</sup>
June 8.0	51.244 <sup>123</sup>	27.88 <sup>98</sup>	46.007 <sup>140</sup>	62.10 <sup>201</sup>	57.485 <sup>346</sup>	44.19 <sup>184</sup>	40.730 <sup>54</sup>	21.35 <sup>132</sup>
18.0	51.328 <sup>157</sup>	28.71 <sup>98</sup>	46.162 <sup>174</sup>	60.13 <sup>197</sup>	57.905 <sup>190</sup>	42.36 <sup>183</sup>	40.838 <sup>164</sup>	20.03 <sup>129</sup>
28.0	51.451 <sup>188</sup>	29.64 <sup>98</sup>	46.267 <sup>140</sup>	58.09 <sup>206</sup>	57.792 <sup>245</sup>	40.59 <sup>177</sup>	41.002 <sup>211</sup>	18.74 <sup>117</sup>
July 7.9	51.608 <sup>214</sup>	30.59 <sup>95</sup>	46.407 <sup>202</sup>	56.63 <sup>201</sup>	58.057 <sup>300</sup>	38.94 <sup>162</sup>	41.213 <sup>265</sup>	17.57 <sup>107</sup>
17.9	51.796 <sup>238</sup>	31.87 <sup>95</sup>	46.561 <sup>227</sup>	54.02 <sup>191</sup>	58.337 <sup>346</sup>	37.42 <sup>126</sup>	41.468 <sup>298</sup>	16.50 <sup>92</sup>
27.9	52.010 <sup>256</sup>	32.52 <sup>85</sup>	46.783 <sup>227</sup>	52.11 <sup>171</sup>	58.683 <sup>387</sup>	36.97 <sup>114</sup>	41.766 <sup>325</sup>	15.58 <sup>78</sup>
Aug. 6.9	52.248 <sup>266</sup>	33.37 <sup>77</sup>	47.010 <sup>246</sup>	50.49 <sup>148</sup>	59.070 <sup>417</sup>	34.96 <sup>95</sup>	42.091 <sup>353</sup>	14.80 <sup>64</sup>
16.8	52.504 <sup>299</sup>	34.14 <sup>62</sup>	47.256 <sup>283</sup>	48.92 <sup>118</sup>	59.437 <sup>466</sup>	33.98 <sup>71</sup>	42.444 <sup>387</sup>	14.16 <sup>46</sup>
26.8	52.773 <sup>278</sup>	34.76 <sup>45</sup>	47.519 <sup>273</sup>	47.74 <sup>93</sup>	59.982 <sup>461</sup>	33.27 <sup>49</sup>	42.815 <sup>387</sup>	13.70 <sup>32</sup>
Sept. 5.8	53.051 <sup>285</sup>	35.21 <sup>24</sup>	47.792 <sup>261</sup>	46.92 <sup>43</sup>	60.398 <sup>472</sup>	32.78 <sup>24</sup>	43.202 <sup>396</sup>	13.38 <sup>17</sup>
15.8	53.336 <sup>287</sup>	35.45 <sup>0</sup>	48.073 <sup>283</sup>	46.49 <sup>2</sup>	60.865 <sup>478</sup>	32.54 <sup>1</sup>	43.598 <sup>399</sup>	13.21 <sup>2</sup>
25.7	53.623 <sup>283</sup>	35.45 <sup>20</sup>	48.356 <sup>277</sup>	46.47 <sup>42</sup>	61.343 <sup>476</sup>	32.58 <sup>24</sup>	43.997 <sup>399</sup>	13.19 <sup>16</sup>
Oct. 5.7	53.908 <sup>271</sup>	35.25 <sup>42</sup>	48.638 <sup>266</sup>	46.89 <sup>88</sup>	61.819 <sup>468</sup>	32.77 <sup>45</sup>	44.396 <sup>390</sup>	13.35 <sup>31</sup>
15.7	54.191 <sup>259</sup>	34.63 <sup>62</sup>	48.915 <sup>244</sup>	47.72 <sup>122</sup>	62.267 <sup>451</sup>	33.25 <sup>72</sup>	44.736 <sup>381</sup>	13.66 <sup>48</sup>
25.6	54.462 <sup>241</sup>	34.21 <sup>90</sup>	49.181 <sup>240</sup>	48.04 <sup>158</sup>	62.738 <sup>430</sup>	33.97 <sup>85</sup>	45.107 <sup>360</sup>	14.14 <sup>61</sup>
Nov. 4.6	54.720 <sup>241</sup>	33.41 <sup>97</sup>	49.431 <sup>231</sup>	50.52 <sup>185</sup>	63.168 <sup>394</sup>	34.92 <sup>119</sup>	45.527 <sup>336</sup>	14.75 <sup>80</sup>
14.6	54.961 <sup>215</sup>	32.44 <sup>103</sup>	49.662 <sup>206</sup>	52.37 <sup>206</sup>	63.562 <sup>343</sup>	36.11 <sup>139</sup>	45.863 <sup>303</sup>	15.55 <sup>94</sup>
24.6	55.176 <sup>196</sup>	31.41 <sup>104</sup>	49.867 <sup>172</sup>	54.45 <sup>231</sup>	63.915 <sup>308</sup>	37.50 <sup>158</sup>	46.106 <sup>259</sup>	16.49 <sup>109</sup>
Dec. 4.5	55.362 <sup>150</sup>	30.35 <sup>108</sup>	50.039 <sup>136</sup>	56.66 <sup>237</sup>	64.216 <sup>340</sup>	39.06 <sup>171</sup>	46.425 <sup>211</sup>	17.53 <sup>118</sup>
14.5	55.512 <sup>110</sup>	29.27 <sup>103</sup>	50.175 <sup>96</sup>	58.98 <sup>230</sup>	64.456 <sup>371</sup>	40.79 <sup>181</sup>	46.636 <sup>151</sup>	18.76 <sup>130</sup>
24.5	55.622 <sup>66</sup>	28.24 <sup>93</sup>	50.271 <sup>49</sup>	61.18 <sup>215</sup>	64.627 <sup>346</sup>	42.90 <sup>186</sup>	46.787 <sup>91</sup>	20.06 <sup>133</sup>
34.5	55.688	27.28	50.330	63.33	64.722	44.46	46.878	21.39
Mean Place	50.426	35.77	45.658	52.93	56.462	49.29	39.370	26.89
Sec $\delta$ , Tan $\delta$	-1.068	+0.130	1.031	-0.253	1.713	+1.691	1.413	+0.998
$D_{\alpha}, D_{\alpha\alpha}$	+0.065	0.000	+0.054	+0.001	+0.068	-0.003	+0.088	-0.002
$D_{\delta}, D_{\delta\delta}$	+0.02	+1.00	+0.01	+1.00	+0.03	+1.00	+0.01	+1.00

FOR THE UPPER TRANSIT AT WASHINGTON.

Washington Mean Time.	θ Aurigæ. Mag. 2.7		1 Geminorum. Mag. 4.3		1 G. Puppis. Mag. 6.2		γ Orionis. Mag. 4.4	
	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.
	h m 5 54	° ' " +37 12	h m 5 59	° ' " +23 15	h m 6 2	° ' " -45 1	h m 6 3	° ' " +14 46
Jan. 0.5	18.806	24.98	17.944	61.62	12.663	78.88	2.658	38.17
10.4	18.861 <sup>55</sup>	25.80 <sup>87</sup>	18.001 <sup>57</sup>	61.63 <sup>1</sup>	12.637 <sup>26</sup>	82.12 <sup>324</sup>	2.706 <sup>53</sup>	37.67 <sup>50</sup>
20.4	18.854 <sup>7</sup>	26.65 <sup>85</sup>	18.006 <sup>5</sup>	61.70 <sup>7</sup>	12.552 <sup>88</sup>	85.11 <sup>300</sup>	2.714 <sup>8</sup>	37.25 <sup>42</sup>
30.4	18.794 <sup>60</sup>	27.46 <sup>81</sup>	17.961 <sup>45</sup>	61.81 <sup>11</sup>	12.409 <sup>148</sup>	87.76 <sup>265</sup>	2.671 <sup>43</sup>	36.91 <sup>34</sup>
Feb. 9.4	18.682 <sup>112</sup>	28.17 <sup>71</sup>	17.869 <sup>92</sup>	61.93 <sup>12</sup>	12.215 <sup>194</sup>	90.02 <sup>226</sup>	2.584 <sup>87</sup>	36.66 <sup>25</sup>
19.3	18.523 <sup>159</sup>	28.72 <sup>55</sup>	17.736 <sup>133</sup>	62.04 <sup>11</sup>	11.978 <sup>267</sup>	91.63 <sup>181</sup>	2.462 <sup>122</sup>	36.46 <sup>20</sup>
29.3	18.328 <sup>195</sup>	29.12 <sup>40</sup>	17.572 <sup>164</sup>	62.11 <sup>7</sup>	11.707 <sup>271</sup>	93.17 <sup>134</sup>	2.306 <sup>156</sup>	36.30 <sup>16</sup>
Mar. 10.3	18.114 <sup>214</sup>	29.30 <sup>18</sup>	17.368 <sup>184</sup>	62.13 <sup>2</sup>	11.414 <sup>293</sup>	94.01 <sup>84</sup>	2.131 <sup>175</sup>	36.20 <sup>10</sup>
20.3	17.887 <sup>227</sup>	29.30 <sup>0</sup>	17.192 <sup>196</sup>	62.10 <sup>3</sup>	11.111 <sup>303</sup>	94.84 <sup>33</sup>	1.946 <sup>135</sup>	36.13 <sup>7</sup>
30.2	17.656 <sup>228</sup>	29.08 <sup>23</sup>	16.998 <sup>194</sup>	62.00 <sup>10</sup>	10.808 <sup>303</sup>	94.17 <sup>17</sup>	1.762 <sup>134</sup>	36.09 <sup>4</sup>
Apr. 9.2	17.451 <sup>208</sup>	28.69 <sup>39</sup>	16.817 <sup>181</sup>	61.84 <sup>16</sup>	10.518 <sup>290</sup>	93.53 <sup>68</sup>	1.590 <sup>173</sup>	36.06 <sup>1</sup>
19.2	17.271 <sup>180</sup>	28.09 <sup>60</sup>	16.658 <sup>159</sup>	61.63 <sup>21</sup>	10.251 <sup>267</sup>	92.99 <sup>113</sup>	1.437 <sup>152</sup>	36.09 <sup>1</sup>
29.1	17.124 <sup>147</sup>	27.96 <sup>73</sup>	16.531 <sup>127</sup>	61.39 <sup>24</sup>	10.018 <sup>233</sup>	90.32 <sup>157</sup>	1.312 <sup>125</sup>	36.15 <sup>6</sup>
May 9.1	17.023 <sup>101</sup>	26.52 <sup>84</sup>	16.442 <sup>89</sup>	61.15 <sup>24</sup>	9.824 <sup>194</sup>	88.36 <sup>196</sup>	1.226 <sup>86</sup>	36.28 <sup>13</sup>
19.1	16.970 <sup>53</sup>	25.61 <sup>91</sup>	16.394 <sup>48</sup>	60.92 <sup>28</sup>	9.677 <sup>147</sup>	86.54 <sup>232</sup>	1.177 <sup>49</sup>	36.47 <sup>19</sup>
29.1	16.967 <sup>3</sup>	24.67 <sup>94</sup>	16.391 <sup>3</sup>	60.72 <sup>20</sup>	9.581 <sup>96</sup>	83.92 <sup>262</sup>	1.169 <sup>8</sup>	36.71 <sup>24</sup>
June 8.0	17.019 <sup>52</sup>	23.74 <sup>98</sup>	16.434 <sup>43</sup>	60.56 <sup>16</sup>	9.539 <sup>42</sup>	81.07 <sup>236</sup>	1.205 <sup>36</sup>	37.04 <sup>33</sup>
18.0	17.121 <sup>102</sup>	22.85 <sup>89</sup>	16.521 <sup>87</sup>	60.46 <sup>10</sup>	9.550 <sup>11</sup>	78.04 <sup>306</sup>	1.280 <sup>75</sup>	37.42 <sup>38</sup>
28.0	17.271 <sup>150</sup>	22.01 <sup>84</sup>	16.651 <sup>120</sup>	60.42 <sup>4</sup>	9.614 <sup>64</sup>	74.93 <sup>311</sup>	1.397 <sup>117</sup>	37.89 <sup>47</sup>
July 8.0	17.466 <sup>195</sup>	21.23 <sup>78</sup>	16.818 <sup>167</sup>	60.44 <sup>2</sup>	9.729 <sup>115</sup>	71.82 <sup>311</sup>	1.550 <sup>153</sup>	38.37 <sup>45</sup>
17.9	17.696 <sup>220</sup>	20.58 <sup>66</sup>	17.018 <sup>200</sup>	60.51 <sup>7</sup>	9.804 <sup>165</sup>	68.81 <sup>301</sup>	1.737 <sup>157</sup>	38.90 <sup>53</sup>
27.9	17.961 <sup>265</sup>	20.01 <sup>57</sup>	17.247 <sup>239</sup>	60.62 <sup>11</sup>	10.104 <sup>210</sup>	65.97 <sup>294</sup>	1.950 <sup>213</sup>	39.42 <sup>52</sup>
Aug. 6.9	18.257 <sup>296</sup>	19.56 <sup>45</sup>	17.501 <sup>254</sup>	60.75 <sup>13</sup>	10.353 <sup>240</sup>	63.40 <sup>287</sup>	2.189 <sup>239</sup>	39.93 <sup>51</sup>
16.8	18.572 <sup>315</sup>	19.19 <sup>37</sup>	17.776 <sup>275</sup>	60.88 <sup>13</sup>	10.636 <sup>233</sup>	61.20 <sup>230</sup>	2.446 <sup>257</sup>	40.35 <sup>42</sup>
26.8	18.906 <sup>334</sup>	18.98 <sup>26</sup>	18.065 <sup>289</sup>	60.99 <sup>11</sup>	10.948 <sup>313</sup>	59.43 <sup>177</sup>	2.718 <sup>373</sup>	40.70 <sup>35</sup>
Sept. 5.8	19.255 <sup>349</sup>	18.76 <sup>17</sup>	18.366 <sup>301</sup>	61.07 <sup>8</sup>	10.948 <sup>333</sup>	59.43 <sup>136</sup>	2.718 <sup>385</sup>	40.70 <sup>26</sup>
15.8	19.610 <sup>355</sup>	18.67 <sup>9</sup>	18.366 <sup>307</sup>	61.07 <sup>3</sup>	11.281 <sup>349</sup>	58.17 <sup>69</sup>	3.006 <sup>302</sup>	40.96 <sup>12</sup>
25.7	19.968 <sup>358</sup>	18.64 <sup>3</sup>	18.673 <sup>311</sup>	61.10 <sup>4</sup>	11.630 <sup>366</sup>	57.48 <sup>9</sup>	3.265 <sup>305</sup>	41.08 <sup>7</sup>
Oct. 5.7	20.325 <sup>357</sup>	18.71 <sup>7</sup>	18.984 <sup>313</sup>	61.06 <sup>10</sup>	11.986 <sup>356</sup>	57.99 <sup>54</sup>	3.590 <sup>306</sup>	41.01 <sup>18</sup>
15.7	20.676 <sup>351</sup>	18.89 <sup>18</sup>	19.296 <sup>313</sup>	60.96 <sup>10</sup>	12.342 <sup>356</sup>	57.98 <sup>84</sup>	3.886 <sup>306</sup>	40.83 <sup>32</sup>
25.7	21.020 <sup>344</sup>	19.11 <sup>22</sup>	19.604 <sup>306</sup>	60.79 <sup>21</sup>	12.688 <sup>346</sup>	59.06 <sup>118</sup>	4.178 <sup>302</sup>	40.51 <sup>60</sup>
Nov. 4.6	21.345 <sup>325</sup>	19.11 <sup>24</sup>	19.902 <sup>296</sup>	60.58 <sup>28</sup>	13.020 <sup>332</sup>	60.78 <sup>172</sup>	4.463 <sup>355</sup>	40.01 <sup>56</sup>
14.6	21.648 <sup>303</sup>	19.45 <sup>34</sup>	20.189 <sup>287</sup>	60.33 <sup>28</sup>	13.327 <sup>307</sup>	63.02 <sup>324</sup>	4.736 <sup>375</sup>	39.45 <sup>56</sup>
24.6	21.922 <sup>274</sup>	19.89 <sup>44</sup>	20.457 <sup>268</sup>	60.08 <sup>25</sup>	13.601 <sup>274</sup>	65.71 <sup>299</sup>	4.994 <sup>356</sup>	38.79 <sup>66</sup>
Dec. 4.5	22.156 <sup>284</sup>	20.42 <sup>53</sup>	20.701 <sup>244</sup>	59.85 <sup>28</sup>	13.884 <sup>233</sup>	66.75 <sup>304</sup>	5.229 <sup>325</sup>	38.08 <sup>71</sup>
14.5	22.492 <sup>192</sup>	21.08 <sup>66</sup>	20.913 <sup>213</sup>	59.65 <sup>20</sup>	14.020 <sup>189</sup>	72.04 <sup>339</sup>	5.481 <sup>302</sup>	37.38 <sup>70</sup>
24.5	22.348 <sup>144</sup>	21.82 <sup>74</sup>	21.088 <sup>175</sup>	59.51 <sup>14</sup>	14.162 <sup>138</sup>	73.45 <sup>341</sup>	5.602 <sup>171</sup>	36.71 <sup>67</sup>
34.5	22.492 <sup>88</sup>	22.61 <sup>79</sup>	21.221 <sup>133</sup>	59.43 <sup>8</sup>	14.226 <sup>74</sup>	76.88 <sup>345</sup>	5.780 <sup>128</sup>	36.09 <sup>62</sup>
34.5	22.580 <sup>88</sup>	23.48 <sup>87</sup>	21.306 <sup>85</sup>	59.43 <sup>1</sup>	14.299 <sup>18</sup>	82.21 <sup>338</sup>	5.813 <sup>83</sup>	35.55 <sup>54</sup>
Mean Place	15.960	29.82	15.448	67.73	10.200	69.66	0.290	44.95
Sec δ, Tan δ	1.256	+0.759	1.089	+0.430	1.415	-1.661	1.034	+0.264
D <sub>α</sub> , D <sub>αα</sub>	+0.081	-0.001	+0.072	0.000	+0.085	-0.601	+0.068	0.000
D <sub>β</sub> , D <sub>ββ</sub>	+0.01	+1.00	0.00	+1.00	0.00	+1.00	-0.01	+1.00

# APPARENT PLACES OF STARS, 1920.

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## FOR THE UPPER TRANSIT AT WASHINGTON.

Washington Mean Time.	$\alpha$ H. Camelopard. Mag. 4.7		$\gamma$ Geminorum. Var. 3.2-4.2		$\delta$ Lynx. Mag. 4.4		$\zeta$ Canis Majoris. Mag. 3.1	
	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.
	h m 6 10	° ' " +69 20	h m 6 10	° ' " +22 31	h m 6 12	° ' " +59 2	h m 6 17	° ' " -30 1
	s	s	s	s	s	s	s	s
Jan. 0.5	7.74	55.76	5.449	45.49	38.190	24.91	16.673	47.06
10.5	7.81 <sup>7</sup>	58.30 <sup>254</sup>	5.516 <sup>67</sup>	45.45 <sup>4</sup>	38.275 <sup>85</sup>	26.97 <sup>206</sup>	16.700 <sup>27</sup>	49.96 <sup>288</sup>
20.4	7.76 <sup>15</sup>	60.78 <sup>348</sup>	5.530 <sup>14</sup>	45.46 <sup>1</sup>	38.268 <sup>9</sup>	29.01 <sup>204</sup>	16.673 <sup>27</sup>	52.63 <sup>267</sup>
30.4	7.59 <sup>8</sup>	63.09 <sup>301</sup>	5.494 <sup>26</sup>	45.54 <sup>8</sup>	38.174 <sup>84</sup>	30.92 <sup>191</sup>	16.599 <sup>77</sup>	55.01 <sup>238</sup>
Feb. 9.4	7.80 <sup>29</sup>	65.12 <sup>203</sup>	5.410 <sup>84</sup>	45.63 <sup>9</sup>	37.998 <sup>176</sup>	32.62 <sup>170</sup>	16.473 <sup>123</sup>	57.06 <sup>207</sup>
19.3	6.91	66.81	5.287	45.74	37.751	34.05	16.310	58.76
29.3	6.43 <sup>48</sup>	68.08 <sup>127</sup>	5.129 <sup>158</sup>	45.83 <sup>9</sup>	37.446 <sup>305</sup>	35.14 <sup>109</sup>	16.114 <sup>196</sup>	60.03 <sup>127</sup>
Mar. 10.3	5.91 <sup>82</sup>	68.89 <sup>81</sup>	4.949 <sup>180</sup>	45.90 <sup>7</sup>	37.101 <sup>345</sup>	35.84 <sup>70</sup>	15.895 <sup>219</sup>	60.88 <sup>86</sup>
20.3	5.36 <sup>55</sup>	69.21 <sup>32</sup>	4.757 <sup>192</sup>	45.92 <sup>2</sup>	36.735 <sup>366</sup>	36.13 <sup>29</sup>	15.663 <sup>232</sup>	61.31 <sup>43</sup>
30.2	4.80 <sup>56</sup>	69.01 <sup>20</sup>	4.564 <sup>193</sup>	45.86 <sup>6</sup>	36.367 <sup>368</sup>	36.01 <sup>12</sup>	15.431 <sup>232</sup>	61.32 <sup>1</sup>
Apr. 9.2	4.27	68.33	4.379	45.76	36.016	35.47	15.206	60.92
19.2	3.78 <sup>49</sup>	67.20 <sup>113</sup>	4.218 <sup>161</sup>	45.62 <sup>14</sup>	35.699 <sup>317</sup>	34.56 <sup>91</sup>	15.001 <sup>205</sup>	60.11 <sup>81</sup>
29.2	3.37 <sup>41</sup>	65.65 <sup>165</sup>	4.086 <sup>182</sup>	45.47 <sup>15</sup>	35.430 <sup>269</sup>	33.30 <sup>126</sup>	14.822 <sup>179</sup>	58.91 <sup>120</sup>
May 9.1	3.06 <sup>31</sup>	63.77 <sup>188</sup>	3.990 <sup>96</sup>	45.28 <sup>19</sup>	35.222 <sup>268</sup>	31.74 <sup>156</sup>	14.676 <sup>146</sup>	57.37 <sup>154</sup>
19.1	2.83 <sup>28</sup>	61.60 <sup>217</sup>	3.933 <sup>57</sup>	45.10 <sup>18</sup>	35.084 <sup>138</sup>	29.97 <sup>177</sup>	14.570 <sup>106</sup>	55.50 <sup>187</sup>
29.1	2.70	59.24	3.919	44.93	35.021	28.04	14.504	53.36
June 8.0	2.70 <sup>0</sup>	56.75 <sup>249</sup>	3.952 <sup>33</sup>	44.82 <sup>11</sup>	35.035 <sup>14</sup>	25.99 <sup>206</sup>	14.483 <sup>21</sup>	51.01 <sup>235</sup>
18.0	2.81 <sup>11</sup>	54.21 <sup>254</sup>	4.026 <sup>74</sup>	44.75 <sup>7</sup>	35.127 <sup>92</sup>	23.91 <sup>208</sup>	14.506 <sup>23</sup>	48.43 <sup>253</sup>
28.0	3.02 <sup>21</sup>	51.70 <sup>251</sup>	4.145 <sup>119</sup>	44.71 <sup>4</sup>	35.292 <sup>165</sup>	21.85 <sup>206</sup>	14.572 <sup>66</sup>	45.85 <sup>263</sup>
July 8.0	3.33 <sup>31</sup>	49.26 <sup>244</sup>	4.297 <sup>162</sup>	44.73 <sup>2</sup>	35.528 <sup>236</sup>	19.86 <sup>199</sup>	14.680 <sup>108</sup>	43.20 <sup>265</sup>
17.9	3.74	46.96	4.486	44.80	35.828	17.99	14.825	40.59
27.9	4.23 <sup>49</sup>	44.87 <sup>309</sup>	4.704 <sup>318</sup>	44.90 <sup>10</sup>	36.183 <sup>355</sup>	16.28 <sup>171</sup>	15.008 <sup>183</sup>	38.12 <sup>247</sup>
Aug. 6.9	4.80 <sup>57</sup>	42.99 <sup>188</sup>	4.950 <sup>246</sup>	44.98 <sup>8</sup>	36.588 <sup>405</sup>	14.75 <sup>183</sup>	15.222 <sup>214</sup>	35.86 <sup>226</sup>
16.9	5.43 <sup>63</sup>	41.40 <sup>159</sup>	5.213 <sup>263</sup>	45.07 <sup>9</sup>	37.035 <sup>447</sup>	13.44 <sup>131</sup>	15.463 <sup>241</sup>	33.89 <sup>197</sup>
26.8	6.10 <sup>67</sup>	40.10 <sup>130</sup>	5.496 <sup>283</sup>	45.17 <sup>10</sup>	37.515 <sup>480</sup>	12.37 <sup>107</sup>	15.726 <sup>263</sup>	32.29 <sup>160</sup>
Sept. 5.8	6.82	39.12	5.791	45.17	38.019	11.54	16.009	31.13
15.8	7.57 <sup>75</sup>	38.48 <sup>64</sup>	6.094 <sup>303</sup>	45.13 <sup>4</sup>	38.543 <sup>524</sup>	10.98 <sup>56</sup>	16.303 <sup>294</sup>	30.45 <sup>68</sup>
25.7	8.34 <sup>77</sup>	38.20 <sup>28</sup>	6.404 <sup>310</sup>	45.00 <sup>13</sup>	39.079 <sup>536</sup>	10.70 <sup>28</sup>	16.608 <sup>305</sup>	30.30 <sup>15</sup>
Oct. 5.7	9.10 <sup>76</sup>	38.29 <sup>9</sup>	6.715 <sup>311</sup>	44.84 <sup>16</sup>	39.616 <sup>537</sup>	10.69 <sup>1</sup>	16.916 <sup>308</sup>	30.69 <sup>39</sup>
15.7	9.86 <sup>74</sup>	38.74 <sup>45</sup>	7.026 <sup>311</sup>	44.58 <sup>26</sup>	40.149 <sup>533</sup>	10.98 <sup>29</sup>	17.220 <sup>304</sup>	31.62 <sup>93</sup>
25.7	10.60	39.56	7.329	44.28	40.670	11.56	17.515	33.07
Nov. 4.6	11.30 <sup>70</sup>	40.74 <sup>118</sup>	7.620 <sup>391</sup>	43.92 <sup>36</sup>	41.167 <sup>497</sup>	12.42 <sup>86</sup>	17.797 <sup>282</sup>	34.98 <sup>191</sup>
14.6	11.94 <sup>64</sup>	42.27 <sup>163</sup>	7.895 <sup>275</sup>	43.58 <sup>34</sup>	41.631 <sup>464</sup>	13.57 <sup>115</sup>	18.056 <sup>269</sup>	37.30 <sup>232</sup>
24.6	12.52 <sup>58</sup>	44.12 <sup>185</sup>	8.148 <sup>263</sup>	43.26 <sup>32</sup>	42.050 <sup>419</sup>	14.98 <sup>141</sup>	18.287 <sup>231</sup>	39.94 <sup>264</sup>
Dec. 4.6	13.00 <sup>48</sup>	46.24 <sup>212</sup>	8.372 <sup>224</sup>	42.96 <sup>30</sup>	42.414 <sup>364</sup>	16.64 <sup>166</sup>	18.482 <sup>195</sup>	42.80 <sup>286</sup>
14.5	13.89	46.24 <sup>234</sup>	8.372 <sup>184</sup>	42.96 <sup>28</sup>	42.414 <sup>297</sup>	16.64 <sup>185</sup>	18.482 <sup>154</sup>	42.80 <sup>300</sup>
24.5	13.87 <sup>28</sup>	48.58 <sup>200</sup>	8.556 <sup>142</sup>	42.73 <sup>17</sup>	42.711 <sup>320</sup>	18.49 <sup>199</sup>	18.636 <sup>107</sup>	45.80 <sup>301</sup>
34.5	13.83 <sup>16</sup>	51.08 <sup>268</sup>	8.698 <sup>96</sup>	42.56 <sup>8</sup>	42.931 <sup>135</sup>	20.48 <sup>208</sup>	18.743 <sup>87</sup>	48.81 <sup>294</sup>
34.5	13.83	53.66	8.793	42.48	43.066	22.56	18.800	51.75
Mean Place	2.079	60.54	2.967	52.25	34.099	30.34	14.435	38.60
Sec $\delta$ , Tan $\delta$	2.835	+2.653	1.083	+0.415	1.944	+1.667	1.155	-0.578
$D_{\alpha}$ , $D_{\omega}$	+0.131	+0.008	+0.072	+0.061	+0.105	+0.006	+0.046	-0.063
$D_{\delta}$ , $D_{\omega}$	-0.02	+1.00	-0.02	+1.00	-0.02	+1.00	-0.03	+1.00

FOR THE UPPER TRANSIT AT WASHINGTON.

Washington Mean Time.	μ Gemminorum. Mag. 3.2		ψ <sup>1</sup> Aurigae. Mag. 5.1		β Canis Majoris. Mag. 2.0		ε Monocerotis. Mag. 4.5	
	Right Ascension.	Declination.	Right Ascension.	Declination.	Right Ascension.	Declination.	Right Ascension.	Declination.
	h m	° ' "	h m	° ' "	h m	° ' "	h m	° ' "
	6 18	+22 33	6 18	+49 19	6 19	-17 54	6 19	+ 4 37
	s	"	s	"	s	"	s	"
Jan. 0.5	9.759 <sup>76</sup>	14.01	47.768 <sup>89</sup>	42.77	12.767 <sup>44</sup>	62.97	34.026 <sup>65</sup>	56.65
10.5	9.835 <sup>22</sup>	13.95 <sup>6</sup>	47.857 <sup>18</sup>	44.32 <sup>185</sup>	12.811 <sup>5</sup>	65.35 <sup>238</sup>	34.091 <sup>17</sup>	55.50 <sup>115</sup>
20.4	9.857 <sup>37</sup>	13.95 <sup>0</sup>	47.875 <sup>54</sup>	45.87 <sup>185</sup>	12.806 <sup>58</sup>	67.53 <sup>218</sup>	34.108 <sup>31</sup>	54.47 <sup>103</sup>
30.4	9.830 <sup>77</sup>	14.03 <sup>8</sup>	47.821 <sup>120</sup>	47.36 <sup>149</sup>	12.753 <sup>97</sup>	69.48 <sup>166</sup>	34.077 <sup>75</sup>	53.59 <sup>88</sup>
Feb. 9.4	9.753 <sup>117</sup>	14.14 <sup>11</sup>	47.701 <sup>180</sup>	48.71 <sup>115</sup>	12.658 <sup>186</sup>	71.14 <sup>135</sup>	34.002 <sup>114</sup>	52.88 <sup>57</sup>
19.3	9.636 <sup>156</sup>	14.27 <sup>12</sup>	47.521 <sup>228</sup>	49.86 <sup>92</sup>	12.520 <sup>166</sup>	72.49 <sup>103</sup>	33.888 <sup>145</sup>	52.31 <sup>42</sup>
29.3	9.480 <sup>179</sup>	14.39 <sup>8</sup>	47.293 <sup>262</sup>	50.78 <sup>60</sup>	12.354 <sup>188</sup>	73.52 <sup>68</sup>	33.743 <sup>169</sup>	51.89 <sup>26</sup>
Mar. 10.3	9.301 <sup>190</sup>	14.47 <sup>7</sup>	47.031 <sup>281</sup>	51.38 <sup>29</sup>	12.166 <sup>202</sup>	74.20 <sup>36</sup>	33.574 <sup>180</sup>	51.63 <sup>14</sup>
20.3	9.111 <sup>193</sup>	14.54 <sup>8</sup>	46.760 <sup>272</sup>	51.67 <sup>37</sup>	11.964 <sup>194</sup>	74.56 <sup>32</sup>	33.394 <sup>174</sup>	51.49 <sup>12</sup>
30.2	8.918 <sup>187</sup>	14.51 <sup>8</sup>	46.468 <sup>272</sup>	51.63 <sup>37</sup>	11.762 <sup>194</sup>	74.56 <sup>32</sup>	33.211 <sup>174</sup>	51.49 <sup>12</sup>
Apr. 9.2	8.731 <sup>164</sup>	14.43 <sup>13</sup>	46.196 <sup>245</sup>	51.26 <sup>67</sup>	11.568 <sup>176</sup>	74.24 <sup>63</sup>	33.037 <sup>156</sup>	51.61 <sup>26</sup>
19.2	8.567 <sup>126</sup>	14.31 <sup>13</sup>	45.951 <sup>206</sup>	50.59 <sup>94</sup>	11.392 <sup>153</sup>	73.61 <sup>95</sup>	32.881 <sup>131</sup>	51.87 <sup>37</sup>
29.2	8.431 <sup>101</sup>	14.18 <sup>17</sup>	45.745 <sup>156</sup>	49.65 <sup>118</sup>	11.240 <sup>121</sup>	72.66 <sup>123</sup>	32.750 <sup>100</sup>	52.24 <sup>50</sup>
May 9.1	8.330 <sup>64</sup>	14.01 <sup>18</sup>	45.586 <sup>104</sup>	48.47 <sup>135</sup>	11.119 <sup>85</sup>	71.43 <sup>149</sup>	32.650 <sup>63</sup>	52.74 <sup>63</sup>
19.1	8.266 <sup>20</sup>	13.83 <sup>17</sup>	45.482 <sup>43</sup>	47.12 <sup>148</sup>	11.034 <sup>44</sup>	69.94 <sup>172</sup>	32.587 <sup>24</sup>	53.37 <sup>75</sup>
29.1	8.246 <sup>9</sup>	13.66 <sup>13</sup>	45.439 <sup>17</sup>	45.64 <sup>156</sup>	10.990 <sup>5</sup>	68.22 <sup>190</sup>	32.563 <sup>16</sup>	54.12 <sup>84</sup>
June 8.0	8.272 <sup>68</sup>	13.53 <sup>9</sup>	45.456 <sup>77</sup>	44.08 <sup>160</sup>	10.985 <sup>37</sup>	66.32 <sup>204</sup>	32.579 <sup>56</sup>	54.96 <sup>92</sup>
18.0	8.340 <sup>109</sup>	13.44 <sup>6</sup>	45.533 <sup>138</sup>	42.48 <sup>158</sup>	11.023 <sup>76</sup>	64.28 <sup>214</sup>	32.635 <sup>93</sup>	55.88 <sup>99</sup>
28.0	8.449 <sup>145</sup>	13.88 <sup>1</sup>	45.671 <sup>191</sup>	40.90 <sup>153</sup>	11.098 <sup>114</sup>	62.14 <sup>216</sup>	32.728 <sup>130</sup>	56.87 <sup>103</sup>
July 8.0	8.594 <sup>182</sup>	13.39 <sup>4</sup>	45.862 <sup>242</sup>	39.37 <sup>144</sup>	11.212 <sup>149</sup>	59.98 <sup>214</sup>	32.858 <sup>162</sup>	57.90 <sup>102</sup>
17.9	8.776 <sup>212</sup>	13.43 <sup>3</sup>	46.104 <sup>285</sup>	37.93 <sup>133</sup>	11.361 <sup>180</sup>	57.84 <sup>203</sup>	33.020 <sup>190</sup>	58.92 <sup>98</sup>
27.9	8.988 <sup>239</sup>	13.46 <sup>4</sup>	46.389 <sup>323</sup>	36.60 <sup>119</sup>	11.541 <sup>208</sup>	55.81 <sup>186</sup>	33.210 <sup>215</sup>	59.90 <sup>91</sup>
Aug. 6.9	9.227 <sup>260</sup>	13.50 <sup>6</sup>	46.712 <sup>357</sup>	35.41 <sup>104</sup>	11.749 <sup>230</sup>	53.95 <sup>161</sup>	33.425 <sup>235</sup>	60.81 <sup>78</sup>
16.9	9.487 <sup>278</sup>	13.56 <sup>1</sup>	47.069 <sup>383</sup>	34.37 <sup>88</sup>	11.979 <sup>251</sup>	52.34 <sup>132</sup>	33.660 <sup>254</sup>	61.59 <sup>61</sup>
26.8	9.765 <sup>293</sup>	13.57 <sup>5</sup>	47.452 <sup>404</sup>	33.49 <sup>70</sup>	12.230 <sup>266</sup>	51.02 <sup>94</sup>	33.914 <sup>266</sup>	62.20 <sup>43</sup>
Sept. 5.8	10.058 <sup>296</sup>	13.52 <sup>10</sup>	47.856 <sup>419</sup>	32.79 <sup>53</sup>	12.496 <sup>277</sup>	50.08 <sup>53</sup>	34.180 <sup>276</sup>	62.63 <sup>18</sup>
15.8	10.357 <sup>310</sup>	13.42 <sup>18</sup>	48.275 <sup>429</sup>	32.27 <sup>34</sup>	12.773 <sup>285</sup>	49.55 <sup>10</sup>	34.456 <sup>282</sup>	62.81 <sup>5</sup>
25.7	10.667 <sup>313</sup>	13.24 <sup>26</sup>	48.704 <sup>433</sup>	31.93 <sup>13</sup>	13.058 <sup>289</sup>	49.45 <sup>36</sup>	34.738 <sup>286</sup>	62.76 <sup>32</sup>
Oct. 5.7	10.979 <sup>312</sup>	12.99 <sup>33</sup>	49.137 <sup>431</sup>	31.80 <sup>7</sup>	13.347 <sup>287</sup>	49.81 <sup>83</sup>	35.024 <sup>286</sup>	62.44 <sup>56</sup>
15.7	11.292 <sup>306</sup>	12.66 <sup>34</sup>	49.568 <sup>423</sup>	31.87 <sup>28</sup>	13.634 <sup>282</sup>	50.64 <sup>124</sup>	35.310 <sup>281</sup>	61.88 <sup>80</sup>
25.7	11.598 <sup>297</sup>	12.32 <sup>41</sup>	49.991 <sup>407</sup>	32.15 <sup>49</sup>	13.916 <sup>269</sup>	51.88 <sup>163</sup>	35.591 <sup>271</sup>	61.08 <sup>99</sup>
Nov. 4.6	11.895 <sup>283</sup>	11.91 <sup>40</sup>	50.398 <sup>385</sup>	32.64 <sup>71</sup>	14.185 <sup>251</sup>	53.51 <sup>196</sup>	35.862 <sup>256</sup>	60.09 <sup>117</sup>
14.6	12.178 <sup>257</sup>	11.51 <sup>38</sup>	50.783 <sup>360</sup>	33.35 <sup>93</sup>	14.436 <sup>226</sup>	55.49 <sup>228</sup>	36.118 <sup>236</sup>	58.92 <sup>127</sup>
24.6	12.435 <sup>230</sup>	11.13 <sup>36</sup>	51.133 <sup>309</sup>	34.28 <sup>113</sup>	14.662 <sup>197</sup>	57.72 <sup>241</sup>	36.354 <sup>208</sup>	57.65 <sup>132</sup>
Dec. 4.6	12.665 <sup>192</sup>	10.77 <sup>26</sup>	51.442 <sup>266</sup>	35.41 <sup>130</sup>	14.859 <sup>160</sup>	60.13 <sup>251</sup>	36.562 <sup>175</sup>	56.33 <sup>134</sup>
14.5	12.857 <sup>151</sup>	10.51 <sup>18</sup>	51.700 <sup>198</sup>	36.71 <sup>145</sup>	15.019 <sup>119</sup>	62.64 <sup>260</sup>	36.737 <sup>135</sup>	54.99 <sup>129</sup>
24.5	13.008 <sup>108</sup>	10.33 <sup>8</sup>	51.898 <sup>130</sup>	38.16 <sup>154</sup>	15.138 <sup>73</sup>	65.14 <sup>243</sup>	36.872 <sup>91</sup>	53.70 <sup>119</sup>
34.5	13.111	10.25	52.028	39.70	15.210	67.57	36.963	52.51
Mean Place	7.278	21.23	44.416	49.13	10.580	54.68	31.766	64.47
Sec δ, Tan δ	1.083	+0.415	1.534	+1.164	1.051	-0.323	1.003	+0.081
D <sub>α</sub> , D <sub>ωα</sub>	+0.072	+0.002	+0.092	+0.006	+0.053	-0.002	+0.063	0.000
D <sub>δ</sub> , D <sub>ωδ</sub>	-0.08	+1.00	-0.03	+1.00	-0.03	+1.00	-0.03	+1.00



# APPARENT PLACES OF STARS, 1920.

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## FOR THE UPPER TRANSIT AT WASHINGTON.

Washington Mean Time.	α Argus. (Canopus.) Mag. -0.9		10 Monocerotis. Mag. 5.0		γ Geminorum. Mag. 4.1		δ Lynceis. Mag. 6.0	
	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.
	h m ° 22	' " " " " "	h m ° 24	' " " " " "	h m ° 24	' " " " " "	h m ° 30	' " " " " "
	s	s	s	s	s	s	s	s
Jan. 0.5	13.229	74.16	2.818	49.89	15.234	42.77	27.40	65.00
10.5	13.211 <sup>18</sup>	77.69 <sup>288</sup>	2.880 <sup>62</sup>	51.60 <sup>171</sup>	15.313 <sup>70</sup>	42.55 <sup>22</sup>	27.51 <sup>11</sup>	67.17 <sup>217</sup>
20.4	13.118 <sup>98</sup>	80.98 <sup>220</sup>	2.894 <sup>14</sup>	53.14 <sup>154</sup>	15.341 <sup>23</sup>	42.43 <sup>12</sup>	27.53 <sup>2</sup>	69.35 <sup>218</sup>
30.4	12.967 <sup>181</sup>	83.96 <sup>208</sup>	2.861 <sup>23</sup>	54.51 <sup>187</sup>	15.319 <sup>23</sup>	42.40 <sup>3</sup>	27.46 <sup>7</sup>	71.42 <sup>207</sup>
Feb. 9.4	12.788 <sup>219</sup>	86.56 <sup>287</sup>	2.783 <sup>79</sup>	55.65 <sup>114</sup>	15.248 <sup>71</sup>	42.42 <sup>2</sup>	27.29 <sup>17</sup>	73.83 <sup>191</sup>
19.4	12.463 <sup>275</sup>	88.96 <sup>213</sup>	2.667 <sup>116</sup>	56.58 <sup>98</sup>	15.135 <sup>113</sup>	42.45 <sup>2</sup>	27.05 <sup>24</sup>	74.98 <sup>165</sup>
29.3	12.149 <sup>314</sup>	90.33 <sup>167</sup>	2.519 <sup>148</sup>	57.27 <sup>69</sup>	14.986 <sup>148</sup>	42.52 <sup>7</sup>	26.73 <sup>32</sup>	76.29 <sup>131</sup>
Mar. 10.3	11.805 <sup>344</sup>	91.48 <sup>115</sup>	2.348 <sup>171</sup>	57.75 <sup>48</sup>	14.813 <sup>173</sup>	42.59 <sup>7</sup>	26.36 <sup>37</sup>	77.23 <sup>94</sup>
20.3	11.444 <sup>361</sup>	92.11 <sup>63</sup>	2.165 <sup>183</sup>	57.98 <sup>23</sup>	14.625 <sup>163</sup>	42.64 <sup>6</sup>	25.97 <sup>30</sup>	77.74 <sup>51</sup>
30.2	11.061 <sup>363</sup>	92.21 <sup>10</sup>	1.979 <sup>186</sup>	58.00 <sup>2</sup>	14.435 <sup>180</sup>	42.66 <sup>2</sup>	25.56 <sup>41</sup>	77.81 <sup>7</sup>
Apr. 9.2	10.727 <sup>354</sup>	91.79 <sup>42</sup>	1.800 <sup>170</sup>	57.80 <sup>20</sup>	14.252 <sup>163</sup>	42.68 <sup>2</sup>	25.17 <sup>39</sup>	77.44 <sup>37</sup>
19.2	10.395 <sup>332</sup>	90.26 <sup>99</sup>	1.639 <sup>161</sup>	57.39 <sup>41</sup>	14.088 <sup>164</sup>	42.58 <sup>5</sup>	24.82 <sup>35</sup>	76.66 <sup>78</sup>
29.2	10.094 <sup>301</sup>	89.50 <sup>126</sup>	1.501 <sup>138</sup>	56.77 <sup>62</sup>	13.951 <sup>137</sup>	42.53 <sup>0</sup>	24.51 <sup>31</sup>	75.50 <sup>116</sup>
May 9.1	9.833 <sup>261</sup>	87.65 <sup>185</sup>	1.394 <sup>109</sup>	55.96 <sup>81</sup>	13.845 <sup>143</sup>	42.46 <sup>7</sup>	24.25 <sup>26</sup>	74.02 <sup>148</sup>
19.1	9.622 <sup>186</sup>	85.42 <sup>228</sup>	1.322 <sup>78</sup>	54.97 <sup>99</sup>	13.780 <sup>65</sup>	42.40 <sup>6</sup>	24.07 <sup>18</sup>	72.25 <sup>177</sup>
29.1	9.466 <sup>100</sup>	82.84 <sup>268</sup>	1.269 <sup>38</sup>	53.80 <sup>117</sup>	13.755 <sup>26</sup>	42.38 <sup>2</sup>	23.96 <sup>11</sup>	70.28 <sup>197</sup>
June 8.1	9.366 <sup>37</sup>	79.99 <sup>265</sup>	1.295 <sup>6</sup>	52.50 <sup>180</sup>	13.771 <sup>16</sup>	42.39 <sup>1</sup>	23.94 <sup>2</sup>	68.15 <sup>218</sup>
18.0	9.329 <sup>27</sup>	76.95 <sup>304</sup>	1.339 <sup>44</sup>	51.10 <sup>140</sup>	13.831 <sup>60</sup>	42.40 <sup>1</sup>	23.99 <sup>5</sup>	65.94 <sup>231</sup>
28.0	9.352 <sup>28</sup>	73.76 <sup>319</sup>	1.422 <sup>63</sup>	49.61 <sup>149</sup>	13.932 <sup>101</sup>	42.47 <sup>7</sup>	24.14 <sup>15</sup>	63.72 <sup>232</sup>
July 8.0	9.437 <sup>86</sup>	70.54 <sup>322</sup>	1.541 <sup>119</sup>	48.09 <sup>182</sup>	14.071 <sup>139</sup>	42.58 <sup>11</sup>	24.35 <sup>21</sup>	61.53 <sup>219</sup>
17.9	9.577 <sup>140</sup>	67.38 <sup>316</sup>	1.692 <sup>151</sup>	46.59 <sup>150</sup>	14.244 <sup>173</sup>	42.72 <sup>14</sup>	24.55 <sup>28</sup>	59.43 <sup>210</sup>
27.9	9.775 <sup>198</sup>	64.38 <sup>300</sup>	1.872 <sup>160</sup>	45.15 <sup>144</sup>	14.446 <sup>202</sup>	42.87 <sup>15</sup>	24.98 <sup>35</sup>	57.46 <sup>197</sup>
Aug. 6.9	10.023 <sup>248</sup>	61.60 <sup>278</sup>	2.079 <sup>207</sup>	43.84 <sup>131</sup>	14.677 <sup>281</sup>	42.99 <sup>12</sup>	25.38 <sup>40</sup>	55.65 <sup>181</sup>
16.9	10.314 <sup>242</sup>	59.18 <sup>242</sup>	2.306 <sup>232</sup>	42.70 <sup>114</sup>	14.923 <sup>251</sup>	43.08 <sup>9</sup>	25.83 <sup>45</sup>	54.05 <sup>160</sup>
26.8	10.645 <sup>281</sup>	57.19 <sup>199</sup>	2.551 <sup>245</sup>	41.78 <sup>92</sup>	15.199 <sup>271</sup>	43.15 <sup>7</sup>	26.32 <sup>49</sup>	52.67 <sup>138</sup>
Sept. 5.8	11.009 <sup>364</sup>	55.70 <sup>149</sup>	2.812 <sup>261</sup>	41.14 <sup>64</sup>	15.484 <sup>285</sup>	43.12 <sup>3</sup>	26.86 <sup>54</sup>	51.55 <sup>112</sup>
15.8	11.396 <sup>337</sup>	54.79 <sup>91</sup>	3.063 <sup>271</sup>	40.80 <sup>34</sup>	15.778 <sup>294</sup>	43.03 <sup>9</sup>	27.41 <sup>55</sup>	50.70 <sup>85</sup>
25.8	11.798 <sup>402</sup>	54.49 <sup>30</sup>	3.362 <sup>279</sup>	40.79 <sup>1</sup>	16.081 <sup>303</sup>	42.84 <sup>19</sup>	27.98 <sup>57</sup>	50.14 <sup>56</sup>
Oct. 5.7	12.205 <sup>407</sup>	54.82 <sup>28</sup>	3.644 <sup>282</sup>	41.13 <sup>34</sup>	16.388 <sup>307</sup>	42.54 <sup>30</sup>	28.56 <sup>58</sup>	49.89 <sup>26</sup>
15.7	12.806 <sup>401</sup>	55.80 <sup>98</sup>	3.927 <sup>283</sup>	41.81 <sup>66</sup>	16.697 <sup>309</sup>	42.15 <sup>29</sup>	29.13 <sup>57</sup>	49.92 <sup>4</sup>
25.7	12.993 <sup>397</sup>	57.41 <sup>141</sup>	4.205 <sup>273</sup>	42.81 <sup>100</sup>	17.002 <sup>305</sup>	41.68 <sup>47</sup>	29.70 <sup>57</sup>	49.92 <sup>37</sup>
Nov. 4.6	13.357 <sup>364</sup>	59.58 <sup>217</sup>	4.475 <sup>270</sup>	44.10 <sup>139</sup>	17.296 <sup>294</sup>	41.17 <sup>31</sup>	30.24 <sup>54</sup>	50.99 <sup>70</sup>
14.6	13.682 <sup>336</sup>	62.23 <sup>265</sup>	4.728 <sup>258</sup>	45.62 <sup>152</sup>	17.577 <sup>281</sup>	40.63 <sup>54</sup>	30.76 <sup>52</sup>	52.01 <sup>102</sup>
24.6	13.961 <sup>279</sup>	65.31 <sup>308</sup>	4.961 <sup>233</sup>	47.32 <sup>170</sup>	17.835 <sup>269</sup>	40.11 <sup>52</sup>	31.24 <sup>48</sup>	53.33 <sup>122</sup>
Dec. 4.6	14.187 <sup>226</sup>	68.68 <sup>337</sup>	5.167 <sup>206</sup>	49.14 <sup>183</sup>	18.066 <sup>231</sup>	39.63 <sup>48</sup>	31.65 <sup>41</sup>	54.93 <sup>160</sup>
14.5	14.349 <sup>183</sup>	72.23 <sup>355</sup>	5.336 <sup>171</sup>	51.00 <sup>188</sup>	18.261 <sup>195</sup>	39.21 <sup>62</sup>	32.00 <sup>35</sup>	56.78 <sup>185</sup>
24.5	14.442 <sup>98</sup>	75.85 <sup>362</sup>	5.470 <sup>123</sup>	52.84 <sup>184</sup>	18.416 <sup>153</sup>	38.86 <sup>35</sup>	32.27 <sup>27</sup>	58.81 <sup>208</sup>
34.5	14.468 <sup>26</sup>	79.42 <sup>357</sup>	5.559 <sup>89</sup>	54.69 <sup>178</sup>	18.524 <sup>108</sup>	38.59 <sup>27</sup>	32.44 <sup>17</sup>	60.98 <sup>217</sup>
Mean Place	10.561	65.82	0.611	41.78	12.793	50.39	23.079	72.10
Sec δ, Tan δ	1.648	-1.310	1.003	-0.082	1.066	+0.369	2.099	+1.846
D <sub>pa</sub> , D <sub>wa</sub>	+0.027	-0.008	+0.059	-0.091	+0.071	+0.003	+0.110	+0.018
D <sub>pd</sub> , D <sub>wd</sub>	-0.04	+1.00	-0.04	+0.99	-0.04	+0.99	-0.05	+0.99

FOR THE UPPER TRANSIT AT WASHINGTON.

Washington Mean Time.	ξ <sup>2</sup> Canis Majoris. Mag. 4.5		β H. Camelopard. Mag. 5.6		γ Geminorum. Mag. 1.9		δ Aurigae. Mag. 5.7	
	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.
	h m 6 31	° ' " -22 53	h m 6 32	° ' " +79 38	h m 6 38	° ' " +16 27	h m 6 38	° ' " +39 27
Jan. 0.5	44.447	68.23	46.63	68.65	7.846	59.15	9.905	38.00
10.5	44.498	70.87	46.81	71.58	7.983	58.68	10.008	38.96
20.4	44.498	73.33	46.74	74.47	7.966	58.32	10.047	39.97
30.4	44.449	75.54	46.43	77.22	7.954	58.06	10.026	40.99
Feb. 9.4	44.354	77.46	45.88	79.71	7.890	57.91	9.945	41.96
19.4	44.218	79.04	45.14	81.84	7.783	57.83	9.811	42.84
29.3	44.048	80.27	44.23	83.54	7.645	57.79	9.633	43.56
Mar. 10.3	43.854	81.13	43.18	84.73	7.479	57.80	9.423	44.10
20.3	43.647	81.62	42.07	85.38	7.295	57.82	9.195	44.41
30.2	43.435	81.72	40.94	85.45	7.108	57.87	8.960	44.51
Apr. 9.2	43.228	81.46	39.82	84.96	6.927	57.91	8.732	44.36
19.2	43.039	80.84	38.78	83.93	6.764	57.94	8.525	44.00
29.2	42.872	79.88	37.85	82.41	6.627	58.00	8.348	43.44
May 9.1	42.735	78.60	37.06	80.46	6.518	58.07	8.208	42.69
19.1	42.634	77.02	36.46	78.15	6.447	58.19	8.116	41.82
29.1	42.571	75.20	36.04	75.54	6.416	58.35	8.072	40.85
June 8.1	42.549	73.14	35.83	72.74	6.424	58.56	8.079	39.81
18.0	42.568	70.94	35.83	69.81	6.475	58.80	8.136	38.74
28.0	42.628	68.63	36.04	66.85	6.565	59.06	8.243	37.67
July 8.0	42.726	66.28	36.46	63.92	6.692	59.37	8.396	36.62
17.9	42.861	63.95	37.07	61.10	6.853	59.69	8.592	35.62
27.9	43.029	61.73	37.86	58.46	7.042	59.98	8.824	34.68
Aug. 6.9	43.227	59.69	38.81	56.03	7.260	60.27	9.091	33.82
16.9	43.451	57.89	39.90	53.88	7.503	60.50	9.386	33.03
26.8	43.697	56.42	41.11	52.04	7.759	60.64	9.703	32.33
Sept. 5.8	43.962	55.33	42.44	50.57	8.032	60.67	10.040	31.71
15.8	44.241	54.67	43.82	49.48	8.319	60.59	10.394	31.18
25.8	44.530	54.49	45.26	48.80	8.613	60.36	10.757	30.74
Oct. 5.7	44.825	54.80	46.72	48.55	8.913	60.00	11.126	30.40
15.7	45.121	55.61	48.18	48.74	9.215	59.52	11.497	30.17
25.7	45.411	56.89	49.61	49.38	9.515	58.94	11.865	30.06
Nov. 4.6	45.692	58.60	50.96	50.46	9.805	58.23	12.224	30.08
14.6	45.954	60.69	52.23	51.96	10.084	57.50	12.565	30.26
24.6	46.195	63.08	53.37	53.86	10.344	56.73	12.881	30.59
Dec. 4.6	46.403	65.69	54.85	56.13	10.577	55.98	13.166	31.08
14.5	46.573	68.41	55.13	58.69	10.778	55.29	13.409	31.75
24.5	46.701	71.17	55.70	61.47	10.939	54.67	13.602	32.55
34.5	46.782	73.87	56.03	64.39	11.052	54.14	13.738	33.47
Mean Place	42.233	60.03	36.451	75.57	5.464	67.29	7.013	45.82
Sec δ, Tan δ	1.066	-0.422	5.567	+5.477	1.043	+0.296	1.295	+0.823
D <sub>α</sub> , D <sub>αα</sub>	+0.050	-0.004	+0.205	+0.052	+0.069	+0.003	+0.083	+0.008
D <sub>β</sub> , D <sub>ββ</sub>	-0.06	+0.99	-0.06	+0.99	-0.06	+0.99	-0.06	+0.99

# APPARENT PLACES OF STARS, 1920.

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## FOR THE UPPER TRANSIT AT WASHINGTON.

Washington Mean Time.	γ Argus. Mag. 3.2		β Menocrotis. Mag. 4.7		ε Geminorum. Mag. 3.2		ξ Geminorum. Mag. 3.4	
	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.
	h m 6 35	° ' " -43 7	h m 6 36	° ' " + 9 58	h m 6 39	° ' " +25 12	h m 6 40	° ' " +12 58
Jan. 0.5	21.388 <sup>24</sup>	38.73	36.665 <sup>85</sup>	6.65	3.185 <sup>97</sup>	33.38	50.336 <sup>91</sup>	50.37 <sup>70</sup>
10.5	21.362 <sup>37</sup>	42.11 <sup>338</sup>	36.750 <sup>86</sup>	5.76 <sup>89</sup>	3.282 <sup>45</sup>	33.42 <sup>4</sup>	50.427 <sup>41</sup>	49.67 <sup>59</sup>
20.4	21.325 <sup>98</sup>	45.27 <sup>316</sup>	36.786 <sup>86</sup>	5.02 <sup>74</sup>	3.327 <sup>9</sup>	33.59 <sup>17</sup>	50.468 <sup>9</sup>	49.08 <sup>47</sup>
30.4	21.227 <sup>98</sup>	48.16 <sup>289</sup>	36.773 <sup>13</sup>	4.40 <sup>63</sup>	3.318 <sup>9</sup>	33.82 <sup>28</sup>	50.459 <sup>9</sup>	48.61 <sup>47</sup>
Feb. 9.4	21.076 <sup>181</sup>	50.70 <sup>264</sup>	36.712 <sup>61</sup>	3.91 <sup>49</sup>	3.255 <sup>63</sup>	34.13 <sup>31</sup>	50.402 <sup>57</sup>	48.29 <sup>32</sup>
19.4	20.876 <sup>289</sup>	52.84 <sup>169</sup>	36.619 <sup>136</sup>	3.55 <sup>24</sup>	3.149 <sup>145</sup>	34.43 <sup>28</sup>	50.302 <sup>135</sup>	48.06 <sup>15</sup>
29.3	20.637 <sup>267</sup>	54.53 <sup>121</sup>	36.474 <sup>168</sup>	3.31 <sup>15</sup>	3.004 <sup>174</sup>	34.71 <sup>24</sup>	50.167 <sup>162</sup>	47.91 <sup>6</sup>
Mar. 10.3	20.370 <sup>283</sup>	55.74 <sup>73</sup>	36.311 <sup>177</sup>	3.16 <sup>6</sup>	2.880 <sup>180</sup>	34.95 <sup>16</sup>	50.005 <sup>177</sup>	47.85 <sup>2</sup>
20.3	20.087 <sup>283</sup>	56.47 <sup>24</sup>	36.134 <sup>188</sup>	3.10 <sup>3</sup>	2.640 <sup>197</sup>	35.11 <sup>11</sup>	49.823 <sup>184</sup>	47.83 <sup>8</sup>
30.3	19.799 <sup>284</sup>	56.71 <sup>24</sup>	35.951 <sup>177</sup>	3.12 <sup>9</sup>	2.443 <sup>192</sup>	35.22 <sup>1</sup>	49.644 <sup>179</sup>	47.86 <sup>7</sup>
Apr. 9.2	19.515 <sup>285</sup>	56.47 <sup>72</sup>	35.774 <sup>161</sup>	3.21 <sup>16</sup>	2.251 <sup>175</sup>	35.21 <sup>9</sup>	49.465 <sup>164</sup>	47.93 <sup>12</sup>
19.2	19.249 <sup>241</sup>	55.75 <sup>118</sup>	35.613 <sup>139</sup>	3.37 <sup>25</sup>	2.076 <sup>151</sup>	35.12 <sup>12</sup>	49.301 <sup>141</sup>	48.05 <sup>15</sup>
29.2	19.008 <sup>298</sup>	54.57 <sup>106</sup>	35.474 <sup>108</sup>	3.62 <sup>30</sup>	1.925 <sup>116</sup>	35.00 <sup>21</sup>	49.160 <sup>111</sup>	48.20 <sup>21</sup>
May 9.1	18.802 <sup>168</sup>	52.97 <sup>190</sup>	35.306 <sup>73</sup>	3.92 <sup>31</sup>	1.809 <sup>80</sup>	34.79 <sup>23</sup>	49.049 <sup>77</sup>	48.41 <sup>25</sup>
19.1	18.634 <sup>130</sup>	50.99 <sup>283</sup>	35.293 <sup>35</sup>	4.31 <sup>46</sup>	1.729 <sup>38</sup>	34.57 <sup>30</sup>	48.972 <sup>39</sup>	48.66 <sup>32</sup>
29.1	18.514 <sup>74</sup>	48.66 <sup>280</sup>	35.258 <sup>5</sup>	4.77 <sup>58</sup>	1.691 <sup>4</sup>	34.27 <sup>27</sup>	48.933 <sup>3</sup>	48.98 <sup>37</sup>
June 8.1	18.440 <sup>32</sup>	46.06 <sup>261</sup>	35.263 <sup>48</sup>	5.30 <sup>60</sup>	1.695 <sup>60</sup>	34.00 <sup>26</sup>	48.936 <sup>41</sup>	49.35 <sup>41</sup>
18.0	18.418 <sup>26</sup>	43.25 <sup>296</sup>	35.306 <sup>83</sup>	5.90 <sup>64</sup>	1.744 <sup>80</sup>	33.74 <sup>25</sup>	48.977 <sup>80</sup>	49.76 <sup>46</sup>
28.0	18.444 <sup>78</sup>	40.30 <sup>301</sup>	35.388 <sup>119</sup>	6.54 <sup>67</sup>	1.833 <sup>188</sup>	33.49 <sup>23</sup>	49.057 <sup>117</sup>	50.22 <sup>48</sup>
July 8.0	18.522 <sup>124</sup>	37.29 <sup>268</sup>	35.507 <sup>151</sup>	7.21 <sup>68</sup>	1.961 <sup>166</sup>	33.28 <sup>23</sup>	49.174 <sup>150</sup>	50.70 <sup>48</sup>
18.0	18.646 <sup>169</sup>	34.31 <sup>287</sup>	35.658 <sup>180</sup>	7.89 <sup>64</sup>	2.127 <sup>193</sup>	33.03 <sup>19</sup>	49.324 <sup>180</sup>	51.18 <sup>48</sup>
27.9	18.815 <sup>211</sup>	31.44 <sup>284</sup>	35.838 <sup>207</sup>	8.53 <sup>69</sup>	2.323 <sup>227</sup>	32.84 <sup>23</sup>	49.504 <sup>206</sup>	51.66 <sup>42</sup>
Aug. 6.9	19.026 <sup>247</sup>	28.80 <sup>288</sup>	36.045 <sup>239</sup>	9.12 <sup>60</sup>	2.550 <sup>280</sup>	32.65 <sup>23</sup>	49.710 <sup>230</sup>	52.06 <sup>34</sup>
16.9	19.273 <sup>299</sup>	26.47 <sup>186</sup>	36.274 <sup>247</sup>	9.62 <sup>37</sup>	2.800 <sup>271</sup>	32.43 <sup>23</sup>	49.940 <sup>243</sup>	52.42 <sup>22</sup>
26.8	19.553 <sup>397</sup>	24.52 <sup>148</sup>	36.521 <sup>294</sup>	9.99 <sup>31</sup>	3.071 <sup>289</sup>	32.21 <sup>23</sup>	50.188 <sup>266</sup>	52.64 <sup>10</sup>
Sept. 5.8	19.860 <sup>326</sup>	23.04 <sup>96</sup>	36.785 <sup>376</sup>	10.20 <sup>4</sup>	3.360 <sup>301</sup>	31.93 <sup>31</sup>	50.454 <sup>278</sup>	52.74 <sup>7</sup>
15.8	20.188 <sup>343</sup>	22.09 <sup>37</sup>	37.061 <sup>284</sup>	10.24 <sup>13</sup>	3.661 <sup>313</sup>	31.62 <sup>33</sup>	50.733 <sup>283</sup>	52.67 <sup>21</sup>
25.8	20.531 <sup>351</sup>	21.72 <sup>23</sup>	37.345 <sup>291</sup>	10.06 <sup>26</sup>	3.974 <sup>316</sup>	31.29 <sup>41</sup>	51.020 <sup>293</sup>	52.46 <sup>39</sup>
Oct. 5.7	20.882 <sup>351</sup>	21.95 <sup>84</sup>	37.636 <sup>268</sup>	9.70 <sup>66</sup>	4.290 <sup>320</sup>	30.88 <sup>43</sup>	51.313 <sup>297</sup>	52.07 <sup>56</sup>
15.7	21.233 <sup>343</sup>	22.79 <sup>143</sup>	37.929 <sup>291</sup>	9.14 <sup>76</sup>	4.610 <sup>380</sup>	30.46 <sup>44</sup>	51.610 <sup>296</sup>	51.51 <sup>73</sup>
25.7	21.576 <sup>327</sup>	24.22 <sup>199</sup>	38.220 <sup>285</sup>	8.38 <sup>88</sup>	4.990 <sup>314</sup>	30.00 <sup>45</sup>	51.906 <sup>290</sup>	50.78 <sup>83</sup>
Nov. 4.7	21.903 <sup>301</sup>	26.21 <sup>248</sup>	38.505 <sup>273</sup>	7.50 <sup>101</sup>	5.244 <sup>289</sup>	29.55 <sup>44</sup>	52.196 <sup>278</sup>	49.95 <sup>93</sup>
14.6	22.204 <sup>288</sup>	28.69 <sup>288</sup>	38.777 <sup>256</sup>	6.49 <sup>108</sup>	5.543 <sup>276</sup>	29.11 <sup>49</sup>	52.474 <sup>259</sup>	49.02 <sup>97</sup>
24.6	22.472 <sup>226</sup>	31.57 <sup>318</sup>	39.060 <sup>228</sup>	5.41 <sup>111</sup>	5.821 <sup>288</sup>	28.72 <sup>30</sup>	52.733 <sup>234</sup>	48.05 <sup>97</sup>
Dec. 4.6	22.698 <sup>176</sup>	34.75 <sup>324</sup>	39.258 <sup>186</sup>	4.30 <sup>109</sup>	6.074 <sup>217</sup>	28.42 <sup>31</sup>	52.987 <sup>203</sup>	47.66 <sup>93</sup>
14.5	22.874 <sup>122</sup>	38.11 <sup>346</sup>	39.458 <sup>157</sup>	3.21 <sup>109</sup>	6.291 <sup>178</sup>	28.21 <sup>3</sup>	53.170 <sup>162</sup>	46.15 <sup>87</sup>
24.5	22.996 <sup>69</sup>	41.57 <sup>341</sup>	39.610 <sup>118</sup>	2.19 <sup>83</sup>	6.467 <sup>128</sup>	28.13 <sup>0</sup>	53.332 <sup>119</sup>	45.28 <sup>87</sup>
34.5	23.068 <sup>69</sup>	44.98 <sup>341</sup>	39.722 <sup>118</sup>	1.26 <sup>83</sup>	6.595 <sup>128</sup>	28.13 <sup>0</sup>	53.451 <sup>119</sup>	44.53 <sup>75</sup>
Mean Place	18.893	30.85	34.359	14.95	0.668	41.74	48.001	53.23
Sec δ, Tan δ	1.870.	-0.987	1.015	+0.176	1.105	+0.471	1.026	+0.230
D <sub>γ</sub> , D <sub>α</sub>	+0.037.	-0.910	+0.066	+0.002	+0.073	+0.005	+0.067	+0.003
D <sub>β</sub> , D <sub>δ</sub>	-0.06	+0.99	-0.06	+0.99	-0.07	+0.99	-0.07	+0.98

FOR THE UPPER TRANSIT AT WASHINGTON.

Washington Mean Time.	$\gamma^5$ Aurigæ. Mag. 5.3		$\alpha$ Canis Majoris. (Sirius.) Mag. -1.6		18 Monocerotis. Mag. 4.7		43 Camelopardalis. Mag. 5.1	
	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.
	h m 6 40	° ' " +43 39	h m 6 41	° ' " -16 36	h m 6 48	° ' " + 2 29	h m 6 45	° ' " +68 58
	s	"	s	"	s	"	s	"
Jan. 0.5	61.643 <sup>116</sup>	22.12	39.424 <sup>60</sup>	29.24	43.590 <sup>67</sup>	54.31	10.72	52.00
10.5	61.759 <sup>116</sup>	23.32 <sup>120</sup>	39.484 <sup>14</sup>	31.65 <sup>241</sup>	43.677 <sup>29</sup>	52.96 <sup>185</sup>	10.89	54.59 <sup>250</sup>
20.4	61.809 <sup>50</sup>	24.58 <sup>126</sup>	39.498 <sup>14</sup>	33.88 <sup>223</sup>	43.715 <sup>29</sup>	51.76 <sup>120</sup>	10.94	57.11 <sup>252</sup>
30.4	61.793 <sup>16</sup>	25.85 <sup>127</sup>	39.462 <sup>26</sup>	35.91 <sup>208</sup>	43.704 <sup>11</sup>	50.71 <sup>106</sup>	10.85	59.56 <sup>245</sup>
Feb. 9.4	61.714 <sup>79</sup>	27.05 <sup>120</sup>	39.382 <sup>80</sup>	37.63 <sup>173</sup>	43.647 <sup>87</sup>	49.84 <sup>87</sup>	10.64	61.84 <sup>228</sup>
	138	109	132	144	96	97	32	199
19.4	61.576	28.14	39.260	39.07	43.549	49.17	10.32	63.83
29.3	61.391 <sup>185</sup>	29.07 <sup>98</sup>	39.102 <sup>188</sup>	40.18 <sup>111</sup>	43.415 <sup>124</sup>	48.66 <sup>51</sup>	9.92	65.48 <sup>165</sup>
Mar. 10.3	61.172 <sup>219</sup>	29.76 <sup>69</sup>	38.922 <sup>180</sup>	40.98 <sup>80</sup>	43.255 <sup>160</sup>	48.31 <sup>85</sup>	9.43	66.70 <sup>122</sup>
20.3	60.926 <sup>246</sup>	30.22 <sup>46</sup>	38.728 <sup>194</sup>	41.45 <sup>47</sup>	43.080 <sup>175</sup>	48.15 <sup>16</sup>	8.91	67.46 <sup>76</sup>
30.3	60.674 <sup>252</sup>	30.39 <sup>17</sup>	38.529 <sup>199</sup>	41.57 <sup>12</sup>	42.898 <sup>182</sup>	48.13 <sup>2</sup>	8.36	67.73 <sup>27</sup>
	246	9	195	17	177	12	53	23
Apr. 9.2	60.428	30.30	38.334	41.40	42.721	48.25	7.83	67.50
19.2	60.201 <sup>227</sup>	29.93 <sup>37</sup>	38.154 <sup>180</sup>	40.90 <sup>59</sup>	42.559 <sup>162</sup>	48.52 <sup>27</sup>	7.32	66.79 <sup>71</sup>
29.2	60.004 <sup>197</sup>	29.32 <sup>61</sup>	37.998 <sup>156</sup>	40.12 <sup>78</sup>	42.416 <sup>148</sup>	48.93 <sup>41</sup>	6.86	65.63 <sup>116</sup>
May 9.1	59.847 <sup>187</sup>	28.49 <sup>83</sup>	37.870 <sup>128</sup>	39.04 <sup>108</sup>	42.304 <sup>112</sup>	49.47 <sup>54</sup>	6.48	64.07 <sup>156</sup>
19.1	59.737 <sup>110</sup>	27.49 <sup>100</sup>	37.776 <sup>94</sup>	37.71 <sup>133</sup>	42.224 <sup>80</sup>	50.15 <sup>68</sup>	6.19	62.18 <sup>189</sup>
	60	115	80	138	44	79	19	217
29.1	59.677 <sup>6</sup>	26.34	37.717	36.18	42.180	50.94	6.00	60.01
June 8.1	59.671 <sup>6</sup>	25.11 <sup>123</sup>	37.698 <sup>19</sup>	34.42 <sup>176</sup>	42.174 <sup>6</sup>	51.84 <sup>90</sup>	5.90	57.64 <sup>237</sup>
18.0	59.721 <sup>50</sup>	23.81 <sup>130</sup>	37.717 <sup>19</sup>	32.54 <sup>135</sup>	42.208 <sup>34</sup>	52.81 <sup>97</sup>	5.91	55.13 <sup>251</sup>
28.0	59.821 <sup>100</sup>	22.50 <sup>131</sup>	37.778 <sup>61</sup>	30.57 <sup>197</sup>	42.278 <sup>70</sup>	53.85 <sup>104</sup>	6.03	52.58 <sup>253</sup>
July 8.0	59.971 <sup>150</sup>	21.20 <sup>130</sup>	37.875 <sup>97</sup>	28.55 <sup>202</sup>	42.335 <sup>107</sup>	54.93 <sup>108</sup>	6.26	50.03 <sup>256</sup>
	197	126	130	126	126	107	31	249
18.0	60.168	19.94	38.005	26.57	42.523	56.00	6.57	47.54
27.9	60.404 <sup>236</sup>	18.76 <sup>118</sup>	38.170 <sup>165</sup>	24.66 <sup>191</sup>	42.691 <sup>168</sup>	57.02 <sup>202</sup>	6.98	45.16 <sup>238</sup>
Aug. 6.9	60.677 <sup>273</sup>	17.64 <sup>112</sup>	38.361 <sup>191</sup>	22.93 <sup>173</sup>	42.835 <sup>194</sup>	57.96 <sup>94</sup>	7.46	42.97 <sup>219</sup>
16.9	60.983 <sup>306</sup>	16.62 <sup>102</sup>	38.579 <sup>218</sup>	21.41 <sup>152</sup>	43.103 <sup>218</sup>	58.77 <sup>91</sup>	8.01	40.97 <sup>200</sup>
26.8	61.313 <sup>354</sup>	15.71 <sup>91</sup>	38.818 <sup>239</sup>	20.19 <sup>123</sup>	43.340 <sup>237</sup>	59.39 <sup>62</sup>	8.63	39.24 <sup>173</sup>
		81	256	90	254	42	66	146
Sept. 5.8	61.667	14.90	39.074	19.29	43.594	59.81	9.29	37.78
15.8	62.037 <sup>370</sup>	14.22 <sup>68</sup>	39.346 <sup>272</sup>	18.31 <sup>48</sup>	43.861 <sup>267</sup>	59.96 <sup>17</sup>	10.00	36.63 <sup>115</sup>
25.8	62.419 <sup>382</sup>	13.66 <sup>56</sup>	39.622 <sup>276</sup>	18.72 <sup>9</sup>	44.138 <sup>277</sup>	59.89 <sup>9</sup>	10.74	35.82 <sup>81</sup>
Oct. 5.7	62.811 <sup>392</sup>	13.24 <sup>42</sup>	39.909 <sup>287</sup>	19.08 <sup>36</sup>	44.423 <sup>285</sup>	59.52 <sup>37</sup>	11.49	35.36 <sup>46</sup>
15.7	63.206 <sup>392</sup>	12.97 <sup>27</sup>	40.200 <sup>291</sup>	19.91 <sup>83</sup>	44.710 <sup>287</sup>	58.87 <sup>65</sup>	12.25	35.26 <sup>10</sup>
		11	284	124	287	89	75	29
25.7	63.598 <sup>394</sup>	12.86 <sup>7</sup>	40.484 <sup>276</sup>	21.15 <sup>161</sup>	44.997 <sup>290</sup>	57.98 <sup>112</sup>	13.00	35.55 <sup>68</sup>
Nov. 4.7	63.982 <sup>397</sup>	12.93 <sup>37</sup>	40.760 <sup>296</sup>	22.76 <sup>161</sup>	45.277 <sup>270</sup>	56.35 <sup>130</sup>	13.71	36.23 <sup>68</sup>
14.6	64.349 <sup>342</sup>	13.20 <sup>45</sup>	41.020 <sup>241</sup>	24.74 <sup>106</sup>	45.547 <sup>251</sup>	55.55 <sup>144</sup>	14.40	37.30 <sup>107</sup>
24.6	64.691 <sup>307</sup>	13.65 <sup>58</sup>	41.261 <sup>211</sup>	27.02 <sup>226</sup>	45.798 <sup>237</sup>	54.11 <sup>151</sup>	15.03	38.72 <sup>142</sup>
Dec. 4.6	64.998 <sup>265</sup>	14.31 <sup>66</sup>	41.472 <sup>176</sup>	29.39 <sup>202</sup>	46.025 <sup>194</sup>	52.60 <sup>153</sup>	15.59	40.49 <sup>177</sup>
		85	176	202	194	153	47	206
14.5	65.263 <sup>213</sup>	15.16 <sup>102</sup>	41.648 <sup>138</sup>	31.91 <sup>202</sup>	46.219 <sup>187</sup>	51.07 <sup>149</sup>	16.06	42.57 <sup>230</sup>
24.5	65.476 <sup>153</sup>	16.18 <sup>102</sup>	41.786 <sup>138</sup>	34.43 <sup>202</sup>	46.376 <sup>187</sup>	49.56 <sup>149</sup>	16.42	44.87 <sup>230</sup>
34.5	65.629 <sup>153</sup>	17.34 <sup>116</sup>	41.875 <sup>89</sup>	36.92 <sup>249</sup>	46.488 <sup>118</sup>	48.18 <sup>140</sup>	16.66	47.34 <sup>247</sup>
Mean Place	58.609	30.51	37.364	19.36	41.347	62.78	5.310	60.54
Sec $\delta$ , Tan $\delta$	1.382	+0.954	1.044	-0.298	1.001	+0.044	2.783	+2.603
$D_{\delta a}$ , $D_{\delta \omega}$	+0.086	+0.011	+0.053	-0.004	+0.062	+0.001	+0.129	+0.034
$D_{\delta \delta}$ , $D_{\delta \omega}$	-0.07	+0.98	-0.07	+0.98	-0.06	+0.98	-0.06	+0.98

# APPARENT PLACES OF STARS, 1920.

## FOR THE UPPER TRANSIT AT WASHINGTON.

Washington Mean Time.	α Pictoris. Mag. 3.3		θ Geminorum. Mag. 3.6		τ Argus. Mag. 2.8		15 Lynceis. Mag. 4.5	
	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.
	h m 6 47	° ' " -61 51	h m 6 47	° ' " +34 3	h m 6 47	° ' " -50 31	h m 6 50	° ' " +58 31
	s	"	s	"	s	"	s	"
Jan. 0.5	25.55	26.35	33.822	23.60	59.710	16.27	25.348	36.59
10.5	25.54	30.06	33.937	24.20	59.738	19.84	25.500	38.59
20.5	25.43	33.60	33.994	24.90	59.933	23.25	25.562	40.64
30.4	25.24	36.89	33.991	25.65	59.582	26.40	25.593	42.65
Feb. 9.4	24.97	39.81	33.981	26.40	59.407	29.20	25.417	44.56
19.4	24.62	42.84	33.821	27.11	59.178	31.59	25.222	46.28
29.3	24.22	44.39	33.667	27.74	58.903	33.54	24.960	47.70
Mar. 10.3	23.78	45.95	33.480	28.26	58.594	35.00	24.647	48.79
20.3	23.31	46.97	33.272	28.62	58.284	35.95	24.301	49.50
30.3	22.83	47.45	33.056	28.80	57.924	36.38	23.942	49.81
Apr. 9.2	22.35	47.40	32.845	28.80	57.588	36.30	23.585	49.70
19.2	21.90	46.83	32.649	28.63	57.266	35.72	23.250	49.20
29.2	21.47	45.74	32.479	28.30	56.971	34.66	22.952	48.31
May 9.2	21.08	44.18	32.342	27.83	56.710	33.13	22.705	47.09
19.1	20.75	42.17	32.246	27.24	56.491	31.19	22.518	45.58
29.1	20.48	39.78	32.194	26.56	56.320	28.89	22.398	43.83
June 8.1	20.28	37.05	32.189	25.82	56.201	26.27	22.350	41.91
18.0	20.15	34.07	32.230	25.05	56.137	23.40	22.375	39.88
28.0	20.10	30.90	32.317	24.26	56.131	20.36	22.472	37.77
July 8.0	20.12	27.64	32.446	23.49	56.181	17.24	22.637	35.67
18.0	20.22	24.38	32.616	22.73	56.267	14.12	22.969	33.60
27.9	20.40	21.21	32.821	22.00	56.446	11.10	23.160	31.62
Aug. 6.9	20.65	18.24	33.057	21.31	56.655	8.27	23.504	29.75
16.9	20.95	15.57	33.322	20.65	56.910	5.74	23.896	28.06
26.9	21.32	13.30	33.609	20.02	57.206	3.59	24.328	26.54
Sept. 5.8	21.74	11.49	33.917	19.43	57.536	1.90	24.793	25.22
15.8	22.21	10.24	34.241	18.86	57.906	0.76	25.267	24.15
25.8	22.70	9.60	34.576	18.33	58.275	0.20	25.802	23.33
Oct. 5.7	23.20	9.62	34.921	17.84	58.666	0.29	26.329	22.78
15.7	23.71	10.29	35.270	17.40	59.080	1.00	26.863	22.52
25.7	24.20	11.62	35.619	17.03	59.448	2.35	27.395	22.55
Nov. 4.7	24.67	13.56	35.962	16.76	59.819	4.29	27.915	22.90
14.6	25.10	16.06	36.292	16.60	60.161	6.76	28.411	23.57
24.6	25.47	19.02	36.601	16.56	60.465	9.67	28.872	24.55
Dec. 4.6	25.77	22.35	36.883	16.66	60.721	12.92	29.287	25.83
14.6	25.99	25.94	37.126	16.93	60.922	16.42	29.642	27.38
24.5	26.13	29.67	37.325	17.33	61.067	20.03	29.925	29.16
34.5	26.17	33.40	37.472	17.88	61.127	23.64	30.127	31.10
Mean Place	22.328	19.53	31.119	32.51	57.950	9.12	21.421	45.68
Sec δ, Tan δ	2.120	-1.870	1.207	+0.676	1.573	-1.214	1.915	+1.634
D <sub>α</sub> , D <sub>δ</sub>	+0.013	-0.023	+0.073	+0.009	+0.060	-0.017	+0.103	+0.024
D <sub>γ</sub> , D <sub>ε</sub>	-0.08	+0.08	-0.08	+0.08	-0.08	+0.08	-0.09	+0.08

FOR THE UPPER TRANSIT AT WASHINGTON.

Washington Mean Time.	θ Canis Majoris. Mag. 4.2		ε Canis Majoris. Mag. 1.6		ζ Geminaorum. Var. 3.7-4.3		ο² Canis Majoris. Mag. 3.1	
	Right Ascension.	Declination.	Right Ascension.	Declination.	Right Ascension.	Declination.	Right Ascension.	Declination.
	h m	° '	h m	° '	h m	° '	h m	° '
	6 50	-11 56	6 55	-28 51	6 59	+20 41	6 59	-23 42
	s	"	s	"	s	"	s	"
Jan. 0.5	30.609 <sup>81</sup>	22.64 <sup>218</sup>	31.158 <sup>70</sup>	52.09 <sup>207</sup>	24.345 <sup>114</sup>	10.25 <sup>26</sup>	43.267 <sup>81</sup>	63.48 <sup>277</sup>
10.5	30.690 <sup>84</sup>	24.82 <sup>202</sup>	31.228 <sup>17</sup>	55.06 <sup>283</sup>	24.459 <sup>66</sup>	9.99 <sup>15</sup>	43.348 <sup>29</sup>	66.25 <sup>261</sup>
20.5	30.724 <sup>17</sup>	26.84 <sup>182</sup>	31.245 <sup>37</sup>	57.89 <sup>268</sup>	24.525 <sup>8</sup>	9.84 <sup>1</sup>	43.377 <sup>23</sup>	68.86 <sup>230</sup>
30.4	30.707 <sup>64</sup>	28.66 <sup>157</sup>	31.208 <sup>85</sup>	60.47 <sup>298</sup>	24.533 <sup>39</sup>	9.83 <sup>5</sup>	43.354 <sup>72</sup>	71.25 <sup>210</sup>
Feb. 9.4	30.643 <sup>106</sup>	30.23 <sup>130</sup>	31.123 <sup>183</sup>	62.75 <sup>196</sup>	24.494 <sup>39</sup>	9.88 <sup>14</sup>	43.282 <sup>116</sup>	73.35 <sup>179</sup>
19.4	30.537 <sup>140</sup>	31.53 <sup>101</sup>	30.991 <sup>170</sup>	64.71 <sup>164</sup>	24.405 <sup>137</sup>	10.02 <sup>18</sup>	43.166 <sup>154</sup>	75.14 <sup>145</sup>
29.3	30.397 <sup>167</sup>	32.54 <sup>73</sup>	30.821 <sup>198</sup>	66.25 <sup>116</sup>	24.278 <sup>169</sup>	10.20 <sup>20</sup>	43.012 <sup>182</sup>	76.59 <sup>107</sup>
Mar. 10.3	30.230 <sup>185</sup>	33.27 <sup>48</sup>	30.623 <sup>215</sup>	67.41 <sup>77</sup>	24.119 <sup>178</sup>	10.40 <sup>18</sup>	42.830 <sup>201</sup>	77.66 <sup>69</sup>
20.3	30.045 <sup>191</sup>	33.70 <sup>15</sup>	30.408 <sup>222</sup>	68.18 <sup>33</sup>	23.941 <sup>189</sup>	10.58 <sup>15</sup>	42.629 <sup>210</sup>	78.35 <sup>32</sup>
30.3	29.854 <sup>188</sup>	33.85 <sup>13</sup>	30.186 <sup>234</sup>	68.51 <sup>8</sup>	23.752 <sup>183</sup>	10.73 <sup>11</sup>	42.419 <sup>208</sup>	78.67 <sup>4</sup>
Apr. 9.2	29.666 <sup>176</sup>	33.72 <sup>41</sup>	29.962 <sup>209</sup>	68.43 <sup>47</sup>	23.569 <sup>176</sup>	10.84 <sup>11</sup>	42.211 <sup>198</sup>	78.63 <sup>43</sup>
19.2	29.490 <sup>155</sup>	33.31 <sup>67</sup>	29.753 <sup>189</sup>	67.96 <sup>86</sup>	23.393 <sup>183</sup>	10.95 <sup>2</sup>	42.013 <sup>178</sup>	78.20 <sup>77</sup>
29.2	29.335 <sup>128</sup>	32.64 <sup>92</sup>	29.544 <sup>164</sup>	67.10 <sup>124</sup>	23.240 <sup>194</sup>	10.97 <sup>1</sup>	41.835 <sup>152</sup>	77.43 <sup>111</sup>
May 9.2	29.207 <sup>96</sup>	31.72 <sup>117</sup>	29.400 <sup>139</sup>	65.86 <sup>183</sup>	23.116 <sup>92</sup>	10.98 <sup>3</sup>	41.683 <sup>130</sup>	76.32 <sup>141</sup>
19.1	29.111 <sup>61</sup>	30.55 <sup>183</sup>	29.271 <sup>95</sup>	64.33 <sup>187</sup>	23.024 <sup>52</sup>	10.95 <sup>4</sup>	41.563 <sup>85</sup>	74.91 <sup>169</sup>
29.1	29.050 <sup>28</sup>	29.22 <sup>163</sup>	29.176 <sup>53</sup>	62.46 <sup>211</sup>	22.972 <sup>11</sup>	10.91 <sup>2</sup>	41.478 <sup>47</sup>	73.22 <sup>191</sup>
June 8.1	29.027 <sup>16</sup>	27.69 <sup>167</sup>	29.123 <sup>12</sup>	60.35 <sup>231</sup>	22.961 <sup>26</sup>	10.89 <sup>3</sup>	41.431 <sup>7</sup>	71.31 <sup>212</sup>
18.0	29.043 <sup>33</sup>	26.02 <sup>176</sup>	29.111 <sup>28</sup>	58.04 <sup>245</sup>	22.987 <sup>66</sup>	10.86 <sup>3</sup>	41.424 <sup>33</sup>	69.19 <sup>233</sup>
28.0	29.096 <sup>89</sup>	24.26 <sup>181</sup>	29.139 <sup>70</sup>	55.59 <sup>260</sup>	23.053 <sup>165</sup>	10.83 <sup>2</sup>	41.457 <sup>71</sup>	66.96 <sup>232</sup>
July 8.0	29.185 <sup>123</sup>	22.45 <sup>180</sup>	29.209 <sup>107</sup>	53.09 <sup>262</sup>	23.158 <sup>140</sup>	10.81 <sup>2</sup>	41.528 <sup>106</sup>	64.64 <sup>231</sup>
18.0	29.308 <sup>154</sup>	20.65 <sup>172</sup>	29.316 <sup>145</sup>	50.57 <sup>243</sup>	23.298 <sup>171</sup>	10.79 <sup>4</sup>	41.634 <sup>142</sup>	62.33 <sup>224</sup>
27.9	29.462 <sup>183</sup>	18.93 <sup>180</sup>	29.461 <sup>180</sup>	48.14 <sup>227</sup>	23.469 <sup>207</sup>	10.75 <sup>6</sup>	41.776 <sup>174</sup>	60.09 <sup>208</sup>
Aug. 6.9	29.645 <sup>207</sup>	17.33 <sup>160</sup>	29.641 <sup>206</sup>	45.87 <sup>205</sup>	23.669 <sup>220</sup>	10.69 <sup>13</sup>	41.950 <sup>203</sup>	58.01 <sup>188</sup>
16.9	29.852 <sup>229</sup>	15.93 <sup>116</sup>	29.847 <sup>237</sup>	43.82 <sup>172</sup>	23.896 <sup>245</sup>	10.56 <sup>15</sup>	42.153 <sup>227</sup>	56.13 <sup>186</sup>
26.9	30.081 <sup>247</sup>	14.77 <sup>86</sup>	30.084 <sup>261</sup>	42.10 <sup>184</sup>	24.142 <sup>267</sup>	10.41 <sup>26</sup>	42.380 <sup>251</sup>	54.57 <sup>121</sup>
Sept. 5.8	30.323 <sup>263</sup>	13.91 <sup>50</sup>	30.345 <sup>278</sup>	40.76 <sup>85</sup>	24.409 <sup>282</sup>	10.16 <sup>32</sup>	42.631 <sup>268</sup>	53.36 <sup>78</sup>
15.8	30.591 <sup>276</sup>	13.41 <sup>10</sup>	30.623 <sup>295</sup>	39.91 <sup>96</sup>	24.691 <sup>295</sup>	9.84 <sup>45</sup>	42.899 <sup>282</sup>	52.58 <sup>31</sup>
25.8	30.866 <sup>283</sup>	13.31 <sup>30</sup>	30.918 <sup>305</sup>	39.55 <sup>14</sup>	24.986 <sup>306</sup>	9.89 <sup>82</sup>	43.182 <sup>294</sup>	52.27 <sup>18</sup>
Oct. 5.7	31.149 <sup>288</sup>	13.61 <sup>70</sup>	31.223 <sup>308</sup>	39.69 <sup>70</sup>	25.292 <sup>312</sup>	8.87 <sup>68</sup>	43.476 <sup>300</sup>	52.45 <sup>66</sup>
15.7	31.437 <sup>286</sup>	14.31 <sup>109</sup>	31.562 <sup>308</sup>	40.39 <sup>128</sup>	25.604 <sup>313</sup>	8.24 <sup>68</sup>	43.776 <sup>300</sup>	53.13 <sup>117</sup>
25.7	31.723 <sup>261</sup>	15.40 <sup>146</sup>	31.840 <sup>291</sup>	41.62 <sup>171</sup>	25.917 <sup>316</sup>	7.56 <sup>74</sup>	44.076 <sup>295</sup>	54.30 <sup>163</sup>
Nov. 4.7	32.004 <sup>270</sup>	16.86 <sup>177</sup>	32.141 <sup>286</sup>	43.33 <sup>211</sup>	26.227 <sup>303</sup>	6.82 <sup>75</sup>	44.371 <sup>283</sup>	55.92 <sup>203</sup>
14.6	32.274 <sup>264</sup>	18.63 <sup>201</sup>	32.427 <sup>264</sup>	45.44 <sup>261</sup>	26.529 <sup>285</sup>	6.07 <sup>71</sup>	44.654 <sup>289</sup>	57.95 <sup>236</sup>
24.6	32.524 <sup>230</sup>	20.64 <sup>218</sup>	32.691 <sup>231</sup>	47.95 <sup>278</sup>	26.814 <sup>261</sup>	5.36 <sup>67</sup>	44.913 <sup>234</sup>	60.31 <sup>263</sup>
Dec. 4.6	32.749 <sup>182</sup>	22.82 <sup>237</sup>	32.922 <sup>183</sup>	50.73 <sup>265</sup>	27.075 <sup>227</sup>	4.70 <sup>85</sup>	45.147 <sup>198</sup>	62.93 <sup>276</sup>
14.6	32.940 <sup>183</sup>	25.09 <sup>229</sup>	33.115 <sup>182</sup>	53.68 <sup>284</sup>	27.302 <sup>190</sup>	4.13 <sup>45</sup>	45.345 <sup>157</sup>	65.69 <sup>282</sup>
24.5	33.093 <sup>168</sup>	27.38 <sup>234</sup>	33.267 <sup>160</sup>	56.72 <sup>300</sup>	27.492 <sup>145</sup>	3.68 <sup>33</sup>	45.502 <sup>110</sup>	68.52 <sup>261</sup>
34.5	33.201 <sup>108</sup>	29.62 <sup>294</sup>	33.367 <sup>100</sup>	59.72 <sup>300</sup>	27.637 <sup>145</sup>	3.35 <sup>33</sup>	45.612 <sup>110</sup>	71.33 <sup>261</sup>
Mean Place	28.411	14.39	28.889	44.49	21.923	19.65	41.085	56.74
Sec δ, Tan δ	1.022	-0.211	1.142	-0.551	1.069	+0.378	1.092	-0.439
D <sub>pa</sub> , D <sub>wa</sub>	+0.056	-0.008	+0.047	-0.009	+0.071	+0.007	+0.050	-0.008
D <sub>pd</sub> , D <sub>wd</sub>	-0.09	+0.98	-0.10	+0.97	-0.10	+0.97	-0.10	+0.97

# APPARENT PLACES OF STARS, 1920.

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FOR THE UPPER TRANSIT AT WASHINGTON.

Washington Mean Time.	γ Canis Majoris. Mag. 4.1		δ Canis Majoris. Mag. 2.0		63 Auriga. Mag. 5.1		51 Geminorum. Mag. 5.3	
	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.
	h m 7 0	° ' " -15 30	h m 7 5	° ' " -26 15	h m 7 6	° ' " +39 26	h m 7 8	° ' " +16 17
	s	"	s	"	s	"	s	"
Jan. 0.5	10.567 <sup>88</sup>	58.99 <sup>238</sup>	10.498 <sup>89</sup>	62.71 <sup>291</sup>	12.206 <sup>142</sup>	58.30 <sup>88</sup>	49.104 <sup>122</sup>	35.44 <sup>58</sup>
10.5	10.665 <sup>86</sup>	61.37 <sup>238</sup>	10.580 <sup>88</sup>	65.62 <sup>291</sup>	12.348 <sup>81</sup>	59.18 <sup>88</sup>	49.226 <sup>71</sup>	34.86 <sup>44</sup>
20.5	10.693 <sup>86</sup>	63.60 <sup>223</sup>	10.613 <sup>88</sup>	68.37 <sup>275</sup>	12.429 <sup>18</sup>	60.18 <sup>100</sup>	49.297 <sup>17</sup>	34.42 <sup>28</sup>
30.4	10.680 <sup>13</sup>	65.63 <sup>208</sup>	10.590 <sup>26</sup>	70.89 <sup>252</sup>	12.447 <sup>18</sup>	61.24 <sup>100</sup>	49.314 <sup>17</sup>	34.14 <sup>28</sup>
Feb. 9.4	10.621 <sup>80</sup>	67.40 <sup>177</sup>	10.519 <sup>71</sup>	73.14 <sup>286</sup>	12.400 <sup>47</sup>	62.32 <sup>108</sup>	49.283 <sup>31</sup>	33.96 <sup>18</sup>
19.4	10.517 <sup>104</sup>	68.89 <sup>140</sup>	10.403 <sup>116</sup>	75.06 <sup>108</sup>	12.297 <sup>108</sup>	63.36 <sup>104</sup>	49.204 <sup>79</sup>	33.91 <sup>5</sup>
29.4	10.379 <sup>126</sup>	70.07 <sup>118</sup>	10.247 <sup>156</sup>	76.60 <sup>154</sup>	12.145 <sup>188</sup>	64.29 <sup>93</sup>	49.086 <sup>118</sup>	33.94 <sup>8</sup>
Mar. 10.3	10.212 <sup>167</sup>	70.94 <sup>87</sup>	10.063 <sup>194</sup>	77.78 <sup>138</sup>	11.955 <sup>190</sup>	65.07 <sup>78</sup>	48.936 <sup>150</sup>	34.01 <sup>7</sup>
20.3	10.027 <sup>185</sup>	71.51 <sup>57</sup>	9.857 <sup>206</sup>	78.57 <sup>79</sup>	11.738 <sup>247</sup>	65.66 <sup>59</sup>	48.765 <sup>171</sup>	34.13 <sup>12</sup>
30.3	9.833 <sup>194</sup>	71.73 <sup>22</sup>	9.642 <sup>215</sup>	78.96 <sup>89</sup>	11.508 <sup>290</sup>	66.08 <sup>37</sup>	48.584 <sup>181</sup>	34.27 <sup>14</sup>
Apr. 9.2	9.642 <sup>191</sup>	71.64 <sup>9</sup>	9.428 <sup>214</sup>	78.96 <sup>0</sup>	11.278 <sup>280</sup>	66.08 <sup>13</sup>	48.584 <sup>182</sup>	34.27 <sup>15</sup>
19.2	9.460 <sup>183</sup>	71.27 <sup>87</sup>	9.224 <sup>204</sup>	78.57 <sup>39</sup>	11.061 <sup>317</sup>	66.16 <sup>10</sup>	48.402 <sup>172</sup>	34.42 <sup>14</sup>
29.2	9.298 <sup>162</sup>	70.59 <sup>68</sup>	9.096 <sup>188</sup>	77.81 <sup>76</sup>	11.061 <sup>194</sup>	66.06 <sup>83</sup>	48.230 <sup>152</sup>	34.56 <sup>16</sup>
May 9.2	9.161 <sup>197</sup>	69.64 <sup>95</sup>	8.877 <sup>189</sup>	76.70 <sup>111</sup>	10.867 <sup>161</sup>	65.73 <sup>88</sup>	48.073 <sup>126</sup>	34.72 <sup>14</sup>
19.1	9.055 <sup>105</sup>	68.43 <sup>123</sup>	8.749 <sup>188</sup>	75.27 <sup>143</sup>	10.706 <sup>121</sup>	65.21 <sup>88</sup>	47.952 <sup>94</sup>	34.86 <sup>17</sup>
29.1	8.983 <sup>72</sup>	67.00 <sup>143</sup>	8.582 <sup>96</sup>	73.56 <sup>171</sup>	10.585 <sup>76</sup>	64.49 <sup>85</sup>	47.858 <sup>59</sup>	35.03 <sup>16</sup>
June 8.1	8.948 <sup>25</sup>	65.88 <sup>162</sup>	8.553 <sup>86</sup>	73.56 <sup>196</sup>	10.509 <sup>39</sup>	63.64 <sup>97</sup>	47.799 <sup>19</sup>	35.19 <sup>19</sup>
18.1	8.952 <sup>4</sup>	63.59 <sup>179</sup>	8.507 <sup>15</sup>	71.58 <sup>218</sup>	10.480 <sup>19</sup>	62.67 <sup>106</sup>	47.780 <sup>17</sup>	35.38 <sup>20</sup>
28.0	8.993 <sup>41</sup>	61.70 <sup>189</sup>	8.582 <sup>22</sup>	69.40 <sup>263</sup>	10.499 <sup>68</sup>	61.61 <sup>110</sup>	47.797 <sup>57</sup>	35.58 <sup>21</sup>
July 8.0	9.070 <sup>77</sup>	59.74 <sup>196</sup>	8.604 <sup>98</sup>	67.07 <sup>241</sup>	10.567 <sup>113</sup>	60.51 <sup>113</sup>	47.854 <sup>92</sup>	35.79 <sup>22</sup>
18.0	9.132 <sup>112</sup>	57.79 <sup>196</sup>	8.667 <sup>102</sup>	64.66 <sup>241</sup>	10.680 <sup>157</sup>	59.38 <sup>114</sup>	47.946 <sup>127</sup>	36.01 <sup>20</sup>
27.9	9.327 <sup>145</sup>	55.90 <sup>180</sup>	8.769 <sup>134</sup>	62.25 <sup>284</sup>	10.837 <sup>198</sup>	58.24 <sup>112</sup>	48.073 <sup>156</sup>	36.21 <sup>18</sup>
Aug. 6.9	9.499 <sup>173</sup>	54.14 <sup>176</sup>	8.903 <sup>170</sup>	59.91 <sup>219</sup>	11.033 <sup>261</sup>	57.12 <sup>108</sup>	48.231 <sup>188</sup>	36.39 <sup>14</sup>
16.9	9.700 <sup>201</sup>	52.59 <sup>155</sup>	9.073 <sup>197</sup>	57.72 <sup>197</sup>	11.264 <sup>304</sup>	56.04 <sup>106</sup>	48.419 <sup>211</sup>	36.58 <sup>7</sup>
26.9	9.923 <sup>244</sup>	51.80 <sup>120</sup>	9.270 <sup>228</sup>	55.75 <sup>189</sup>	11.528 <sup>300</sup>	54.99 <sup>99</sup>	48.630 <sup>234</sup>	36.60 <sup>4</sup>
Sept. 5.8	10.167 <sup>262</sup>	50.34 <sup>90</sup>	9.498 <sup>261</sup>	54.10 <sup>189</sup>	11.818 <sup>316</sup>	54.00 <sup>94</sup>	48.864 <sup>254</sup>	36.56 <sup>14</sup>
15.8	10.429 <sup>275</sup>	49.74 <sup>18</sup>	9.749 <sup>269</sup>	52.81 <sup>85</sup>	12.134 <sup>335</sup>	53.06 <sup>87</sup>	49.118 <sup>270</sup>	36.42 <sup>28</sup>
25.8	10.704 <sup>275</sup>	49.56 <sup>18</sup>	10.018 <sup>287</sup>	51.96 <sup>39</sup>	12.469 <sup>353</sup>	52.19 <sup>79</sup>	49.388 <sup>285</sup>	36.14 <sup>40</sup>
Oct. 5.8	10.969 <sup>285</sup>	49.81 <sup>26</sup>	10.305 <sup>286</sup>	51.57 <sup>10</sup>	12.822 <sup>364</sup>	51.40 <sup>69</sup>	49.673 <sup>295</sup>	35.74 <sup>55</sup>
15.7	11.280 <sup>291</sup>	50.50 <sup>111</sup>	10.603 <sup>304</sup>	51.87 <sup>67</sup>	13.186 <sup>373</sup>	50.71 <sup>60</sup>	49.968 <sup>304</sup>	35.19 <sup>69</sup>
25.7	11.571 <sup>291</sup>	51.61 <sup>111</sup>	10.907 <sup>305</sup>	52.34 <sup>116</sup>	13.559 <sup>376</sup>	50.11 <sup>47</sup>	50.272 <sup>306</sup>	34.50 <sup>80</sup>
Nov. 4.7	11.858 <sup>287</sup>	53.12 <sup>151</sup>	11.218 <sup>301</sup>	53.50 <sup>164</sup>	13.935 <sup>372</sup>	49.64 <sup>32</sup>	50.573 <sup>305</sup>	33.70 <sup>89</sup>
14.6	12.133 <sup>275</sup>	54.97 <sup>188</sup>	11.514 <sup>301</sup>	55.14 <sup>206</sup>	14.307 <sup>363</sup>	49.32 <sup>15</sup>	50.883 <sup>298</sup>	32.81 <sup>95</sup>
24.6	12.361 <sup>288</sup>	57.09 <sup>212</sup>	11.800 <sup>286</sup>	57.20 <sup>241</sup>	14.669 <sup>348</sup>	49.17 <sup>4</sup>	51.181 <sup>262</sup>	31.86 <sup>97</sup>
Dec. 4.6	12.801 <sup>282</sup>	59.42 <sup>283</sup>	12.067 <sup>297</sup>	59.61 <sup>267</sup>	15.012 <sup>315</sup>	49.21 <sup>24</sup>	51.463 <sup>261</sup>	30.89 <sup>93</sup>
14.6	12.623 <sup>200</sup>	60.42 <sup>268</sup>	12.308 <sup>241</sup>	62.28 <sup>268</sup>	15.327 <sup>278</sup>	49.45 <sup>43</sup>	51.724 <sup>231</sup>	29.86 <sup>87</sup>
24.5	12.923 <sup>181</sup>	61.85 <sup>247</sup>	12.511 <sup>162</sup>	65.14 <sup>268</sup>	15.605 <sup>251</sup>	49.88 <sup>64</sup>	51.955 <sup>193</sup>	29.09 <sup>76</sup>
34.5	12.964 <sup>116</sup>	64.32 <sup>244</sup>	12.673 <sup>113</sup>	68.07 <sup>268</sup>	15.836 <sup>178</sup>	50.52 <sup>81</sup>	52.148 <sup>149</sup>	28.33 <sup>64</sup>
34.5	13.100 <sup>116</sup>	66.76 <sup>244</sup>	12.786 <sup>113</sup>	70.89 <sup>268</sup>	16.014 <sup>178</sup>	51.83 <sup>81</sup>	52.297 <sup>149</sup>	27.69 <sup>64</sup>
Mean Place	8.364	50.90	8.246	55.21	9.387	68.59	46.761	45.10
Sec δ, Tan δ	1.038	-0.278	1.115	-0.494	1.295	+0.823	1.042	+0.292
D <sub>γ</sub> , D <sub>δ</sub>	+0.054	-0.095	+0.049	-0.099	+0.083	+0.016	+0.069	+0.066
D <sub>γ</sub> , D <sub>δ</sub>	-0.19	+0.97	-0.11	+0.96	-0.11	+0.96	-0.12	+0.96

APPARENT PLACES OF STARS, 1920.

FOR THE UPPER TRANSIT AT WASHINGTON.

Washington Mean Time.	$\gamma^2$ Volantis. Mag. 3.9		$\lambda$ Geminorum. Mag. 3.6		$\pi$ Argus. Mag. 2.7		$\delta$ Geminorum. Mag. 3.5	
	Right Ascension.	Declination.	Right Ascension.	Declination.	Right Ascension.	Declination.	Right Ascension.	Declination.
	h m 7 9	° ' " -70 22	h m 7 18	° ' " +16 40	h m 7 14	° ' " -36 57	h m 7 15	° ' " +22 7
Jan. 0.5	29.98	14.50	32.181	58.87	21.415	18.72	23.252	40.68
10.5	29.98	18.30	32.288	58.90	21.500	22.06	23.365	40.45
20.5	29.85	21.98	32.364	57.88	21.525	25.23	23.466	40.39
30.4	29.60	25.47	32.387	57.61	21.492	28.19	23.494	40.43
Feb. 9.4	29.24	28.67	32.359	57.47	21.405	30.96	23.467	40.58
19.4	28.77	31.49	32.284	57.43	21.287	33.19	23.392	40.81
29.4	28.22	33.89	32.168	57.47	21.087	35.12	23.275	41.10
Mar. 10.3	27.61	35.81	32.021	57.58	20.875	36.63	23.124	41.39
20.3	26.95	37.22	31.851	57.72	20.689	37.70	22.949	41.67
30.3	26.27	38.10	31.670	57.88	20.391	38.32	22.762	41.91
Apr. 9.3	25.58	38.44	31.488	58.04	20.142	38.47	22.576	42.08
19.2	24.90	38.25	31.315	58.20	19.901	38.18	22.398	42.19
29.2	24.25	37.54	31.162	58.36	19.678	37.44	22.238	42.28
May 9.2	23.66	36.30	31.034	58.50	19.481	36.29	22.105	42.29
19.1	23.12	34.61	30.936	58.65	19.313	34.77	22.003	42.25
29.1	22.66	32.49	30.876	58.81	19.185	32.87	21.938	42.17
June 8.1	22.29	29.99	30.851	58.97	19.095	30.67	21.911	42.07
18.1	22.01	27.18	30.865	59.15	19.048	28.24	21.924	41.95
28.0	21.83	24.14	30.916	59.33	19.044	25.62	21.976	41.82
July 8.0	21.76	20.95	31.005	59.51	19.064	22.88	22.066	41.69
18.0	21.80	17.69	31.128	59.68	19.167	20.13	22.190	41.54
28.0	21.95	14.47	31.282	59.82	19.290	17.43	22.348	41.36
Aug. 6.9	22.20	11.39	31.464	59.91	19.454	14.86	22.565	41.15
16.9	22.56	8.55	31.673	59.94	19.652	12.54	22.749	40.88
26.9	23.00	6.06	31.903	59.87	19.884	10.53	22.967	40.55
Sept. 5.8	23.53	4.02	32.155	59.68	20.145	8.92	23.246	40.16
15.8	24.12	2.49	32.423	59.38	20.483	7.78	23.623	39.68
25.8	24.77	1.53	32.706	58.94	20.740	7.16	23.815	39.11
Oct. 5.8	25.46	1.22	33.001	58.36	21.062	7.10	24.122	38.47
15.7	26.15	1.57	33.305	57.64	21.394	7.63	24.437	37.77
25.7	26.83	2.60	33.612	56.81	21.728	8.75	24.754	36.98
Nov. 4.7	27.48	4.25	33.919	55.90	22.067	10.41	25.073	36.18
14.7	28.08	6.49	34.218	54.94	22.370	12.57	25.384	35.37
24.6	28.61	9.26	34.505	53.97	22.661	15.15	25.682	34.62
Dec. 4.6	29.05	12.44	34.789	53.03	22.919	18.08	25.956	33.94
14.6	29.37	15.94	35.005	52.16	23.188	21.24	26.202	33.36
24.5	29.58	19.63	35.203	51.41	23.398	24.54	26.408	32.93
34.5	29.66	23.41	35.357	50.78	23.527	27.97	26.570	32.62
Mean Place	25.778	9.41	29.822	68.74	19.667	12.12	20.844	50.91
Sec $\delta$ , Tan $\delta$	2.977	-2.804	1.044	+0.800	1.251	-0.752	1.079	+0.407
$D_{\alpha}, D_{\alpha\alpha}$	-0.010	-0.056	+0.069	+0.006	+0.042	+0.016	+0.071	+0.099
$D_{\delta}, D_{\delta\delta}$	-0.12	+0.95	-0.13	+0.95	-0.12	+0.95	-0.12	+0.95



# APPARENT PLACES OF STARS, 1920.

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## FOR THE UPPER TRANSIT AT WASHINGTON.

Washington Mean Time.	♄ Volantis. Mag. 4.0		♊ Geminae. Mag. 3.9		♃ Canis Majoris. Mag. 2.4		Groombridge 1308. Mag. 5.8	
	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.
	h m 7 16	° ' " -87 48	h m 7 20	° ' " +27 57	h m 7 20	° ' " -29 8	h m 7 22	° ' " +68 37
	s	"	s	"	s	"	s	"
Jan. 0.5	56.77	43.87	48.122	19.01	58.170	53.29	39.39	39.45
10.5	56.80	47.69	48.267	19.12	58.269	56.33	39.66	41.83
20.5	56.72	51.42	48.357	19.41	58.314	59.26	39.79	44.33
30.4	56.53	54.95	48.390	19.81	58.305	61.97	39.80	46.86
Feb. 9.4	56.23	58.21	48.368	20.29	58.243	64.41	39.68	49.31
19.4	55.84	61.09	48.293	20.82	58.134	66.52	39.45	51.57
29.4	55.37	63.57	48.174	21.37	57.984	68.28	39.10	53.55
Mar. 10.3	54.85	65.59	48.018	21.88	57.801	69.65	38.68	55.18
20.3	54.28	67.09	47.837	22.32	57.595	70.62	38.20	56.38
30.3	53.68	68.06	47.642	22.66	57.377	71.18	37.68	57.12
Apr. 9.3	53.08	68.50	47.445	22.88	57.157	71.33	37.15	57.87
19.2	52.48	68.40	47.256	22.99	56.945	71.07	36.63	57.13
29.2	51.91	67.77	47.086	22.98	56.747	70.42	36.15	56.41
May 9.2	51.38	66.63	46.941	22.85	56.574	69.40	35.72	55.25
19.1	50.91	65.03	46.831	22.62	56.428	68.04	35.36	53.69
29.1	50.50	62.98	46.758	22.31	56.318	66.36	35.10	51.79
June 8.1	50.17	60.55	46.724	21.93	56.244	64.41	34.92	49.61
18.1	49.92	57.79	46.732	21.50	56.209	62.22	34.84	47.23
28.0	49.76	54.80	46.780	21.03	56.214	59.88	34.86	44.68
July 8.0	49.70	51.62	46.868	20.53	56.258	57.43	34.99	42.07
18.0	49.72	48.39	46.994	20.01	56.340	54.95	35.20	39.43
28.0	49.85	45.16	47.154	19.48	56.460	52.52	35.51	36.85
Aug. 6.9	50.07	42.07	47.344	18.92	56.614	50.21	35.90	34.84
16.9	50.38	39.21	47.564	18.33	56.800	48.12	36.37	31.99
26.9	50.77	36.67	47.809	17.72	57.016	46.32	36.91	29.32
Sept. 5.8	51.23	34.57	48.077	17.07	57.258	44.88	37.50	27.88
15.8	51.76	32.97	48.363	16.37	57.525	43.88	38.15	26.21
25.8	52.34	31.95	48.668	15.65	57.810	43.36	38.84	24.84
Oct. 5.8	52.95	31.56	48.985	14.90	58.111	43.37	39.55	23.80
15.7	53.67	31.83	49.312	14.13	58.421	43.91	40.29	23.13
25.7	54.19	32.77	49.645	13.37	58.735	44.98	41.04	22.85
Nov. 4.7	54.79	34.37	49.978	12.65	59.046	46.56	41.78	22.96
14.7	55.34	36.55	50.306	11.99	59.346	48.59	42.50	23.49
24.6	55.84	39.26	50.619	11.42	59.629	51.01	43.17	24.43
Dec. 4.6	56.26	42.41	50.911	10.98	59.884	53.74	43.79	25.77
14.6	56.57	45.99	51.171	10.69	60.104	56.67	44.33	27.47
24.5	56.79	49.59	51.396	10.56	60.283	59.73	44.77	29.52
34.5	56.89	53.39	51.568	10.60	60.412	62.79	45.11	31.80
Mean Place	52.898	39.15	45.628	29.81	55.892	46.37	34.327	51.59
Sec δ, Tan δ	2.648	-2.452	1.182	+0.531	1.145	-0.558	2.744	+2.555
D <sub>α</sub> , D <sub>ω</sub>	0.000	-0.054	+0.074	+0.012	+0.047	-0.013	+0.125	+0.060
D <sub>δ</sub> , D <sub>ε</sub>	-0.13	+0.04	-0.14	+0.04	-0.14	+0.04	-0.14	+0.04

APPARENT PLACES OF STARS, 1920.

FOR THE UPPER TRANSIT AT WASHINGTON.

Washington Mean Time.	$\beta$ Canis Minoris. Mag. 3.1		$\rho$ Geminorum. Mag. 4.2		$\sigma$ Argus. Mag. 3.3		$\alpha^2$ Geminorum. (Castor.) Mag. 2.0	
	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.
	h m 7 22	° ' " + 8 26	h m 7 23	° ' " +31 56	h m 7 26	° ' " -43 8	h m 7 29	° ' " +32 3
Jan. 0.5	51.062 <sup>130</sup>	55.85 <sup>110</sup>	60.669 <sup>154</sup>	30.78 <sup>87</sup>	44.007 <sup>96</sup>	25.89 <sup>85</sup>	32.453 <sup>158</sup>	44.43 <sup>35</sup>
10.5	51.192 <sup>78</sup>	54.75 <sup>94</sup>	60.823 <sup>96</sup>	31.15 <sup>51</sup>	44.103 <sup>31</sup>	28.90 <sup>342</sup>	32.611 <sup>104</sup>	44.78 <sup>50</sup>
20.5	51.270 <sup>30</sup>	53.81 <sup>78</sup>	60.919 <sup>38</sup>	31.66 <sup>64</sup>	44.134 <sup>33</sup>	32.82 <sup>321</sup>	32.715 <sup>43</sup>	45.28 <sup>64</sup>
30.5	51.900 <sup>23</sup>	53.03 <sup>63</sup>	60.957 <sup>20</sup>	32.30 <sup>78</sup>	44.101 <sup>92</sup>	35.58 <sup>298</sup>	32.758 <sup>16</sup>	45.92 <sup>72</sup>
Feb. 9.4	51.277 <sup>66</sup>	52.40 <sup>45</sup>	60.937 <sup>74</sup>	33.03 <sup>75</sup>	44.009 <sup>146</sup>	38.46 <sup>200</sup>	32.742 <sup>70</sup>	46.64 <sup>75</sup>
19.4	51.211 <sup>108</sup>	51.95 <sup>30</sup>	60.863 <sup>123</sup>	33.78 <sup>73</sup>	43.863 <sup>194</sup>	41.06 <sup>219</sup>	32.672 <sup>120</sup>	47.39 <sup>78</sup>
29.4	51.103 <sup>140</sup>	51.65 <sup>17</sup>	60.741 <sup>160</sup>	34.51 <sup>66</sup>	43.669 <sup>258</sup>	43.25 <sup>176</sup>	32.552 <sup>157</sup>	48.17 <sup>67</sup>
Mar. 10.3	50.963 <sup>160</sup>	51.48 <sup>4</sup>	60.581 <sup>187</sup>	35.17 <sup>56</sup>	43.438 <sup>258</sup>	45.01 <sup>181</sup>	32.395 <sup>185</sup>	48.84 <sup>58</sup>
20.3	50.803 <sup>175</sup>	51.44 <sup>4</sup>	60.394 <sup>208</sup>	35.73 <sup>43</sup>	43.180 <sup>274</sup>	46.32 <sup>82</sup>	32.210 <sup>200</sup>	49.42 <sup>46</sup>
30.3	50.628 <sup>175</sup>	51.48 <sup>15</sup>	60.192 <sup>205</sup>	36.16 <sup>26</sup>	42.906 <sup>278</sup>	47.14 <sup>35</sup>	32.010 <sup>303</sup>	49.88 <sup>30</sup>
Apr. 9.3	50.453 <sup>167</sup>	51.63 <sup>22</sup>	59.987 <sup>198</sup>	36.41 <sup>11</sup>	42.628 <sup>272</sup>	47.49 <sup>15</sup>	31.807 <sup>199</sup>	50.18 <sup>14</sup>
19.2	50.286 <sup>152</sup>	51.85 <sup>28</sup>	59.789 <sup>180</sup>	36.52 <sup>5</sup>	42.356 <sup>258</sup>	47.84 <sup>61</sup>	31.608 <sup>181</sup>	50.32 <sup>3</sup>
29.2	50.134 <sup>129</sup>	52.13 <sup>37</sup>	59.609 <sup>151</sup>	36.47 <sup>23</sup>	42.100 <sup>232</sup>	46.73 <sup>106</sup>	31.427 <sup>157</sup>	50.29 <sup>19</sup>
May 9.2	50.005 <sup>108</sup>	52.50 <sup>43</sup>	59.458 <sup>118</sup>	36.25 <sup>84</sup>	41.868 <sup>200</sup>	45.67 <sup>146</sup>	31.270 <sup>85</sup>	50.10 <sup>47</sup>
19.2	49.902 <sup>67</sup>	52.93 <sup>50</sup>	59.340 <sup>80</sup>	35.91 <sup>46</sup>	41.668 <sup>164</sup>	44.19 <sup>188</sup>	31.148 <sup>85</sup>	49.79 <sup>31</sup>
29.1	49.835 <sup>33</sup>	53.43 <sup>55</sup>	59.260 <sup>38</sup>	35.45 <sup>56</sup>	41.504 <sup>123</sup>	42.31 <sup>220</sup>	31.063 <sup>46</sup>	49.32 <sup>55</sup>
June 8.1	49.802 <sup>3</sup>	53.98 <sup>60</sup>	59.222 <sup>4</sup>	34.80 <sup>63</sup>	41.381 <sup>78</sup>	40.11 <sup>280</sup>	31.017 <sup>3</sup>	48.77 <sup>65</sup>
18.1	49.805 <sup>39</sup>	54.58 <sup>62</sup>	59.226 <sup>46</sup>	34.26 <sup>70</sup>	41.308 <sup>31</sup>	37.61 <sup>280</sup>	31.014 <sup>41</sup>	48.12 <sup>71</sup>
28.0	49.844 <sup>74</sup>	55.20 <sup>62</sup>	59.272 <sup>68</sup>	33.56 <sup>72</sup>	41.272 <sup>15</sup>	34.90 <sup>286</sup>	31.055 <sup>79</sup>	47.41 <sup>75</sup>
July 8.0	49.918 <sup>106</sup>	55.84 <sup>64</sup>	59.360 <sup>127</sup>	32.84 <sup>76</sup>	41.287 <sup>62</sup>	32.04 <sup>291</sup>	31.134 <sup>118</sup>	46.66 <sup>78</sup>
18.0	50.024 <sup>137</sup>	56.46 <sup>58</sup>	59.487 <sup>163</sup>	32.06 <sup>77</sup>	41.349 <sup>108</sup>	29.13 <sup>288</sup>	31.252 <sup>158</sup>	45.88 <sup>81</sup>
28.0	50.161 <sup>167</sup>	57.04 <sup>51</sup>	59.649 <sup>196</sup>	31.31 <sup>78</sup>	41.457 <sup>152</sup>	26.25 <sup>275</sup>	31.410 <sup>187</sup>	45.07 <sup>82</sup>
Aug. 6.9	50.328 <sup>191</sup>	57.55 <sup>41</sup>	59.845 <sup>226</sup>	30.88 <sup>80</sup>	41.609 <sup>192</sup>	23.50 <sup>254</sup>	31.597 <sup>220</sup>	44.25 <sup>85</sup>
16.9	50.519 <sup>215</sup>	57.96 <sup>28</sup>	60.070 <sup>259</sup>	29.78 <sup>81</sup>	41.802 <sup>233</sup>	20.96 <sup>233</sup>	31.817 <sup>248</sup>	43.40 <sup>87</sup>
26.9	50.734 <sup>234</sup>	58.24 <sup>10</sup>	60.322 <sup>275</sup>	28.92 <sup>81</sup>	42.035 <sup>268</sup>	18.73 <sup>183</sup>	32.065 <sup>271</sup>	42.53 <sup>87</sup>
Sept. 5.9	50.968 <sup>255</sup>	58.34 <sup>9</sup>	60.587 <sup>296</sup>	28.11 <sup>83</sup>	42.308 <sup>298</sup>	16.90 <sup>136</sup>	32.336 <sup>294</sup>	41.66 <sup>89</sup>
15.8	51.223 <sup>270</sup>	58.25 <sup>82</sup>	60.895 <sup>314</sup>	27.28 <sup>83</sup>	42.601 <sup>324</sup>	15.54 <sup>82</sup>	32.630 <sup>311</sup>	40.77 <sup>86</sup>
25.8	51.493 <sup>284</sup>	57.93 <sup>52</sup>	61.209 <sup>326</sup>	26.46 <sup>81</sup>	42.925 <sup>343</sup>	14.72 <sup>22</sup>	32.941 <sup>329</sup>	39.91 <sup>88</sup>
Oct. 5.8	51.777 <sup>298</sup>	57.41 <sup>74</sup>	61.537 <sup>349</sup>	25.65 <sup>79</sup>	43.268 <sup>356</sup>	14.50 <sup>87</sup>	33.270 <sup>338</sup>	39.03 <sup>86</sup>
15.7	52.070 <sup>298</sup>	56.67 <sup>95</sup>	61.877 <sup>347</sup>	24.86 <sup>74</sup>	43.624 <sup>360</sup>	14.87 <sup>98</sup>	33.608 <sup>347</sup>	38.17 <sup>78</sup>
25.7	52.368 <sup>296</sup>	55.72 <sup>111</sup>	62.224 <sup>347</sup>	24.12 <sup>66</sup>	43.964 <sup>354</sup>	15.85 <sup>156</sup>	33.955 <sup>347</sup>	37.39 <sup>72</sup>
Nov. 4.7	52.666 <sup>294</sup>	54.61 <sup>124</sup>	62.571 <sup>341</sup>	23.46 <sup>56</sup>	44.338 <sup>341</sup>	17.43 <sup>212</sup>	34.302 <sup>343</sup>	36.67 <sup>62</sup>
14.7	52.960 <sup>281</sup>	53.37 <sup>133</sup>	62.912 <sup>328</sup>	22.90 <sup>43</sup>	44.679 <sup>318</sup>	19.55 <sup>258</sup>	34.645 <sup>329</sup>	36.05 <sup>47</sup>
24.6	53.241 <sup>280</sup>	52.04 <sup>136</sup>	63.240 <sup>304</sup>	22.47 <sup>26</sup>	44.997 <sup>283</sup>	22.13 <sup>296</sup>	34.974 <sup>310</sup>	35.58 <sup>32</sup>
Dec. 4.6	53.501 <sup>232</sup>	50.68 <sup>134</sup>	63.544 <sup>274</sup>	22.21 <sup>9</sup>	45.286 <sup>240</sup>	25.11 <sup>396</sup>	35.284 <sup>278</sup>	35.26 <sup>18</sup>
14.6	53.733 <sup>197</sup>	49.34 <sup>130</sup>	63.818 <sup>233</sup>	22.12 <sup>9</sup>	45.590 <sup>189</sup>	26.37 <sup>344</sup>	35.562 <sup>238</sup>	35.13 <sup>7</sup>
24.6	53.930 <sup>156</sup>	48.04 <sup>117</sup>	64.051 <sup>184</sup>	22.21 <sup>29</sup>	45.709 <sup>131</sup>	31.81 <sup>351</sup>	35.800 <sup>189</sup>	35.20 <sup>27</sup>
34.5	54.066	46.87	64.235	22.50	45.840	35.32	35.980	35.47
Mean Place	48.815	65.54	58.103	41.97	41.506	19.74	29.900	55.95
Sec $\delta$ , Tan $\delta$	1.011	+0.149	1.178	+0.623	1.371	-0.937	1.180	+0.626
$D_{\alpha}, D_{\delta}$	+0.065	+0.004	+0.077	+0.015	+0.033	-0.023	+0.077	+0.016
$D_{\delta}, D_{\alpha}$	-0.14	+0.94	-0.14	+0.93	-0.15	+0.93	-0.15	+0.92

# APPARENT PLACES OF STARS, 1920.

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## FOR THE UPPER TRANSIT AT WASHINGTON.

Washington Mean Time.	25 Monocerotis. Mag. 5.2		α Canis Minoris. (Procyon.) Mag. 0.5		β Lyncis. Mag. 5.0		α Geminorum. Mag. 3.7	
	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.
	h m 7 33	° ' " - 3 55	h m 7 35	° ' " + 5 25	h m 7 36	° ' " +58 53	h m 7 39	° ' " +24 35
Jan. 0.5	20.187	61.54	9.061	41.04	18.561	43.61	39.640	15.68
10.5	20.316 <sup>129</sup>	63.41 <sup>157</sup>	9.196 <sup>135</sup>	40.28 <sup>136</sup>	18.796 <sup>235</sup>	45.47 <sup>193</sup>	39.801 <sup>161</sup>	15.52 <sup>16</sup>
20.5	20.397 <sup>81</sup>	65.12 <sup>171</sup>	9.279 <sup>83</sup>	39.11 <sup>117</sup>	18.940 <sup>144</sup>	47.50 <sup>203</sup>	39.909 <sup>108</sup>	15.54 <sup>2</sup>
30.5	20.428 <sup>31</sup>	66.65 <sup>153</sup>	9.312 <sup>32</sup>	38.11 <sup>100</sup>	18.991 <sup>51</sup>	49.62 <sup>212</sup>	39.962 <sup>53</sup>	15.73 <sup>19</sup>
Feb. 9.4	20.410 <sup>18</sup>	67.96 <sup>131</sup>	9.298 <sup>14</sup>	37.29 <sup>82</sup>	18.950 <sup>41</sup>	51.71 <sup>209</sup>	39.958 <sup>4</sup>	16.04 <sup>31</sup>
19.4	20.346 <sup>64</sup>	69.04 <sup>108</sup>	9.235 <sup>63</sup>	36.65 <sup>88</sup>	18.821 <sup>129</sup>	53.72 <sup>201</sup>	39.904 <sup>54</sup>	16.43 <sup>39</sup>
29.4	20.241 <sup>106</sup>	69.90 <sup>86</sup>	9.135 <sup>100</sup>	36.22 <sup>43</sup>	18.616 <sup>205</sup>	55.54 <sup>182</sup>	39.803 <sup>101</sup>	16.88 <sup>45</sup>
Mar. 10.4	20.105 <sup>136</sup>	70.52 <sup>62</sup>	8.998 <sup>137</sup>	35.95 <sup>27</sup>	18.346 <sup>270</sup>	57.08 <sup>154</sup>	39.665 <sup>138</sup>	17.34 <sup>46</sup>
20.3	19.945 <sup>160</sup>	70.92 <sup>40</sup>	8.840 <sup>158</sup>	35.80 <sup>15</sup>	18.028 <sup>318</sup>	58.30 <sup>122</sup>	39.498 <sup>167</sup>	17.79 <sup>45</sup>
30.3	19.773 <sup>172</sup>	71.09 <sup>17</sup>	8.667 <sup>173</sup>	35.81 <sup>1</sup>	17.679 <sup>249</sup>	59.13 <sup>83</sup>	39.315 <sup>183</sup>	18.18 <sup>39</sup>
Apr. 9.3	19.596 <sup>177</sup>	71.06 <sup>3</sup>	8.493 <sup>174</sup>	35.93 <sup>12</sup>	17.320 <sup>359</sup>	59.57 <sup>44</sup>	39.127 <sup>188</sup>	18.49 <sup>31</sup>
19.2	19.424 <sup>172</sup>	70.82 <sup>24</sup>	8.324 <sup>169</sup>	36.15 <sup>22</sup>	16.967 <sup>353</sup>	59.58 <sup>1</sup>	38.943 <sup>184</sup>	18.71 <sup>22</sup>
29.2	19.267 <sup>157</sup>	70.40 <sup>42</sup>	8.168 <sup>156</sup>	36.48 <sup>33</sup>	16.636 <sup>331</sup>	59.18 <sup>40</sup>	38.775 <sup>168</sup>	18.84 <sup>13</sup>
May 9.2	19.130 <sup>137</sup>	69.80 <sup>60</sup>	8.037 <sup>131</sup>	36.90 <sup>42</sup>	16.343 <sup>293</sup>	58.39 <sup>79</sup>	38.628 <sup>147</sup>	18.88 <sup>4</sup>
19.2	19.021 <sup>109</sup>	69.02 <sup>78</sup>	7.932 <sup>106</sup>	37.40 <sup>50</sup>	16.099 <sup>244</sup>	57.24 <sup>118</sup>	38.511 <sup>117</sup>	18.84 <sup>4</sup>
29.1	18.942 <sup>79</sup>	68.11 <sup>91</sup>	7.858 <sup>74</sup>	37.97 <sup>57</sup>	15.913 <sup>186</sup>	55.79 <sup>145</sup>	38.428 <sup>83</sup>	18.84 <sup>12</sup>
June 8.1	18.895 <sup>47</sup>	67.05 <sup>106</sup>	7.819 <sup>39</sup>	38.61 <sup>64</sup>	15.790 <sup>123</sup>	54.06 <sup>173</sup>	38.380 <sup>48</sup>	18.72 <sup>19</sup>
18.1	18.884 <sup>11</sup>	65.88 <sup>117</sup>	7.811 <sup>8</sup>	39.31 <sup>70</sup>	15.737 <sup>53</sup>	52.13 <sup>193</sup>	38.372 <sup>8</sup>	18.53 <sup>25</sup>
28.1	18.906 <sup>22</sup>	64.64 <sup>134</sup>	7.841 <sup>30</sup>	40.04 <sup>73</sup>	15.751 <sup>14</sup>	50.03 <sup>210</sup>	38.372 <sup>30</sup>	18.28 <sup>29</sup>
July 8.0	18.963 <sup>57</sup>	63.35 <sup>139</sup>	7.903 <sup>62</sup>	40.80 <sup>76</sup>	15.833 <sup>82</sup>	47.84 <sup>219</sup>	38.402 <sup>67</sup>	17.99 <sup>33</sup>
18.0	19.051 <sup>88</sup>	62.07 <sup>126</sup>	8.000 <sup>97</sup>	41.53 <sup>73</sup>	15.962 <sup>149</sup>	45.60 <sup>224</sup>	38.469 <sup>103</sup>	17.66 <sup>37</sup>
28.0	19.171 <sup>120</sup>	60.82 <sup>125</sup>	8.126 <sup>136</sup>	42.21 <sup>66</sup>	16.194 <sup>212</sup>	43.35 <sup>225</sup>	38.572 <sup>136</sup>	17.29 <sup>41</sup>
Aug. 6.9	19.319 <sup>148</sup>	59.68 <sup>114</sup>	8.282 <sup>156</sup>	42.81 <sup>60</sup>	16.194 <sup>260</sup>	43.35 <sup>225</sup>	38.708 <sup>168</sup>	16.88 <sup>45</sup>
16.9	19.494 <sup>175</sup>	58.67 <sup>104</sup>	8.462 <sup>180</sup>	43.31 <sup>50</sup>	16.463 <sup>324</sup>	41.15 <sup>220</sup>	38.876 <sup>168</sup>	16.43 <sup>51</sup>
26.9	19.695 <sup>201</sup>	57.85 <sup>82</sup>	8.668 <sup>206</sup>	43.63 <sup>22</sup>	16.787 <sup>372</sup>	39.04 <sup>211</sup>	39.071 <sup>195</sup>	15.92 <sup>51</sup>
Sept. 5.9	19.916 <sup>221</sup>	57.28 <sup>57</sup>	8.895 <sup>227</sup>	43.78 <sup>15</sup>	17.159 <sup>415</sup>	37.03 <sup>185</sup>	39.294 <sup>247</sup>	15.35 <sup>57</sup>
15.8	19.916 <sup>241</sup>	57.28 <sup>28</sup>	8.895 <sup>227</sup>	43.78 <sup>7</sup>	17.574 <sup>415</sup>	35.18 <sup>185</sup>	39.541 <sup>247</sup>	14.72 <sup>63</sup>
25.8	20.157 <sup>260</sup>	57.00 <sup>2</sup>	9.139 <sup>244</sup>	43.71 <sup>7</sup>	18.028 <sup>454</sup>	33.52 <sup>166</sup>	39.808 <sup>267</sup>	14.00 <sup>72</sup>
Oct. 5.8	20.417 <sup>280</sup>	57.02 <sup>2</sup>	9.403 <sup>264</sup>	43.39 <sup>32</sup>	18.513 <sup>486</sup>	32.06 <sup>144</sup>	40.094 <sup>286</sup>	13.21 <sup>79</sup>
15.8	20.691 <sup>274</sup>	57.88 <sup>36</sup>	9.680 <sup>277</sup>	42.84 <sup>55</sup>	19.024 <sup>511</sup>	30.89 <sup>119</sup>	40.397 <sup>303</sup>	12.86 <sup>85</sup>
25.7	20.976 <sup>285</sup>	56.07 <sup>69</sup>	9.970 <sup>290</sup>	42.04 <sup>80</sup>	19.564 <sup>530</sup>	29.96 <sup>93</sup>	40.713 <sup>316</sup>	11.46 <sup>90</sup>
Nov. 4.7	21.267 <sup>291</sup>	59.08 <sup>101</sup>	10.264 <sup>294</sup>	41.00 <sup>104</sup>	20.096 <sup>542</sup>	29.36 <sup>60</sup>	41.037 <sup>324</sup>	10.53 <sup>93</sup>
14.7	21.561 <sup>294</sup>	60.39 <sup>131</sup>	10.560 <sup>296</sup>	39.76 <sup>124</sup>	20.638 <sup>542</sup>	29.09 <sup>27</sup>	41.366 <sup>329</sup>	9.59 <sup>94</sup>
24.6	21.850 <sup>289</sup>	61.97 <sup>158</sup>	10.852 <sup>292</sup>	38.36 <sup>140</sup>	21.169 <sup>531</sup>	29.17 <sup>8</sup>	41.691 <sup>325</sup>	8.68 <sup>91</sup>
Dec. 4.6	22.128 <sup>278</sup>	63.73 <sup>176</sup>	11.132 <sup>290</sup>	36.96 <sup>150</sup>	21.680 <sup>511</sup>	29.60 <sup>43</sup>	42.007 <sup>316</sup>	7.85 <sup>83</sup>
14.6	22.387 <sup>259</sup>	65.63 <sup>190</sup>	11.396 <sup>284</sup>	35.29 <sup>157</sup>	22.153 <sup>473</sup>	30.41 <sup>81</sup>	42.303 <sup>296</sup>	7.13 <sup>72</sup>
24.6	22.619 <sup>232</sup>	67.60 <sup>197</sup>	11.631 <sup>235</sup>	33.72 <sup>157</sup>	22.575 <sup>422</sup>	31.57 <sup>116</sup>	42.572 <sup>269</sup>	6.54 <sup>59</sup>
34.5	22.816 <sup>197</sup>	69.57 <sup>197</sup>	11.832 <sup>201</sup>	32.19 <sup>153</sup>	22.936 <sup>361</sup>	33.04 <sup>147</sup>	42.807 <sup>235</sup>	6.11 <sup>43</sup>
Mean Place	18.009	52.68	6.901	51.03	14.854	56.83	37.254	27.21
Sec δ, Tan δ	1.002	-0.069	1.004	+0.095	1.986	+1.657	1.100	+0.458
Dψα, Dωα	+0.060	-0.002	+0.063	+0.003	+0.101	+0.045	+0.072	+0.013
Dψδ, Dωδ	-0.16	+0.92	-0.16	+0.92	-0.16	+0.91	-0.17	+0.91

FOR THE UPPER TRANSIT AT WASHINGTON.

Washington Mean Time.	β Geminorum. (Pollux.) Mag. 1.2		γ Puppis. Mag. 5.1		ε Argus. Mag. 3.5		φ Geminorum. Mag. 5.0	
	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.
	h m 7 40	° ' " +28 12	h m 7 42	° ' " -14 22	h m 7 45	° ' " -24 39	h m 7 48	° ' " +26 58
Jan. 0.5	27.839	62.12	18.026	14.36	58.007	38.02	38.658	14.49
10.5	28.003 <sup>164</sup>	62.17 <sup>5</sup>	18.157 <sup>131</sup>	16.80 <sup>244</sup>	58.137 <sup>180</sup>	38.94 <sup>292</sup>	38.832 <sup>174</sup>	14.45 <sup>4</sup>
20.5	28.114 <sup>111</sup>	62.42 <sup>25</sup>	18.239 <sup>82</sup>	19.10 <sup>290</sup>	58.215 <sup>78</sup>	41.75 <sup>261</sup>	38.951 <sup>119</sup>	14.60 <sup>15</sup>
30.5	28.168 <sup>54</sup>	62.83 <sup>41</sup>	18.271 <sup>32</sup>	21.21 <sup>211</sup>	58.239 <sup>24</sup>	44.37 <sup>262</sup>	39.012 <sup>61</sup>	14.92 <sup>32</sup>
Feb. 9.4	28.162 <sup>6</sup>	63.38 <sup>59</sup>	18.252 <sup>60</sup>	23.10 <sup>189</sup>	58.210 <sup>20</sup>	46.76 <sup>290</sup>	39.019 <sup>7</sup>	15.36 <sup>44</sup>
19.4	28.103	63.93	18.186	24.73	58.134	48.85	38.972	15.90
29.4	28.000 <sup>103</sup>	64.54 <sup>61</sup>	18.079 <sup>107</sup>	26.05 <sup>132</sup>	58.015 <sup>119</sup>	50.61 <sup>176</sup>	38.876 <sup>96</sup>	16.49 <sup>59</sup>
Mar. 10.4	27.858 <sup>142</sup>	65.14 <sup>60</sup>	17.939 <sup>140</sup>	27.08 <sup>103</sup>	57.859 <sup>156</sup>	52.03 <sup>142</sup>	38.739 <sup>127</sup>	17.07 <sup>56</sup>
20.3	27.685 <sup>173</sup>	65.68 <sup>54</sup>	17.774 <sup>165</sup>	27.82 <sup>74</sup>	57.679 <sup>180</sup>	53.07 <sup>164</sup>	38.576 <sup>163</sup>	17.63 <sup>56</sup>
30.3	27.494 <sup>191</sup>	66.14 <sup>46</sup>	17.595 <sup>179</sup>	28.24 <sup>42</sup>	57.483 <sup>196</sup>	53.74 <sup>67</sup>	38.393 <sup>183</sup>	18.11 <sup>48</sup>
Apr. 9.3	27.298	66.50	17.411	28.36	57.281	54.04	38.204	18.48
19.2	27.109 <sup>189</sup>	66.71 <sup>21</sup>	17.230 <sup>181</sup>	28.20 <sup>16</sup>	57.060 <sup>201</sup>	53.96 <sup>8</sup>	38.017 <sup>187</sup>	18.75 <sup>27</sup>
29.2	26.930 <sup>179</sup>	66.82 <sup>11</sup>	17.062 <sup>168</sup>	27.75 <sup>45</sup>	56.893 <sup>187</sup>	53.52 <sup>44</sup>	37.841 <sup>176</sup>	18.90 <sup>15</sup>
May 9.2	26.777 <sup>153</sup>	66.77 <sup>5</sup>	16.912 <sup>150</sup>	27.03 <sup>72</sup>	56.725 <sup>168</sup>	52.73 <sup>79</sup>	37.688 <sup>153</sup>	18.95 <sup>5</sup>
19.2	26.654 <sup>123</sup>	66.61 <sup>16</sup>	16.789 <sup>123</sup>	26.08 <sup>97</sup>	56.580 <sup>145</sup>	51.61 <sup>112</sup>	37.563 <sup>125</sup>	18.86 <sup>9</sup>
29.1	26.563 <sup>91</sup>	66.34 <sup>27</sup>	16.603 <sup>96</sup>	24.87 <sup>119</sup>	56.465 <sup>115</sup>	50.20 <sup>141</sup>	37.472 <sup>91</sup>	18.67 <sup>19</sup>
June 8.1	26.512 <sup>51</sup>	66.02 <sup>32</sup>	16.631 <sup>62</sup>	23.47 <sup>140</sup>	56.384 <sup>81</sup>	48.52 <sup>168</sup>	37.415 <sup>57</sup>	18.40 <sup>27</sup>
18.1	26.502 <sup>10</sup>	65.59 <sup>43</sup>	16.601 <sup>30</sup>	21.90 <sup>157</sup>	56.337 <sup>47</sup>	46.61 <sup>101</sup>	37.398 <sup>17</sup>	18.06 <sup>34</sup>
28.1	26.528 <sup>26</sup>	65.09 <sup>50</sup>	16.609 <sup>8</sup>	20.21 <sup>169</sup>	56.325 <sup>12</sup>	44.54 <sup>207</sup>	37.418 <sup>20</sup>	17.63 <sup>43</sup>
July 8.0	26.594 <sup>66</sup>	64.55 <sup>54</sup>	16.648 <sup>39</sup>	18.45 <sup>176</sup>	56.352 <sup>27</sup>	42.35 <sup>219</sup>	37.478 <sup>60</sup>	17.15 <sup>48</sup>
18.0	26.698	63.98	16.722	16.66	56.413	40.11	37.574	16.63
28.0	26.837 <sup>136</sup>	63.36 <sup>62</sup>	16.827 <sup>106</sup>	14.90 <sup>176</sup>	56.509 <sup>96</sup>	37.89 <sup>322</sup>	37.701 <sup>127</sup>	16.06 <sup>57</sup>
Aug. 6.9	27.006 <sup>169</sup>	62.69 <sup>67</sup>	16.963 <sup>136</sup>	13.23 <sup>167</sup>	56.638 <sup>120</sup>	35.77 <sup>212</sup>	37.861 <sup>160</sup>	15.43 <sup>63</sup>
16.9	27.208 <sup>202</sup>	61.98 <sup>71</sup>	17.127 <sup>164</sup>	11.74 <sup>149</sup>	56.799 <sup>161</sup>	33.82 <sup>195</sup>	38.054 <sup>183</sup>	14.74 <sup>69</sup>
26.9	27.493 <sup>235</sup>	61.23 <sup>75</sup>	17.318 <sup>191</sup>	10.48 <sup>126</sup>	56.991 <sup>192</sup>	32.13 <sup>169</sup>	38.273 <sup>219</sup>	14.01 <sup>73</sup>
Sept. 5.9	27.686	60.44	17.535	9.51	57.209	30.76	38.518	13.22
15.8	27.960 <sup>274</sup>	59.61 <sup>83</sup>	17.773 <sup>238</sup>	8.86 <sup>65</sup>	57.453 <sup>244</sup>	29.78 <sup>98</sup>	38.785 <sup>267</sup>	12.35 <sup>87</sup>
25.8	28.255 <sup>205</sup>	58.71 <sup>90</sup>	18.031 <sup>268</sup>	8.60 <sup>26</sup>	57.720 <sup>267</sup>	29.24 <sup>54</sup>	39.072 <sup>287</sup>	11.45 <sup>90</sup>
Oct. 5.8	28.564 <sup>309</sup>	57.80 <sup>91</sup>	18.306 <sup>275</sup>	8.75 <sup>15</sup>	58.006 <sup>286</sup>	29.18 <sup>6</sup>	39.375 <sup>303</sup>	10.50 <sup>95</sup>
15.8	28.890 <sup>326</sup>	56.86 <sup>94</sup>	18.594 <sup>288</sup>	9.34 <sup>59</sup>	58.306 <sup>300</sup>	29.62 <sup>44</sup>	39.695 <sup>320</sup>	9.50 <sup>100</sup>
25.7	29.224 <sup>334</sup>	55.96 <sup>90</sup>	18.889 <sup>295</sup>	10.10 <sup>101</sup>	58.614 <sup>308</sup>	29.62 <sup>96</sup>	39.995 <sup>332</sup>	8.51 <sup>99</sup>
Nov. 4.7	29.561 <sup>337</sup>	55.07 <sup>89</sup>	19.188 <sup>299</sup>	10.35 <sup>133</sup>	58.814 <sup>311</sup>	30.58 <sup>143</sup>	40.027 <sup>336</sup>	7.54 <sup>97</sup>
14.7	29.895 <sup>334</sup>	54.25 <sup>82</sup>	19.483 <sup>295</sup>	11.73 <sup>178</sup>	58.925 <sup>304</sup>	32.00 <sup>166</sup>	40.363 <sup>333</sup>	6.64 <sup>90</sup>
24.6	30.221 <sup>326</sup>	53.55 <sup>70</sup>	19.768 <sup>285</sup>	13.48 <sup>205</sup>	59.230 <sup>305</sup>	33.86 <sup>225</sup>	40.696 <sup>325</sup>	5.81 <sup>83</sup>
Dec. 4.6	30.526 <sup>305</sup>	52.97 <sup>58</sup>	20.031 <sup>263</sup>	15.53 <sup>227</sup>	59.524 <sup>272</sup>	36.11 <sup>265</sup>	41.021 <sup>308</sup>	5.12 <sup>69</sup>
14.6	30.802	52.97	20.031	17.80	59.796	38.66	41.329	5.12
24.6	31.041 <sup>239</sup>	52.58 <sup>23</sup>	20.267 <sup>201</sup>	17.80 <sup>241</sup>	60.038 <sup>248</sup>	41.48 <sup>268</sup>	41.611 <sup>245</sup>	4.61 <sup>32</sup>
34.5	31.233 <sup>192</sup>	52.35 <sup>1</sup>	20.468 <sup>158</sup>	22.69 <sup>248</sup>	60.241 <sup>150</sup>	44.31 <sup>268</sup>	41.856 <sup>201</sup>	4.29 <sup>32</sup>
34.5	31.233 <sup>192</sup>	52.34	20.626	25.15	60.400	47.23	42.057	4.14 <sup>15</sup>
Mean Place	25.395	73.97	15.853	6.54	55.781	29.37	36.263	26.65
Sec δ, Tan δ	1.135	+0.587	1.032	-0.256	1.100	-0.459	1.122	+0.509
D <sub>φa</sub> , D <sub>ωa</sub>	+0.074	+0.015	+0.055	-0.007	+0.050	-0.014	+0.073	+0.016
D <sub>φδ</sub> , D <sub>ωδ</sub>	-0.17	+0.91	-0.17	+0.90	-0.18	+0.90	-0.18	+0.89

# APPARENT PLACES OF STARS, 1920.

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FOR THE UPPER TRANSIT AT WASHINGTON.

Washington Mean Time.	♁ Lyncis. Mag. 5.7		♁ Groombridge 1374. Mag. 5.6		χ Argus. Mag. 3.6		ω Cancr. Mag. 5.9	
	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.
	h m 7 48	° ' " +47 45	h m 7 50	° ' " +74 7	h m 7 54	° ' " -52 45	h m 7 56	° ' " +25 36
Jan. 0.6	56.627 <sup>215</sup>	70.14	45.10	46.72	47.530 <sup>132</sup>	66.15	7.924 <sup>179</sup>	33.90 <sup>14</sup>
10.5	56.842 <sup>144</sup>	71.35 <sup>121</sup>	45.50 <sup>40</sup>	49.20 <sup>248</sup>	47.662 <sup>57</sup>	69.89 <sup>374</sup>	8.103 <sup>177</sup>	33.76 <sup>3</sup>
20.5	56.986 <sup>72</sup>	72.75 <sup>140</sup>	45.76 <sup>8</sup>	51.87 <sup>267</sup>	47.719 <sup>17</sup>	73.60 <sup>371</sup>	8.290 <sup>69</sup>	33.79 <sup>23</sup>
30.5	57.058 <sup>2</sup>	74.29 <sup>154</sup>	45.84 <sup>9</sup>	54.62 <sup>275</sup>	47.702 <sup>17</sup>	77.18 <sup>356</sup>	8.299 <sup>13</sup>	34.01 <sup>38</sup>
Feb. 9.4	57.056 <sup>72</sup>	75.88 <sup>159</sup>	45.75 <sup>24</sup>	57.35 <sup>259</sup>	47.612 <sup>156</sup>	80.54 <sup>305</sup>	8.312 <sup>39</sup>	34.89 <sup>47</sup>
19.4	56.984	77.47	45.51	59.94	47.456	88.59	8.273	34.86
29.4	56.850 <sup>184</sup>	78.97 <sup>150</sup>	45.12 <sup>29</sup>	62.29 <sup>235</sup>	47.242 <sup>214</sup>	86.27 <sup>268</sup>	8.186 <sup>87</sup>	35.39 <sup>53</sup>
Mar. 10.4	56.663 <sup>187</sup>	80.31 <sup>134</sup>	44.59 <sup>53</sup>	64.30 <sup>301</sup>	46.979 <sup>263</sup>	88.58 <sup>296</sup>	8.059 <sup>127</sup>	35.96 <sup>57</sup>
20.3	56.436 <sup>227</sup>	81.43 <sup>112</sup>	43.98 <sup>61</sup>	65.89 <sup>159</sup>	46.679 <sup>300</sup>	90.33 <sup>180</sup>	7.901 <sup>158</sup>	36.51 <sup>55</sup>
30.3	56.183 <sup>268</sup>	82.28 <sup>85</sup>	43.90 <sup>68</sup>	67.01 <sup>112</sup>	46.354 <sup>325</sup>	91.64 <sup>181</sup>	7.724 <sup>177</sup>	37.01 <sup>50</sup>
Apr. 9.3	55.920	82.82 <sup>54</sup>	42.59	67.61 <sup>71</sup>	46.017	92.45 <sup>81</sup>	7.537 <sup>187</sup>	37.42 <sup>41</sup>
19.3	55.658 <sup>262</sup>	83.03 <sup>21</sup>	41.87 <sup>72</sup>	67.68 <sup>7</sup>	45.679 <sup>338</sup>	92.75 <sup>80</sup>	7.352 <sup>185</sup>	37.74 <sup>32</sup>
29.2	55.413 <sup>245</sup>	82.93 <sup>10</sup>	41.18 <sup>69</sup>	67.23 <sup>45</sup>	45.351 <sup>328</sup>	92.54 <sup>21</sup>	7.178 <sup>174</sup>	37.92 <sup>18</sup>
May 9.2	55.194 <sup>219</sup>	82.52 <sup>41</sup>	40.55 <sup>63</sup>	66.26 <sup>97</sup>	45.044 <sup>307</sup>	91.83 <sup>71</sup>	7.025 <sup>153</sup>	38.03 <sup>11</sup>
19.2	55.011 <sup>188</sup>	81.81 <sup>71</sup>	39.99 <sup>56</sup>	64.85 <sup>141</sup>	44.764 <sup>280</sup>	90.68 <sup>120</sup>	6.899 <sup>126</sup>	38.01 <sup>2</sup>
29.1	54.872 <sup>92</sup>	80.85 <sup>118</sup>	39.54 <sup>24</sup>	63.02 <sup>219</sup>	44.522 <sup>201</sup>	88.99 <sup>205</sup>	6.805 <sup>61</sup>	37.91 <sup>21</sup>
June 8.1	54.780 <sup>40</sup>	79.66 <sup>129</sup>	39.20 <sup>23</sup>	60.83 <sup>247</sup>	44.321 <sup>152</sup>	86.94 <sup>238</sup>	6.744 <sup>23</sup>	37.70 <sup>29</sup>
18.1	54.740 <sup>10</sup>	78.28 <sup>182</sup>	38.97 <sup>10</sup>	58.36 <sup>268</sup>	44.169 <sup>102</sup>	84.56 <sup>269</sup>	6.721 <sup>12</sup>	37.41 <sup>33</sup>
28.1	54.750 <sup>62</sup>	76.76 <sup>164</sup>	38.87 <sup>4</sup>	55.68 <sup>282</sup>	44.067 <sup>47</sup>	81.87 <sup>289</sup>	6.733 <sup>50</sup>	37.08 <sup>40</sup>
July 8.0	54.812 <sup>112</sup>	75.12 <sup>171</sup>	38.91 <sup>16</sup>	52.86 <sup>291</sup>	44.020 <sup>8</sup>	78.98 <sup>302</sup>	6.783 <sup>88</sup>	36.68 <sup>47</sup>
18.0	54.924	73.41	39.07	49.95	44.028	75.96	6.871	36.21
28.0	55.083 <sup>159</sup>	71.67 <sup>174</sup>	39.36 <sup>29</sup>	47.03 <sup>292</sup>	44.092 <sup>64</sup>	72.92 <sup>304</sup>	6.990 <sup>119</sup>	35.71 <sup>50</sup>
Aug. 7.0	55.286 <sup>208</sup>	69.92 <sup>175</sup>	39.76 <sup>40</sup>	44.16 <sup>267</sup>	44.212 <sup>120</sup>	69.92 <sup>300</sup>	7.141 <sup>151</sup>	35.14 <sup>57</sup>
16.9	55.530 <sup>244</sup>	68.19 <sup>173</sup>	40.28 <sup>52</sup>	41.39 <sup>277</sup>	44.386 <sup>174</sup>	67.09 <sup>283</sup>	7.324 <sup>183</sup>	34.48 <sup>66</sup>
26.9	55.809 <sup>279</sup>	66.50 <sup>169</sup>	40.89 <sup>61</sup>	38.80 <sup>259</sup>	44.612 <sup>226</sup>	64.52 <sup>257</sup>	7.533 <sup>209</sup>	33.78 <sup>70</sup>
Sept. 5.9	56.124	64.90	41.59	36.41	44.888	62.31	7.769	33.01
15.8	56.470 <sup>346</sup>	63.37 <sup>153</sup>	42.38 <sup>79</sup>	34.29 <sup>212</sup>	45.207 <sup>319</sup>	60.55 <sup>176</sup>	8.027 <sup>258</sup>	32.16 <sup>85</sup>
25.8	56.842 <sup>373</sup>	61.97 <sup>140</sup>	43.23 <sup>85</sup>	32.47 <sup>182</sup>	45.565 <sup>358</sup>	59.32 <sup>123</sup>	8.308 <sup>281</sup>	31.23 <sup>93</sup>
Oct. 5.8	57.236 <sup>394</sup>	60.71 <sup>126</sup>	44.15 <sup>92</sup>	31.01 <sup>146</sup>	45.954 <sup>389</sup>	58.67 <sup>65</sup>	8.607 <sup>299</sup>	30.23 <sup>100</sup>
15.8	57.649 <sup>413</sup>	59.64 <sup>107</sup>	45.09 <sup>94</sup>	29.93 <sup>108</sup>	46.365 <sup>411</sup>	58.67 <sup>0</sup>	8.919 <sup>312</sup>	29.21 <sup>102</sup>
25.7	58.073	58.76 <sup>88</sup>	46.06 <sup>97</sup>	29.27 <sup>66</sup>	46.787	59.29	9.246 <sup>327</sup>	28.15
Nov. 4.7	58.503 <sup>480</sup>	58.12 <sup>64</sup>	47.03 <sup>97</sup>	29.05 <sup>29</sup>	47.210 <sup>423</sup>	60.57 <sup>128</sup>	9.580 <sup>334</sup>	27.09 <sup>106</sup>
14.7	58.930 <sup>427</sup>	57.74 <sup>38</sup>	47.99 <sup>96</sup>	29.30 <sup>25</sup>	47.621 <sup>411</sup>	62.45 <sup>183</sup>	9.912 <sup>332</sup>	26.09 <sup>100</sup>
24.7	59.344 <sup>414</sup>	57.65 <sup>9</sup>	48.90 <sup>91</sup>	30.02 <sup>72</sup>	48.007 <sup>386</sup>	64.88 <sup>243</sup>	10.238 <sup>326</sup>	25.17 <sup>92</sup>
Dec. 4.6	59.735 <sup>391</sup>	57.36 <sup>21</sup>	49.74 <sup>84</sup>	31.20 <sup>118</sup>	48.356 <sup>349</sup>	67.77 <sup>289</sup>	10.548 <sup>310</sup>	24.37 <sup>80</sup>
14.6	60.090	58.36 <sup>50</sup>	50.50	32.82	48.657	71.03	10.832 <sup>284</sup>	23.74
24.6	60.399 <sup>309</sup>	59.18 <sup>82</sup>	51.15 <sup>65</sup>	34.83 <sup>201</sup>	48.898 <sup>241</sup>	74.56 <sup>363</sup>	11.081 <sup>249</sup>	23.29 <sup>45</sup>
34.5	60.651 <sup>262</sup>	60.26 <sup>108</sup>	51.65 <sup>50</sup>	37.16 <sup>233</sup>	49.073 <sup>175</sup>	78.24	11.289 <sup>208</sup>	23.04 <sup>25</sup>
Mean Place	53.674	83.88	39.003	61.51	44.721	62.77	5.575	46.28
Sec δ, Tan δ	1.488	+1.102	3.657	+3.518	1.653	-1.316	1.109	+0.479
D <sub>♁</sub> α, D <sub>♁</sub> ω	+0.087	+0.034	+0.144	+0.109	+0.031	-0.042	+0.072	+0.016
D <sub>♁</sub> δ, D <sub>♁</sub> ε	-0.18	+0.89	-0.18	+0.89	-0.19	+0.88	-0.19	+0.87

FOR THE UPPER TRANSIT AT WASHINGTON.

Washington Mean Time.	χ Geminorum. Mag. 5.0		γ Lynceis. Mag. 4.9		ρ Argus. Mag. 2.9		δ H. Ursae Majoris. Mag. 5.5	
	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.
	h m 7 58	° ' " +28 0	h m 8 2	° ' " +51 43	h m 8 4	° ' " -24 4	h m 8 4	° ' " +68 42
Jan. 0.6	38.886 <sup>186</sup>	57.99 <sup>2</sup>	30.042 <sup>246</sup>	64.25 <sup>135</sup>	10.899 <sup>180</sup>	28.27 <sup>202</sup>	56.89 <sup>26</sup>	24.81 <sup>219</sup>
10.5	39.072 <sup>180</sup>	57.97 <sup>20</sup>	30.288 <sup>171</sup>	65.60 <sup>159</sup>	10.849 <sup>98</sup>	31.19 <sup>284</sup>	57.25 <sup>26</sup>	27.00 <sup>239</sup>
20.5	39.202 <sup>75</sup>	58.17 <sup>20</sup>	30.459 <sup>98</sup>	67.19 <sup>174</sup>	10.847 <sup>45</sup>	34.03 <sup>284</sup>	57.50 <sup>11</sup>	29.39 <sup>289</sup>
30.5	39.277 <sup>15</sup>	58.53 <sup>36</sup>	30.552 <sup>12</sup>	68.93 <sup>182</sup>	10.892 <sup>9</sup>	36.69 <sup>243</sup>	57.61 <sup>1</sup>	31.93 <sup>254</sup>
Feb. 9.5	39.292 <sup>39</sup>	59.03 <sup>61</sup>	30.564 <sup>69</sup>	70.75 <sup>181</sup>	10.883 <sup>59</sup>	39.12 <sup>214</sup>	57.60 <sup>14</sup>	34.52 <sup>259</sup>
19.4	39.253 <sup>67</sup>	59.64 <sup>66</sup>	30.502 <sup>133</sup>	72.56 <sup>178</sup>	10.624 <sup>100</sup>	41.26 <sup>186</sup>	57.46 <sup>25</sup>	37.01 <sup>280</sup>
29.4	39.166 <sup>129</sup>	60.30 <sup>67</sup>	30.369 <sup>192</sup>	74.29 <sup>186</sup>	10.824 <sup>138</sup>	43.12 <sup>160</sup>	57.21 <sup>35</sup>	39.31 <sup>204</sup>
Mar. 10.4	39.087 <sup>161</sup>	60.97 <sup>64</sup>	30.177 <sup>236</sup>	75.85 <sup>138</sup>	10.386 <sup>169</sup>	44.62 <sup>114</sup>	56.86 <sup>43</sup>	41.35 <sup>168</sup>
20.3	38.876 <sup>180</sup>	61.61 <sup>55</sup>	29.941 <sup>270</sup>	77.18 <sup>108</sup>	10.217 <sup>187</sup>	45.76 <sup>79</sup>	56.43 <sup>46</sup>	43.03 <sup>124</sup>
30.3	38.696 <sup>191</sup>	62.16 <sup>45</sup>	29.671 <sup>286</sup>	78.21 <sup>70</sup>	10.080 <sup>186</sup>	46.55 <sup>40</sup>	55.94 <sup>52</sup>	44.27 <sup>79</sup>
Apr. 9.3	38.505 <sup>189</sup>	62.61 <sup>33</sup>	29.385 <sup>287</sup>	78.91 <sup>34</sup>	9.885 <sup>193</sup>	48.95 <sup>6</sup>	55.42 <sup>52</sup>	45.06 <sup>32</sup>
19.3	38.316 <sup>178</sup>	62.94 <sup>19</sup>	29.098 <sup>275</sup>	79.25 <sup>1</sup>	9.642 <sup>188</sup>	47.01 <sup>32</sup>	54.90 <sup>51</sup>	45.38 <sup>21</sup>
29.2	38.138 <sup>168</sup>	63.13 <sup>6</sup>	28.823 <sup>248</sup>	79.24 <sup>37</sup>	9.454 <sup>170</sup>	46.69 <sup>67</sup>	54.39 <sup>47</sup>	45.17 <sup>68</sup>
May 9.2	37.980 <sup>181</sup>	63.19 <sup>8</sup>	28.575 <sup>214</sup>	78.87 <sup>71</sup>	9.284 <sup>180</sup>	48.02 <sup>97</sup>	53.92 <sup>42</sup>	44.49 <sup>113</sup>
19.2	37.849 <sup>100</sup>	63.11 <sup>18</sup>	28.361 <sup>170</sup>	78.16 <sup>101</sup>	9.134 <sup>122</sup>	45.05 <sup>136</sup>	53.50 <sup>35</sup>	43.36 <sup>153</sup>
29.2	37.749 <sup>67</sup>	62.93 <sup>30</sup>	28.191 <sup>121</sup>	77.15 <sup>128</sup>	9.012 <sup>98</sup>	43.77 <sup>156</sup>	53.15 <sup>26</sup>	41.83 <sup>189</sup>
June 8.1	37.686 <sup>23</sup>	62.63 <sup>39</sup>	28.070 <sup>66</sup>	75.87 <sup>150</sup>	8.919 <sup>98</sup>	42.21 <sup>178</sup>	52.89 <sup>18</sup>	39.94 <sup>219</sup>
18.1	37.659 <sup>11</sup>	62.24 <sup>49</sup>	28.002 <sup>14</sup>	74.37 <sup>169</sup>	8.860 <sup>26</sup>	40.43 <sup>196</sup>	52.71 <sup>9</sup>	37.75 <sup>242</sup>
28.1	37.670 <sup>51</sup>	61.76 <sup>54</sup>	27.988 <sup>41</sup>	72.68 <sup>183</sup>	8.884 <sup>10</sup>	38.45 <sup>210</sup>	52.62 <sup>1</sup>	35.33 <sup>261</sup>
July 8.0	37.721 <sup>84</sup>	61.22 <sup>60</sup>	28.029 <sup>95</sup>	70.85 <sup>196</sup>	8.844 <sup>42</sup>	36.85 <sup>214</sup>	52.63 <sup>10</sup>	32.72 <sup>271</sup>
18.0	37.805 <sup>180</sup>	60.62 <sup>67</sup>	28.124 <sup>146</sup>	68.92 <sup>199</sup>	8.886 <sup>80</sup>	34.21 <sup>216</sup>	52.73 <sup>20</sup>	30.01 <sup>276</sup>
28.0	37.925 <sup>182</sup>	59.95 <sup>72</sup>	28.270 <sup>196</sup>	66.93 <sup>201</sup>	8.966 <sup>109</sup>	32.05 <sup>210</sup>	52.93 <sup>28</sup>	27.25 <sup>275</sup>
Aug. 7.0	38.077 <sup>183</sup>	59.23 <sup>79</sup>	28.466 <sup>240</sup>	64.92 <sup>206</sup>	9.075 <sup>146</sup>	29.95 <sup>198</sup>	53.21 <sup>37</sup>	24.50 <sup>270</sup>
16.9	38.260 <sup>211</sup>	58.44 <sup>83</sup>	28.706 <sup>261</sup>	62.92 <sup>196</sup>	9.221 <sup>174</sup>	28.02 <sup>168</sup>	53.58 <sup>44</sup>	21.80 <sup>259</sup>
26.9	38.471 <sup>227</sup>	57.61 <sup>90</sup>	28.987 <sup>323</sup>	60.96 <sup>186</sup>	9.395 <sup>204</sup>	26.34 <sup>140</sup>	54.02 <sup>51</sup>	19.21 <sup>242</sup>
Sept. 5.9	38.708 <sup>262</sup>	56.71 <sup>97</sup>	29.309 <sup>357</sup>	59.08 <sup>177</sup>	9.599 <sup>281</sup>	24.94 <sup>101</sup>	54.53 <sup>56</sup>	16.79 <sup>219</sup>
15.8	38.970 <sup>284</sup>	55.74 <sup>101</sup>	29.666 <sup>390</sup>	57.31 <sup>168</sup>	9.890 <sup>267</sup>	23.93 <sup>61</sup>	55.11 <sup>63</sup>	14.60 <sup>195</sup>
25.8	39.254 <sup>308</sup>	54.73 <sup>104</sup>	30.055 <sup>415</sup>	55.68 <sup>147</sup>	10.087 <sup>278</sup>	23.82 <sup>15</sup>	55.74 <sup>68</sup>	12.65 <sup>166</sup>
Oct. 5.8	39.557 <sup>320</sup>	53.69 <sup>107</sup>	30.470 <sup>439</sup>	54.21 <sup>136</sup>	10.365 <sup>296</sup>	23.17 <sup>37</sup>	56.42 <sup>71</sup>	10.99 <sup>132</sup>
15.8	39.877 <sup>332</sup>	52.62 <sup>108</sup>	30.909 <sup>454</sup>	52.96 <sup>108</sup>	10.661 <sup>306</sup>	23.54 <sup>86</sup>	57.13 <sup>74</sup>	9.87 <sup>93</sup>
25.7	40.209 <sup>389</sup>	51.54 <sup>104</sup>	31.363 <sup>463</sup>	51.93 <sup>74</sup>	10.966 <sup>215</sup>	24.40 <sup>134</sup>	57.87 <sup>76</sup>	8.74 <sup>52</sup>
Nov. 4.7	40.548 <sup>341</sup>	50.50 <sup>97</sup>	31.826 <sup>463</sup>	51.19 <sup>46</sup>	11.281 <sup>312</sup>	25.74 <sup>176</sup>	58.62 <sup>74</sup>	8.22 <sup>8</sup>
14.7	40.889 <sup>381</sup>	49.53 <sup>86</sup>	32.289 <sup>462</sup>	50.73 <sup>12</sup>	11.593 <sup>302</sup>	27.50 <sup>217</sup>	59.36 <sup>73</sup>	8.14 <sup>37</sup>
24.7	41.220 <sup>317</sup>	48.67 <sup>70</sup>	32.741 <sup>429</sup>	50.61 <sup>28</sup>	11.895 <sup>282</sup>	29.67 <sup>248</sup>	60.08 <sup>68</sup>	8.51 <sup>81</sup>
Dec. 4.6	41.537 <sup>291</sup>	47.97 <sup>54</sup>	33.170 <sup>392</sup>	50.84 <sup>57</sup>	12.177 <sup>267</sup>	32.15 <sup>272</sup>	60.76 <sup>62</sup>	9.32 <sup>124</sup>
14.6	41.828 <sup>268</sup>	47.43 <sup>35</sup>	33.562 <sup>346</sup>	51.41 <sup>90</sup>	12.434 <sup>230</sup>	34.87 <sup>285</sup>	61.38 <sup>53</sup>	10.56 <sup>168</sup>
24.6	42.086 <sup>213</sup>	47.08 <sup>11</sup>	33.908 <sup>284</sup>	52.31 <sup>123</sup>	12.654 <sup>178</sup>	37.72 <sup>293</sup>	61.91 <sup>43</sup>	12.22 <sup>203</sup>
34.5	42.299	46.97	34.192	53.53	12.832	40.65	62.34	14.25
Mean Place	36.508	70.73	26.983	79.20	8.201	22.02	52.265	40.75
Sec δ, Tan δ	1.183	+0.532	1.615	+1.268	1.095	-0.447	2.754	+2.566
D <sub>α</sub> , D <sub>ω</sub>	+0.073	+0.018	+0.090	+0.043	+0.061	-0.015	+0.119	+0.089
D <sub>β</sub> , D <sub>δ</sub>	-0.20	+0.87	-0.20	+0.86	-0.21	+0.86	-0.21	+0.86

# APPARENT PLACES OF STARS, 1920.

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## FOR THE UPPER TRANSIT AT WASHINGTON.

Washington Mean Time.	γ Argus. Mag. 2.2		ζ Cancri (mean). Mag. 4.7		Bradley 1167. Mag. 5.7		30 Puppis. Mag. 5.0	
	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.
	h m 8 7	° ' " -47 5	h m 8 7	° ' " +17 53	h m 8 9	° ' " +75 59	h m 8 9	° ' " -15 32
	s	"	s	"	s	"	s	"
Jan. 0.6	6.694 <sup>151</sup>	64.74	39.798 <sup>132</sup>	12.85	38.35	54.50	41.482 <sup>159</sup>	54.18
10.5	6.845 <sup>85</sup>	68.38 <sup>304</sup>	39.975 <sup>131</sup>	11.95	38.86	56.94 <sup>244</sup>	41.641 <sup>100</sup>	56.68 <sup>255</sup>
20.5	6.930 <sup>85</sup>	72.00 <sup>302</sup>	40.106 <sup>131</sup>	11.49	39.21	59.62 <sup>268</sup>	41.750 <sup>100</sup>	59.11 <sup>243</sup>
30.5	6.947 <sup>17</sup>	75.50 <sup>330</sup>	40.188 <sup>77</sup>	11.21	39.36	62.43 <sup>281</sup>	41.809 <sup>59</sup>	61.37 <sup>226</sup>
Feb. 9.5	6.896 <sup>51</sup>	78.79 <sup>329</sup>	40.206 <sup>23</sup>	11.11	39.33	65.28 <sup>283</sup>	41.816 <sup>7</sup>	63.41 <sup>204</sup>
19.4	6.785 <sup>111</sup>	81.80 <sup>301</sup>	40.180 <sup>26</sup>	11.12	39.11	67.99 <sup>273</sup>	41.774 <sup>42</sup>	65.19 <sup>178</sup>
29.4	6.618 <sup>167</sup>	84.45 <sup>285</sup>	40.109 <sup>71</sup>	11.31	38.72	70.52 <sup>263</sup>	41.689 <sup>85</sup>	66.69 <sup>150</sup>
Mar. 10.4	6.406 <sup>212</sup>	86.71 <sup>236</sup>	39.996 <sup>113</sup>	11.58	38.18	72.74 <sup>222</sup>	41.568 <sup>121</sup>	67.89 <sup>120</sup>
20.3	6.159 <sup>247</sup>	88.52 <sup>181</sup>	39.852 <sup>144</sup>	11.90	37.52	74.56 <sup>183</sup>	41.417 <sup>151</sup>	68.77 <sup>88</sup>
30.3	5.887 <sup>273</sup>	89.87 <sup>135</sup>	39.691 <sup>161</sup>	12.26	36.78	75.91 <sup>185</sup>	41.249 <sup>168</sup>	69.35 <sup>58</sup>
Apr. 9.3	5.601 <sup>298</sup>	90.73 <sup>86</sup>	39.518 <sup>173</sup>	12.61	36.78	75.91 <sup>84</sup>	41.249 <sup>178</sup>	69.35 <sup>28</sup>
19.3	5.313 <sup>288</sup>	91.11 <sup>83</sup>	39.345 <sup>173</sup>	12.94	35.98	76.75 <sup>31</sup>	41.071 <sup>179</sup>	69.63 <sup>3</sup>
29.2	5.032 <sup>281</sup>	90.99 <sup>12</sup>	39.181 <sup>104</sup>	13.24	35.17	77.06 <sup>23</sup>	40.892 <sup>171</sup>	69.60 <sup>32</sup>
May 9.2	4.768 <sup>284</sup>	90.40 <sup>89</sup>	39.035 <sup>146</sup>	13.51	34.37	76.83 <sup>78</sup>	40.721 <sup>157</sup>	69.28 <sup>60</sup>
19.2	4.527 <sup>241</sup>	89.34 <sup>106</sup>	38.911 <sup>124</sup>	13.72	33.62	76.07 <sup>125</sup>	40.564 <sup>134</sup>	68.68 <sup>85</sup>
29.2	4.317 <sup>210</sup>	87.85 <sup>149</sup>	38.911 <sup>96</sup>	13.72	32.94	74.82 <sup>170</sup>	40.430 <sup>110</sup>	67.83 <sup>108</sup>
June 8.1	4.145 <sup>172</sup>	86.96 <sup>189</sup>	38.815 <sup>63</sup>	13.90	32.37	73.12 <sup>45</sup>	40.320 <sup>80</sup>	66.75 <sup>131</sup>
18.1	4.013 <sup>182</sup>	86.96 <sup>222</sup>	38.752 <sup>31</sup>	14.05	31.92	71.08 <sup>209</sup>	40.240 <sup>51</sup>	65.44 <sup>149</sup>
28.1	3.924 <sup>89</sup>	83.74 <sup>222</sup>	38.721 <sup>31</sup>	14.16	31.58	68.62 <sup>241</sup>	40.189 <sup>51</sup>	63.95 <sup>149</sup>
July 8.0	3.883 <sup>4</sup>	81.21 <sup>283</sup>	38.725 <sup>4</sup>	14.23	31.39	65.94 <sup>268</sup>	40.172 <sup>17</sup>	62.33 <sup>162</sup>
18.0	3.887 <sup>4</sup>	78.49 <sup>273</sup>	38.768 <sup>38</sup>	14.25	31.35	63.08 <sup>286</sup>	40.187 <sup>15</sup>	60.61 <sup>172</sup>
28.0	3.942 <sup>55</sup>	75.61 <sup>286</sup>	38.836 <sup>70</sup>	14.21	31.44	60.10 <sup>298</sup>	40.284 <sup>47</sup>	58.83 <sup>178</sup>
Aug. 7.0	3.942 <sup>55</sup>	72.70 <sup>291</sup>	38.938 <sup>100</sup>	14.13	31.67	60.10 <sup>305</sup>	40.312 <sup>78</sup>	57.09 <sup>174</sup>
16.9	4.044 <sup>102</sup>	69.38 <sup>287</sup>	39.066 <sup>138</sup>	13.95	32.04	57.06 <sup>305</sup>	40.422 <sup>110</sup>	55.40 <sup>169</sup>
26.9	4.195 <sup>151</sup>	67.11 <sup>273</sup>	39.227 <sup>161</sup>	13.68	32.55	54.08 <sup>292</sup>	40.562 <sup>140</sup>	53.86 <sup>154</sup>
Sept. 5.9	4.392 <sup>197</sup>	64.61 <sup>250</sup>	39.416 <sup>189</sup>	13.32	33.17	51.07 <sup>282</sup>	40.731 <sup>169</sup>	52.53 <sup>133</sup>
15.9	4.631 <sup>230</sup>	62.46 <sup>215</sup>	39.629 <sup>213</sup>	13.32	33.17	48.25 <sup>282</sup>	40.731 <sup>194</sup>	52.53 <sup>105</sup>
25.8	4.913 <sup>282</sup>	60.74 <sup>122</sup>	39.867 <sup>286</sup>	12.81	33.90	45.63 <sup>280</sup>	40.925 <sup>222</sup>	51.48 <sup>73</sup>
Oct. 5.8	5.228 <sup>315</sup>	59.51 <sup>123</sup>	40.127 <sup>260</sup>	12.19	34.72	43.24 <sup>280</sup>	41.147 <sup>222</sup>	50.75 <sup>35</sup>
15.8	5.574 <sup>346</sup>	58.85 <sup>66</sup>	40.404 <sup>277</sup>	11.44	35.65	41.16 <sup>286</sup>	41.391 <sup>244</sup>	50.40 <sup>5</sup>
25.7	5.943 <sup>384</sup>	58.79 <sup>6</sup>	40.700 <sup>296</sup>	10.51	36.63	39.41 <sup>175</sup>	41.658 <sup>267</sup>	50.45 <sup>49</sup>
Nov. 4.7	6.327 <sup>384</sup>	59.37 <sup>58</sup>	41.011 <sup>311</sup>	9.49	37.86	38.06 <sup>186</sup>	41.941 <sup>283</sup>	50.94 <sup>92</sup>
14.7	6.715 <sup>388</sup>	60.56 <sup>119</sup>	41.328 <sup>317</sup>	8.35	38.74	37.10 <sup>95</sup>	42.236 <sup>295</sup>	51.86 <sup>133</sup>
24.7	7.097 <sup>382</sup>	62.34 <sup>178</sup>	41.647 <sup>319</sup>	7.17	39.83	36.62 <sup>46</sup>	42.541 <sup>305</sup>	53.19 <sup>183</sup>
Dec. 4.6	7.463 <sup>386</sup>	64.87 <sup>283</sup>	41.961 <sup>314</sup>	5.93	40.91	36.63 <sup>1</sup>	42.845 <sup>304</sup>	54.89 <sup>170</sup>
14.6	7.800 <sup>337</sup>	67.45 <sup>278</sup>	42.261 <sup>300</sup>	4.69	41.96	37.18 <sup>50</sup>	43.148 <sup>298</sup>	56.90 <sup>301</sup>
24.6	8.096 <sup>296</sup>	67.45 <sup>315</sup>	42.261 <sup>279</sup>	3.52	42.94	38.12 <sup>99</sup>	43.425 <sup>282</sup>	59.29 <sup>230</sup>
34.6	8.342 <sup>246</sup>	70.66 <sup>341</sup>	42.540 <sup>245</sup>	2.45	43.82	38.12 <sup>146</sup>	43.682 <sup>225</sup>	61.64 <sup>254</sup>
	8.531 <sup>189</sup>	74.61 <sup>357</sup>	42.785 <sup>267</sup>	1.50	44.56	39.58 <sup>189</sup>	43.907 <sup>185</sup>	64.18 <sup>254</sup>
		77.88 <sup>357</sup>	42.992 <sup>267</sup>	0.74	45.22	39.58 <sup>287</sup>	44.092 <sup>185</sup>	66.73 <sup>255</sup>
Mean Place	4.006	61.45	37.574	24.60	81.913	70.97	39.345	46.80
Sec δ, Tan δ	1.469	-1.976	1.051	+0.323	4.133	+4.611	1.088	-0.278
D <sub>γ</sub> α, D <sub>α</sub> α	+0.037	-0.938	+0.068	+0.011	+0.151	+0.144	+0.055	-0.010
D <sub>γ</sub> δ, D <sub>α</sub> δ	-0.21	+0.85	-0.21	+0.85	-0.21	+0.84	-0.21	+0.84

APPARENT PLACES OF STARS, 1920.

FOR THE UPPER TRANSIT AT WASHINGTON.

Washington Mean Time.	δ Argus. Mag. 2.0		ε Hydræ. Mag. 3.5		σ <sup>2</sup> Canori (mess). Mag. 5.5		ζ Hydræ. Mag. 3.3	
	Right Ascension.	Declination.	Right Ascension.	Declination.	Right Ascension.	Declination.	Right Ascension.	Declination.
	h m 8 42	° ' " -54 24	h m 8 42	° ' " + 6 42	h m 8 49	° ' " +30 52	h m 8 51	° ' " + 6 14
	s	"	s	"	s	"	s	"
Jan. 0.6	32.287 <sup>214</sup>	54.29	34.516	36.71	24.236	44.66	12.032	52.04
10.6	32.501 <sup>141</sup>	58.00 <sup>371</sup>	34.717 <sup>201</sup>	35.26 <sup>145</sup>	24.526 <sup>240</sup>	44.55 <sup>11</sup>	12.241 <sup>209</sup>	50.55 <sup>149</sup>
20.5	32.642 <sup>62</sup>	61.78 <sup>378</sup>	34.873 <sup>166</sup>	33.98 <sup>128</sup>	24.714 <sup>188</sup>	44.74 <sup>19</sup>	12.404 <sup>163</sup>	49.23 <sup>132</sup>
30.5	32.704 <sup>62</sup>	65.54 <sup>376</sup>	34.979 <sup>106</sup>	32.93 <sup>106</sup>	24.847 <sup>133</sup>	45.16 <sup>42</sup>	12.518 <sup>114</sup>	48.12 <sup>111</sup>
Feb. 9.5	32.690 <sup>14</sup>	69.16 <sup>362</sup>	35.033 <sup>54</sup>	32.08 <sup>85</sup>	24.920 <sup>73</sup>	45.32 <sup>66</sup>	12.581 <sup>63</sup>	47.23 <sup>89</sup>
19.5	32.604 <sup>86</sup>	72.57 <sup>341</sup>	35.038	31.46 <sup>62</sup>	24.936 <sup>16</sup>	46.63 <sup>81</sup>	12.593 <sup>12</sup>	46.57 <sup>66</sup>
29.4	32.452 <sup>182</sup>	75.68 <sup>311</sup>	34.996 <sup>42</sup>	31.04 <sup>42</sup>	24.896 <sup>40</sup>	47.55 <sup>92</sup>	12.558 <sup>35</sup>	46.12 <sup>45</sup>
Mar. 10.4	32.242 <sup>210</sup>	78.44 <sup>276</sup>	34.913 <sup>83</sup>	30.81 <sup>23</sup>	24.808 <sup>88</sup>	48.53 <sup>98</sup>	12.483 <sup>75</sup>	45.87 <sup>25</sup>
20.4	31.985 <sup>287</sup>	80.80 <sup>286</sup>	34.797 <sup>116</sup>	30.74 <sup>7</sup>	24.680 <sup>136</sup>	49.50 <sup>97</sup>	12.375 <sup>108</sup>	45.78 <sup>9</sup>
30.3	31.692 <sup>293</sup>	82.70 <sup>190</sup>	34.659 <sup>138</sup>	30.81 <sup>7</sup>	24.521 <sup>169</sup>	50.42 <sup>92</sup>	12.241 <sup>124</sup>	45.84 <sup>6</sup>
Apr. 9.3	31.375 <sup>317</sup>	84.12 <sup>142</sup>	34.506 <sup>183</sup>	31.01 <sup>20</sup>	24.344 <sup>177</sup>	51.23 <sup>81</sup>	12.093 <sup>148</sup>	46.03 <sup>19</sup>
19.3	31.045 <sup>330</sup>	85.04 <sup>92</sup>	34.347 <sup>189</sup>	31.29 <sup>28</sup>	24.159 <sup>185</sup>	51.90 <sup>67</sup>	11.937 <sup>156</sup>	46.30 <sup>27</sup>
29.3	30.714 <sup>331</sup>	85.46 <sup>42</sup>	34.191 <sup>186</sup>	31.66 <sup>37</sup>	23.974 <sup>185</sup>	52.40 <sup>50</sup>	11.782 <sup>155</sup>	46.68 <sup>38</sup>
May 9.2	30.390 <sup>304</sup>	85.36 <sup>10</sup>	34.045 <sup>146</sup>	32.09 <sup>43</sup>	23.800 <sup>174</sup>	52.73 <sup>33</sup>	11.638 <sup>144</sup>	47.13 <sup>45</sup>
19.2	30.084 <sup>336</sup>	84.77 <sup>89</sup>	33.916 <sup>139</sup>	32.57 <sup>48</sup>	23.645 <sup>165</sup>	52.86 <sup>13</sup>	11.507 <sup>131</sup>	47.63 <sup>50</sup>
29.2	29.804 <sup>280</sup>	83.69 <sup>108</sup>	33.809 <sup>107</sup>	33.10 <sup>53</sup>	23.513 <sup>132</sup>	52.82 <sup>4</sup>	11.398 <sup>109</sup>	48.16 <sup>53</sup>
June 8.2	29.556 <sup>245</sup>	82.16 <sup>163</sup>	33.728 <sup>81</sup>	33.10 <sup>56</sup>	23.411 <sup>102</sup>	52.82 <sup>23</sup>	11.398 <sup>87</sup>	48.16 <sup>58</sup>
18.1	29.347 <sup>209</sup>	80.22 <sup>194</sup>	33.673 <sup>55</sup>	33.66 <sup>58</sup>	23.411 <sup>70</sup>	52.69 <sup>30</sup>	11.311 <sup>59</sup>	48.74 <sup>60</sup>
28.1	29.182 <sup>166</sup>	77.91 <sup>231</sup>	33.647 <sup>26</sup>	34.24 <sup>59</sup>	23.341 <sup>37</sup>	52.20 <sup>64</sup>	11.252 <sup>33</sup>	49.34 <sup>59</sup>
July 8.1	29.066 <sup>116</sup>	75.31 <sup>280</sup>	33.650 <sup>3</sup>	34.83 <sup>58</sup>	23.304 <sup>2</sup>	51.66 <sup>67</sup>	11.219 <sup>3</sup>	49.93 <sup>60</sup>
18.0	29.002 <sup>64</sup>	72.50 <sup>281</sup>	33.683 <sup>38</sup>	35.41 <sup>55</sup>	23.302 <sup>81</sup>	50.99 <sup>81</sup>	11.216 <sup>25</sup>	50.53 <sup>57</sup>
28.0	28.992 <sup>10</sup>	72.50 <sup>296</sup>	33.683 <sup>62</sup>	35.96 <sup>49</sup>	23.333 <sup>67</sup>	50.18 <sup>93</sup>	11.241 <sup>54</sup>	51.10 <sup>49</sup>
Aug. 7.0	29.040 <sup>48</sup>	69.54 <sup>299</sup>	33.745 <sup>90</sup>	36.45 <sup>40</sup>	23.400 <sup>99</sup>	49.25 <sup>108</sup>	11.295 <sup>81</sup>	51.59 <sup>41</sup>
17.0	29.146 <sup>106</sup>	66.55 <sup>299</sup>	33.835 <sup>90</sup>	36.85 <sup>28</sup>	23.499 <sup>99</sup>	48.22 <sup>108</sup>	11.376 <sup>110</sup>	52.00 <sup>31</sup>
26.9	29.310 <sup>164</sup>	63.63 <sup>292</sup>	33.954 <sup>119</sup>	37.13 <sup>14</sup>	23.631 <sup>132</sup>	47.07 <sup>115</sup>	11.486 <sup>110</sup>	52.31 <sup>14</sup>
Sept. 5.9	29.531 <sup>221</sup>	60.86 <sup>277</sup>	34.099 <sup>145</sup>	37.27 <sup>4</sup>	23.795 <sup>104</sup>	45.84 <sup>123</sup>	11.624 <sup>138</sup>	52.45 <sup>4</sup>
15.9	29.531 <sup>275</sup>	58.35 <sup>213</sup>	34.272 <sup>178</sup>	37.23 <sup>4</sup>	23.999 <sup>194</sup>	44.53 <sup>181</sup>	11.789 <sup>165</sup>	52.41 <sup>4</sup>
25.9	29.806 <sup>323</sup>	56.22 <sup>186</sup>	34.472 <sup>200</sup>	36.98 <sup>26</sup>	24.213 <sup>224</sup>	43.14 <sup>139</sup>	11.980 <sup>191</sup>	52.16 <sup>26</sup>
Oct. 5.8	30.129 <sup>323</sup>	54.54 <sup>115</sup>	34.695 <sup>223</sup>	36.51 <sup>47</sup>	24.466 <sup>253</sup>	41.69 <sup>146</sup>	12.199 <sup>146</sup>	51.69 <sup>47</sup>
15.8	30.499 <sup>370</sup>	53.39 <sup>106</sup>	34.943 <sup>248</sup>	35.79 <sup>73</sup>	24.746 <sup>280</sup>	40.19 <sup>150</sup>	12.441 <sup>242</sup>	50.97 <sup>72</sup>
25.8	30.903 <sup>404</sup>	52.84 <sup>55</sup>	35.212 <sup>269</sup>	34.84 <sup>96</sup>	25.051 <sup>305</sup>	38.68 <sup>151</sup>	12.707 <sup>266</sup>	50.02 <sup>95</sup>
Nov. 4.7	31.334 <sup>431</sup>	52.93 <sup>9</sup>	35.500 <sup>288</sup>	34.84 <sup>118</sup>	25.051 <sup>326</sup>	38.68 <sup>180</sup>	12.707 <sup>287</sup>	50.02 <sup>120</sup>
14.7	31.781 <sup>447</sup>	52.93 <sup>72</sup>	35.500 <sup>302</sup>	33.66 <sup>138</sup>	25.377 <sup>343</sup>	37.18 <sup>145</sup>	12.994 <sup>209</sup>	48.82 <sup>139</sup>
24.7	32.229 <sup>448</sup>	53.65 <sup>137</sup>	35.802 <sup>309</sup>	32.28 <sup>164</sup>	25.720 <sup>354</sup>	35.73 <sup>134</sup>	13.293 <sup>311</sup>	47.43 <sup>157</sup>
Dec. 4.7	32.664 <sup>435</sup>	55.02 <sup>196</sup>	36.111 <sup>310</sup>	30.74 <sup>166</sup>	26.074 <sup>355</sup>	34.39 <sup>120</sup>	13.604 <sup>311</sup>	45.86 <sup>168</sup>
14.6	33.075 <sup>371</sup>	56.98 <sup>252</sup>	36.421 <sup>302</sup>	29.08 <sup>170</sup>	26.429 <sup>348</sup>	33.19 <sup>77</sup>	13.915 <sup>306</sup>	44.18 <sup>175</sup>
24.6	33.446 <sup>317</sup>	59.50 <sup>295</sup>	36.723 <sup>286</sup>	27.38 <sup>170</sup>	26.777 <sup>332</sup>	32.17 <sup>77</sup>	14.221 <sup>290</sup>	42.43 <sup>174</sup>
34.6	33.763 <sup>255</sup>	62.45 <sup>382</sup>	37.009 <sup>299</sup>	25.68 <sup>168</sup>	27.109 <sup>304</sup>	31.40 <sup>53</sup>	14.511 <sup>265</sup>	40.69 <sup>169</sup>
	34.018 <sup>255</sup>	65.77 <sup>358</sup>	37.268 <sup>236</sup>	24.05 <sup>153</sup>	27.413 <sup>267</sup>	30.87 <sup>24</sup>	14.776 <sup>231</sup>	39.00 <sup>157</sup>
	34.018 <sup>255</sup>	69.35 <sup>358</sup>	37.494 <sup>236</sup>	22.52 <sup>153</sup>	27.680 <sup>267</sup>	30.63 <sup>24</sup>	15.007 <sup>231</sup>	37.43 <sup>157</sup>
Mean Place	29.457	53.92	32.479	47.66	22.092	59.95	10.026	62.99
Sec δ, Tan δ	1.719	-1.898	1.007	+0.118	1.165	+0.598	1.006	+0.109
Dφa, Dωa	+0.033	-0.061	+0.064	+0.005	+0.073	+0.027	+0.063	+0.005
Dφδ, Dωδ	-0.26	+0.76	-0.26	+0.76	-0.27	+0.74	-0.27	+0.73



# APPARENT PLACES OF STARS, 1920.

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FOR THE UPPER TRANSIT AT WASHINGTON.

Washington Mean Time.	ι Ursa Majoris. Mag. 3.1		α Cancri. Mag. 4.3		β <sup>1</sup> Carinae. Mag. 5.1		κ Ursa Majoris. Mag. 3.7	
	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.
	h m 8 53	° ' " +48 20	h m 8 54	° ' " +12 9	h m 8 55	° ' " -58 55	h m 8 58	° ' " +47 27
	s	"	s	"	s	"	s	"
Jan. 0.6	46.869	66.25	8.860	53.28	3.954	12.32	12.811	67.90
10.6	47.166 <sup>297</sup>	67.09	9.077 <sup>217</sup>	52.09 <sup>119</sup>	4.203 <sup>240</sup>	16.02 <sup>370</sup>	13.109 <sup>298</sup>	68.66 <sup>76</sup>
20.5	47.398 <sup>232</sup>	68.26 <sup>84</sup>	9.248 <sup>171</sup>	51.11 <sup>98</sup>	4.371 <sup>108</sup>	19.84 <sup>382</sup>	13.344 <sup>285</sup>	69.77 <sup>111</sup>
30.5	47.559 <sup>161</sup>	69.69 <sup>142</sup>	9.369 <sup>121</sup>	50.36 <sup>75</sup>	4.453 <sup>82</sup>	23.68 <sup>394</sup>	13.512 <sup>168</sup>	71.14 <sup>137</sup>
Feb. 9.5	47.646 <sup>87</sup>	71.32 <sup>162</sup>	9.438 <sup>69</sup>	49.83 <sup>53</sup>	4.451 <sup>2</sup>	27.43 <sup>375</sup>	13.605 <sup>93</sup>	72.74 <sup>160</sup>
19.5	47.661 <sup>15</sup>	73.09	9.455 <sup>17</sup>	49.52 <sup>31</sup>	4.368 <sup>83</sup>	30.99 <sup>356</sup>	13.627 <sup>22</sup>	74.46 <sup>172</sup>
29.4	47.602 <sup>59</sup>	74.88 <sup>179</sup>	9.424 <sup>81</sup>	49.40 <sup>12</sup>	4.210 <sup>158</sup>	34.29 <sup>330</sup>	13.578 <sup>49</sup>	76.24 <sup>178</sup>
Mar. 10.4	47.482 <sup>120</sup>	76.63 <sup>175</sup>	9.352 <sup>72</sup>	49.45 <sup>5</sup>	3.986 <sup>234</sup>	37.26 <sup>297</sup>	13.468 <sup>110</sup>	77.99 <sup>175</sup>
20.4	47.310 <sup>172</sup>	78.26 <sup>163</sup>	9.244 <sup>106</sup>	49.64 <sup>19</sup>	3.707 <sup>279</sup>	39.83 <sup>257</sup>	13.306 <sup>163</sup>	79.61 <sup>162</sup>
30.4	47.100 <sup>210</sup>	79.67 <sup>141</sup>	9.111 <sup>133</sup>	49.92 <sup>28</sup>	3.387 <sup>320</sup>	41.97 <sup>214</sup>	13.102 <sup>204</sup>	81.05 <sup>144</sup>
Apr. 9.3	46.861 <sup>239</sup>	80.83 <sup>116</sup>	8.962 <sup>149</sup>	50.28 <sup>36</sup>	3.036 <sup>551</sup>	43.63 <sup>166</sup>	12.872 <sup>230</sup>	82.24 <sup>119</sup>
19.3	46.608 <sup>253</sup>	81.69 <sup>86</sup>	8.804 <sup>158</sup>	50.68 <sup>40</sup>	2.666 <sup>370</sup>	44.80 <sup>117</sup>	12.627 <sup>245</sup>	83.15 <sup>91</sup>
29.3	46.353 <sup>255</sup>	82.21 <sup>52</sup>	8.648 <sup>156</sup>	51.11 <sup>43</sup>	2.289 <sup>377</sup>	45.44 <sup>64</sup>	12.380 <sup>247</sup>	83.73 <sup>58</sup>
May 9.2	46.112 <sup>241</sup>	82.41 <sup>20</sup>	8.502 <sup>146</sup>	51.55 <sup>44</sup>	1.916 <sup>373</sup>	45.58 <sup>14</sup>	12.142 <sup>238</sup>	83.97 <sup>24</sup>
19.2	45.889 <sup>223</sup>	82.25 <sup>16</sup>	8.369 <sup>133</sup>	51.98 <sup>43</sup>	1.558 <sup>358</sup>	45.19 <sup>39</sup>	11.925 <sup>217</sup>	83.87 <sup>10</sup>
29.2	45.694 <sup>195</sup>	81.77 <sup>48</sup>	8.258 <sup>111</sup>	52.40 <sup>42</sup>	1.224 <sup>334</sup>	44.29 <sup>90</sup>	11.734 <sup>191</sup>	83.45 <sup>42</sup>
June 8.2	45.536 <sup>158</sup>	80.96 <sup>81</sup>	8.170 <sup>88</sup>	52.81 <sup>41</sup>	0.922 <sup>302</sup>	42.92 <sup>137</sup>	11.579 <sup>155</sup>	82.71 <sup>74</sup>
18.1	45.420 <sup>116</sup>	79.87 <sup>109</sup>	8.109 <sup>61</sup>	53.18 <sup>37</sup>	0.661 <sup>261</sup>	41.11 <sup>181</sup>	11.462 <sup>117</sup>	81.69 <sup>102</sup>
28.1	45.347 <sup>78</sup>	78.52 <sup>135</sup>	8.074 <sup>35</sup>	53.52 <sup>34</sup>	0.445 <sup>216</sup>	38.91 <sup>220</sup>	11.387 <sup>75</sup>	80.41 <sup>128</sup>
July 8.1	45.319 <sup>28</sup>	76.97 <sup>155</sup>	8.070 <sup>4</sup>	53.81 <sup>29</sup>	0.282 <sup>168</sup>	36.37 <sup>254</sup>	11.356 <sup>31</sup>	78.91 <sup>150</sup>
18.1	45.336 <sup>17</sup>	75.22 <sup>175</sup>	8.096 <sup>26</sup>	54.04 <sup>23</sup>	0.176 <sup>106</sup>	33.59 <sup>278</sup>	11.370 <sup>14</sup>	77.21 <sup>170</sup>
28.0	45.399 <sup>63</sup>	73.33 <sup>189</sup>	8.149 <sup>53</sup>	54.20 <sup>16</sup>	0.132 <sup>44</sup>	30.62 <sup>297</sup>	11.428 <sup>58</sup>	75.37 <sup>164</sup>
Aug. 7.0	45.507 <sup>108</sup>	71.30 <sup>203</sup>	8.232 <sup>83</sup>	54.26 <sup>6</sup>	0.153 <sup>21</sup>	27.59 <sup>303</sup>	11.529 <sup>101</sup>	73.40 <sup>197</sup>
17.0	45.657 <sup>150</sup>	69.22 <sup>208</sup>	8.342 <sup>110</sup>	54.20 <sup>6</sup>	0.239 <sup>86</sup>	24.57 <sup>302</sup>	11.674 <sup>145</sup>	71.34 <sup>206</sup>
26.9	45.851 <sup>194</sup>	67.09 <sup>213</sup>	8.482 <sup>140</sup>	54.00 <sup>20</sup>	0.393 <sup>154</sup>	21.68 <sup>289</sup>	11.859 <sup>185</sup>	69.22 <sup>212</sup>
Sept. 5.9	46.086 <sup>235</sup>	64.91 <sup>218</sup>	8.648 <sup>166</sup>	53.81 <sup>36</sup>	0.612 <sup>219</sup>	19.02 <sup>266</sup>	11.859 <sup>226</sup>	67.08 <sup>214</sup>
15.9	46.360 <sup>274</sup>	62.78 <sup>213</sup>	8.841 <sup>193</sup>	53.10 <sup>54</sup>	0.896 <sup>284</sup>	16.70 <sup>232</sup>	12.035 <sup>265</sup>	64.95 <sup>213</sup>
25.9	46.673 <sup>313</sup>	60.70 <sup>208</sup>	9.061 <sup>220</sup>	52.36 <sup>74</sup>	1.238 <sup>342</sup>	14.81 <sup>189</sup>	12.350 <sup>303</sup>	62.88 <sup>207</sup>
Oct. 5.8	47.018 <sup>345</sup>	58.73 <sup>197</sup>	9.308 <sup>247</sup>	51.44 <sup>92</sup>	1.635 <sup>397</sup>	13.45 <sup>136</sup>	12.653 <sup>337</sup>	60.88 <sup>200</sup>
15.8	47.396 <sup>378</sup>	56.89 <sup>184</sup>	9.577 <sup>269</sup>	50.30 <sup>114</sup>	2.075 <sup>440</sup>	12.66 <sup>79</sup>	12.990 <sup>368</sup>	58.99 <sup>188</sup>
25.8	47.800 <sup>404</sup>	55.23 <sup>186</sup>	9.866 <sup>289</sup>	49.01 <sup>129</sup>	2.549 <sup>474</sup>	12.52 <sup>14</sup>	13.358 <sup>397</sup>	57.00 <sup>169</sup>
Nov. 4.8	47.800 <sup>423</sup>	55.23 <sup>142</sup>	9.866 <sup>306</sup>	49.01 <sup>143</sup>	2.549 <sup>492</sup>	12.52 <sup>60</sup>	13.755 <sup>417</sup>	57.31 <sup>149</sup>
14.7	48.223 <sup>438</sup>	53.81 <sup>116</sup>	10.172 <sup>316</sup>	47.58 <sup>155</sup>	3.041 <sup>498</sup>	13.02 <sup>116</sup>	14.172 <sup>431</sup>	55.82 <sup>121</sup>
24.7	48.661 <sup>440</sup>	52.65 <sup>84</sup>	10.488 <sup>318</sup>	46.03 <sup>161</sup>	3.539 <sup>488</sup>	14.18 <sup>179</sup>	14.603 <sup>438</sup>	54.61 <sup>92</sup>
Dec. 4.7	49.101 <sup>430</sup>	51.81 <sup>50</sup>	10.806 <sup>313</sup>	44.42 <sup>160</sup>	4.027 <sup>462</sup>	15.97 <sup>284</sup>	15.038 <sup>428</sup>	53.69 <sup>57</sup>
14.6	49.531 <sup>409</sup>	51.31 <sup>11</sup>	11.119 <sup>286</sup>	42.82 <sup>154</sup>	4.489 <sup>419</sup>	18.31 <sup>286</sup>	15.466 <sup>407</sup>	53.12 <sup>19</sup>
24.6	49.940 <sup>376</sup>	51.20 <sup>25</sup>	11.417 <sup>273</sup>	41.28 <sup>144</sup>	4.908 <sup>362</sup>	21.17 <sup>325</sup>	15.873 <sup>376</sup>	52.93 <sup>19</sup>
34.6	50.316 <sup>827</sup>	51.45 <sup>64</sup>	11.690 <sup>260</sup>	39.84 <sup>128</sup>	5.270 <sup>286</sup>	24.42 <sup>353</sup>	16.249 <sup>330</sup>	53.12 <sup>56</sup>
	50.643	52.09	11.930	38.56	5.563	27.95	16.579	53.68
Mean Place	44.322	84.16	6.846	65.40	0.903	13.30	10.325	85.96
Sec δ, Tan δ	1.505	+1.124	1.023	+0.216	1.937	-1.659	1.479	+1.090
D <sub>ψ</sub> a, D <sub>ω</sub> a	+0.083	+0.062	+0.065	+0.010	+0.030	-0.077	+0.082	+0.051
D <sub>ψ</sub> δ, D <sub>ω</sub> δ	-0.27	+0.73	-0.27	+0.73	-0.28	+0.72	-0.28	+0.71

FOR THE UPPER TRANSIT AT WASHINGTON.

Washington Mean Time.	$\beta$ Cancri. Mag. 3.8		$\delta^1$ Lynceis. Mag. 4.4		$\delta^1$ Cancri. Mag. 5.9		$\epsilon$ Argus. Mag. 1.7	
	Right Ascension.	Declination.	Right Ascension.	Declination.	Right Ascension.	Declination.	Right Ascension.	Declination.
	h m 8 12	° ' " + 9 25	h m 8 17	° ' " +43 26	h m 8 18	° ' " +18 34	h m 8 20	° ' " -59 15
Jan. 0.6	12.827	48.05	24.654	30.19	49.320	71.59	55.548	7.37
10.5	13.001	46.86	24.890	31.01	49.512	70.92	55.732	11.16
20.5	13.190	45.84	25.065	32.06	49.655	70.46	55.831	15.00
30.5	13.208	45.03	25.172	33.32	49.744	70.20	55.844	18.78
Feb. 9.5	13.235	44.38	25.209	34.72	49.780	70.13	55.770	22.40
19.4	13.209	43.95	25.180	36.18	49.765	70.22	55.618	25.77
29.4	13.142	43.71	25.090	37.63	49.701	70.45	55.395	28.81
Mar. 10.4	13.035	43.59	24.945	39.00	49.595	70.77	55.109	31.46
20.4	12.898	43.61	24.760	40.21	49.459	71.16	54.777	33.68
30.3	12.743	43.75	24.544	41.23	49.301	71.57	54.408	35.44
Apr. 9.3	12.579	43.98	24.312	42.00	49.181	71.97	54.018	36.68
19.3	12.413	44.25	24.076	42.50	48.959	72.35	53.617	37.40
29.2	12.255	44.59	23.848	42.71	48.794	72.69	53.219	37.60
May 9.2	12.113	44.99	23.640	42.63	48.645	72.99	52.837	37.29
19.2	11.990	45.41	23.458	42.26	48.516	73.23	52.479	36.45
29.2	11.895	45.86	23.312	41.63	48.415	73.41	52.154	35.14
June 8.1	11.831	46.32	23.205	40.78	48.344	73.55	51.872	33.37
18.1	11.796	46.82	23.142	39.72	48.305	73.63	51.640	31.20
28.1	11.794	47.32	23.122	38.46	48.299	73.66	51.461	28.68
July 8.1	11.825	47.81	23.148	37.08	48.327	73.62	51.343	25.89
18.0	11.885	48.25	23.218	35.58	48.386	73.53	51.287	22.91
28.0	11.978	48.65	23.331	33.98	48.478	73.38	51.298	19.82
Aug. 7.0	12.099	48.97	23.484	32.32	48.600	73.14	51.377	16.72
16.9	12.247	49.17	23.677	30.63	48.751	72.81	51.521	13.71
26.9	12.423	49.23	23.905	28.94	48.929	72.36	51.733	10.92
Sept. 5.9	12.624	49.14	24.168	27.25	49.133	71.79	52.008	8.43
15.9	12.847	48.84	24.463	25.60	49.363	71.08	52.342	6.34
25.8	13.094	48.35	24.787	24.01	49.615	70.25	52.729	4.76
Oct. 5.8	13.360	47.64	25.138	22.50	49.888	69.28	53.158	3.72
15.8	13.645	46.71	25.510	21.10	50.181	68.18	53.623	3.32
25.8	13.941	45.60	25.900	19.88	50.489	66.97	54.108	3.57
Nov. 4.7	14.247	44.34	26.303	18.83	50.806	65.72	54.602	4.48
14.7	14.566	42.92	26.709	18.02	51.129	64.43	55.069	6.02
24.7	14.890	41.43	27.109	17.46	51.448	63.13	55.563	8.17
Dec. 4.6	15.150	39.90	27.494	17.19	51.756	61.92	55.979	10.84
14.6	15.420	38.41	27.852	17.23	52.042	60.82	56.353	13.96
24.6	15.661	37.02	28.171	17.59	52.298	59.66	56.661	17.42
34.6	15.862	35.75	28.441	18.25	52.516	59.09	56.895	21.10
Mean Place	10.682	59.00	22.015	45.50	47.132	84.09	52.415	6.21
Sec $\delta$ , Tan $\delta$	1.014	+0.166	1.377	+0.947	1.055	+0.836	1.956	-1.681
$D_{\alpha}, D_{\delta}$	+0.065	+0.006	+0.062	+0.036	+0.069	+0.913	+0.025	-0.065
$D_{\delta}, D_{\alpha}$	-0.22	+0.84	-0.22	+0.83	-0.23	+0.82	-0.23	+0.82

FOR THE UPPER TRANSIT AT WASHINGTON.

Washington Mean Time.	30 Monocerotis. Mag. 4.0		θ Chamæleontis. Mag. 4.3		ο Ursa Majoris. Mag. 3.5		Groombridge 1450. Mag. 6.0	
	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.
	h m 8 21	° ' " - 3 38	h m 8 22	° ' " -77 13	h m 8 23	° ' " +00 58	h m 8 27	° ' " +38 17
	s	"	s	"	s	"	s	"
Jan. 0.6	41.952 <sup>175</sup>	49.86	69.93	36.87	41.45	56.11	45.705 <sup>234</sup>	15.21
10.5	42.127 <sup>120</sup>	51.34 <sup>198</sup>	70.20 <sup>27</sup>	40.62 <sup>378</sup>	41.78 <sup>33</sup>	57.82 <sup>171</sup>	45.939 <sup>834</sup>	15.65 <sup>44</sup>
20.5	42.256 <sup>78</sup>	53.15 <sup>181</sup>	70.30 <sup>10</sup>	44.46 <sup>834</sup>	42.01 <sup>23</sup>	59.79 <sup>197</sup>	46.116 <sup>177</sup>	16.37 <sup>72</sup>
30.5	42.334 <sup>20</sup>	54.78 <sup>163</sup>	70.20 <sup>10</sup>	48.90 <sup>884</sup>	42.15 <sup>14</sup>	61.96 <sup>216</sup>	46.231 <sup>115</sup>	17.30 <sup>93</sup>
Feb. 9.5	42.363 <sup>22</sup>	56.19 <sup>141</sup>	69.91 <sup>29</sup>	52.03 <sup>373</sup>	42.20 <sup>5</sup>	64.22 <sup>227</sup>	46.281 <sup>50</sup>	18.40 <sup>110</sup>
19.4	42.341	57.39	69.47	55.55	42.14	66.50	46.289	19.62 <sup>122</sup>
29.4	42.277 <sup>64</sup>	58.35 <sup>96</sup>	68.86 <sup>61</sup>	58.79 <sup>324</sup>	41.99 <sup>18</sup>	68.68 <sup>213</sup>	46.198 <sup>71</sup>	20.86 <sup>124</sup>
Mar. 10.4	42.175 <sup>102</sup>	59.05 <sup>79</sup>	68.13 <sup>73</sup>	61.67 <sup>288</sup>	41.77 <sup>23</sup>	70.87 <sup>199</sup>	46.076 <sup>122</sup>	22.06 <sup>122</sup>
20.4	42.043 <sup>132</sup>	59.53 <sup>48</sup>	67.29 <sup>84</sup>	64.15 <sup>248</sup>	41.48 <sup>29</sup>	72.40 <sup>173</sup>	45.915 <sup>161</sup>	23.20 <sup>112</sup>
30.3	41.891 <sup>161</sup>	59.78 <sup>26</sup>	66.37 <sup>92</sup>	66.17 <sup>202</sup>	41.14 <sup>34</sup>	73.78 <sup>128</sup>	45.724 <sup>191</sup>	24.18 <sup>96</sup>
Apr. 9.3	41.790	59.86	65.39	67.70	40.78	74.76	45.515	24.96 <sup>57</sup>
19.3	41.565 <sup>165</sup>	59.72 <sup>14</sup>	64.38 <sup>101</sup>	68.71 <sup>101</sup>	40.40 <sup>38</sup>	75.82 <sup>56</sup>	45.302 <sup>213</sup>	25.53 <sup>33</sup>
29.2	41.407 <sup>156</sup>	59.40 <sup>32</sup>	63.37 <sup>101</sup>	69.18 <sup>47</sup>	40.03 <sup>37</sup>	75.43 <sup>11</sup>	45.095 <sup>207</sup>	25.86 <sup>33</sup>
May 9.2	41.261 <sup>146</sup>	58.92 <sup>46</sup>	62.38 <sup>99</sup>	69.18 <sup>5</sup>	39.68 <sup>28</sup>	75.11 <sup>32</sup>	44.903 <sup>192</sup>	25.94 <sup>8</sup>
19.2	41.133 <sup>126</sup>	58.27 <sup>65</sup>	61.42 <sup>96</sup>	68.54 <sup>59</sup>	39.37 <sup>31</sup>	74.37 <sup>74</sup>	44.736 <sup>167</sup>	25.78 <sup>16</sup>
29.2	41.082 <sup>101</sup>	57.48 <sup>79</sup>	60.54 <sup>88</sup>	67.45 <sup>109</sup>	39.11 <sup>26</sup>	73.25 <sup>119</sup>	44.598 <sup>138</sup>	25.39 <sup>39</sup>
June 8.1	40.956 <sup>76</sup>	56.56 <sup>92</sup>	59.74 <sup>90</sup>	65.87 <sup>158</sup>	38.90 <sup>21</sup>	71.77 <sup>148</sup>	44.496 <sup>109</sup>	24.79 <sup>60</sup>
18.1	40.911 <sup>45</sup>	55.55 <sup>101</sup>	59.04 <sup>70</sup>	63.85 <sup>203</sup>	38.76 <sup>14</sup>	69.99 <sup>178</sup>	44.431 <sup>65</sup>	23.99 <sup>80</sup>
28.1	40.804 <sup>17</sup>	54.48 <sup>107</sup>	58.48 <sup>56</sup>	61.45 <sup>249</sup>	38.68 <sup>8</sup>	67.95 <sup>204</sup>	44.407 <sup>24</sup>	23.03 <sup>96</sup>
July 8.1	40.908 <sup>14</sup>	58.33 <sup>118</sup>	58.04 <sup>44</sup>	58.78 <sup>273</sup>	38.67 <sup>1</sup>	65.72 <sup>223</sup>	44.423 <sup>16</sup>	21.92 <sup>111</sup>
18.0	40.952 <sup>44</sup>	52.19 <sup>114</sup>	57.77 <sup>27</sup>	55.76 <sup>297</sup>	38.73 <sup>6</sup>	68.83 <sup>289</sup>	44.480 <sup>57</sup>	20.69 <sup>123</sup>
28.0	41.028 <sup>76</sup>	51.05 <sup>114</sup>	57.65 <sup>12</sup>	52.64 <sup>312</sup>	38.86 <sup>13</sup>	60.85 <sup>248</sup>	44.573 <sup>93</sup>	19.36 <sup>133</sup>
Aug. 7.0	41.131 <sup>108</sup>	50.08 <sup>103</sup>	57.69 <sup>4</sup>	49.43 <sup>316</sup>	39.05 <sup>19</sup>	58.32 <sup>263</sup>	44.706 <sup>33</sup>	17.95 <sup>141</sup>
16.9	41.265 <sup>134</sup>	49.11 <sup>92</sup>	57.92 <sup>23</sup>	46.36 <sup>312</sup>	38.90 <sup>25</sup>	55.81 <sup>261</sup>	44.874 <sup>168</sup>	16.48 <sup>147</sup>
26.9	41.424 <sup>166</sup>	48.38 <sup>73</sup>	58.30 <sup>28</sup>	43.41 <sup>295</sup>	39.61 <sup>31</sup>	53.33 <sup>245</sup>	45.076 <sup>202</sup>	14.96 <sup>152</sup>
Sept. 5.9	41.612 <sup>188</sup>	47.88 <sup>59</sup>	58.84 <sup>54</sup>	40.73 <sup>286</sup>	39.07 <sup>26</sup>	50.94 <sup>289</sup>	45.076 <sup>233</sup>	13.42 <sup>154</sup>
15.9	41.822 <sup>210</sup>	47.02 <sup>26</sup>	59.53 <sup>69</sup>	38.42 <sup>231</sup>	40.88 <sup>41</sup>	48.70 <sup>234</sup>	45.309 <sup>265</sup>	11.86 <sup>156</sup>
25.8	42.057 <sup>235</sup>	47.68 <sup>6</sup>	60.34 <sup>81</sup>	36.58 <sup>184</sup>	40.84 <sup>46</sup>	46.64 <sup>206</sup>	45.868 <sup>294</sup>	10.32 <sup>164</sup>
Oct. 5.8	42.313 <sup>256</sup>	48.05 <sup>37</sup>	61.25 <sup>91</sup>	35.27 <sup>131</sup>	40.84 <sup>50</sup>	44.80 <sup>184</sup>	46.187 <sup>319</sup>	8.81 <sup>151</sup>
15.8	42.587 <sup>274</sup>	48.74 <sup>69</sup>	62.24 <sup>99</sup>	34.58 <sup>69</sup>	41.87 <sup>53</sup>	43.23 <sup>187</sup>	46.529 <sup>342</sup>	7.36 <sup>145</sup>
25.8	42.878 <sup>301</sup>	49.76 <sup>102</sup>	63.28 <sup>104</sup>	34.55 <sup>3</sup>	42.42 <sup>55</sup>	41.97 <sup>126</sup>	46.880 <sup>361</sup>	6.02 <sup>134</sup>
Nov. 4.7	43.176 <sup>308</sup>	51.09 <sup>133</sup>	64.32 <sup>104</sup>	35.17 <sup>62</sup>	42.99 <sup>57</sup>	41.06 <sup>91</sup>	47.265 <sup>375</sup>	4.82 <sup>120</sup>
14.7	43.480 <sup>304</sup>	52.67 <sup>156</sup>	65.84 <sup>102</sup>	36.45 <sup>136</sup>	43.57 <sup>58</sup>	40.53 <sup>59</sup>	47.645 <sup>380</sup>	3.78 <sup>104</sup>
24.7	43.781 <sup>301</sup>	54.43 <sup>181</sup>	66.29 <sup>95</sup>	38.36 <sup>191</sup>	44.14 <sup>57</sup>	40.41 <sup>12</sup>	48.023 <sup>378</sup>	2.97 <sup>81</sup>
Dec. 4.6	44.068 <sup>287</sup>	56.42 <sup>194</sup>	67.14 <sup>85</sup>	40.83 <sup>247</sup>	44.68 <sup>54</sup>	40.71 <sup>30</sup>	48.390 <sup>367</sup>	2.40 <sup>57</sup>
14.6	44.365 <sup>267</sup>	58.46 <sup>204</sup>	67.85 <sup>71</sup>	43.77 <sup>294</sup>	45.18 <sup>60</sup>	41.44 <sup>73</sup>	49.782 <sup>342</sup>	2.12 <sup>28</sup>
24.6	44.572 <sup>237</sup>	60.52 <sup>208</sup>	68.42 <sup>57</sup>	47.10 <sup>323</sup>	45.63 <sup>45</sup>	42.58 <sup>114</sup>	49.041 <sup>309</sup>	2.12 <sup>0</sup>
34.6	44.773 <sup>201</sup>	63.51 <sup>199</sup>	69.82 <sup>49</sup>	50.71 <sup>361</sup>	46.01 <sup>38</sup>	44.09 <sup>151</sup>	49.305 <sup>264</sup>	2.42 <sup>30</sup>
Mean Place	39.806	49.33	63.862	37.32	37.959	73.29	43.261	30.54
Sec δ, Tan δ	1.002	-0.064	4.524	-4.413	2.062	+1.806	1.274	+0.789
D <sub>α</sub> , D <sub>ω</sub>	+0.060	+0.002	-0.064	-0.172	+0.100	+0.879	+0.076	+0.032
D <sub>δ</sub> , D <sub>ε</sub>	-0.23	+0.81	-0.23	+0.81	-0.23	+0.81	-0.24	+0.80

FOR THE UPPER TRANSIT AT WASHINGTON.

Washington Mean Time.	$\theta$ Pyzidis. Mag. 4.9		$\alpha$ Hydrae. Mag. 2.2		$h$ Ursae Majoris. Mag. 3.8		$d$ Ursae Majoris. Mag. 4.6	
	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.
	h m 9 17	° ' -25 37	h m 9 23	° ' - 8 18	h m 9 25	° ' +63 24	h m 9 27	° ' +70 10
	s	"	s	"	s	"	s	"
Jan. 0.6	58.886	32.99	41.301	47.63	17.42	24.29	29.80	37.17
10.6	59.111 <sup>225</sup>	35.95 <sup>296</sup>	41.580 <sup>229</sup>	49.91 <sup>228</sup>	17.88 <sup>46</sup>	25.60 <sup>131</sup>	30.37 <sup>57</sup>	38.74 <sup>157</sup>
20.6	59.289 <sup>178</sup>	38.91 <sup>296</sup>	41.715 <sup>185</sup>	52.10 <sup>219</sup>	18.24 <sup>36</sup>	27.33 <sup>173</sup>	30.84 <sup>47</sup>	40.74 <sup>200</sup>
30.5	59.416 <sup>127</sup>	41.78 <sup>287</sup>	41.852 <sup>137</sup>	54.12 <sup>202</sup>	18.51 <sup>27</sup>	29.39 <sup>206</sup>	31.17 <sup>33</sup>	43.07 <sup>233</sup>
Feb. 9.5	59.490 <sup>74</sup>	44.50 <sup>272</sup>	41.940 <sup>88</sup>	55.96 <sup>184</sup>	18.68 <sup>17</sup>	31.70 <sup>231</sup>	31.38 <sup>21</sup>	45.65 <sup>258</sup>
19.5	59.510	47.01	41.980	57.53	18.75	34.17	31.45	48.37
29.5	59.481 <sup>29</sup>	49.24 <sup>223</sup>	41.971 <sup>9</sup>	58.86 <sup>133</sup>	18.70 <sup>5</sup>	36.88 <sup>251</sup>	31.38 <sup>7</sup>	51.11 <sup>274</sup>
Mar. 10.4	59.409 <sup>72</sup>	51.18 <sup>194</sup>	41.920 <sup>51</sup>	59.94 <sup>108</sup>	18.56 <sup>14</sup>	39.13 <sup>245</sup>	31.19 <sup>19</sup>	53.75 <sup>264</sup>
20.4	59.299 <sup>110</sup>	52.81 <sup>163</sup>	41.834 <sup>96</sup>	60.75 <sup>51</sup>	18.34 <sup>22</sup>	41.42 <sup>220</sup>	30.89 <sup>20</sup>	56.21 <sup>246</sup>
30.4	59.161 <sup>138</sup>	54.08 <sup>137</sup>	41.719 <sup>115</sup>	61.31 <sup>56</sup>	18.05 <sup>29</sup>	43.44 <sup>202</sup>	30.50 <sup>89</sup>	58.35 <sup>214</sup>
Apr. 9.3	59.003	55.01	41.587	61.65	17.71	45.12	30.03	60.12
19.3	58.833 <sup>170</sup>	55.58 <sup>57</sup>	41.441 <sup>146</sup>	61.72 <sup>7</sup>	17.34 <sup>37</sup>	46.40 <sup>126</sup>	29.52 <sup>51</sup>	61.45 <sup>133</sup>
29.3	58.658 <sup>172</sup>	55.79 <sup>31</sup>	41.292 <sup>149</sup>	61.60 <sup>12</sup>	16.94 <sup>40</sup>	47.25 <sup>85</sup>	28.96 <sup>56</sup>	62.29 <sup>84</sup>
May 9.3	58.486	55.66	41.146	61.26	16.55	47.63	28.42	62.62
19.2	58.324 <sup>162</sup>	55.19 <sup>47</sup>	41.009 <sup>137</sup>	60.74 <sup>52</sup>	16.16 <sup>39</sup>	47.54 <sup>28</sup>	27.90 <sup>54</sup>	62.45 <sup>33</sup>
29.2	58.177 <sup>147</sup>	54.40 <sup>79</sup>	40.887 <sup>122</sup>	60.66 <sup>69</sup>	15.82 <sup>84</sup>	46.99 <sup>55</sup>	27.41 <sup>49</sup>	61.77 <sup>68</sup>
June 8.2	58.048 <sup>120</sup>	53.31 <sup>109</sup>	40.780 <sup>107</sup>	59.20 <sup>85</sup>	15.51 <sup>31</sup>	46.01 <sup>96</sup>	26.97 <sup>44</sup>	60.61 <sup>116</sup>
18.2	57.943 <sup>106</sup>	51.94 <sup>137</sup>	40.696 <sup>84</sup>	58.21 <sup>99</sup>	15.25 <sup>26</sup>	44.62 <sup>130</sup>	26.60 <sup>37</sup>	59.02 <sup>159</sup>
28.1	57.862 <sup>81</sup>	50.34 <sup>166</sup>	40.637 <sup>59</sup>	57.12 <sup>109</sup>	15.05 <sup>20</sup>	42.86 <sup>176</sup>	26.30 <sup>30</sup>	57.04 <sup>198</sup>
July 8.1	57.809 <sup>53</sup>	48.55 <sup>179</sup>	40.599 <sup>38</sup>	55.94 <sup>118</sup>	14.92 <sup>13</sup>	40.77 <sup>200</sup>	26.08 <sup>22</sup>	54.72 <sup>232</sup>
18.1	57.783 <sup>26</sup>	46.63 <sup>192</sup>	40.588 <sup>11</sup>	54.73 <sup>121</sup>	14.84 <sup>8</sup>	38.43 <sup>234</sup>	25.96 <sup>12</sup>	52.11 <sup>261</sup>
28.0	57.788 <sup>5</sup>	44.62 <sup>201</sup>	40.605 <sup>17</sup>	53.82 <sup>121</sup>	14.84 <sup>0</sup>	35.85 <sup>238</sup>	25.92 <sup>4</sup>	49.29 <sup>262</sup>
Aug. 7.0	57.825 <sup>37</sup>	42.61 <sup>201</sup>	40.648 <sup>48</sup>	52.95 <sup>117</sup>	14.90 <sup>6</sup>	33.12 <sup>273</sup>	25.97 <sup>5</sup>	46.28 <sup>301</sup>
17.0	57.895 <sup>79</sup>	40.66 <sup>195</sup>	40.721 <sup>78</sup>	51.27 <sup>108</sup>	15.03 <sup>13</sup>	30.28 <sup>284</sup>	26.11 <sup>24</sup>	43.19 <sup>309</sup>
27.0	57.997 <sup>139</sup>	38.86 <sup>180</sup>	40.821 <sup>100</sup>	50.36 <sup>91</sup>	15.22 <sup>19</sup>	27.38 <sup>290</sup>	26.35 <sup>14</sup>	40.05 <sup>314</sup>
Sept. 5.9	58.136	37.28	40.963	49.67	15.48	24.47	26.68	36.93
15.9	58.207 <sup>171</sup>	35.98 <sup>130</sup>	41.113 <sup>180</sup>	49.20 <sup>47</sup>	15.82 <sup>34</sup>	21.62 <sup>285</sup>	27.08 <sup>40</sup>	33.90 <sup>303</sup>
25.9	58.513 <sup>206</sup>	35.05 <sup>93</sup>	41.304 <sup>191</sup>	49.04 <sup>16</sup>	16.20 <sup>38</sup>	18.87 <sup>276</sup>	27.57 <sup>49</sup>	31.00 <sup>290</sup>
Oct. 5.9	58.751 <sup>238</sup>	34.54 <sup>51</sup>	41.526 <sup>222</sup>	49.20 <sup>16</sup>	16.64 <sup>44</sup>	16.90 <sup>287</sup>	28.13 <sup>56</sup>	28.30 <sup>270</sup>
15.8	59.018 <sup>267</sup>	34.48 <sup>6</sup>	41.772 <sup>246</sup>	49.74 <sup>54</sup>	17.14 <sup>50</sup>	13.94 <sup>236</sup>	28.76 <sup>63</sup>	25.88 <sup>242</sup>
25.8	59.313 <sup>295</sup>	34.48 <sup>43</sup>	41.772 <sup>274</sup>	49.74 <sup>87</sup>	17.14 <sup>54</sup>	13.94 <sup>297</sup>	28.76 <sup>69</sup>	25.88 <sup>210</sup>
Nov. 4.8	59.627 <sup>314</sup>	34.91 <sup>92</sup>	42.046 <sup>238</sup>	50.61 <sup>194</sup>	17.68 <sup>58</sup>	11.87 <sup>174</sup>	29.45 <sup>74</sup>	23.78 <sup>172</sup>
14.7	59.952 <sup>325</sup>	35.83 <sup>140</sup>	42.339 <sup>298</sup>	51.85 <sup>154</sup>	18.26 <sup>60</sup>	10.13 <sup>185</sup>	30.19 <sup>78</sup>	22.06 <sup>128</sup>
24.7	60.284 <sup>332</sup>	37.23 <sup>184</sup>	42.648 <sup>309</sup>	53.39 <sup>184</sup>	18.86 <sup>62</sup>	8.78 <sup>91</sup>	30.97 <sup>78</sup>	20.78 <sup>80</sup>
Dec. 4.7	60.610 <sup>326</sup>	39.07 <sup>221</sup>	42.961 <sup>311</sup>	55.23 <sup>205</sup>	19.48 <sup>61</sup>	7.87 <sup>44</sup>	31.75 <sup>77</sup>	19.98 <sup>28</sup>
14.7	60.919 <sup>309</sup>	41.28 <sup>253</sup>	43.272 <sup>303</sup>	57.28 <sup>221</sup>	20.09 <sup>60</sup>	7.43 <sup>7</sup>	32.52 <sup>76</sup>	19.70 <sup>25</sup>
24.6	61.203 <sup>284</sup>	43.81 <sup>276</sup>	43.575 <sup>276</sup>	59.49 <sup>227</sup>	20.69 <sup>55</sup>	7.50 <sup>56</sup>	33.28 <sup>70</sup>	19.95 <sup>78</sup>
34.6	61.453 <sup>250</sup>	46.57 <sup>290</sup>	43.854 <sup>249</sup>	61.76 <sup>220</sup>	21.24 <sup>49</sup>	8.06 <sup>104</sup>	33.98 <sup>63</sup>	20.73 <sup>78</sup>
	61.453 <sup>250</sup>	49.47 <sup>200</sup>	44.108 <sup>249</sup>	64.06 <sup>220</sup>	21.78 <sup>49</sup>	9.10 <sup>104</sup>	34.61 <sup>63</sup>	22.02 <sup>129</sup>
Mean Place	56.838	29.22	39.396	40.00	14.472	45.49	26.249	58.99
Sec $\delta$ , Tan $\delta$	1.109	-0.480	1.011	-0.146	2.234	+1.998	2.949	+2.774
$D\phi\alpha$ , $D\omega\alpha$	+0.053	-0.024	+0.059	-0.008	+0.094	+0.104	+0.107	+0.145
$D\phi\delta$ , $D\omega\delta$	-0.30	+0.65	-0.31	+0.68	-0.31	+0.68	-0.31	+0.62

# APPARENT PLACES OF STARS, 1920.

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## FOR THE UPPER TRANSIT AT WASHINGTON.

Washington Mean Time.	θ Ursae Majoris. Mag. 3.3		γ Argus. Mag. 3.6		ξ Leonis. Mag. 5.1		10 Leonis Minoris. Mag. 4.6	
	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.
	h m 9 27	° ' " +52 1	h m 9 27	° ' " -40 6	h m 9 27	° ' " +11 38	h m 9 29	° ' " +36 44
	s	"	s	"	s	"	s	"
Jan. 0.6	33.376 <sup>351</sup>	74.11 <sup>78</sup>	35.007 <sup>269</sup>	58.97 <sup>332</sup>	40.025 <sup>244</sup>	64.94 <sup>134</sup>	21.738 <sup>291</sup>	55.17 <sup>2</sup>
10.6	33.727 <sup>286</sup>	74.89 <sup>114</sup>	35.256 <sup>196</sup>	62.29 <sup>342</sup>	40.269 <sup>291</sup>	63.60 <sup>111</sup>	22.029 <sup>241</sup>	55.15 <sup>32</sup>
20.6	34.013 <sup>219</sup>	76.03 <sup>148</sup>	35.452 <sup>128</sup>	65.71 <sup>342</sup>	40.470 <sup>151</sup>	62.49 <sup>88</sup>	22.270 <sup>183</sup>	55.47 <sup>65</sup>
30.5	34.232 <sup>140</sup>	77.51 <sup>176</sup>	35.590 <sup>77</sup>	69.13 <sup>333</sup>	40.621 <sup>103</sup>	61.61 <sup>38</sup>	22.453 <sup>134</sup>	56.12 <sup>92</sup>
Feb. 9.5	34.372 <sup>61</sup>	79.27 <sup>194</sup>	35.667 <sup>18</sup>	72.46 <sup>315</sup>	40.724 <sup>51</sup>	60.99 <sup>38</sup>	22.577 <sup>62</sup>	57.04 <sup>115</sup>
19.5	34.433 <sup>18</sup>	81.21 <sup>203</sup>	35.685 <sup>—</sup>	75.61 <sup>291</sup>	40.775 <sup>2</sup>	60.61 <sup>16</sup>	22.639 <sup>0</sup>	58.19 <sup>130</sup>
29.5	34.415 <sup>86</sup>	83.24 <sup>203</sup>	35.647 <sup>88</sup>	78.52 <sup>261</sup>	40.777 <sup>43</sup>	60.45 <sup>3</sup>	22.639 <sup>54</sup>	59.49 <sup>138</sup>
Mar. 10.4	34.829 <sup>149</sup>	85.27 <sup>197</sup>	35.559 <sup>189</sup>	81.13 <sup>227</sup>	40.734 <sup>80</sup>	60.48 <sup>21</sup>	22.585 <sup>101</sup>	60.87 <sup>139</sup>
20.4	34.180 <sup>202</sup>	87.24 <sup>176</sup>	35.429 <sup>166</sup>	83.40 <sup>189</sup>	40.654 <sup>110</sup>	60.69 <sup>31</sup>	22.484 <sup>140</sup>	62.26 <sup>134</sup>
30.4	33.978 <sup>287</sup>	89.00 <sup>151</sup>	35.263 <sup>199</sup>	85.29 <sup>143</sup>	40.544 <sup>130</sup>	61.00 <sup>41</sup>	22.344 <sup>168</sup>	63.60 <sup>120</sup>
Apr. 9.3	33.741 <sup>260</sup>	90.51 <sup>121</sup>	35.073 <sup>207</sup>	86.77 <sup>167</sup>	40.414 <sup>145</sup>	61.41 <sup>47</sup>	22.176 <sup>185</sup>	64.80 <sup>104</sup>
19.3	33.481 <sup>271</sup>	91.72 <sup>89</sup>	34.866 <sup>215</sup>	87.84 <sup>62</sup>	40.269 <sup>148</sup>	61.88 <sup>50</sup>	21.991 <sup>192</sup>	65.84 <sup>88</sup>
29.3	33.210 <sup>271</sup>	92.61 <sup>59</sup>	34.651 <sup>215</sup>	88.46 <sup>19</sup>	40.121 <sup>143</sup>	62.38 <sup>51</sup>	21.799 <sup>190</sup>	66.67 <sup>58</sup>
May 9.3	32.939 <sup>269</sup>	93.11 <sup>9</sup>	34.436 <sup>299</sup>	88.65 <sup>28</sup>	39.978 <sup>186</sup>	62.89 <sup>50</sup>	21.609 <sup>179</sup>	67.25 <sup>33</sup>
19.2	32.680 <sup>286</sup>	93.20 <sup>28</sup>	34.227 <sup>185</sup>	88.40 <sup>66</sup>	39.842 <sup>120</sup>	63.39 <sup>49</sup>	21.430 <sup>160</sup>	67.58 <sup>8</sup>
29.2	32.444 <sup>204</sup>	92.92 <sup>64</sup>	34.082 <sup>177</sup>	87.74 <sup>108</sup>	39.722 <sup>102</sup>	63.88 <sup>45</sup>	21.270 <sup>189</sup>	67.66 <sup>18</sup>
June 8.2	32.240 <sup>169</sup>	92.28 <sup>101</sup>	33.855 <sup>154</sup>	86.66 <sup>146</sup>	39.620 <sup>80</sup>	64.33 <sup>41</sup>	21.131 <sup>110</sup>	67.48 <sup>42</sup>
18.2	32.071 <sup>131</sup>	91.27 <sup>130</sup>	33.701 <sup>127</sup>	85.20 <sup>178</sup>	39.540 <sup>56</sup>	64.74 <sup>37</sup>	21.021 <sup>80</sup>	67.06 <sup>67</sup>
28.1	31.940 <sup>86</sup>	89.97 <sup>162</sup>	33.574 <sup>98</sup>	83.42 <sup>207</sup>	39.484 <sup>32</sup>	65.11 <sup>28</sup>	20.941 <sup>48</sup>	66.39 <sup>109</sup>
July 8.1	31.854 <sup>36</sup>	88.35 <sup>184</sup>	33.476 <sup>68</sup>	81.35 <sup>229</sup>	39.452 <sup>4</sup>	65.41 <sup>23</sup>	20.893 <sup>14</sup>	65.52 <sup>126</sup>
18.1	31.818 <sup>9</sup>	86.51 <sup>207</sup>	33.413 <sup>29</sup>	79.06 <sup>245</sup>	39.448 <sup>23</sup>	65.64 <sup>16</sup>	20.879 <sup>20</sup>	64.43 <sup>142</sup>
28.0	31.827 <sup>55</sup>	84.44 <sup>224</sup>	33.384 <sup>10</sup>	76.61 <sup>254</sup>	39.471 <sup>40</sup>	65.80 <sup>2</sup>	20.899 <sup>55</sup>	63.17 <sup>156</sup>
Aug. 7.0	31.882 <sup>104</sup>	82.20 <sup>228</sup>	33.394 <sup>50</sup>	74.07 <sup>260</sup>	39.520 <sup>76</sup>	65.82 <sup>10</sup>	20.954 <sup>84</sup>	61.75 <sup>170</sup>
17.0	31.986 <sup>149</sup>	79.82 <sup>245</sup>	33.444 <sup>93</sup>	71.57 <sup>242</sup>	39.596 <sup>105</sup>	65.72 <sup>24</sup>	21.042 <sup>129</sup>	60.19 <sup>170</sup>
27.0	32.135 <sup>195</sup>	77.37 <sup>261</sup>	33.537 <sup>135</sup>	69.15 <sup>221</sup>	39.701 <sup>136</sup>	65.48 <sup>43</sup>	21.166 <sup>160</sup>	58.49 <sup>179</sup>
Sept. 5.9	32.330 <sup>243</sup>	74.86 <sup>260</sup>	33.672 <sup>173</sup>	66.94 <sup>192</sup>	39.837 <sup>163</sup>	65.05 <sup>61</sup>	21.326 <sup>194</sup>	56.70 <sup>187</sup>
15.9	32.573 <sup>267</sup>	72.36 <sup>247</sup>	33.850 <sup>221</sup>	65.02 <sup>156</sup>	40.000 <sup>192</sup>	64.44 <sup>81</sup>	21.520 <sup>268</sup>	54.83 <sup>194</sup>
25.9	32.860 <sup>327</sup>	69.89 <sup>241</sup>	34.071 <sup>260</sup>	63.46 <sup>110</sup>	40.192 <sup>223</sup>	63.63 <sup>101</sup>	21.748 <sup>323</sup>	52.89 <sup>196</sup>
Oct. 5.9	33.187 <sup>368</sup>	67.48 <sup>226</sup>	34.331 <sup>299</sup>	62.36 <sup>66</sup>	40.415 <sup>260</sup>	62.62 <sup>121</sup>	22.011 <sup>295</sup>	50.93 <sup>196</sup>
15.8	33.555 <sup>406</sup>	65.22 <sup>205</sup>	34.630 <sup>339</sup>	61.76 <sup>3</sup>	40.665 <sup>375</sup>	61.41 <sup>139</sup>	22.306 <sup>324</sup>	48.98 <sup>190</sup>
25.8	33.960 <sup>436</sup>	63.17 <sup>184</sup>	34.959 <sup>352</sup>	61.73 <sup>53</sup>	40.940 <sup>295</sup>	60.02 <sup>156</sup>	22.630 <sup>350</sup>	47.08 <sup>181</sup>
Nov. 4.8	34.396 <sup>455</sup>	61.33 <sup>162</sup>	35.311 <sup>368</sup>	62.26 <sup>112</sup>	41.235 <sup>313</sup>	58.46 <sup>167</sup>	22.980 <sup>367</sup>	45.27 <sup>165</sup>
14.7	34.851 <sup>469</sup>	59.81 <sup>119</sup>	35.679 <sup>372</sup>	63.38 <sup>165</sup>	41.548 <sup>321</sup>	56.79 <sup>174</sup>	23.347 <sup>379</sup>	43.62 <sup>146</sup>
24.7	35.320 <sup>465</sup>	58.62 <sup>79</sup>	36.061 <sup>367</sup>	65.03 <sup>216</sup>	41.869 <sup>322</sup>	55.05 <sup>175</sup>	23.726 <sup>380</sup>	42.16 <sup>120</sup>
Dec. 4.7	35.785 <sup>453</sup>	57.83 <sup>38</sup>	36.418 <sup>347</sup>	67.19 <sup>260</sup>	42.191 <sup>311</sup>	53.30 <sup>171</sup>	24.106 <sup>370</sup>	40.96 <sup>91</sup>
14.7	36.238 <sup>424</sup>	57.45 <sup>7</sup>	36.765 <sup>318</sup>	69.79 <sup>294</sup>	42.502 <sup>298</sup>	51.59 <sup>169</sup>	24.476 <sup>347</sup>	40.05 <sup>57</sup>
24.6	36.662 <sup>384</sup>	57.52 <sup>51</sup>	37.083 <sup>277</sup>	72.73 <sup>319</sup>	42.795 <sup>266</sup>	50.00 <sup>144</sup>	24.823 <sup>314</sup>	39.48 <sup>20</sup>
34.6	37.046 <sup>384</sup>	58.03 <sup>51</sup>	37.360 <sup>277</sup>	75.92 <sup>—</sup>	43.061 <sup>266</sup>	48.56 <sup>—</sup>	25.137 <sup>—</sup>	39.28 <sup>—</sup>
Mean Place	31.000	94.18	32.761	58.67	33.157	77.33	19.704	72.91
Sec δ, Tan δ	1.626	+1.282	1.306	-0.843	1.021	+0.206	1.243	+0.747
D <sub>ψ</sub> α. D <sub>ω</sub> α	+0.082	+0.067	+0.047	-0.044	+0.065	+0.011	+0.073	+0.069
D <sub>ψ</sub> δ. D <sub>ω</sub> δ	-0.31	+0.62	-0.31	+0.62	-0.31	+0.62	-0.31	+0.61

APPARENT PLACES OF STARS, 1920.

FOR THE UPPER TRANSIT AT WASHINGTON.

Washington Mean Time.	γ Cancri. Mag. 5.5		Groombridge 1446 Mag. 6.3		δ Hydræ. Mag. 4.2		σ Hydræ. Mag. 4.5	
	Right Ascension.	Declination.	Right Ascension.	Declination.	Right Ascension.	Declination.	Right Ascension.	Declination.
	h m s	° ' "	h m s	° ' "	h m s	° ' "	h m s	° ' "
	8 28	+20 42	8 30	+73 54	8 33	+ 5 58	8 34	+ 3 36
Jan. 0.6	7.903 <sup>205</sup>	36.78 <sup>59</sup>	56.23 <sup>54</sup>	21.22 <sup>220</sup>	27.418 <sup>194</sup>	50.25 <sup>147</sup>	36.713 <sup>192</sup>	73.28 <sup>159</sup>
10.6	7.508 <sup>154</sup>	36.19 <sup>35</sup>	56.77 <sup>37</sup>	23.42 <sup>250</sup>	27.612 <sup>146</sup>	48.78 <sup>128</sup>	36.905 <sup>146</sup>	71.69 <sup>142</sup>
20.5	7.662 <sup>99</sup>	35.84 <sup>16</sup>	57.14 <sup>22</sup>	25.92 <sup>269</sup>	27.758 <sup>97</sup>	47.60 <sup>108</sup>	37.051 <sup>97</sup>	70.27 <sup>124</sup>
30.5	7.761 <sup>47</sup>	35.68 <sup>3</sup>	57.36 <sup>5</sup>	28.61 <sup>278</sup>	27.855 <sup>44</sup>	46.42 <sup>87</sup>	37.148 <sup>44</sup>	69.03 <sup>101</sup>
Feb. 9.5	7.808 <sup>7</sup>	35.71 <sup>22</sup>	57.41 <sup>12</sup>	31.39 <sup>275</sup>	27.899 <sup>4</sup>	45.55 <sup>66</sup>	37.192 <sup>4</sup>	68.02 <sup>80</sup>
19.4	7.801	35.98 <sup>35</sup>	57.29 <sup>26</sup>	34.14 <sup>261</sup>	27.895 <sup>51</sup>	44.80 <sup>46</sup>	37.188 <sup>51</sup>	67.22 <sup>57</sup>
29.4	7.745 <sup>86</sup>	36.28 <sup>43</sup>	57.03 <sup>42</sup>	36.75 <sup>226</sup>	27.844 <sup>89</sup>	44.43 <sup>25</sup>	37.137 <sup>88</sup>	66.65 <sup>41</sup>
Mar. 10.4	7.649 <sup>96</sup>	36.71 <sup>49</sup>	56.61 <sup>52</sup>	39.11 <sup>202</sup>	27.755 <sup>122</sup>	44.18 <sup>11</sup>	37.049 <sup>120</sup>	66.24 <sup>20</sup>
20.4	7.515 <sup>134</sup>	37.20 <sup>80</sup>	56.09 <sup>61</sup>	41.13 <sup>159</sup>	27.633 <sup>144</sup>	44.07 <sup>5</sup>	36.929 <sup>143</sup>	66.04 <sup>3</sup>
30.3	7.360 <sup>167</sup>	37.70 <sup>48</sup>	55.48 <sup>67</sup>	42.72 <sup>111</sup>	27.489 <sup>157</sup>	44.12 <sup>18</sup>	36.786 <sup>153</sup>	66.01 <sup>11</sup>
Apr. 9.3	7.193	38.18 <sup>45</sup>	54.81 <sup>69</sup>	43.83 <sup>80</sup>	27.332 <sup>100</sup>	44.28 <sup>26</sup>	36.633 <sup>160</sup>	66.12 <sup>24</sup>
19.3	7.019 <sup>174</sup>	38.63 <sup>36</sup>	54.12 <sup>70</sup>	44.43 <sup>8</sup>	27.172 <sup>157</sup>	44.54 <sup>36</sup>	36.473 <sup>157</sup>	66.36 <sup>35</sup>
29.3	6.853 <sup>166</sup>	38.99 <sup>32</sup>	53.42 <sup>66</sup>	44.51 <sup>45</sup>	27.015 <sup>145</sup>	44.90 <sup>43</sup>	36.316 <sup>145</sup>	66.71 <sup>43</sup>
May 9.2	6.699 <sup>134</sup>	39.31 <sup>21</sup>	52.76 <sup>13</sup>	44.06 <sup>88</sup>	26.870 <sup>127</sup>	45.38 <sup>50</sup>	36.171 <sup>127</sup>	67.14 <sup>53</sup>
19.2	6.565 <sup>108</sup>	39.52 <sup>9</sup>	52.15 <sup>44</sup>	43.10 <sup>143</sup>	26.743 <sup>103</sup>	45.83 <sup>54</sup>	36.044 <sup>105</sup>	67.67 <sup>61</sup>
29.2	6.457 <sup>78</sup>	39.65 <sup>1</sup>	51.62 <sup>34</sup>	41.67 <sup>184</sup>	26.640 <sup>78</sup>	46.37 <sup>59</sup>	35.939 <sup>78</sup>	68.28 <sup>65</sup>
June 8.1	6.379 <sup>48</sup>	39.74 <sup>1</sup>	51.18 <sup>23</sup>	39.83 <sup>221</sup>	26.562 <sup>49</sup>	46.66 <sup>62</sup>	35.861 <sup>51</sup>	68.93 <sup>72</sup>
18.1	6.331 <sup>15</sup>	39.75 <sup>7</sup>	50.84 <sup>23</sup>	37.62 <sup>250</sup>	26.513 <sup>19</sup>	47.58 <sup>63</sup>	35.810 <sup>22</sup>	69.65 <sup>75</sup>
28.1	6.316 <sup>21</sup>	39.68 <sup>15</sup>	50.62 <sup>10</sup>	35.12 <sup>273</sup>	26.494 <sup>11</sup>	48.21 <sup>63</sup>	35.788 <sup>10</sup>	70.40 <sup>74</sup>
July 8.1	6.337 <sup>51</sup>	39.53 <sup>23</sup>	50.52 <sup>2</sup>	32.39 <sup>291</sup>	26.505 <sup>41</sup>	48.84 <sup>60</sup>	35.798 <sup>37</sup>	71.14 <sup>73</sup>
18.0	6.388	39.30 <sup>20</sup>	50.54 <sup>13</sup>	29.48 <sup>301</sup>	26.546 <sup>70</sup>	49.44 <sup>56</sup>	35.835 <sup>68</sup>	71.87 <sup>69</sup>
28.0	6.469 <sup>81</sup>	39.00 <sup>27</sup>	50.67 <sup>26</sup>	26.47 <sup>304</sup>	26.616 <sup>99</sup>	50.00 <sup>46</sup>	35.903 <sup>96</sup>	72.56 <sup>59</sup>
Aug. 7.0	6.583 <sup>114</sup>	38.63 <sup>49</sup>	50.93 <sup>33</sup>	23.43 <sup>302</sup>	26.715 <sup>126</sup>	50.46 <sup>36</sup>	35.999 <sup>124</sup>	73.15 <sup>48</sup>
17.0	6.727 <sup>144</sup>	38.14 <sup>60</sup>	51.31 <sup>47</sup>	20.41 <sup>293</sup>	26.841 <sup>154</sup>	50.82 <sup>19</sup>	36.123 <sup>152</sup>	73.63 <sup>32</sup>
26.9	6.898 <sup>200</sup>	37.54 <sup>73</sup>	51.78 <sup>58</sup>	17.48 <sup>290</sup>	26.995 <sup>180</sup>	51.01 <sup>1</sup>	36.275 <sup>180</sup>	73.95 <sup>13</sup>
Sept. 5.9	7.066	36.81 <sup>82</sup>	52.36 <sup>67</sup>	14.68 <sup>250</sup>	27.175 <sup>306</sup>	51.02 <sup>10</sup>	36.455 <sup>205</sup>	74.06 <sup>9</sup>
15.9	7.323 <sup>225</sup>	35.99 <sup>96</sup>	53.03 <sup>74</sup>	12.00 <sup>235</sup>	27.881 <sup>290</sup>	50.83 <sup>43</sup>	36.640 <sup>226</sup>	73.99 <sup>34</sup>
25.8	7.573 <sup>250</sup>	35.08 <sup>107</sup>	53.77 <sup>83</sup>	9.74 <sup>204</sup>	27.611 <sup>252</sup>	50.40 <sup>66</sup>	36.836 <sup>252</sup>	73.65 <sup>59</sup>
Oct. 5.8	7.845 <sup>274</sup>	33.96 <sup>130</sup>	54.60 <sup>92</sup>	7.70 <sup>168</sup>	27.863 <sup>274</sup>	49.74 <sup>92</sup>	37.136 <sup>272</sup>	73.06 <sup>87</sup>
15.8	8.139 <sup>311</sup>	32.76 <sup>126</sup>	55.48 <sup>92</sup>	6.02 <sup>129</sup>	28.137 <sup>290</sup>	48.82 <sup>114</sup>	37.410 <sup>289</sup>	72.19 <sup>112</sup>
25.8	8.450	31.51 <sup>130</sup>	56.40 <sup>95</sup>	4.73 <sup>84</sup>	28.427 <sup>303</sup>	47.68 <sup>136</sup>	37.699 <sup>301</sup>	71.07 <sup>135</sup>
Nov. 4.7	8.770 <sup>320</sup>	30.21 <sup>134</sup>	57.35 <sup>96</sup>	3.89 <sup>38</sup>	28.730 <sup>306</sup>	46.32 <sup>151</sup>	38.000 <sup>306</sup>	69.72 <sup>153</sup>
14.7	9.097 <sup>327</sup>	28.87 <sup>129</sup>	58.31 <sup>93</sup>	3.51 <sup>12</sup>	29.038 <sup>308</sup>	44.81 <sup>164</sup>	38.806 <sup>308</sup>	68.19 <sup>168</sup>
24.7	9.423 <sup>326</sup>	27.68 <sup>118</sup>	59.24 <sup>90</sup>	3.63 <sup>62</sup>	29.346 <sup>298</sup>	43.17 <sup>169</sup>	38.614 <sup>297</sup>	66.51 <sup>177</sup>
Dec. 4.7	9.740 <sup>327</sup>	26.40 <sup>106</sup>	60.14 <sup>82</sup>	4.25 <sup>112</sup>	29.644 <sup>281</sup>	41.43 <sup>171</sup>	38.911 <sup>278</sup>	64.74 <sup>180</sup>
14.6	10.036	25.34 <sup>91</sup>	60.96 <sup>73</sup>	5.37 <sup>159</sup>	29.925 <sup>252</sup>	39.77 <sup>163</sup>	39.130 <sup>252</sup>	62.94 <sup>175</sup>
24.6	10.303	24.43 <sup>70</sup>	61.69 <sup>62</sup>	6.96 <sup>201</sup>	30.177 <sup>177</sup>	38.14 <sup>154</sup>	39.441 <sup>214</sup>	61.19 <sup>165</sup>
34.6	10.580	23.73	62.31	8.97	30.394 <sup>117</sup>	36.69	39.655	59.54
Mean Place	5.130	49.77	50.902	39.40	25.356	60.97	34.658	88.32
Sec δ, Tan δ	1.069	+0.378	3.607	+3.466	1.005	+0.105	1.002	+0.063
D <sub>γ</sub> α, D <sub>σ</sub> α	+0.069	+0.015	+0.184	+0.141	+0.068	+0.004	+0.063	+0.003
D <sub>γ</sub> δ, D <sub>σ</sub> δ	-0.24	+0.80	-0.24	+0.79	-0.25	+0.78	-0.25	+0.78

# APPARENT PLACES OF STARS, 1920.

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## FOR THE UPPER TRANSIT AT WASHINGTON.

Washington Mean Time.	γ Cancri. Mag. 4.7		δ Cancri. Mag. 4.2		α Pyrdis. Mag. 3.7		ε Cancri. Mag. 4.2	
	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.
	h m 8 38	° ' " +21 44	h m 8 40	° ' " +18 26	h m 8 40	° ' " -32 53	h m 8 41	° ' " +29 2
	s	"	s	"	s	"	s	"
Jan. 0.6	41.725 <sup>212</sup>	72.20 <sup>58</sup>	10.602 <sup>213</sup>	44.10 <sup>77</sup>	24.856 <sup>190</sup>	54.09 <sup>325</sup>	53.856 <sup>228</sup>	57.71 <sup>16</sup>
10.6	41.937 <sup>165</sup>	71.62 <sup>33</sup>	10.814 <sup>164</sup>	43.33 <sup>55</sup>	25.046 <sup>135</sup>	57.34 <sup>323</sup>	54.084 <sup>178</sup>	57.55 <sup>9</sup>
20.5	42.102 <sup>113</sup>	71.29 <sup>10</sup>	10.978 <sup>112</sup>	42.78 <sup>34</sup>	25.181 <sup>81</sup>	60.56 <sup>314</sup>	54.262 <sup>122</sup>	57.64 <sup>35</sup>
30.5	42.214 <sup>57</sup>	71.19 <sup>8</sup>	11.090 <sup>57</sup>	42.44 <sup>11</sup>	25.262 <sup>22</sup>	63.70 <sup>294</sup>	54.384 <sup>64</sup>	57.99 <sup>54</sup>
Feb. 9.5	42.271 <sup>5</sup>	71.27 <sup>27</sup>	11.147 <sup>5</sup>	42.33 <sup>8</sup>	25.284 <sup>31</sup>	66.64 <sup>270</sup>	54.448 <sup>7</sup>	58.53 <sup>71</sup>
19.4	42.276 <sup>46</sup>	71.54 <sup>42</sup>	11.152 <sup>44</sup>	42.41 <sup>23</sup>	25.253 <sup>83</sup>	69.34 <sup>240</sup>	54.455 <sup>46</sup>	59.24 <sup>81</sup>
29.4	42.280 <sup>90</sup>	71.96 <sup>50</sup>	11.108 <sup>87</sup>	42.64 <sup>35</sup>	25.171 <sup>136</sup>	71.74 <sup>207</sup>	54.409 <sup>94</sup>	60.05 <sup>87</sup>
Mar. 10.4	42.140 <sup>126</sup>	72.46 <sup>57</sup>	11.021 <sup>122</sup>	42.99 <sup>42</sup>	25.046 <sup>160</sup>	73.81 <sup>188</sup>	54.315 <sup>132</sup>	60.92 <sup>87</sup>
20.4	42.015 <sup>182</sup>	73.03 <sup>56</sup>	10.899 <sup>145</sup>	43.41 <sup>47</sup>	24.886 <sup>185</sup>	75.49 <sup>180</sup>	54.183 <sup>160</sup>	61.79 <sup>79</sup>
30.3	41.863 <sup>165</sup>	73.59 <sup>55</sup>	10.754 <sup>163</sup>	43.88 <sup>47</sup>	24.701 <sup>200</sup>	76.79 <sup>88</sup>	54.023 <sup>176</sup>	62.58 <sup>74</sup>
Apr. 9.3	41.698 <sup>172</sup>	74.14 <sup>50</sup>	10.591 <sup>167</sup>	44.35 <sup>46</sup>	24.501 <sup>208</sup>	77.07 <sup>48</sup>	53.847 <sup>184</sup>	63.32 <sup>60</sup>
19.3	41.526 <sup>167</sup>	74.64 <sup>44</sup>	10.424 <sup>162</sup>	44.81 <sup>41</sup>	24.293 <sup>206</sup>	78.15 <sup>6</sup>	53.663 <sup>181</sup>	63.92 <sup>46</sup>
29.3	41.359 <sup>157</sup>	75.08 <sup>34</sup>	10.262 <sup>183</sup>	45.22 <sup>37</sup>	24.087 <sup>197</sup>	78.21 <sup>36</sup>	53.482 <sup>168</sup>	64.38 <sup>28</sup>
May 9.2	41.202 <sup>136</sup>	75.42 <sup>24</sup>	10.109 <sup>184</sup>	45.59 <sup>30</sup>	23.890 <sup>180</sup>	77.86 <sup>74</sup>	53.314 <sup>150</sup>	64.66 <sup>13</sup>
19.2	41.066 <sup>114</sup>	75.66 <sup>15</sup>	9.975 <sup>110</sup>	45.89 <sup>28</sup>	23.710 <sup>169</sup>	77.12 <sup>110</sup>	53.164 <sup>124</sup>	64.79 <sup>3</sup>
29.2	40.952 <sup>86</sup>	75.81 <sup>6</sup>	9.865 <sup>83</sup>	46.12 <sup>18</sup>	23.551 <sup>138</sup>	76.02 <sup>145</sup>	53.040 <sup>96</sup>	64.76 <sup>20</sup>
June 8.1	40.866 <sup>55</sup>	75.87 <sup>3</sup>	9.782 <sup>55</sup>	46.30 <sup>10</sup>	23.418 <sup>104</sup>	74.57 <sup>175</sup>	52.944 <sup>63</sup>	64.56 <sup>33</sup>
18.1	40.811 <sup>22</sup>	75.84 <sup>11</sup>	9.727 <sup>23</sup>	46.40 <sup>4</sup>	23.314 <sup>71</sup>	72.82 <sup>201</sup>	52.881 <sup>29</sup>	64.23 <sup>47</sup>
28.1	40.789 <sup>7</sup>	75.73 <sup>21</sup>	9.704 <sup>8</sup>	46.44 <sup>3</sup>	23.243 <sup>37</sup>	70.81 <sup>232</sup>	52.852 <sup>5</sup>	63.76 <sup>59</sup>
July 8.1	40.796 <sup>41</sup>	75.52 <sup>30</sup>	9.712 <sup>39</sup>	46.41 <sup>11</sup>	23.206 <sup>3</sup>	68.59 <sup>233</sup>	52.857 <sup>40</sup>	63.17 <sup>72</sup>
18.0	40.837 <sup>75</sup>	75.22 <sup>36</sup>	9.751 <sup>71</sup>	46.30 <sup>20</sup>	23.263 <sup>33</sup>	66.26 <sup>261</sup>	52.897 <sup>73</sup>	62.45 <sup>81</sup>
28.0	40.912 <sup>106</sup>	74.86 <sup>47</sup>	9.822 <sup>99</sup>	46.10 <sup>28</sup>	23.236 <sup>70</sup>	63.85 <sup>240</sup>	52.970 <sup>107</sup>	61.64 <sup>91</sup>
Aug. 7.0	41.015 <sup>134</sup>	74.39 <sup>59</sup>	9.921 <sup>180</sup>	45.81 <sup>40</sup>	23.306 <sup>107</sup>	61.45 <sup>228</sup>	53.077 <sup>137</sup>	60.73 <sup>101</sup>
17.0	41.149 <sup>161</sup>	73.80 <sup>70</sup>	10.051 <sup>168</sup>	45.41 <sup>52</sup>	23.413 <sup>143</sup>	59.17 <sup>210</sup>	53.214 <sup>160</sup>	59.72 <sup>110</sup>
26.9	41.310 <sup>190</sup>	73.10 <sup>81</sup>	10.209 <sup>185</sup>	44.89 <sup>65</sup>	23.556 <sup>179</sup>	57.07 <sup>188</sup>	53.383 <sup>199</sup>	58.62 <sup>120</sup>
Sept. 5.9	41.500 <sup>219</sup>	72.29 <sup>93</sup>	10.394 <sup>212</sup>	44.24 <sup>80</sup>	23.735 <sup>214</sup>	55.24 <sup>147</sup>	53.582 <sup>227</sup>	57.42 <sup>127</sup>
15.9	41.719 <sup>244</sup>	71.36 <sup>106</sup>	10.606 <sup>237</sup>	43.44 <sup>93</sup>	23.949 <sup>246</sup>	53.77 <sup>106</sup>	53.809 <sup>255</sup>	56.15 <sup>134</sup>
25.8	41.963 <sup>263</sup>	70.30 <sup>118</sup>	10.843 <sup>262</sup>	42.51 <sup>108</sup>	24.195 <sup>277</sup>	52.71 <sup>58</sup>	54.064 <sup>281</sup>	54.81 <sup>139</sup>
Oct. 5.8	42.231 <sup>291</sup>	69.12 <sup>126</sup>	11.105 <sup>263</sup>	41.43 <sup>122</sup>	24.472 <sup>302</sup>	52.13 <sup>4</sup>	54.345 <sup>305</sup>	53.42 <sup>143</sup>
15.8	42.522 <sup>308</sup>	67.86 <sup>134</sup>	11.388 <sup>308</sup>	40.21 <sup>132</sup>	24.774 <sup>321</sup>	52.09 <sup>51</sup>	54.650 <sup>328</sup>	51.99 <sup>142</sup>
25.8	42.830 <sup>322</sup>	66.52 <sup>137</sup>	11.691 <sup>316</sup>	38.89 <sup>139</sup>	25.095 <sup>334</sup>	52.60 <sup>103</sup>	54.973 <sup>339</sup>	50.57 <sup>139</sup>
Nov. 4.7	43.152 <sup>390</sup>	65.15 <sup>128</sup>	12.007 <sup>324</sup>	37.50 <sup>143</sup>	25.429 <sup>340</sup>	53.63 <sup>159</sup>	55.312 <sup>349</sup>	49.18 <sup>131</sup>
14.7	43.482 <sup>339</sup>	63.77 <sup>183</sup>	12.331 <sup>325</sup>	36.07 <sup>141</sup>	25.769 <sup>335</sup>	55.22 <sup>204</sup>	55.661 <sup>349</sup>	47.87 <sup>117</sup>
24.7	43.811 <sup>322</sup>	62.44 <sup>123</sup>	12.656 <sup>315</sup>	34.66 <sup>136</sup>	26.104 <sup>321</sup>	57.26 <sup>247</sup>	56.010 <sup>341</sup>	46.70 <sup>101</sup>
Dec. 4.7	44.133 <sup>306</sup>	61.21 <sup>108</sup>	12.972 <sup>299</sup>	33.30 <sup>128</sup>	26.425 <sup>295</sup>	59.73 <sup>280</sup>	56.351 <sup>323</sup>	45.69 <sup>80</sup>
14.6	44.438 <sup>275</sup>	60.13 <sup>91</sup>	13.271 <sup>271</sup>	32.07 <sup>106</sup>	26.720 <sup>261</sup>	62.53 <sup>303</sup>	56.674 <sup>293</sup>	44.89 <sup>56</sup>
24.6	44.713 <sup>240</sup>	59.22 <sup>67</sup>	13.542 <sup>287</sup>	30.99 <sup>89</sup>	26.981 <sup>218</sup>	65.56 <sup>318</sup>	56.967 <sup>256</sup>	44.33 <sup>31</sup>
34.6	44.955	58.55	13.779	30.10	27.199	68.74	57.223	44.02
Mean Place	39.594	85.67	8.496	57.08	22.617	50.37	51.647	72.44
Sec δ, Tan δ	1.077	+0.899	1.054	+0.834	1.191	-0.647	1.144	+0.555
D <sub>γδ</sub> , D <sub>αε</sub>	+0.069	+0.017	+0.068	+0.014	+0.048	-0.028	+0.072	+0.024
D <sub>δδ</sub> , D <sub>αδ</sub>	-0.25	+0.77	-0.26	+0.77	-0.26	+0.77	-0.26	+0.76

FOR THE UPPER TRANSIT AT WASHINGTON.

Washington Mean Time.	δ Argus. Mag. 2.0		ε Hydræ. Mag. 3.5		σ <sup>2</sup> Cancri (mean). Mag. 5.5		ζ Hydræ. Mag. 3.3	
	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.
	h m 8 42	° ' -54 24	h m 8 42	° ' + 6 42	h m 8 49	° ' +30 52	h m 8 51	° ' + 6 14
Jan. 0.6	32.287 <sup>314</sup>	54.29	34.516	36.71	24.286	44.66	12.032	52.04
10.6	32.501 <sup>141</sup>	58.00 <sup>371</sup>	34.717 <sup>201</sup>	35.26 <sup>145</sup>	24.526 <sup>240</sup>	44.55 <sup>11</sup>	12.241 <sup>209</sup>	50.55 <sup>149</sup>
20.5	32.642 <sup>62</sup>	61.78 <sup>378</sup>	34.873 <sup>166</sup>	33.98 <sup>128</sup>	24.714 <sup>188</sup>	44.74 <sup>19</sup>	12.404 <sup>163</sup>	49.23 <sup>132</sup>
30.5	32.704 <sup>14</sup>	65.54 <sup>376</sup>	34.979 <sup>106</sup>	32.93 <sup>106</sup>	24.847 <sup>183</sup>	45.16 <sup>42</sup>	12.518 <sup>114</sup>	48.12 <sup>111</sup>
Feb. 9.5	32.890 <sup>86</sup>	69.16 <sup>362</sup>	35.033 <sup>54</sup>	32.08 <sup>85</sup>	24.920 <sup>73</sup>	45.82 <sup>66</sup>	12.581 <sup>63</sup>	47.23 <sup>89</sup>
19.5	32.804	72.57	35.038	31.46	24.936	46.63	12.593	46.57
29.4	32.452 <sup>182</sup>	75.68 <sup>311</sup>	34.996 <sup>42</sup>	31.04 <sup>42</sup>	24.896 <sup>40</sup>	47.55 <sup>92</sup>	12.558 <sup>75</sup>	46.12 <sup>45</sup>
Mar. 10.4	32.242 <sup>210</sup>	78.44 <sup>276</sup>	34.913 <sup>83</sup>	30.81 <sup>23</sup>	24.808 <sup>88</sup>	48.53 <sup>98</sup>	12.483 <sup>85</sup>	45.87 <sup>25</sup>
20.4	31.985 <sup>287</sup>	80.80 <sup>286</sup>	34.797 <sup>116</sup>	30.74 <sup>7</sup>	24.680 <sup>128</sup>	49.50 <sup>97</sup>	12.375 <sup>108</sup>	45.78 <sup>9</sup>
30.3	31.692 <sup>298</sup>	82.70 <sup>190</sup>	34.659 <sup>188</sup>	30.81 <sup>7</sup>	24.521 <sup>159</sup>	50.42 <sup>92</sup>	12.241 <sup>134</sup>	45.84 <sup>6</sup>
Apr. 9.3	31.375	84.12	34.506	31.01	24.344	51.23	12.093	46.03
19.3	31.045 <sup>330</sup>	85.04 <sup>92</sup>	34.347 <sup>189</sup>	31.29 <sup>28</sup>	24.159 <sup>185</sup>	51.90 <sup>67</sup>	11.937 <sup>158</sup>	46.30 <sup>27</sup>
29.3	30.714 <sup>331</sup>	85.46 <sup>42</sup>	34.191 <sup>166</sup>	31.66 <sup>37</sup>	23.974 <sup>185</sup>	52.40 <sup>50</sup>	11.782 <sup>155</sup>	46.68 <sup>38</sup>
May 9.2	30.390 <sup>394</sup>	85.36 <sup>10</sup>	34.045 <sup>146</sup>	32.09 <sup>43</sup>	23.800 <sup>174</sup>	52.73 <sup>33</sup>	11.638 <sup>144</sup>	47.13 <sup>45</sup>
19.2	30.084 <sup>306</sup>	84.77 <sup>89</sup>	33.916 <sup>129</sup>	32.57 <sup>48</sup>	23.645 <sup>155</sup>	52.86 <sup>13</sup>	11.507 <sup>121</sup>	47.63 <sup>50</sup>
29.2	29.804	83.69	33.809	33.10	23.513	52.82	11.398	48.16
June 8.2	29.556 <sup>248</sup>	82.16 <sup>153</sup>	33.728	33.66 <sup>56</sup>	23.411 <sup>102</sup>	52.59 <sup>23</sup>	11.311 <sup>87</sup>	48.74 <sup>58</sup>
18.1	29.347 <sup>209</sup>	80.22 <sup>194</sup>	33.673	34.24 <sup>58</sup>	23.341 <sup>70</sup>	52.20 <sup>39</sup>	11.252 <sup>59</sup>	49.34 <sup>60</sup>
28.1	29.182 <sup>165</sup>	77.91 <sup>231</sup>	33.647 <sup>26</sup>	34.83 <sup>59</sup>	23.304 <sup>37</sup>	51.66 <sup>54</sup>	11.219 <sup>3</sup>	49.93 <sup>59</sup>
July 8.1	29.066 <sup>116</sup>	75.31 <sup>260</sup>	33.650	35.41 <sup>58</sup>	23.302 <sup>2</sup>	50.99 <sup>67</sup>	11.216 <sup>2</sup>	50.53 <sup>60</sup>
18.0	29.002	72.50	33.683	35.96 <sup>49</sup>	23.333	50.18	11.241	51.10 <sup>40</sup>
28.0	28.992 <sup>10</sup>	69.54 <sup>296</sup>	33.745 <sup>62</sup>	36.45 <sup>40</sup>	23.400 <sup>67</sup>	49.25 <sup>93</sup>	11.295 <sup>54</sup>	51.59 <sup>41</sup>
Aug. 7.0	29.040 <sup>48</sup>	66.55 <sup>299</sup>	33.835	36.85 <sup>40</sup>	23.499	48.22 <sup>103</sup>	11.376	52.00 <sup>31</sup>
17.0	29.146 <sup>106</sup>	63.63 <sup>292</sup>	33.954	37.13 <sup>28</sup>	23.631 <sup>122</sup>	47.07 <sup>115</sup>	11.486 <sup>110</sup>	52.31 <sup>14</sup>
26.9	29.310 <sup>164</sup>	60.86 <sup>277</sup>	34.099	37.27 <sup>14</sup>	23.795 <sup>164</sup>	45.84 <sup>128</sup>	11.624 <sup>138</sup>	52.45 <sup>14</sup>
Sept. 5.9	29.531	58.35	34.272	37.23	23.989	44.53	11.789	52.41
15.9	29.806 <sup>275</sup>	56.22 <sup>213</sup>	34.472 <sup>200</sup>	36.98 <sup>25</sup>	24.213 <sup>224</sup>	43.14 <sup>139</sup>	11.980 <sup>191</sup>	52.16 <sup>26</sup>
25.9	30.129 <sup>323</sup>	54.54 <sup>108</sup>	34.695 <sup>223</sup>	36.51 <sup>47</sup>	24.466 <sup>258</sup>	41.69 <sup>145</sup>	12.199 <sup>219</sup>	51.69 <sup>47</sup>
Oct. 5.8	30.499 <sup>370</sup>	53.39 <sup>115</sup>	34.943 <sup>248</sup>	35.79 <sup>72</sup>	24.746 <sup>280</sup>	40.19 <sup>150</sup>	12.441 <sup>242</sup>	50.97 <sup>72</sup>
15.8	30.903 <sup>404</sup>	52.84 <sup>55</sup>	35.212 <sup>269</sup>	34.84 <sup>95</sup>	25.051 <sup>305</sup>	38.68 <sup>151</sup>	12.707 <sup>265</sup>	50.02 <sup>95</sup>
25.8	31.334	52.93	35.500	33.66	25.377	37.18	12.994	48.82
Nov. 4.7	31.781 <sup>447</sup>	53.65 <sup>72</sup>	35.802 <sup>302</sup>	32.28 <sup>138</sup>	25.720 <sup>343</sup>	35.73 <sup>145</sup>	13.293 <sup>290</sup>	47.43 <sup>139</sup>
14.7	32.229 <sup>448</sup>	55.02 <sup>137</sup>	36.111 <sup>309</sup>	30.74 <sup>154</sup>	26.074 <sup>354</sup>	34.39 <sup>184</sup>	13.604 <sup>311</sup>	45.86 <sup>157</sup>
24.7	32.664 <sup>435</sup>	56.98 <sup>196</sup>	36.421 <sup>310</sup>	29.08 <sup>166</sup>	26.429 <sup>355</sup>	33.19 <sup>120</sup>	13.915 <sup>311</sup>	44.18 <sup>168</sup>
Dec. 4.7	33.075 <sup>471</sup>	59.50 <sup>252</sup>	36.723 <sup>302</sup>	27.38 <sup>170</sup>	26.777 <sup>348</sup>	32.17 <sup>102</sup>	14.221 <sup>305</sup>	42.43 <sup>175</sup>
14.6	33.446	62.45	37.009	25.68	27.109	31.40	14.511	40.69
24.6	33.763 <sup>317</sup>	65.77 <sup>382</sup>	37.268 <sup>269</sup>	24.05 <sup>163</sup>	27.413 <sup>304</sup>	30.87 <sup>53</sup>	14.776 <sup>265</sup>	39.00 <sup>169</sup>
34.6	34.018 <sup>255</sup>	69.35 <sup>358</sup>	37.494 <sup>236</sup>	22.52 <sup>153</sup>	27.680 <sup>267</sup>	30.63 <sup>24</sup>	15.007 <sup>221</sup>	37.43 <sup>157</sup>
Mean Place	29.457	53.92	32.479	47.66	22.092	50.95	10.026	62.99
Sec δ, Tan δ	1.719	-1.398	1.007	+0.118	1.185	+0.598	1.006	+0.109
D <sub>φ</sub> α, D <sub>ω</sub> α	+0.033	-0.061	+0.064	+0.005	+0.073	+0.027	+0.063	+0.005
D <sub>φ</sub> δ, D <sub>ω</sub> δ	-0.26	+0.76	-0.26	+0.76	-0.27	+0.74	-0.27	+0.73



# APPARENT PLACES OF STARS, 1920.

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FOR THE UPPER TRANSIT AT WASHINGTON.

Washington Mean Time.	♄ Ursa Majoris. Mag. 3.1		♋ Canceri. Mag. 4.3		♌ Carinae. Mag. 5.1		♋ Ursa Majoris. Mag. 3.7	
	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.
	h m	° '	h m	° '	h m	° '	h m	° '
	8 53	+48 20	8 54	+12 9	8 55	-58 55	8 58	+47 27
	s	"	s	"	s	"	s	"
Jan. 0.6	46.869	66.25	8.860	53.28	3.954	12.32	12.811	67.90
10.6	47.166 <sup>297</sup>	67.09 <sup>84</sup>	9.077 <sup>217</sup>	52.09 <sup>119</sup>	4.203 <sup>249</sup>	16.02 <sup>370</sup>	13.109 <sup>298</sup>	68.66 <sup>76</sup>
20.6	47.398 <sup>282</sup>	68.26 <sup>117</sup>	9.248 <sup>171</sup>	51.11 <sup>98</sup>	4.371 <sup>166</sup>	19.84 <sup>382</sup>	13.344 <sup>285</sup>	69.77 <sup>111</sup>
30.6	47.559 <sup>161</sup>	69.69 <sup>143</sup>	9.369 <sup>121</sup>	50.36 <sup>75</sup>	4.453 <sup>82</sup>	23.68 <sup>354</sup>	13.512 <sup>168</sup>	71.14 <sup>137</sup>
Feb. 9.5	47.646 <sup>87</sup>	71.32 <sup>163</sup>	9.438 <sup>60</sup>	49.83 <sup>53</sup>	4.451 <sup>2</sup>	27.43 <sup>375</sup>	13.606 <sup>93</sup>	72.74 <sup>160</sup>
19.5	47.661 <sup>15</sup>	73.09 <sup>177</sup>	9.455 <sup>17</sup>	49.52 <sup>31</sup>	4.368 <sup>83</sup>	30.99 <sup>366</sup>	13.627 <sup>22</sup>	74.46 <sup>172</sup>
29.4	47.602 <sup>80</sup>	74.88 <sup>179</sup>	9.424 <sup>81</sup>	49.40 <sup>12</sup>	4.210 <sup>158</sup>	34.29 <sup>330</sup>	13.578 <sup>49</sup>	76.24 <sup>178</sup>
Mar. 10.4	47.482 <sup>120</sup>	76.63 <sup>175</sup>	9.352 <sup>72</sup>	49.45 <sup>5</sup>	3.986 <sup>224</sup>	37.26 <sup>297</sup>	13.468 <sup>110</sup>	77.99 <sup>175</sup>
20.4	47.310 <sup>172</sup>	78.26 <sup>163</sup>	9.244 <sup>108</sup>	49.64 <sup>19</sup>	3.707 <sup>379</sup>	39.83 <sup>267</sup>	13.306 <sup>162</sup>	79.61 <sup>162</sup>
30.4	47.100 <sup>210</sup>	79.67 <sup>141</sup>	9.111 <sup>133</sup>	49.92 <sup>28</sup>	3.387 <sup>270</sup>	41.97 <sup>214</sup>	13.102 <sup>204</sup>	81.05 <sup>144</sup>
Apr. 9.3	46.861 <sup>230</sup>	80.83 <sup>116</sup>	8.962 <sup>149</sup>	50.28 <sup>36</sup>	3.036 <sup>351</sup>	43.63 <sup>166</sup>	12.872 <sup>280</sup>	82.24 <sup>119</sup>
19.3	46.608 <sup>253</sup>	81.69 <sup>86</sup>	8.804 <sup>158</sup>	50.68 <sup>40</sup>	2.666 <sup>370</sup>	44.80 <sup>117</sup>	12.627 <sup>245</sup>	83.15 <sup>91</sup>
29.3	46.353 <sup>255</sup>	82.21 <sup>62</sup>	8.648 <sup>156</sup>	51.11 <sup>43</sup>	2.289 <sup>377</sup>	45.44 <sup>64</sup>	12.380 <sup>247</sup>	83.73 <sup>56</sup>
May 9.2	46.112 <sup>241</sup>	82.41 <sup>30</sup>	8.502 <sup>146</sup>	51.55 <sup>44</sup>	1.916 <sup>378</sup>	45.58 <sup>14</sup>	12.142 <sup>288</sup>	83.97 <sup>24</sup>
19.2	45.889 <sup>228</sup>	82.25 <sup>16</sup>	8.369 <sup>133</sup>	51.98 <sup>43</sup>	1.558 <sup>358</sup>	45.19 <sup>39</sup>	11.925 <sup>217</sup>	83.87 <sup>10</sup>
29.2	45.694 <sup>195</sup>	81.77 <sup>48</sup>	8.258 <sup>111</sup>	52.40 <sup>42</sup>	1.224 <sup>334</sup>	44.29 <sup>90</sup>	11.734 <sup>191</sup>	83.87 <sup>42</sup>
June 8.2	45.536 <sup>158</sup>	80.96 <sup>81</sup>	8.170 <sup>88</sup>	52.81 <sup>41</sup>	0.922 <sup>302</sup>	42.92 <sup>187</sup>	11.579 <sup>155</sup>	82.71 <sup>74</sup>
18.1	45.420 <sup>116</sup>	79.87 <sup>109</sup>	8.109 <sup>61</sup>	53.18 <sup>37</sup>	0.661 <sup>261</sup>	41.11 <sup>181</sup>	11.462 <sup>117</sup>	81.69 <sup>102</sup>
28.1	45.347 <sup>78</sup>	78.52 <sup>125</sup>	8.074 <sup>35</sup>	53.52 <sup>34</sup>	0.445 <sup>216</sup>	38.91 <sup>220</sup>	11.387 <sup>75</sup>	80.41 <sup>128</sup>
July 8.1	45.319 <sup>28</sup>	76.97 <sup>155</sup>	8.070 <sup>4</sup>	53.81 <sup>29</sup>	0.282 <sup>168</sup>	36.37 <sup>254</sup>	11.356 <sup>31</sup>	78.91 <sup>150</sup>
18.1	45.336 <sup>17</sup>	75.22 <sup>175</sup>	8.096 <sup>26</sup>	54.04 <sup>23</sup>	0.176 <sup>106</sup>	33.59 <sup>278</sup>	11.370 <sup>14</sup>	77.21 <sup>170</sup>
28.0	45.399 <sup>63</sup>	73.33 <sup>189</sup>	8.149 <sup>53</sup>	54.20 <sup>16</sup>	0.132 <sup>44</sup>	30.62 <sup>297</sup>	11.428 <sup>58</sup>	75.37 <sup>184</sup>
Aug. 7.0	45.507 <sup>108</sup>	71.30 <sup>203</sup>	8.232 <sup>83</sup>	54.26 <sup>6</sup>	0.153 <sup>21</sup>	27.59 <sup>363</sup>	11.529 <sup>101</sup>	73.40 <sup>197</sup>
17.0	45.657 <sup>180</sup>	69.22 <sup>208</sup>	8.342 <sup>110</sup>	54.20 <sup>6</sup>	0.239 <sup>86</sup>	24.57 <sup>362</sup>	11.674 <sup>145</sup>	71.34 <sup>206</sup>
26.9	45.851 <sup>194</sup>	67.09 <sup>213</sup>	8.482 <sup>140</sup>	54.00 <sup>20</sup>	0.393 <sup>154</sup>	21.68 <sup>389</sup>	11.859 <sup>185</sup>	69.22 <sup>212</sup>
Sept. 5.9	46.086 <sup>235</sup>	64.91 <sup>213</sup>	8.648 <sup>166</sup>	53.64 <sup>36</sup>	0.612 <sup>219</sup>	19.02 <sup>266</sup>	11.859 <sup>226</sup>	67.08 <sup>214</sup>
15.9	46.360 <sup>274</sup>	62.78 <sup>213</sup>	8.841 <sup>193</sup>	53.10 <sup>54</sup>	0.896 <sup>284</sup>	16.70 <sup>232</sup>	12.088 <sup>265</sup>	67.08 <sup>213</sup>
25.9	46.673 <sup>313</sup>	60.70 <sup>208</sup>	9.061 <sup>220</sup>	52.36 <sup>74</sup>	1.238 <sup>342</sup>	14.81 <sup>189</sup>	12.350 <sup>303</sup>	64.95 <sup>207</sup>
Oct. 5.8	47.018 <sup>345</sup>	58.73 <sup>197</sup>	9.308 <sup>247</sup>	51.44 <sup>92</sup>	1.635 <sup>397</sup>	13.45 <sup>136</sup>	12.653 <sup>337</sup>	62.88 <sup>200</sup>
15.8	47.396 <sup>378</sup>	56.89 <sup>184</sup>	9.577 <sup>269</sup>	50.30 <sup>114</sup>	1.835 <sup>440</sup>	12.66 <sup>79</sup>	12.990 <sup>368</sup>	60.88 <sup>188</sup>
25.8	47.800 <sup>404</sup>	55.23 <sup>166</sup>	9.866 <sup>289</sup>	49.01 <sup>129</sup>	2.075 <sup>474</sup>	12.66 <sup>14</sup>	13.358 <sup>397</sup>	59.00 <sup>169</sup>
Nov. 4.8	48.223 <sup>423</sup>	53.81 <sup>142</sup>	10.172 <sup>306</sup>	47.58 <sup>143</sup>	2.549 <sup>492</sup>	12.52 <sup>80</sup>	13.755 <sup>417</sup>	57.31 <sup>149</sup>
14.7	48.661 <sup>438</sup>	52.65 <sup>116</sup>	10.488 <sup>316</sup>	46.03 <sup>158</sup>	3.041 <sup>498</sup>	13.02 <sup>116</sup>	14.172 <sup>481</sup>	55.82 <sup>121</sup>
24.7	49.101 <sup>440</sup>	51.81 <sup>84</sup>	10.806 <sup>318</sup>	44.42 <sup>161</sup>	3.539 <sup>498</sup>	14.18 <sup>116</sup>	14.603 <sup>481</sup>	54.61 <sup>121</sup>
Dec. 4.7	49.531 <sup>430</sup>	51.31 <sup>80</sup>	11.119 <sup>318</sup>	42.82 <sup>160</sup>	4.027 <sup>488</sup>	15.97 <sup>179</sup>	15.038 <sup>435</sup>	53.69 <sup>92</sup>
14.6	49.940 <sup>409</sup>	51.20 <sup>11</sup>	11.417 <sup>288</sup>	41.28 <sup>154</sup>	4.489 <sup>462</sup>	18.31 <sup>284</sup>	15.468 <sup>428</sup>	53.12 <sup>57</sup>
24.6	50.316 <sup>376</sup>	51.45 <sup>25</sup>	11.690 <sup>273</sup>	39.84 <sup>144</sup>	4.908 <sup>419</sup>	21.17 <sup>286</sup>	15.873 <sup>407</sup>	52.93 <sup>19</sup>
34.6	50.643 <sup>327</sup>	52.09 <sup>64</sup>	11.930 <sup>246</sup>	38.56 <sup>128</sup>	5.270 <sup>362</sup>	24.42 <sup>325</sup>	16.249 <sup>376</sup>	53.12 <sup>19</sup>
	50.643 <sup>327</sup>	52.09 <sup>64</sup>	11.930 <sup>246</sup>	38.56 <sup>128</sup>	5.563 <sup>298</sup>	27.95 <sup>353</sup>	16.579 <sup>330</sup>	53.68 <sup>56</sup>
Mean Place	44.322	84.16	6.846	65.40	0.903	13.30	10.325	85.95
Sec δ, Tan δ	1.505	+1.124	1.023	+0.216	1.937	-1.659	1.479	+1.090
D <sub>α</sub> , D <sub>ω</sub>	+0.083	+0.052	+0.065	+0.010	+0.030	-0.077	+0.082	+0.051
D <sub>β</sub> , D <sub>δ</sub>	-0.27	+0.73	-0.27	+0.73	-0.28	+0.72	-0.28	+0.71

APPARENT PLACES OF STARS, 1920.

FOR THE UPPER TRANSIT AT WASHINGTON.

Washington Mean Time.	$\sigma^2$ Ursae Majoris. Mag. 4.9		$\kappa$ Cancri. Mag. 5.1		$\lambda$ Argus. Mag. 2.2		$\theta$ Hydras. Mag. 3.8	
	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.
	h m 9 3	° ' " +67 27	h m 9 3	° ' " +10 59	h m 9 5	° ' " -43 6	h m 9 10	° ' " + 2 38
Jan. 0.6	26.23	18.00	26.953	15.31	5.553	34.09	14.162	58.99
10.6	26.70 <sup>47</sup>	19.67 <sup>167</sup>	27.176 <sup>223</sup>	14.03 <sup>128</sup>	5.780 <sup>227</sup>	37.55 <sup>346</sup>	14.384 <sup>222</sup>	57.24 <sup>175</sup>
20.6	27.07 <sup>37</sup>	21.72 <sup>205</sup>	27.354 <sup>178</sup>	12.95 <sup>108</sup>	5.949 <sup>169</sup>	41.09 <sup>354</sup>	14.563 <sup>179</sup>	55.66 <sup>158</sup>
30.5	27.32 <sup>25</sup>	24.06 <sup>234</sup>	27.482 <sup>128</sup>	12.09 <sup>86</sup>	6.056 <sup>107</sup>	44.60 <sup>351</sup>	14.694 <sup>131</sup>	54.28 <sup>138</sup>
Feb. 9.5	27.46 <sup>14</sup>	26.59 <sup>253</sup>	27.561 <sup>79</sup>	11.48 <sup>61</sup>	6.099 <sup>43</sup>	47.99 <sup>339</sup>	14.774 <sup>80</sup>	53.13 <sup>115</sup>
19.5	27.46 <sup>0</sup>	29.20 <sup>261</sup>	27.587 <sup>26</sup>	11.07 <sup>41</sup>	6.081 <sup>18</sup>	51.19 <sup>320</sup>	14.805 <sup>31</sup>	52.21 <sup>92</sup>
29.4	27.36 <sup>10</sup>	31.77 <sup>257</sup>	27.566 <sup>21</sup>	10.89 <sup>18</sup>	6.006 <sup>75</sup>	54.11 <sup>292</sup>	14.788 <sup>17</sup>	51.53 <sup>68</sup>
Mar. 10.4	27.14 <sup>23</sup>	34.22 <sup>240</sup>	27.502 <sup>64</sup>	10.89 <sup>0</sup>	5.882 <sup>124</sup>	56.69 <sup>258</sup>	14.729 <sup>59</sup>	51.06 <sup>47</sup>
20.4	26.84 <sup>30</sup>	36.42 <sup>225</sup>	27.404 <sup>98</sup>	11.03 <sup>14</sup>	5.714 <sup>168</sup>	58.92 <sup>223</sup>	14.636 <sup>93</sup>	50.80 <sup>26</sup>
30.4	26.46 <sup>38</sup>	38.30 <sup>188</sup>	27.277 <sup>127</sup>	11.29 <sup>26</sup>	5.516 <sup>198</sup>	60.73 <sup>181</sup>	14.515 <sup>121</sup>	50.71 <sup>9</sup>
Apr. 9.3	26.02 <sup>44</sup>	39.78 <sup>148</sup>	27.132 <sup>145</sup>	11.62 <sup>33</sup>	5.294 <sup>222</sup>	62.12 <sup>139</sup>	14.377 <sup>138</sup>	50.77 <sup>6</sup>
19.3	25.54 <sup>48</sup>	40.81 <sup>103</sup>	26.978 <sup>154</sup>	12.01 <sup>39</sup>	5.058 <sup>286</sup>	63.04 <sup>92</sup>	14.229 <sup>148</sup>	50.99 <sup>22</sup>
29.3	25.06 <sup>48</sup>	41.36 <sup>55</sup>	26.825 <sup>153</sup>	12.45 <sup>44</sup>	4.817 <sup>241</sup>	63.51 <sup>47</sup>	14.080 <sup>149</sup>	51.32 <sup>33</sup>
May 9.3	24.59 <sup>47</sup>	41.42 <sup>6</sup>	26.680 <sup>145</sup>	12.91 <sup>46</sup>	4.583 <sup>284</sup>	63.53 <sup>2</sup>	13.937 <sup>143</sup>	51.75 <sup>43</sup>
19.2	24.15 <sup>44</sup>	41.00 <sup>42</sup>	26.546 <sup>134</sup>	13.89 <sup>48</sup>	4.358 <sup>225</sup>	63.09 <sup>44</sup>	13.805 <sup>132</sup>	52.26 <sup>51</sup>
29.2	23.75 <sup>40</sup>	40.10 <sup>90</sup>	26.432 <sup>114</sup>	13.85 <sup>46</sup>	4.152 <sup>206</sup>	62.20 <sup>89</sup>	13.691 <sup>114</sup>	52.85 <sup>56</sup>
June 8.2	23.40 <sup>35</sup>	38.78 <sup>132</sup>	26.337 <sup>95</sup>	14.29 <sup>44</sup>	3.969 <sup>183</sup>	60.91 <sup>130</sup>	13.596 <sup>95</sup>	53.50 <sup>65</sup>
18.1	23.12 <sup>28</sup>	37.04 <sup>174</sup>	26.271 <sup>66</sup>	14.72 <sup>43</sup>	3.813 <sup>156</sup>	59.22 <sup>169</sup>	13.526 <sup>70</sup>	54.21 <sup>71</sup>
28.1	22.91 <sup>21</sup>	34.97 <sup>207</sup>	26.231 <sup>40</sup>	15.10 <sup>38</sup>	3.690 <sup>128</sup>	57.22 <sup>300</sup>	13.480 <sup>46</sup>	54.93 <sup>72</sup>
July 8.1	22.78 <sup>3</sup>	32.62 <sup>235</sup>	26.217 <sup>14</sup>	15.46 <sup>36</sup>	3.602 <sup>88</sup>	54.93 <sup>329</sup>	13.460 <sup>20</sup>	55.66 <sup>73</sup>
18.1	22.75 <sup>2</sup>	30.02 <sup>260</sup>	26.234 <sup>17</sup>	15.75 <sup>29</sup>	3.552 <sup>50</sup>	52.43 <sup>250</sup>	13.467 <sup>7</sup>	56.36 <sup>70</sup>
28.0	22.78 <sup>3</sup>	27.25 <sup>277</sup>	26.277 <sup>43</sup>	15.97 <sup>22</sup>	3.542 <sup>10</sup>	49.81 <sup>262</sup>	13.503 <sup>36</sup>	57.02 <sup>66</sup>
Aug. 7.0	22.90 <sup>12</sup>	24.37 <sup>288</sup>	26.351 <sup>74</sup>	16.09 <sup>12</sup>	3.574 <sup>32</sup>	47.13 <sup>268</sup>	13.566 <sup>63</sup>	57.59 <sup>57</sup>
17.0	23.10 <sup>20</sup>	21.42 <sup>295</sup>	26.451 <sup>100</sup>	16.06 <sup>3</sup>	3.651 <sup>77</sup>	44.49 <sup>264</sup>	13.655 <sup>89</sup>	58.05 <sup>46</sup>
27.0	23.38 <sup>28</sup>	18.47 <sup>295</sup>	26.580 <sup>129</sup>	15.91 <sup>16</sup>	3.771 <sup>120</sup>	42.00 <sup>249</sup>	13.774 <sup>119</sup>	58.35 <sup>30</sup>
Sept. 5.9	23.73 <sup>35</sup>	15.58 <sup>289</sup>	26.738 <sup>158</sup>	15.58 <sup>33</sup>	3.936 <sup>165</sup>	39.73 <sup>227</sup>	13.920 <sup>146</sup>	58.47 <sup>12</sup>
15.9	24.16 <sup>43</sup>	12.79 <sup>279</sup>	26.923 <sup>185</sup>	15.08 <sup>50</sup>	4.146 <sup>210</sup>	37.79 <sup>194</sup>	14.095 <sup>175</sup>	58.35 <sup>12</sup>
25.9	24.65 <sup>49</sup>	10.18 <sup>261</sup>	27.136 <sup>213</sup>	14.37 <sup>71</sup>	4.395 <sup>249</sup>	36.26 <sup>153</sup>	14.298 <sup>203</sup>	58.00 <sup>35</sup>
Oct. 5.8	25.20 <sup>55</sup>	7.78 <sup>240</sup>	27.375 <sup>239</sup>	13.45 <sup>92</sup>	4.686 <sup>291</sup>	35.21 <sup>105</sup>	14.527 <sup>229</sup>	57.37 <sup>63</sup>
15.8	25.81 <sup>61</sup>	5.67 <sup>211</sup>	27.640 <sup>265</sup>	12.31 <sup>114</sup>	5.009 <sup>323</sup>	34.71 <sup>50</sup>	14.782 <sup>255</sup>	56.48 <sup>89</sup>
25.8	26.45 <sup>64</sup>	3.88 <sup>179</sup>	27.924 <sup>284</sup>	11.01 <sup>130</sup>	5.361 <sup>352</sup>	34.80 <sup>9</sup>	14.782 <sup>277</sup>	56.48 <sup>116</sup>
Nov. 4.8	27.13 <sup>68</sup>	2.47 <sup>141</sup>	28.226 <sup>302</sup>	9.55 <sup>146</sup>	5.730 <sup>369</sup>	35.48 <sup>68</sup>	15.059 <sup>206</sup>	55.32 <sup>141</sup>
14.7	27.84 <sup>71</sup>	1.49 <sup>98</sup>	28.541 <sup>315</sup>	7.97 <sup>158</sup>	6.111 <sup>381</sup>	36.76 <sup>128</sup>	15.355 <sup>206</sup>	53.91 <sup>141</sup>
24.7	28.55 <sup>71</sup>	0.97 <sup>52</sup>	28.860 <sup>319</sup>	6.31 <sup>166</sup>	6.111 <sup>381</sup>	36.76 <sup>128</sup>	15.664 <sup>309</sup>	52.29 <sup>162</sup>
Dec. 4.7	29.24 <sup>69</sup>	0.95 <sup>2</sup>	29.173 <sup>313</sup>	4.64 <sup>167</sup>	6.489 <sup>378</sup>	38.59 <sup>183</sup>	15.977 <sup>313</sup>	50.52 <sup>177</sup>
14.6	29.24 <sup>66</sup>	0.95 <sup>49</sup>	29.173 <sup>301</sup>	4.64 <sup>161</sup>	6.856 <sup>367</sup>	40.93 <sup>234</sup>	16.288 <sup>311</sup>	48.64 <sup>188</sup>
24.6	29.90 <sup>61</sup>	1.44 <sup>98</sup>	29.474 <sup>279</sup>	3.03 <sup>153</sup>	7.197 <sup>341</sup>	43.69 <sup>276</sup>	16.585 <sup>297</sup>	46.72 <sup>192</sup>
34.6	30.51 <sup>62</sup>	2.42 <sup>142</sup>	29.753 <sup>244</sup>	1.50 <sup>136</sup>	7.500 <sup>303</sup>	46.79 <sup>310</sup>	16.860 <sup>275</sup>	44.83 <sup>189</sup>
	31.03 <sup>52</sup>	3.84 <sup>142</sup>	29.997 <sup>244</sup>	0.14 <sup>136</sup>	7.759 <sup>259</sup>	50.14 <sup>335</sup>	17.103 <sup>243</sup>	43.02 <sup>181</sup>
Mean Place	22.594	38.21	24.981	27.31	3.169	33.26	12.230	69.26
Sec $\delta$ , Tan $\delta$	2.608	+2.409	1.019	+0.194	1.370	-0.936	1.001	+0.046
$D_{\mu\alpha}$ , $D_{\mu\delta}$	+0.106	+0.115	+0.065	+0.009	+0.044	-0.045	+0.062	+0.002
$D_{\nu\alpha}$ , $D_{\nu\delta}$	-0.29	+0.70	-0.29	+0.70	-0.29	+0.69	-0.29	+0.68

FOR THE UPPER TRANSIT AT WASHINGTON.

Washington Mean Time.	β Argus. Mag. 1.8		83 Cancri. Mag. 6.6		† Argus. Mag. 2.2		40 Lyncis. Mag. 3.3	
	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.
	h m 9 12	° ' " -69 23	h m 9 14	° ' " +18 2	h m 9 14	° ' " -58 56	h m 9 16	° ' " +34 43
Jan. 0.6	23.67	11.98	33.141	29.16	59.793	18.54	13.288	37.09
10.6	24.03 <sup>36</sup>	15.61 <sup>363</sup>	33.382 <sup>241</sup>	28.21 <sup>95</sup>	60.078 <sup>285</sup>	22.15 <sup>361</sup>	13.558 <sup>270</sup>	37.06 <sup>3</sup>
20.6	24.27 <sup>24</sup>	19.44 <sup>383</sup>	33.578 <sup>196</sup>	27.50 <sup>71</sup>	60.286 <sup>208</sup>	25.93 <sup>378</sup>	13.782 <sup>224</sup>	37.35 <sup>29</sup>
30.6	24.40 <sup>13</sup>	23.36 <sup>392</sup>	33.723 <sup>145</sup>	27.07 <sup>43</sup>	60.410 <sup>124</sup>	29.76 <sup>383</sup>	13.947 <sup>165</sup>	37.93 <sup>58</sup>
Feb. 9.5	24.40 <sup>0</sup>	27.24 <sup>388</sup>	33.817 <sup>94</sup>	26.87 <sup>20</sup>	60.449 <sup>39</sup>	33.55 <sup>379</sup>	14.053 <sup>106</sup>	38.75 <sup>82</sup>
19.5	24.29 <sup>11</sup>	31.02 <sup>378</sup>	33.856 <sup>39</sup>	26.90 <sup>3</sup>	60.406 <sup>48</sup>	37.20 <sup>365</sup>	14.098 <sup>45</sup>	39.77 <sup>102</sup>
29.4	24.08 <sup>21</sup>	34.56 <sup>356</sup>	33.845 <sup>11</sup>	27.14 <sup>24</sup>	60.288 <sup>118</sup>	40.61 <sup>341</sup>	14.083 <sup>15</sup>	40.96 <sup>119</sup>
Mar. 10.4	23.77 <sup>31</sup>	37.87 <sup>329</sup>	33.789 <sup>56</sup>	27.52 <sup>38</sup>	60.101 <sup>187</sup>	43.73 <sup>312</sup>	14.017 <sup>66</sup>	42.21 <sup>125</sup>
20.4	23.37 <sup>49</sup>	40.82 <sup>295</sup>	33.695 <sup>94</sup>	28.00 <sup>48</sup>	59.856 <sup>245</sup>	46.48 <sup>275</sup>	13.907 <sup>110</sup>	43.47 <sup>126</sup>
30.4	22.91 <sup>46</sup>	43.36 <sup>264</sup>	33.572 <sup>123</sup>	28.54 <sup>54</sup>	59.564 <sup>292</sup>	48.84 <sup>296</sup>	13.759 <sup>148</sup>	44.65 <sup>118</sup>
Apr. 9.3	22.40 <sup>51</sup>	45.42 <sup>206</sup>	33.428 <sup>144</sup>	29.13 <sup>59</sup>	59.237 <sup>337</sup>	50.73 <sup>189</sup>	13.586 <sup>172</sup>	45.74 <sup>109</sup>
19.3	21.85 <sup>55</sup>	47.01 <sup>159</sup>	33.274 <sup>154</sup>	29.71 <sup>58</sup>	58.885 <sup>353</sup>	52.13 <sup>140</sup>	13.401 <sup>185</sup>	46.63 <sup>89</sup>
29.3	21.28 <sup>87</sup>	48.08 <sup>107</sup>	33.116 <sup>168</sup>	30.27 <sup>56</sup>	58.523 <sup>363</sup>	53.03 <sup>90</sup>	13.211 <sup>190</sup>	47.36 <sup>78</sup>
May 9.3	20.71 <sup>87</sup>	48.61 <sup>53</sup>	32.964 <sup>152</sup>	30.77 <sup>50</sup>	58.153 <sup>364</sup>	53.42 <sup>39</sup>	13.026 <sup>185</sup>	47.84 <sup>48</sup>
19.2	20.14 <sup>84</sup>	48.62 <sup>1</sup>	32.823 <sup>141</sup>	31.19 <sup>43</sup>	57.802 <sup>356</sup>	53.30 <sup>13</sup>	12.855 <sup>171</sup>	48.12 <sup>28</sup>
29.2	19.60 <sup>84</sup>	48.08 <sup>54</sup>	32.702 <sup>121</sup>	31.54 <sup>35</sup>	57.465 <sup>387</sup>	52.66 <sup>64</sup>	12.703 <sup>152</sup>	48.13 <sup>1</sup>
June 8.2	19.10 <sup>50</sup>	47.02 <sup>106</sup>	32.601 <sup>101</sup>	31.81 <sup>27</sup>	57.155 <sup>319</sup>	51.53 <sup>113</sup>	12.574 <sup>129</sup>	47.93 <sup>20</sup>
18.1	18.64 <sup>46</sup>	45.47 <sup>145</sup>	32.525 <sup>76</sup>	31.98 <sup>17</sup>	56.877 <sup>278</sup>	49.94 <sup>159</sup>	12.477 <sup>97</sup>	47.49 <sup>44</sup>
28.1	18.25 <sup>39</sup>	43.47 <sup>200</sup>	32.477 <sup>48</sup>	32.09 <sup>11</sup>	56.642 <sup>285</sup>	47.93 <sup>201</sup>	12.412 <sup>65</sup>	46.87 <sup>62</sup>
July 8.1	17.92 <sup>33</sup>	41.09 <sup>238</sup>	32.456 <sup>21</sup>	32.07 <sup>2</sup>	56.454 <sup>188</sup>	45.57 <sup>236</sup>	12.380 <sup>32</sup>	46.03 <sup>84</sup>
18.1	17.68 <sup>24</sup>	38.41 <sup>268</sup>	32.463 <sup>7</sup>	31.98 <sup>9</sup>	56.320 <sup>174</sup>	42.91 <sup>266</sup>	12.380 <sup>0</sup>	45.05 <sup>98</sup>
28.0	17.53 <sup>15</sup>	35.47 <sup>294</sup>	32.498 <sup>35</sup>	31.76 <sup>23</sup>	56.243 <sup>187</sup>	40.04 <sup>287</sup>	12.414 <sup>34</sup>	43.89 <sup>116</sup>
Aug. 7.0	17.47 <sup>6</sup>	32.39 <sup>308</sup>	32.563 <sup>65</sup>	31.44 <sup>33</sup>	56.229 <sup>14</sup>	37.06 <sup>301</sup>	12.414 <sup>71</sup>	43.89 <sup>129</sup>
17.0	17.51 <sup>4</sup>	29.26 <sup>313</sup>	32.657 <sup>94</sup>	30.98 <sup>46</sup>	56.281 <sup>52</sup>	34.05 <sup>301</sup>	12.485 <sup>103</sup>	42.60 <sup>141</sup>
27.0	17.66 <sup>18</sup>	26.18 <sup>308</sup>	32.779 <sup>122</sup>	30.39 <sup>89</sup>	56.490 <sup>119</sup>	31.12 <sup>296</sup>	12.588 <sup>138</sup>	41.19 <sup>155</sup>
Sept. 5.9	17.91 <sup>26</sup>	23.27 <sup>291</sup>	32.779 <sup>152</sup>	30.39 <sup>74</sup>	56.490 <sup>187</sup>	31.12 <sup>274</sup>	12.726 <sup>169</sup>	39.64 <sup>165</sup>
15.9	17.91 <sup>35</sup>	23.27 <sup>261</sup>	32.931 <sup>182</sup>	29.65 <sup>92</sup>	56.567 <sup>264</sup>	28.38 <sup>244</sup>	12.895 <sup>204</sup>	37.99 <sup>171</sup>
25.9	18.26 <sup>44</sup>	20.66 <sup>223</sup>	33.113 <sup>210</sup>	28.73 <sup>106</sup>	56.841 <sup>316</sup>	25.94 <sup>206</sup>	13.099 <sup>239</sup>	36.28 <sup>176</sup>
Oct. 5.8	18.70 <sup>58</sup>	18.43 <sup>176</sup>	33.323 <sup>237</sup>	27.67 <sup>121</sup>	57.157 <sup>375</sup>	23.89 <sup>186</sup>	13.338 <sup>268</sup>	34.52 <sup>181</sup>
15.8	19.23 <sup>59</sup>	16.67 <sup>117</sup>	33.560 <sup>265</sup>	26.46 <sup>138</sup>	57.532 <sup>424</sup>	22.33 <sup>100</sup>	13.606 <sup>300</sup>	32.71 <sup>177</sup>
25.8	19.82 <sup>86</sup>	15.50 <sup>58</sup>	33.825 <sup>286</sup>	25.08 <sup>143</sup>	57.956 <sup>463</sup>	21.33 <sup>37</sup>	13.906 <sup>324</sup>	30.92 <sup>177</sup>
Nov. 25.8	20.48 <sup>68</sup>	14.92 <sup>9</sup>	34.113 <sup>309</sup>	23.60 <sup>158</sup>	58.419 <sup>491</sup>	20.96 <sup>26</sup>	14.230 <sup>348</sup>	29.15 <sup>168</sup>
4.8	21.16 <sup>70</sup>	15.01 <sup>76</sup>	34.422 <sup>322</sup>	22.02 <sup>163</sup>	58.910 <sup>508</sup>	21.22 <sup>93</sup>	14.578 <sup>363</sup>	27.47 <sup>166</sup>
14.7	21.86 <sup>66</sup>	15.77 <sup>143</sup>	34.744 <sup>328</sup>	20.40 <sup>162</sup>	59.413 <sup>499</sup>	22.15 <sup>155</sup>	14.941 <sup>371</sup>	25.91 <sup>136</sup>
24.7	22.54 <sup>59</sup>	17.20 <sup>204</sup>	35.072 <sup>327</sup>	18.78 <sup>154</sup>	59.912 <sup>480</sup>	23.70 <sup>244</sup>	15.312 <sup>367</sup>	24.55 <sup>113</sup>
Dec. 4.7	23.19 <sup>59</sup>	19.24 <sup>259</sup>	35.399 <sup>315</sup>	17.24 <sup>145</sup>	60.392 <sup>443</sup>	25.84 <sup>287</sup>	15.679 <sup>357</sup>	23.42 <sup>84</sup>
14.7	23.78 <sup>51</sup>	21.83 <sup>306</sup>	35.714 <sup>293</sup>	15.79 <sup>127</sup>	60.835 <sup>393</sup>	28.51 <sup>310</sup>	16.066 <sup>332</sup>	22.58 <sup>56</sup>
24.6	24.29 <sup>42</sup>	24.89 <sup>330</sup>	36.007 <sup>263</sup>	14.52 <sup>107</sup>	61.226 <sup>381</sup>	31.61 <sup>245</sup>	16.368 <sup>299</sup>	22.03 <sup>24</sup>
34.6	24.71 <sup>42</sup>	28.28 <sup>330</sup>	36.270 <sup>263</sup>	13.45 <sup>107</sup>	61.559 <sup>381</sup>	35.09 <sup>245</sup>	16.667 <sup>299</sup>	21.79 <sup>24</sup>
Mean Place	19.670	15.29	31.191	42.81	56.802	20.74	11.193	54.03
Sec δ, Tan δ	2.841	-2.659	1.052	+0.326	1.938	-1.661	1.217	+0.693
D <sub>α</sub> , D <sub>αα</sub>	+0.014	-0.182	+0.067	+0.016	+0.032	-0.083	+0.073	+0.035
D <sub>δ</sub> , D <sub>δδ</sub>	-0.30	+0.67	-0.30	+0.66	-0.30	+0.66	-0.30	+0.66

FOR THE UPPER TRANSIT AT WASHINGTON.

Washington Mean Time.	$\theta$ Pyxidis. Mag. 4.9		$\alpha$ Hydræ. Mag. 2.2		$h$ Ursæ Majoris. Mag. 3.8		$d$ Ursæ Majoris. Mag. 4.6	
	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.
	h m 9 17	° ' -25 37	h m 9 23	° ' - 8 18	h m 9 25	° ' +63 24	h m 9 27	° ' +70 10
	s	"	s	"	s	"	s	"
Jan. 0.6	58.886	32.99	41.301	47.63	17.42	24.29	29.80	37.17
10.6	59.111 <sup>225</sup>	35.95 <sup>296</sup>	41.530 <sup>229</sup>	49.91 <sup>228</sup>	17.88 <sup>46</sup>	25.60 <sup>131</sup>	30.37 <sup>57</sup>	38.74 <sup>157</sup>
20.6	59.289 <sup>178</sup>	38.91 <sup>296</sup>	41.715 <sup>185</sup>	52.10 <sup>219</sup>	18.24 <sup>36</sup>	27.33 <sup>173</sup>	30.84 <sup>47</sup>	40.74 <sup>200</sup>
30.5	59.416 <sup>127</sup>	41.78 <sup>287</sup>	41.852 <sup>137</sup>	54.12 <sup>202</sup>	18.51 <sup>27</sup>	29.39 <sup>206</sup>	31.17 <sup>33</sup>	43.07 <sup>233</sup>
Feb. 9.5	59.490 <sup>74</sup>	44.50 <sup>272</sup>	41.940 <sup>88</sup>	55.96 <sup>184</sup>	18.68 <sup>17</sup>	31.70 <sup>231</sup>	31.38 <sup>21</sup>	45.65 <sup>258</sup>
	20	261	40	157	7	247	21	272
19.5	59.510	47.01	41.980	57.53	18.75	34.17	31.45	48.37
29.5	59.481 <sup>29</sup>	49.24 <sup>223</sup>	41.971 <sup>9</sup>	58.86 <sup>133</sup>	18.70 <sup>5</sup>	36.68 <sup>261</sup>	31.38 <sup>7</sup>	51.11 <sup>274</sup>
Mar. 10.4	59.409 <sup>72</sup>	51.18 <sup>194</sup>	41.920 <sup>51</sup>	59.94 <sup>108</sup>	18.56 <sup>14</sup>	39.13 <sup>245</sup>	31.19 <sup>19</sup>	53.75 <sup>264</sup>
20.4	59.299 <sup>110</sup>	52.81 <sup>163</sup>	41.834 <sup>86</sup>	60.75 <sup>81</sup>	18.34 <sup>22</sup>	41.42 <sup>229</sup>	30.89 <sup>30</sup>	56.21 <sup>246</sup>
30.4	59.161 <sup>188</sup>	54.08 <sup>127</sup>	41.719 <sup>115</sup>	61.31 <sup>56</sup>	18.05 <sup>29</sup>	43.44 <sup>202</sup>	30.50 <sup>39</sup>	58.35 <sup>214</sup>
	168	98	132	34	34	168	47	177
Apr. 9.3	59.003	55.01	41.587	61.65	17.71	45.12	30.03	60.12
19.3	58.833 <sup>170</sup>	55.58 <sup>57</sup>	41.441 <sup>146</sup>	61.72 <sup>7</sup>	17.34 <sup>37</sup>	46.40 <sup>128</sup>	29.52 <sup>51</sup>	61.45 <sup>133</sup>
29.3	58.658 <sup>175</sup>	55.79 <sup>21</sup>	41.292 <sup>149</sup>	61.60 <sup>12</sup>	16.94 <sup>40</sup>	47.25 <sup>85</sup>	28.96 <sup>56</sup>	62.29 <sup>84</sup>
May 9.3	58.486 <sup>172</sup>	55.66 <sup>13</sup>	41.146 <sup>146</sup>	61.26 <sup>34</sup>	16.55 <sup>39</sup>	47.63 <sup>28</sup>	28.42 <sup>54</sup>	62.62 <sup>33</sup>
19.2	58.324 <sup>162</sup>	55.19 <sup>47</sup>	41.009 <sup>137</sup>	60.74 <sup>52</sup>	16.16 <sup>39</sup>	47.54 <sup>9</sup>	27.90 <sup>52</sup>	62.45 <sup>17</sup>
	147	79	122	69	34	55	49	68
29.2	58.177	54.40	40.887	60.05	15.82	46.99	27.41	61.77
June 8.2	58.048 <sup>129</sup>	53.31 <sup>109</sup>	40.780 <sup>107</sup>	59.20 <sup>85</sup>	15.51 <sup>31</sup>	46.01 <sup>98</sup>	26.97 <sup>44</sup>	60.61 <sup>116</sup>
18.2	57.943 <sup>105</sup>	51.94 <sup>137</sup>	40.696 <sup>84</sup>	58.21 <sup>99</sup>	15.25 <sup>26</sup>	44.62 <sup>139</sup>	26.60 <sup>37</sup>	59.02 <sup>159</sup>
28.1	57.862 <sup>81</sup>	50.34 <sup>166</sup>	40.637 <sup>59</sup>	57.12 <sup>109</sup>	15.05 <sup>20</sup>	42.86 <sup>176</sup>	26.30 <sup>30</sup>	57.04 <sup>196</sup>
July 8.1	57.809 <sup>58</sup>	48.55 <sup>179</sup>	40.599 <sup>38</sup>	55.94 <sup>118</sup>	14.92 <sup>13</sup>	40.77 <sup>209</sup>	26.08 <sup>22</sup>	54.72 <sup>232</sup>
	26	192	11	121	8	234	12	261
18.1	57.783	46.63	40.588	54.73	14.84	38.43	25.96	52.11
28.0	57.788 <sup>5</sup>	44.62 <sup>201</sup>	40.605 <sup>17</sup>	53.52 <sup>121</sup>	14.84 <sup>0</sup>	35.85 <sup>298</sup>	25.92 <sup>4</sup>	49.29 <sup>282</sup>
Aug. 7.0	57.825 <sup>37</sup>	42.61 <sup>201</sup>	40.648 <sup>48</sup>	52.35 <sup>117</sup>	14.90 <sup>6</sup>	33.12 <sup>273</sup>	25.97 <sup>5</sup>	46.28 <sup>301</sup>
17.0	57.895 <sup>79</sup>	40.66 <sup>195</sup>	40.721 <sup>73</sup>	51.27 <sup>106</sup>	15.03 <sup>13</sup>	30.28 <sup>284</sup>	26.11 <sup>14</sup>	43.19 <sup>309</sup>
27.0	57.997 <sup>102</sup>	38.86 <sup>180</sup>	40.821 <sup>100</sup>	50.36 <sup>91</sup>	15.22 <sup>19</sup>	27.38 <sup>290</sup>	26.35 <sup>24</sup>	40.05 <sup>314</sup>
	189	168	132	69	26	294	33	312
Sept. 5.9	58.136	37.28	40.953	49.67	15.48	24.47	26.68	36.93
15.9	58.307 <sup>171</sup>	35.98 <sup>130</sup>	41.113 <sup>160</sup>	49.20 <sup>47</sup>	15.82 <sup>34</sup>	21.62 <sup>285</sup>	27.08 <sup>40</sup>	33.90 <sup>303</sup>
25.9	58.513 <sup>206</sup>	35.05 <sup>93</sup>	41.304 <sup>191</sup>	49.04 <sup>16</sup>	16.20 <sup>38</sup>	18.87 <sup>276</sup>	27.57 <sup>49</sup>	31.00 <sup>290</sup>
Oct. 5.9	58.751 <sup>238</sup>	34.54 <sup>51</sup>	41.526 <sup>222</sup>	49.20 <sup>16</sup>	16.64 <sup>44</sup>	16.90 <sup>287</sup>	28.13 <sup>56</sup>	28.30 <sup>270</sup>
15.8	59.018 <sup>267</sup>	34.48 <sup>6</sup>	41.772 <sup>246</sup>	49.74 <sup>54</sup>	17.14 <sup>50</sup>	13.94 <sup>236</sup>	28.76 <sup>63</sup>	25.88 <sup>242</sup>
	295	43	274	87	54	207	69	210
25.8	59.313	34.91	42.046	50.61	17.68	11.87	29.45	23.78
Nov. 4.8	59.627 <sup>314</sup>	35.83 <sup>92</sup>	42.339 <sup>298</sup>	51.85 <sup>124</sup>	18.26 <sup>58</sup>	10.13 <sup>174</sup>	30.19 <sup>74</sup>	22.06 <sup>172</sup>
14.7	59.952 <sup>325</sup>	37.23 <sup>140</sup>	42.648 <sup>309</sup>	53.39 <sup>154</sup>	18.86 <sup>60</sup>	8.78 <sup>185</sup>	30.97 <sup>78</sup>	20.78 <sup>128</sup>
24.7	60.284 <sup>322</sup>	39.07 <sup>184</sup>	42.961 <sup>313</sup>	55.23 <sup>184</sup>	19.48 <sup>62</sup>	7.87 <sup>91</sup>	31.75 <sup>78</sup>	19.98 <sup>80</sup>
Dec. 4.7	60.610 <sup>326</sup>	41.28 <sup>221</sup>	43.272 <sup>311</sup>	57.28 <sup>205</sup>	20.09 <sup>61</sup>	7.43 <sup>44</sup>	32.52 <sup>77</sup>	19.70 <sup>28</sup>
	399	253	303	221	60	7	76	25
14.7	60.919	43.81	43.575	59.49	20.69	7.50	33.28	19.95
24.6	61.203 <sup>284</sup>	46.57 <sup>276</sup>	43.854 <sup>279</sup>	61.76 <sup>227</sup>	21.24 <sup>55</sup>	8.06 <sup>56</sup>	33.98 <sup>70</sup>	20.73 <sup>78</sup>
34.6	61.453 <sup>250</sup>	49.47 <sup>290</sup>	44.108 <sup>249</sup>	64.06 <sup>230</sup>	21.73 <sup>49</sup>	9.10 <sup>104</sup>	34.61 <sup>63</sup>	22.02 <sup>129</sup>
Mean Place	56.838	29.22	39.396	40.00	14.472	45.40	26.240	53.99
Sec $\delta$ , Tan $\delta$	1.109	-0.480	1.011	-0.146	2.234	+1.998	2.949	+2.774
$D\mu\alpha$ , $D\omega\alpha$	+0.053	-0.024	+0.059	-0.008	+0.094	+0.104	+0.107	+0.145
$D\mu\delta$ , $D\omega\delta$	-0.30	+0.65	-0.31	+0.63	-0.31	+0.68	-0.31	+0.62

# APPARENT PLACES OF STARS, 1920.

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## FOR THE UPPER TRANSIT AT WASHINGTON.

Washington Mean Time.	θ Ursa Majoris. Mag. 3.3		γ Argus. Mag. 3.6		ξ Leonis. Mag. 5.1		10 Leonis Minoris. Mag. 4.6	
	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.
	h m 9 27	° ' " +52 1	h m 9 27	° ' " -40 6	h m 9 27	° ' " +11 38	h m 9 29	° ' " +36 44
	s	"	s	"	s	"	s	"
Jan. 0.6	33.376	74.11	85.007	58.97	40.025	64.94	21.738	55.17
10.6	33.727 <sup>351</sup>	74.89 <sup>78</sup>	85.256 <sup>298</sup>	58.229 <sup>322</sup>	40.269 <sup>244</sup>	63.60 <sup>134</sup>	22.029 <sup>201</sup>	55.15 <sup>2</sup>
20.6	34.013 <sup>296</sup>	76.03 <sup>114</sup>	85.452 <sup>196</sup>	65.71 <sup>342</sup>	40.470 <sup>201</sup>	62.49 <sup>111</sup>	22.270 <sup>241</sup>	55.47 <sup>32</sup>
30.5	34.232 <sup>319</sup>	77.51 <sup>148</sup>	85.590 <sup>188</sup>	69.13 <sup>342</sup>	40.621 <sup>161</sup>	61.61 <sup>88</sup>	22.453 <sup>183</sup>	56.12 <sup>66</sup>
Feb. 9.5	34.372 <sup>140</sup>	79.27 <sup>176</sup>	85.667 <sup>77</sup>	72.46 <sup>323</sup>	40.724 <sup>108</sup>	60.99 <sup>63</sup>	22.577 <sup>124</sup>	57.04 <sup>92</sup>
19.5	34.433 <sup>61</sup>	81.21 <sup>194</sup>	85.685 <sup>18</sup>	75.61 <sup>315</sup>	40.775 <sup>51</sup>	60.61 <sup>38</sup>	22.639 <sup>62</sup>	58.19 <sup>115</sup>
29.5	34.415 <sup>18</sup>	83.24 <sup>308</sup>	85.647 <sup>38</sup>	78.52 <sup>201</sup>	40.777 <sup>2</sup>	60.45 <sup>16</sup>	22.639 <sup>0</sup>	59.49 <sup>130</sup>
Mar. 10.4	34.329 <sup>86</sup>	85.27 <sup>203</sup>	85.559 <sup>88</sup>	81.13 <sup>261</sup>	40.734 <sup>43</sup>	60.48 <sup>3</sup>	22.585 <sup>54</sup>	60.87 <sup>138</sup>
20.4	34.180 <sup>149</sup>	87.24 <sup>197</sup>	85.429 <sup>130</sup>	83.40 <sup>237</sup>	40.654 <sup>90</sup>	60.69 <sup>21</sup>	22.484 <sup>101</sup>	62.26 <sup>139</sup>
30.4	33.978 <sup>202</sup>	89.00 <sup>176</sup>	85.263 <sup>166</sup>	85.29 <sup>189</sup>	40.544 <sup>110</sup>	61.00 <sup>31</sup>	22.344 <sup>140</sup>	63.60 <sup>134</sup>
Apr. 9.3	33.741 <sup>287</sup>	90.51 <sup>151</sup>	85.073 <sup>199</sup>	86.77 <sup>148</sup>	40.414 <sup>130</sup>	61.41 <sup>41</sup>	22.176 <sup>168</sup>	64.80 <sup>120</sup>
19.3	33.481 <sup>260</sup>	91.72 <sup>121</sup>	84.866 <sup>207</sup>	87.84 <sup>107</sup>	40.269 <sup>145</sup>	61.88 <sup>47</sup>	21.991 <sup>185</sup>	65.84 <sup>104</sup>
29.3	33.210 <sup>271</sup>	92.61 <sup>99</sup>	84.651 <sup>215</sup>	88.46 <sup>62</sup>	40.121 <sup>148</sup>	62.38 <sup>60</sup>	21.799 <sup>192</sup>	66.67 <sup>83</sup>
May 9.3	32.939 <sup>271</sup>	93.11 <sup>59</sup>	84.436 <sup>215</sup>	88.65 <sup>19</sup>	39.978 <sup>143</sup>	62.89 <sup>51</sup>	21.609 <sup>190</sup>	67.26 <sup>58</sup>
19.2	32.680 <sup>269</sup>	93.20 <sup>9</sup>	84.227 <sup>209</sup>	88.40 <sup>26</sup>	39.842 <sup>186</sup>	63.39 <sup>50</sup>	21.430 <sup>179</sup>	67.56 <sup>33</sup>
29.2	32.444 <sup>286</sup>	92.92 <sup>26</sup>	84.082 <sup>196</sup>	87.74 <sup>66</sup>	39.722 <sup>130</sup>	63.88 <sup>49</sup>	21.270 <sup>160</sup>	67.86 <sup>8</sup>
June 8.2	32.240 <sup>204</sup>	92.28 <sup>64</sup>	83.855 <sup>177</sup>	86.66 <sup>108</sup>	39.620 <sup>102</sup>	64.33 <sup>45</sup>	21.131 <sup>189</sup>	67.48 <sup>18</sup>
18.2	32.071 <sup>169</sup>	91.27 <sup>101</sup>	83.701 <sup>164</sup>	85.20 <sup>146</sup>	39.540 <sup>80</sup>	64.74 <sup>41</sup>	21.021 <sup>110</sup>	67.06 <sup>42</sup>
28.1	31.940 <sup>181</sup>	89.97 <sup>130</sup>	83.574 <sup>127</sup>	83.42 <sup>178</sup>	39.484 <sup>66</sup>	65.11 <sup>37</sup>	20.941 <sup>80</sup>	66.39 <sup>67</sup>
July 8.1	31.854 <sup>86</sup>	88.35 <sup>162</sup>	83.476 <sup>96</sup>	81.85 <sup>207</sup>	39.452 <sup>32</sup>	65.41 <sup>30</sup>	20.893 <sup>48</sup>	65.52 <sup>87</sup>
18.1	31.818 <sup>26</sup>	86.51 <sup>134</sup>	83.413 <sup>68</sup>	79.06 <sup>289</sup>	39.448 <sup>4</sup>	65.64 <sup>23</sup>	20.879 <sup>14</sup>	64.43 <sup>109</sup>
28.0	31.827 <sup>9</sup>	84.44 <sup>207</sup>	83.384 <sup>29</sup>	76.61 <sup>245</sup>	39.471 <sup>23</sup>	65.80 <sup>16</sup>	20.899 <sup>20</sup>	63.17 <sup>126</sup>
Aug. 7.0	31.882 <sup>55</sup>	82.20 <sup>234</sup>	83.394 <sup>10</sup>	74.07 <sup>264</sup>	39.520 <sup>49</sup>	65.82 <sup>2</sup>	20.954 <sup>65</sup>	61.75 <sup>142</sup>
17.0	31.986 <sup>104</sup>	79.82 <sup>288</sup>	83.444 <sup>50</sup>	71.57 <sup>260</sup>	39.596 <sup>76</sup>	65.72 <sup>10</sup>	21.042 <sup>88</sup>	60.19 <sup>156</sup>
27.0	32.135 <sup>149</sup>	77.37 <sup>245</sup>	83.537 <sup>93</sup>	69.15 <sup>242</sup>	39.701 <sup>242</sup>	65.48 <sup>24</sup>	21.166 <sup>124</sup>	58.49 <sup>170</sup>
Sept. 5.9	32.330 <sup>195</sup>	77.37 <sup>251</sup>	83.537 <sup>135</sup>	69.15 <sup>221</sup>	39.701 <sup>136</sup>	65.48 <sup>43</sup>	21.166 <sup>160</sup>	58.49 <sup>179</sup>
15.9	32.330	74.86	83.672	66.94	39.837	65.05	21.326	56.79
25.9	32.573 <sup>242</sup>	72.38 <sup>260</sup>	83.850 <sup>178</sup>	65.02 <sup>192</sup>	40.000 <sup>168</sup>	64.44 <sup>61</sup>	21.520 <sup>194</sup>	54.83 <sup>187</sup>
Oct. 5.9	32.860 <sup>267</sup>	69.89 <sup>247</sup>	84.071 <sup>231</sup>	63.46 <sup>166</sup>	40.192 <sup>192</sup>	63.63 <sup>81</sup>	21.748 <sup>226</sup>	52.89 <sup>194</sup>
15.8	33.187 <sup>327</sup>	67.48 <sup>241</sup>	84.331 <sup>260</sup>	62.36 <sup>110</sup>	40.415 <sup>228</sup>	62.62 <sup>101</sup>	22.011 <sup>263</sup>	50.98 <sup>196</sup>
25.8	33.555 <sup>368</sup>	65.22 <sup>236</sup>	84.630 <sup>299</sup>	61.76 <sup>66</sup>	40.665 <sup>250</sup>	61.41 <sup>121</sup>	22.306 <sup>295</sup>	48.98 <sup>196</sup>
Nov. 4.8	33.960 <sup>406</sup>	63.17 <sup>206</sup>	84.959 <sup>339</sup>	61.73 <sup>3</sup>	40.940 <sup>275</sup>	60.02 <sup>139</sup>	22.630 <sup>324</sup>	47.08 <sup>190</sup>
14.7	34.396 <sup>436</sup>	61.33 <sup>184</sup>	85.311 <sup>352</sup>	62.26 <sup>58</sup>	41.235 <sup>295</sup>	58.46 <sup>166</sup>	22.980 <sup>360</sup>	45.27 <sup>181</sup>
24.7	34.851 <sup>455</sup>	59.81 <sup>152</sup>	85.679 <sup>368</sup>	63.38 <sup>112</sup>	41.548 <sup>313</sup>	56.79 <sup>167</sup>	23.347 <sup>367</sup>	43.62 <sup>166</sup>
Dec. 4.7	35.320 <sup>469</sup>	58.62 <sup>119</sup>	86.061 <sup>373</sup>	65.03 <sup>166</sup>	41.869 <sup>321</sup>	55.05 <sup>174</sup>	23.726 <sup>379</sup>	42.16 <sup>146</sup>
14.7	35.785 <sup>465</sup>	57.83 <sup>79</sup>	86.418 <sup>367</sup>	67.19 <sup>216</sup>	42.191 <sup>322</sup>	53.30 <sup>175</sup>	24.106 <sup>380</sup>	40.96 <sup>120</sup>
24.6	36.238 <sup>458</sup>	57.45 <sup>38</sup>	86.765 <sup>347</sup>	69.79 <sup>260</sup>	42.502 <sup>311</sup>	51.59 <sup>171</sup>	24.476 <sup>370</sup>	40.05 <sup>91</sup>
34.6	36.662 <sup>424</sup>	57.52 <sup>7</sup>	87.083 <sup>318</sup>	72.73 <sup>264</sup>	42.795 <sup>296</sup>	50.00 <sup>169</sup>	24.823 <sup>347</sup>	39.48 <sup>57</sup>
34.6	37.046 <sup>384</sup>	58.03 <sup>51</sup>	87.360 <sup>277</sup>	75.92 <sup>319</sup>	43.061 <sup>266</sup>	48.56 <sup>144</sup>	25.137 <sup>314</sup>	39.28 <sup>20</sup>
Mean Place	31.000	94.18	82.761	58.67	38.157	77.33	19.704	72.91
Sec δ, Tan δ	1.626	+1.282	1.308	-0.843	1.021	+0.206	1.248	+0.747
Dψα, Dωα	+0.082	+0.067	+0.047	-0.044	+0.065	+0.011	+0.073	+0.069
Dψδ, Dωδ	-0.31	+0.62	-0.31	+0.62	-0.31	+0.62	-0.31	+0.61

FOR THE UPPER TRANSIT AT WASHINGTON.

Washington Mean Time.	α Leonis. Mag. 3.8		θ Antilæ. Mag. 5.0		ε Leonis. Mag. 3.1		ν Argus. Mag. 3.2	
	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.
	h m 9 36	° ' " +10 14	h m 9 40	° ' " -27 24	h m 9 41	° ' " +24 8	h m 9 45	° ' " -64 41
	s	"	s	"	s	"	s	"
Jan. 0.6	54.806	73.27	40.092	12.07	20.667	20.08	9.50	57.88
10.6	55.054 <sup>248</sup>	71.83 <sup>144</sup>	40.340 <sup>248</sup>	15.04 <sup>997</sup>	20.937 <sup>270</sup>	19.32 <sup>76</sup>	9.88 <sup>38</sup>	61.33 <sup>345</sup>
20.6	55.262 <sup>208</sup>	70.62 <sup>121</sup>	40.543 <sup>208</sup>	18.04 <sup>800</sup>	21.165 <sup>228</sup>	18.85 <sup>47</sup>	10.17 <sup>29</sup>	65.03 <sup>370</sup>
30.5	55.423 <sup>161</sup>	69.63 <sup>99</sup>	40.695 <sup>162</sup>	21.00 <sup>296</sup>	21.341 <sup>176</sup>	18.71 <sup>14</sup>	10.38 <sup>21</sup>	68.87 <sup>394</sup>
Feb. 9.5	55.594 <sup>111</sup>	68.91 <sup>72</sup>	40.795 <sup>100</sup>	23.83 <sup>883</sup>	21.466 <sup>125</sup>	18.85 <sup>14</sup>	10.49 <sup>11</sup>	72.75 <sup>388</sup>
	60	49	48	263	70	36	0	383
19.5	55.594	68.42	40.840	26.46	21.536	19.21	10.49	76.58
29.5	55.605 <sup>11</sup>	68.18 <sup>24</sup>	40.836 <sup>4</sup>	28.86 <sup>240</sup>	21.552 <sup>18</sup>	19.81 <sup>60</sup>	10.40 <sup>9</sup>	80.25 <sup>367</sup>
Mar. 10.4	55.571 <sup>72</sup>	68.14 <sup>4</sup>	40.786 <sup>50</sup>	30.97 <sup>211</sup>	21.522 <sup>80</sup>	20.55 <sup>74</sup>	10.24 <sup>16</sup>	83.69 <sup>344</sup>
20.4	55.499 <sup>83</sup>	68.26 <sup>12</sup>	40.697 <sup>89</sup>	32.78 <sup>181</sup>	21.449 <sup>78</sup>	21.41 <sup>86</sup>	10.00 <sup>24</sup>	86.82 <sup>313</sup>
30.4	55.397 <sup>102</sup>	68.54 <sup>28</sup>	40.575 <sup>122</sup>	34.24 <sup>146</sup>	21.339 <sup>110</sup>	22.29 <sup>88</sup>	9.69 <sup>31</sup>	89.60 <sup>278</sup>
	125	38	144	112	135	90	35	236
Apr. 9.4	55.272	68.92	40.431	35.36	21.204	23.19	9.34	91.96
19.3	55.133 <sup>139</sup>	69.37 <sup>45</sup>	40.270 <sup>161</sup>	36.12 <sup>76</sup>	21.052 <sup>182</sup>	24.03 <sup>84</sup>	8.95 <sup>39</sup>	93.86 <sup>190</sup>
29.3	54.989 <sup>144</sup>	69.86 <sup>49</sup>	40.102 <sup>168</sup>	36.53 <sup>41</sup>	20.896 <sup>156</sup>	24.78 <sup>75</sup>	8.53 <sup>42</sup>	95.26 <sup>140</sup>
May 9.3	54.847 <sup>142</sup>	70.39 <sup>53</sup>	39.933 <sup>169</sup>	36.58 <sup>5</sup>	20.739 <sup>157</sup>	25.41 <sup>68</sup>	8.09 <sup>44</sup>	96.15 <sup>89</sup>
19.2	54.712 <sup>135</sup>	70.92 <sup>53</sup>	39.771 <sup>162</sup>	36.29 <sup>29</sup>	20.591 <sup>148</sup>	25.94 <sup>53</sup>	7.66 <sup>43</sup>	96.52 <sup>37</sup>
	121	52	154	64	186	36	43	17
29.2	54.591	71.44	39.617	35.65	20.455	26.30	7.23	96.35
June 8.2	54.486 <sup>105</sup>	71.93 <sup>40</sup>	39.479 <sup>138</sup>	34.71 <sup>94</sup>	20.337 <sup>118</sup>	26.49 <sup>19</sup>	6.82 <sup>41</sup>	95.67 <sup>68</sup>
18.2	54.402 <sup>84</sup>	72.40 <sup>47</sup>	39.360 <sup>119</sup>	33.46 <sup>125</sup>	20.241 <sup>96</sup>	26.57 <sup>8</sup>	6.44 <sup>38</sup>	94.48 <sup>119</sup>
28.1	54.341 <sup>61</sup>	72.83 <sup>43</sup>	39.262 <sup>98</sup>	31.97 <sup>149</sup>	20.169 <sup>72</sup>	26.47 <sup>10</sup>	6.10 <sup>34</sup>	92.82 <sup>166</sup>
July 8.1	54.302 <sup>30</sup>	73.20 <sup>37</sup>	39.189 <sup>78</sup>	30.25 <sup>172</sup>	20.124 <sup>45</sup>	26.22 <sup>25</sup>	5.81 <sup>29</sup>	90.74 <sup>208</sup>
	12	30	48	187	19	40	24	244
18.1	54.290	73.50	39.141	28.38	20.105	25.82	5.57	88.30
28.1	54.304 <sup>14</sup>	73.70 <sup>20</sup>	39.124 <sup>17</sup>	26.40 <sup>198</sup>	20.114 <sup>9</sup>	25.26 <sup>56</sup>	5.40 <sup>17</sup>	85.58 <sup>272</sup>
Aug. 7.0	54.344 <sup>40</sup>	73.80 <sup>10</sup>	39.137 <sup>13</sup>	24.38 <sup>202</sup>	20.154 <sup>40</sup>	24.56 <sup>70</sup>	5.32 <sup>8</sup>	82.65 <sup>293</sup>
17.0	54.411 <sup>67</sup>	73.78 <sup>2</sup>	39.182 <sup>45</sup>	22.39 <sup>199</sup>	20.223 <sup>69</sup>	23.68 <sup>88</sup>	5.30 <sup>2</sup>	79.61 <sup>304</sup>
27.0	54.506 <sup>95</sup>	73.59 <sup>19</sup>	39.261 <sup>79</sup>	20.51 <sup>188</sup>	20.322 <sup>99</sup>	22.67 <sup>101</sup>	5.36 <sup>6</sup>	76.58 <sup>303</sup>
	125	35	116	169	129	116	15	293
Sept. 5.9	54.631	73.24	39.377	18.82	20.451	21.51	5.51	73.65
15.9	54.785 <sup>154</sup>	72.69 <sup>55</sup>	39.528 <sup>151</sup>	17.39 <sup>142</sup>	20.613 <sup>162</sup>	20.19 <sup>132</sup>	5.75 <sup>24</sup>	70.94 <sup>271</sup>
25.9	54.968 <sup>183</sup>	71.92 <sup>77</sup>	39.715 <sup>187</sup>	16.31 <sup>108</sup>	20.806 <sup>198</sup>	18.75 <sup>144</sup>	6.06 <sup>31</sup>	68.54 <sup>240</sup>
Oct. 5.9	55.182 <sup>214</sup>	70.95 <sup>97</sup>	39.939 <sup>294</sup>	15.62 <sup>69</sup>	21.031 <sup>225</sup>	17.17 <sup>158</sup>	6.46 <sup>40</sup>	66.58 <sup>196</sup>
15.8	55.424 <sup>242</sup>	69.76 <sup>119</sup>	40.197 <sup>258</sup>	15.39 <sup>23</sup>	21.288 <sup>267</sup>	15.50 <sup>167</sup>	6.93 <sup>47</sup>	65.13 <sup>145</sup>
	270	139	287	25	285	175	52	85
25.8	55.694	68.37	40.484	15.64	21.573	13.75	7.45	64.28
Nov. 4.8	55.985 <sup>291</sup>	66.81 <sup>156</sup>	40.796 <sup>312</sup>	16.39 <sup>75</sup>	21.880 <sup>307</sup>	11.97 <sup>178</sup>	8.02 <sup>57</sup>	64.05 <sup>28</sup>
14.8	56.295 <sup>310</sup>	65.11 <sup>170</sup>	41.125 <sup>329</sup>	17.62 <sup>123</sup>	22.210 <sup>330</sup>	10.19 <sup>178</sup>	8.61 <sup>59</sup>	64.48 <sup>48</sup>
24.7	56.614 <sup>319</sup>	63.33 <sup>178</sup>	41.462 <sup>337</sup>	19.31 <sup>169</sup>	22.549 <sup>339</sup>	8.48 <sup>171</sup>	9.21 <sup>60</sup>	65.57 <sup>109</sup>
Dec. 4.7	56.936 <sup>322</sup>	61.52 <sup>181</sup>	41.799 <sup>337</sup>	21.41 <sup>210</sup>	22.892 <sup>343</sup>	6.90 <sup>158</sup>	9.79 <sup>58</sup>	67.29 <sup>172</sup>
	314	178	325	245	337	139	56	229
14.7	57.250	59.74	42.124	23.86	23.229	5.51	10.35	69.58
24.6	57.545 <sup>295</sup>	58.07 <sup>167</sup>	42.427 <sup>308</sup>	26.56 <sup>270</sup>	23.548 <sup>319</sup>	4.33 <sup>118</sup>	10.85 <sup>50</sup>	72.38 <sup>280</sup>
34.6	57.813 <sup>268</sup>	56.54 <sup>153</sup>	42.696 <sup>269</sup>	29.44 <sup>288</sup>	23.838 <sup>290</sup>	3.43 <sup>90</sup>	11.27 <sup>42</sup>	75.60 <sup>322</sup>
Mean Place	52.984	85.38	38.100	9.51	18.824	35.51	6.191	62.78
Sec δ, Tan δ	1.016	+0.181	1.126	-0.519	1.096	+0.448	2.340	-2.116
D <sub>ψα</sub> , D <sub>ωα</sub>	+0.064	+0.010	+0.053	-0.028	+0.068	+0.025	+0.030	-0.117
D <sub>ψδ</sub> , D <sub>ωδ</sub>	-0.32	+0.58	-0.33	+0.57	-0.33	+0.57	-0.33	+0.56

# APPARENT PLACES OF STARS, 1920.

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## FOR THE UPPER TRANSIT AT WASHINGTON.

Washington Mean Time.	ν Ursae Majoris. Mag. 3.9		ε Serpentis. Mag. 6.0		μ Leonis. Mag. 4.1		Groombridge 1586. Mag. 6.0	
	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.
	h m 9 45	° ' " +59 24	h m 9 47	° ' " - 3 52	h m 9 48	° ' " +26 22	h m 9 51	° ' " +73 14
	s	"	s	"	s	"	s	"
Jan. 0.6	21.360 <sup>482</sup>	35.25	14.005	12.42	14.819	47.83	19.36	75.50
10.6	21.792 <sup>482</sup>	36.18 <sup>98</sup>	14.252 <sup>247</sup>	14.53 <sup>211</sup>	15.099 <sup>290</sup>	47.15 <sup>68</sup>	20.06 <sup>70</sup>	76.92 <sup>142</sup>
20.6	22.153 <sup>361</sup>	37.56 <sup>188</sup>	14.460 <sup>208</sup>	16.52 <sup>199</sup>	15.336 <sup>287</sup>	46.79 <sup>36</sup>	20.65 <sup>59</sup>	78.81 <sup>189</sup>
30.6	22.433 <sup>260</sup>	39.32 <sup>178</sup>	14.623 <sup>168</sup>	18.34 <sup>183</sup>	15.523 <sup>187</sup>	46.73 <sup>6</sup>	21.10 <sup>45</sup>	81.12 <sup>231</sup>
Feb. 9.5	22.624 <sup>191</sup>	41.40 <sup>208</sup>	14.737 <sup>114</sup>	19.94 <sup>190</sup>	15.657 <sup>134</sup>	46.98 <sup>25</sup>	21.41 <sup>31</sup>	83.72 <sup>260</sup>
19.5	22.722 <sup>98</sup>	43.68 <sup>228</sup>	14.802 <sup>65</sup>	21.31 <sup>187</sup>	15.735 <sup>78</sup>	47.48 <sup>50</sup>	21.56 <sup>15</sup>	86.52 <sup>280</sup>
29.5	22.727 <sup>5</sup>	46.07 <sup>239</sup>	14.819 <sup>17</sup>	22.42 <sup>111</sup>	15.769 <sup>24</sup>	48.21 <sup>73</sup>	21.56 <sup>0</sup>	89.39 <sup>287</sup>
Mar. 10.4	22.646 <sup>81</sup>	48.47 <sup>240</sup>	14.793 <sup>26</sup>	23.29 <sup>87</sup>	15.733 <sup>26</sup>	49.09 <sup>88</sup>	21.39 <sup>17</sup>	92.21 <sup>282</sup>
20.4	22.487 <sup>159</sup>	50.77 <sup>239</sup>	14.729 <sup>64</sup>	23.91 <sup>63</sup>	15.683 <sup>70</sup>	50.06 <sup>97</sup>	21.09 <sup>30</sup>	94.87 <sup>266</sup>
30.4	22.263 <sup>224</sup>	52.86 <sup>200</sup>	14.636 <sup>98</sup>	24.31 <sup>40</sup>	15.587 <sup>106</sup>	51.08 <sup>108</sup>	20.68 <sup>41</sup>	97.27 <sup>240</sup>
	276	183	117	18	133	100	53	204
Apr. 9.4	21.987	54.69	14.519	24.49	15.424	52.98	20.15	99.31
19.3	21.675 <sup>312</sup>	56.17 <sup>146</sup>	14.388 <sup>131</sup>	24.48 <sup>1</sup>	15.273 <sup>151</sup>	53.61 <sup>93</sup>	19.57 <sup>58</sup>	100.91 <sup>160</sup>
29.3	21.343 <sup>282</sup>	57.25 <sup>108</sup>	14.251 <sup>137</sup>	24.29 <sup>19</sup>	15.114 <sup>159</sup>	53.85 <sup>84</sup>	18.94 <sup>63</sup>	102.03 <sup>112</sup>
May 9.3	21.006 <sup>237</sup>	57.90 <sup>65</sup>	14.113 <sup>135</sup>	23.95 <sup>24</sup>	14.953 <sup>161</sup>	54.54 <sup>69</sup>	18.30 <sup>64</sup>	102.64 <sup>61</sup>
19.2	20.677 <sup>239</sup>	58.11 <sup>21</sup>	13.989 <sup>138</sup>	23.46 <sup>49</sup>	14.799 <sup>184</sup>	55.06 <sup>54</sup>	17.65 <sup>65</sup>	102.70 <sup>6</sup>
	268	24	131	62	141	37	62	46
29.2	20.369	57.87	13.869	22.84	14.668	55.45	17.03	102.24
June 8.2	20.090 <sup>279</sup>	57.20 <sup>67</sup>	13.751 <sup>108</sup>	22.11 <sup>73</sup>	14.535 <sup>123</sup>	55.63 <sup>18</sup>	16.46 <sup>57</sup>	101.27 <sup>97</sup>
18.2	19.850 <sup>240</sup>	56.12 <sup>108</sup>	13.660 <sup>91</sup>	21.29 <sup>83</sup>	14.431 <sup>104</sup>	55.65 <sup>2</sup>	15.96 <sup>50</sup>	99.83 <sup>144</sup>
28.1	19.656 <sup>194</sup>	54.66 <sup>146</sup>	13.590 <sup>70</sup>	20.39 <sup>90</sup>	14.353 <sup>78</sup>	55.47 <sup>18</sup>	15.54 <sup>42</sup>	97.96 <sup>187</sup>
July 8.1	19.512 <sup>144</sup>	52.86 <sup>180</sup>	13.541 <sup>49</sup>	19.46 <sup>98</sup>	14.300 <sup>58</sup>	55.13 <sup>24</sup>	15.20 <sup>34</sup>	95.70 <sup>226</sup>
	91	211	25	95	26	50	25	260
18.1	19.421	50.75	13.516	18.51	14.274	54.63	14.95	93.10
28.1	19.385 <sup>36</sup>	48.40 <sup>235</sup>	13.515 <sup>1</sup>	17.57 <sup>94</sup>	14.276 <sup>2</sup>	54.94 <sup>69</sup>	14.81 <sup>14</sup>	90.24 <sup>286</sup>
Aug. 7.0	19.407 <sup>23</sup>	45.84 <sup>296</sup>	13.540 <sup>28</sup>	16.69 <sup>98</sup>	14.308 <sup>33</sup>	53.11 <sup>83</sup>	14.78 <sup>3</sup>	87.15 <sup>309</sup>
17.0	19.485 <sup>78</sup>	43.13 <sup>271</sup>	13.591 <sup>51</sup>	15.91 <sup>78</sup>	14.370 <sup>62</sup>	52.11 <sup>100</sup>	14.86 <sup>8</sup>	83.93 <sup>322</sup>
27.0	19.623 <sup>194</sup>	40.32 <sup>287</sup>	13.671 <sup>89</sup>	15.29 <sup>63</sup>	14.462 <sup>98</sup>	50.95 <sup>116</sup>	15.04 <sup>18</sup>	80.62 <sup>331</sup>
	194	287	100	45	124	130	28	332
Sept. 5.9	19.817	37.45	13.780	14.84	14.586	49.65	15.32	77.39
15.9	20.068 <sup>251</sup>	34.58 <sup>287</sup>	13.920 <sup>140</sup>	14.63 <sup>21</sup>	14.742 <sup>166</sup>	48.20 <sup>145</sup>	15.71 <sup>39</sup>	74.03 <sup>327</sup>
25.9	20.375 <sup>307</sup>	31.76 <sup>263</sup>	14.092 <sup>173</sup>	14.68 <sup>5</sup>	14.930 <sup>186</sup>	46.61 <sup>159</sup>	16.20 <sup>49</sup>	70.87 <sup>316</sup>
Oct. 5.9	20.737 <sup>262</sup>	29.05 <sup>271</sup>	14.294 <sup>202</sup>	15.04 <sup>26</sup>	15.152 <sup>222</sup>	44.92 <sup>169</sup>	16.79 <sup>59</sup>	67.90 <sup>297</sup>
15.8	21.149 <sup>112</sup>	26.52 <sup>258</sup>	14.526 <sup>222</sup>	15.71 <sup>67</sup>	15.405 <sup>263</sup>	43.14 <sup>178</sup>	17.46 <sup>67</sup>	65.17 <sup>273</sup>
	450	231	261	93	283	184	75	240
25.8	21.608	24.21	14.787	16.69	15.688	41.30	18.21	62.77
Nov. 4.8	22.106 <sup>498</sup>	22.19 <sup>202</sup>	15.071 <sup>284</sup>	17.99 <sup>130</sup>	15.998 <sup>310</sup>	39.44 <sup>196</sup>	19.03 <sup>82</sup>	60.75 <sup>202</sup>
14.8	22.633 <sup>527</sup>	20.53 <sup>166</sup>	15.375 <sup>304</sup>	19.57 <sup>148</sup>	16.328 <sup>339</sup>	37.62 <sup>182</sup>	19.90 <sup>37</sup>	59.17 <sup>158</sup>
24.7	23.180 <sup>547</sup>	19.26 <sup>137</sup>	15.689 <sup>314</sup>	21.38 <sup>181</sup>	16.672 <sup>344</sup>	35.88 <sup>174</sup>	20.79 <sup>69</sup>	58.08 <sup>109</sup>
Dec. 4.7	23.731 <sup>561</sup>	18.44 <sup>82</sup>	16.006 <sup>317</sup>	23.37 <sup>199</sup>	17.021 <sup>349</sup>	34.30 <sup>168</sup>	21.70 <sup>91</sup>	57.52 <sup>56</sup>
	539	33	310	212	344	140	88	2
14.7	24.270	18.11	16.316	25.49	17.365	32.00	22.58	57.54
24.6	24.781 <sup>511</sup>	18.27 <sup>16</sup>	16.609 <sup>293</sup>	27.65 <sup>216</sup>	17.692 <sup>327</sup>	31.77 <sup>113</sup>	23.42 <sup>64</sup>	58.12 <sup>58</sup>
34.6	25.247 <sup>488</sup>	18.93 <sup>68</sup>	16.876 <sup>287</sup>	29.78 <sup>232</sup>	17.992 <sup>300</sup>	30.61 <sup>86</sup>	24.19 <sup>77</sup>	59.23 <sup>111</sup>
Mean Place	18.992	57.01	12.210	3.98	13.095	63.90	15.864	93.69
Sec δ, Tan δ	1.965	+1.092	1.092	-0.068	1.116	+0.496	3.471	+3.324
D <sub>α</sub> , D <sub>αα</sub>	+0.086	+0.094	+0.060	-0.004	+0.068	+0.928	+0.106	+0.188
D <sub>β</sub> , D <sub>ββ</sub>	-0.33	+0.55	-0.36	+0.55	-0.33	+0.54	-0.34	+0.53

FOR THE UPPER TRANSIT AT WASHINGTON.

Washington Mean Time.	19 Leonis Minoris. Mag. 5.2		φ Argus. Mag. 3.7		π Leonis. Mag. 4.9		γ Leonis. Mag. 3.6	
	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.
	h m 9 52	° ' " +41 25	h m 9 54	° ' " -54 11	h m 9 55	° ' " + 8 25	h m 10 2	° ' " +17 8
	s	"	s	"	s	"	s	"
Jan. 0.6	49.370	55.17	5.652	8.67	60.962	31.42	60.008	58.09
10.6	49.695 <sup>325</sup>	55.20 <sup>3</sup>	5.977 <sup>325</sup>	12.04 <sup>387</sup>	61.225 <sup>288</sup>	29.83 <sup>150</sup>	60.286 <sup>278</sup>	58.89 <sup>120</sup>
20.6	49.973 <sup>278</sup>	55.63 <sup>43</sup>	6.240 <sup>288</sup>	15.64 <sup>300</sup>	61.447 <sup>232</sup>	28.45 <sup>138</sup>	60.523 <sup>237</sup>	55.95 <sup>94</sup>
30.6	50.194 <sup>221</sup>	56.43 <sup>80</sup>	6.432 <sup>192</sup>	19.35 <sup>371</sup>	61.624 <sup>177</sup>	27.32 <sup>118</sup>	60.714 <sup>191</sup>	55.31 <sup>64</sup>
Feb. 9.5	50.352 <sup>158</sup>	57.56 <sup>113</sup>	6.551 <sup>119</sup>	23.06 <sup>371</sup>	61.753 <sup>120</sup>	26.44 <sup>98</sup>	60.855 <sup>141</sup>	54.94 <sup>37</sup>
	92	137	44	364	79	62	89	8
19.5	50.444	58.93	6.595	26.70	61.832	25.82	60.944	54.86
29.5	50.473 <sup>29</sup>	60.49 <sup>156</sup>	6.571 <sup>24</sup>	30.17 <sup>347</sup>	61.861 <sup>20</sup>	25.43 <sup>80</sup>	60.982 <sup>38</sup>	55.02 <sup>16</sup>
Mar. 10.4	50.441 <sup>32</sup>	62.17 <sup>168</sup>	6.481 <sup>90</sup>	33.40 <sup>323</sup>	61.847 <sup>14</sup>	25.23 <sup>15</sup>	60.974 <sup>8</sup>	55.39 <sup>37</sup>
20.4	50.356 <sup>85</sup>	63.88 <sup>169</sup>	6.335 <sup>146</sup>	36.32 <sup>292</sup>	61.793 <sup>84</sup>	25.33 <sup>5</sup>	60.925 <sup>49</sup>	55.91 <sup>52</sup>
30.4	50.226 <sup>130</sup>	65.48 <sup>162</sup>	6.140 <sup>195</sup>	38.88 <sup>256</sup>	61.707 <sup>56</sup>	25.55 <sup>22</sup>	60.839 <sup>86</sup>	56.55 <sup>64</sup>
	165	180	282	216	111	82	111	72
Apr. 9.4	50.061	66.98	5.908	41.04	61.596	25.87	60.723	57.27
19.3	49.873 <sup>188</sup>	68.30 <sup>132</sup>	5.647 <sup>261</sup>	42.77 <sup>173</sup>	61.467 <sup>120</sup>	26.30 <sup>43</sup>	60.599 <sup>120</sup>	58.00 <sup>73</sup>
29.3	49.673 <sup>200</sup>	69.36 <sup>106</sup>	5.367 <sup>280</sup>	44.02 <sup>126</sup>	61.334 <sup>133</sup>	26.80 <sup>80</sup>	60.460 <sup>139</sup>	58.72 <sup>72</sup>
May 9.3	49.469 <sup>204</sup>	70.14 <sup>78</sup>	5.078 <sup>289</sup>	44.79 <sup>77</sup>	61.197 <sup>137</sup>	27.33 <sup>58</sup>	60.318 <sup>142</sup>	59.39 <sup>67</sup>
19.3	49.271 <sup>198</sup>	70.63 <sup>49</sup>	4.786 <sup>292</sup>	45.06 <sup>37</sup>	61.064 <sup>133</sup>	27.88 <sup>55</sup>	60.179 <sup>139</sup>	60.01 <sup>62</sup>
	185	18	284	22	128	56	129	53
29.2	49.086	70.81	4.502	44.84	60.941	28.46	60.050	60.54
June 8.2	48.921 <sup>165</sup>	70.68 <sup>13</sup>	4.231 <sup>271</sup>	44.13 <sup>71</sup>	60.833 <sup>108</sup>	29.02 <sup>56</sup>	59.935 <sup>115</sup>	60.98 <sup>44</sup>
18.2	48.781 <sup>140</sup>	70.24 <sup>44</sup>	3.982 <sup>249</sup>	42.98 <sup>117</sup>	60.741 <sup>92</sup>	29.55 <sup>38</sup>	59.836 <sup>99</sup>	61.31 <sup>33</sup>
28.1	48.671 <sup>110</sup>	69.52 <sup>72</sup>	3.759 <sup>223</sup>	41.35 <sup>161</sup>	60.668 <sup>73</sup>	30.05 <sup>80</sup>	59.757 <sup>79</sup>	61.52 <sup>21</sup>
July 8.1	48.590 <sup>81</sup>	68.53 <sup>99</sup>	3.569 <sup>190</sup>	39.36 <sup>199</sup>	60.616 <sup>58</sup>	30.49 <sup>44</sup>	59.700 <sup>57</sup>	61.61 <sup>9</sup>
	47	125	150	232	27	38	34	3
18.1	48.543	67.28	3.419	37.04	60.589	30.87	59.666	61.58
28.1	48.582 <sup>11</sup>	65.82 <sup>146</sup>	3.313 <sup>106</sup>	34.46 <sup>256</sup>	60.584 <sup>5</sup>	31.18 <sup>31</sup>	59.656 <sup>10</sup>	61.41 <sup>17</sup>
Aug. 7.0	48.556 <sup>24</sup>	64.14 <sup>168</sup>	3.257 <sup>54</sup>	31.71 <sup>275</sup>	60.607 <sup>28</sup>	31.88 <sup>30</sup>	59.673 <sup>17</sup>	61.09 <sup>32</sup>
17.0	48.617 <sup>61</sup>	62.30 <sup>184</sup>	3.255 <sup>3</sup>	28.86 <sup>235</sup>	60.653 <sup>46</sup>	31.41 <sup>3</sup>	59.716 <sup>43</sup>	60.63 <sup>46</sup>
27.0	48.714 <sup>97</sup>	60.31 <sup>199</sup>	3.308 <sup>58</sup>	26.03 <sup>288</sup>	60.731 <sup>78</sup>	31.31 <sup>10</sup>	59.789 <sup>73</sup>	59.99 <sup>64</sup>
	136	212	114	272	103	27	102	51
Sept. 6.0	48.850	58.19	3.422	23.81	60.334	31.04	59.891	59.18
15.9	49.025 <sup>175</sup>	55.99 <sup>220</sup>	3.597 <sup>175</sup>	26.82 <sup>249</sup>	60.970 <sup>136</sup>	30.56 <sup>48</sup>	60.023 <sup>122</sup>	58.20 <sup>98</sup>
25.9	49.238 <sup>213</sup>	53.78 <sup>226</sup>	3.833 <sup>236</sup>	18.65 <sup>217</sup>	61.137 <sup>167</sup>	29.85 <sup>71</sup>	60.189 <sup>106</sup>	57.02 <sup>118</sup>
Oct. 5.9	49.490 <sup>262</sup>	51.46 <sup>227</sup>	4.126 <sup>293</sup>	16.90 <sup>175</sup>	61.334 <sup>197</sup>	28.92 <sup>93</sup>	60.387 <sup>198</sup>	55.66 <sup>136</sup>
15.8	49.779 <sup>289</sup>	49.21 <sup>225</sup>	4.472 <sup>346</sup>	15.65 <sup>125</sup>	61.564 <sup>230</sup>	27.74 <sup>113</sup>	60.615 <sup>228</sup>	54.14 <sup>152</sup>
	324	218	392	60	261	133	261	167
25.8	50.103	47.08	4.864	14.96	61.325	26.36	60.876	52.47
Nov. 4.8	50.457 <sup>364</sup>	44.99 <sup>204</sup>	5.292 <sup>428</sup>	14.89 <sup>7</sup>	62.106 <sup>231</sup>	24.77 <sup>159</sup>	61.164 <sup>288</sup>	50.69 <sup>178</sup>
14.8	50.836 <sup>379</sup>	43.12 <sup>187</sup>	5.746 <sup>454</sup>	15.45 <sup>56</sup>	62.410 <sup>304</sup>	23.05 <sup>172</sup>	61.475 <sup>311</sup>	48.84 <sup>185</sup>
24.7	51.232 <sup>396</sup>	41.50 <sup>163</sup>	6.209 <sup>463</sup>	16.63 <sup>118</sup>	62.726 <sup>316</sup>	21.29 <sup>185</sup>	61.800 <sup>325</sup>	46.98 <sup>156</sup>
Dec. 4.7	51.635 <sup>403</sup>	40.17 <sup>133</sup>	6.669 <sup>480</sup>	18.41 <sup>178</sup>	63.049 <sup>323</sup>	19.81 <sup>189</sup>	62.133 <sup>333</sup>	45.16 <sup>182</sup>
	395	98	440	231	313	189	330	172
14.7	52.030	39.19	7.109	20.72	63.367	17.42	62.463	43.44
24.7	52.410 <sup>380</sup>	38.59 <sup>60</sup>	7.515 <sup>406</sup>	23.51 <sup>279</sup>	63.670 <sup>368</sup>	15.62 <sup>180</sup>	62.780 <sup>317</sup>	41.89 <sup>155</sup>
34.6	52.759 <sup>349</sup>	36.39 <sup>20</sup>	7.873 <sup>358</sup>	26.63 <sup>317</sup>	63.950 <sup>399</sup>	13.84 <sup>168</sup>	63.072 <sup>292</sup>	40.55 <sup>134</sup>
Mean Place	47.449	74.48	3.066	12.45	59.235	48.98	58.313	72.08
Sec δ, Tan δ	1.334	+0.883	1.709	-1.386	1.011	+0.148	1.046	+0.309
D <sub>φ</sub> , D <sub>ω</sub>	+0.073	+0.050	+0.042	-0.079	+0.063	+0.008	+0.065	+0.018
D <sub>δ</sub> , D <sub>ω</sub>	-0.84	+0.53	-0.34	+0.52	-0.34	+0.52	-0.35	+0.49



# APPARENT PLACES OF STARS, 1920.

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## FOR THE UPPER TRANSIT AT WASHINGTON.

Washington Mean Time.	α Leonis. (Regulus.) Mag. 1.3		λ Hydræ. Mag. 3.8		γ Velorum. Mag. 4.1		β Ursæ Majoris. Mag. 5.7	
	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.
	h m 10 4	° ' " +12 21	h m 10 6	° ' " -11 57	h m 10 11	° ' " -41 43	h m 10 12	° ' " +65 29
	s	s	s	s	s	s	s	s
Jan. 0.6	8.501	18.70	43.028	34.94	24.541	23.56	16.97	65.75
10.6	8.771 <sup>270</sup>	17.24 <sup>146</sup>	43.289 <sup>261</sup>	37.37 <sup>243</sup>	24.842 <sup>301</sup>	31.72 <sup>316</sup>	17.52 <sup>55</sup>	66.66 <sup>91</sup>
20.6	9.001 <sup>230</sup>	16.06 <sup>118</sup>	43.512 <sup>223</sup>	39.75 <sup>238</sup>	25.092 <sup>252</sup>	35.04 <sup>322</sup>	17.99 <sup>47</sup>	68.06 <sup>140</sup>
30.6	9.189 <sup>188</sup>	15.12 <sup>94</sup>	43.691 <sup>179</sup>	42.01 <sup>226</sup>	25.292 <sup>200</sup>	38.42 <sup>328</sup>	18.37 <sup>38</sup>	69.92 <sup>186</sup>
Feb. 9.5	9.323 <sup>130</sup>	14.47 <sup>66</sup>	43.822 <sup>131</sup>	44.09 <sup>206</sup>	25.490 <sup>138</sup>	41.96 <sup>328</sup>	18.65 <sup>28</sup>	72.14 <sup>222</sup>
	88	38	82	187	70	328	16	248
19.5	9.416	14.00	43.904	45.96	25.599	45.08	18.81	74.62
29.5	9.454 <sup>38</sup>	13.95 <sup>14</sup>	43.937 <sup>33</sup>	47.57 <sup>161</sup>	25.530 <sup>21</sup>	43.17 <sup>309</sup>	18.87 <sup>6</sup>	77.25 <sup>263</sup>
Mar. 10.5	9.443 <sup>6</sup>	14.03 <sup>8</sup>	43.927 <sup>10</sup>	43.94 <sup>137</sup>	25.499 <sup>81</sup>	51.03 <sup>290</sup>	18.82 <sup>5</sup>	79.93 <sup>268</sup>
20.4	9.400 <sup>48</sup>	14.30 <sup>27</sup>	43.879 <sup>48</sup>	50.03 <sup>109</sup>	25.430 <sup>79</sup>	53.09 <sup>267</sup>	18.67 <sup>15</sup>	82.53 <sup>260</sup>
30.4	9.321 <sup>79</sup>	14.72 <sup>42</sup>	43.797 <sup>82</sup>	56.87 <sup>84</sup>	25.391 <sup>119</sup>	55.84 <sup>224</sup>	18.43 <sup>24</sup>	84.97 <sup>244</sup>
	106	49	105	57	122	187	31	215
Apr. 9.4	9.213	15.21	43.692	51.44	25.149	57.71	18.12	87.12
19.3	9.086 <sup>127</sup>	15.78 <sup>57</sup>	43.506 <sup>124</sup>	51.75 <sup>31</sup>	24.974 <sup>178</sup>	59.18 <sup>147</sup>	17.76 <sup>36</sup>	88.93 <sup>181</sup>
29.3	8.952 <sup>134</sup>	16.46 <sup>62</sup>	43.435 <sup>123</sup>	51.84 <sup>9</sup>	24.783 <sup>191</sup>	60.24 <sup>106</sup>	17.36 <sup>40</sup>	90.35 <sup>142</sup>
May 9.3	8.815 <sup>137</sup>	17.01 <sup>61</sup>	43.298 <sup>137</sup>	51.69 <sup>15</sup>	24.582 <sup>201</sup>	60.86 <sup>62</sup>	16.94 <sup>42</sup>	91.31 <sup>96</sup>
19.3	8.689 <sup>125</sup>	17.62 <sup>61</sup>	43.163 <sup>125</sup>	51.33 <sup>26</sup>	24.379 <sup>203</sup>	61.06 <sup>20</sup>	16.52 <sup>42</sup>	91.76 <sup>45</sup>
	125	37	123	58	199	28	41	5
29.2	8.555	18.19	43.085	50.77	24.180	60.93	16.11	91.71
June 8.2	8.442 <sup>113</sup>	18.71 <sup>52</sup>	42.918 <sup>117</sup>	50.02 <sup>75</sup>	23.989 <sup>191</sup>	60.18 <sup>65</sup>	15.72 <sup>39</sup>	91.18 <sup>53</sup>
18.2	8.343 <sup>99</sup>	19.15 <sup>44</sup>	42.815 <sup>103</sup>	49.11 <sup>91</sup>	23.813 <sup>176</sup>	59.12 <sup>106</sup>	15.38 <sup>34</sup>	90.19 <sup>99</sup>
28.2	8.266 <sup>77</sup>	19.32 <sup>37</sup>	42.728 <sup>87</sup>	48.07 <sup>104</sup>	23.655 <sup>158</sup>	57.71 <sup>141</sup>	15.08 <sup>30</sup>	88.76 <sup>143</sup>
July 8.1	8.210 <sup>56</sup>	19.81 <sup>29</sup>	42.662 <sup>66</sup>	46.91 <sup>116</sup>	23.522 <sup>133</sup>	55.95 <sup>178</sup>	14.83 <sup>25</sup>	86.93 <sup>183</sup>
	34	20	46	123	107	292	18	218
18.1	8.176	20.01	42.616	45.68	23.415	53.98	14.65	84.75
28.1	8.163 <sup>13</sup>	20.09 <sup>3</sup>	42.592 <sup>24</sup>	44.42 <sup>126</sup>	23.333 <sup>77</sup>	51.68 <sup>225</sup>	14.53 <sup>12</sup>	82.26 <sup>249</sup>
Aug. 7.0	8.178 <sup>16</sup>	20.06 <sup>3</sup>	42.594 <sup>2</sup>	43.17 <sup>125</sup>	23.297 <sup>41</sup>	49.39 <sup>228</sup>	14.47 <sup>6</sup>	79.51 <sup>275</sup>
17.0	8.219 <sup>41</sup>	19.86 <sup>29</sup>	42.623 <sup>29</sup>	42.00 <sup>117</sup>	23.292 <sup>5</sup>	46.84 <sup>248</sup>	14.49 <sup>2</sup>	76.55 <sup>296</sup>
27.0	8.283 <sup>99</sup>	19.52 <sup>34</sup>	42.682 <sup>59</sup>	40.94 <sup>106</sup>	23.331 <sup>39</sup>	44.41 <sup>243</sup>	14.58 <sup>9</sup>	73.47 <sup>308</sup>
	99	54	88	89	84	233	16	316
Sept. 6.0	8.387	18.98	42.770	40.05	23.415	42.06	14.74	70.31
15.9	8.514 <sup>127</sup>	18.26 <sup>72</sup>	42.891 <sup>121</sup>	39.40 <sup>65</sup>	23.544 <sup>129</sup>	39.97 <sup>211</sup>	14.97 <sup>23</sup>	67.11 <sup>320</sup>
25.9	8.676 <sup>162</sup>	17.33 <sup>98</sup>	43.046 <sup>155</sup>	39.08 <sup>37</sup>	23.722 <sup>178</sup>	38.16 <sup>181</sup>	15.28 <sup>31</sup>	63.96 <sup>315</sup>
Oct. 5.9	8.868 <sup>192</sup>	16.19 <sup>114</sup>	43.284 <sup>186</sup>	38.96 <sup>7</sup>	23.946 <sup>224</sup>	36.74 <sup>142</sup>	15.66 <sup>38</sup>	60.92 <sup>304</sup>
15.9	9.094 <sup>226</sup>	14.84 <sup>125</sup>	43.456 <sup>222</sup>	39.27 <sup>31</sup>	24.215 <sup>299</sup>	35.78 <sup>96</sup>	16.10 <sup>44</sup>	58.03 <sup>289</sup>
	265	123	254	68	309	45	50	263
25.8	9.349	13.32	43.710	39.95	24.524	35.33	16.60	55.40
Nov. 4.8	9.632 <sup>293</sup>	11.65 <sup>167</sup>	43.990 <sup>300</sup>	41.00 <sup>105</sup>	24.368 <sup>344</sup>	35.43 <sup>10</sup>	17.16 <sup>56</sup>	53.08 <sup>232</sup>
14.8	9.936 <sup>304</sup>	9.84 <sup>131</sup>	44.293 <sup>303</sup>	42.41 <sup>141</sup>	25.237 <sup>399</sup>	36.11 <sup>68</sup>	17.77 <sup>61</sup>	51.12 <sup>196</sup>
24.7	10.255 <sup>319</sup>	7.99 <sup>135</sup>	44.609 <sup>316</sup>	44.14 <sup>173</sup>	25.621 <sup>334</sup>	37.34 <sup>122</sup>	18.41 <sup>64</sup>	49.59 <sup>153</sup>
Dec. 4.7	10.582 <sup>327</sup>	6.11 <sup>138</sup>	44.931 <sup>322</sup>	46.15 <sup>202</sup>	26.010 <sup>389</sup>	39.11 <sup>177</sup>	19.06 <sup>65</sup>	48.56 <sup>103</sup>
	324	133	319	220	378	225	65	50
14.7	10.996	4.23	45.259	43.35	26.333	41.36	19.71	48.06
24.7	11.215 <sup>362</sup>	2.57 <sup>171</sup>	45.553 <sup>363</sup>	50.79 <sup>225</sup>	26.747 <sup>359</sup>	44.01 <sup>265</sup>	20.34 <sup>63</sup>	48.10 <sup>4</sup>
34.6	11.502 <sup>397</sup>	1.02 <sup>155</sup>	45.832 <sup>379</sup>	53.11 <sup>241</sup>	27.071 <sup>324</sup>	46.98 <sup>297</sup>	20.92 <sup>58</sup>	48.63 <sup>58</sup>
Mean Place	6.814	31.39	41.273	39.68	22.426	39.69	14.606	89.21
Sec δ, Tan δ	1.024	+0.219	1.022	-0.212	1.340	-0.292	2.412	+2.195
D <sub>1</sub> α, D <sub>2</sub> α	+0.064	+0.013	+0.056	-0.012	+0.050	-0.053	+0.088	+0.130
D <sub>1</sub> δ, D <sub>2</sub> δ	-0.35	+0.43	-0.35	+0.47	-0.35	+0.46	-0.35	+0.45

APPARENT PLACES OF STARS, 1920.

FOR THE UPPER TRANSIT AT WASHINGTON.

Washington Mean Time.	ζ Leonis. Mag. 3.6		λ Ursae Majoris. Mag. 3.5		γ Leonis pr. Mag. 2.6		μ Ursae Majoris. Mag. 3.2	
	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.
	h m 10 12	° ' " +23 48	h m 10 12	° ' " +48 18	h m 10 15	° ' " +20 14	h m 10 17	° ' " +41 53
Jan. 0.7	16.320	43.75	18.569	32.06	35.500	33.40	35.923	48.58
10.6	16.612 <sup>292</sup>	42.79 <sup>06</sup>	18.917 <sup>348</sup>	32.00 <sup>6</sup>	35.787 <sup>287</sup>	32.28 <sup>112</sup>	36.268 <sup>345</sup>	48.44 <sup>14</sup>
20.6	16.865 <sup>253</sup>	42.17 <sup>63</sup>	19.220 <sup>303</sup>	32.39 <sup>39</sup>	36.039 <sup>252</sup>	31.45 <sup>83</sup>	36.571 <sup>303</sup>	48.71 <sup>27</sup>
30.6	17.072 <sup>207</sup>	41.88 <sup>29</sup>	19.467 <sup>247</sup>	33.19 <sup>80</sup>	36.245 <sup>206</sup>	30.94 <sup>51</sup>	36.821 <sup>250</sup>	49.40 <sup>69</sup>
Feb. 9.5	17.229 <sup>157</sup>	41.90 <sup>2</sup>	19.651 <sup>184</sup>	34.34 <sup>115</sup>	36.399 <sup>154</sup>	30.72 <sup>23</sup>	37.009 <sup>188</sup>	50.45 <sup>105</sup>
19.5	17.331 <sup>102</sup>	42.21 <sup>31</sup>	19.770 <sup>119</sup>	35.78 <sup>144</sup>	36.505 <sup>108</sup>	30.81 <sup>9</sup>	37.133 <sup>124</sup>	51.81 <sup>136</sup>
29.5	17.381 <sup>50</sup>	42.77 <sup>56</sup>	19.824 <sup>54</sup>	37.46 <sup>168</sup>	36.559 <sup>54</sup>	31.15 <sup>34</sup>	37.192 <sup>59</sup>	53.41 <sup>160</sup>
Mar. 10.5	17.382 <sup>1</sup>	43.53 <sup>76</sup>	19.814 <sup>179</sup>	39.25 <sup>10</sup>	36.564 <sup>5</sup>	31.68 <sup>53</sup>	37.191 <sup>1</sup>	55.14 <sup>173</sup>
20.4	17.337 <sup>45</sup>	44.43 <sup>90</sup>	19.748 <sup>66</sup>	41.09 <sup>184</sup>	36.526 <sup>38</sup>	32.39 <sup>71</sup>	37.133 <sup>58</sup>	56.95 <sup>181</sup>
30.4	17.255 <sup>82</sup>	45.41 <sup>98</sup>	19.633 <sup>115</sup>	42.89 <sup>180</sup>	36.450 <sup>76</sup>	33.21 <sup>82</sup>	37.028 <sup>106</sup>	58.72 <sup>177</sup>
Apr. 9.4	17.144 <sup>111</sup>	46.42 <sup>101</sup>	19.480 <sup>153</sup>	44.57 <sup>168</sup>	36.347 <sup>108</sup>	34.08 <sup>87</sup>	36.885 <sup>143</sup>	60.40 <sup>168</sup>
19.4	17.013 <sup>131</sup>	47.40 <sup>98</sup>	19.299 <sup>181</sup>	46.08 <sup>151</sup>	36.223 <sup>124</sup>	34.95 <sup>87</sup>	36.713 <sup>172</sup>	61.91 <sup>151</sup>
29.3	16.869 <sup>144</sup>	48.32 <sup>92</sup>	19.100 <sup>199</sup>	47.33 <sup>125</sup>	36.087 <sup>136</sup>	35.81 <sup>86</sup>	36.522 <sup>191</sup>	63.19 <sup>128</sup>
May 9.3	16.720 <sup>149</sup>	49.18 <sup>81</sup>	18.893 <sup>207</sup>	48.30 <sup>97</sup>	35.944 <sup>143</sup>	36.59 <sup>78</sup>	36.323 <sup>199</sup>	64.21 <sup>102</sup>
19.3	16.573 <sup>147</sup>	49.80 <sup>67</sup>	18.688 <sup>206</sup>	48.95 <sup>65</sup>	35.806 <sup>139</sup>	37.26 <sup>67</sup>	36.124 <sup>199</sup>	64.92 <sup>71</sup>
29.2	16.434 <sup>139</sup>	50.33 <sup>53</sup>	18.491 <sup>197</sup>	49.27 <sup>32</sup>	35.671 <sup>134</sup>	37.82 <sup>56</sup>	35.935 <sup>189</sup>	65.30 <sup>38</sup>
June 8.2	16.308 <sup>126</sup>	50.99 <sup>36</sup>	18.311 <sup>180</sup>	49.27 <sup>0</sup>	35.550 <sup>121</sup>	38.24 <sup>42</sup>	35.759 <sup>176</sup>	65.37 <sup>7</sup>
18.2	16.199 <sup>108</sup>	50.88 <sup>19</sup>	18.153 <sup>158</sup>	48.93 <sup>34</sup>	35.444 <sup>106</sup>	38.54 <sup>30</sup>	35.603 <sup>156</sup>	65.10 <sup>27</sup>
28.2	16.108 <sup>91</sup>	50.90 <sup>2</sup>	18.019 <sup>134</sup>	48.26 <sup>67</sup>	35.355 <sup>89</sup>	38.68 <sup>14</sup>	35.472 <sup>131</sup>	64.52 <sup>58</sup>
July 8.1	16.041 <sup>67</sup>	50.73 <sup>17</sup>	17.916 <sup>103</sup>	47.29 <sup>97</sup>	35.288 <sup>97</sup>	38.66 <sup>2</sup>	35.367 <sup>105</sup>	63.64 <sup>88</sup>
18.1	15.996 <sup>45</sup>	50.39 <sup>24</sup>	17.844 <sup>72</sup>	46.08 <sup>126</sup>	35.245 <sup>48</sup>	38.50 <sup>16</sup>	35.294 <sup>73</sup>	62.48 <sup>116</sup>
28.1	15.977 <sup>19</sup>	49.88 <sup>51</sup>	17.806 <sup>38</sup>	44.58 <sup>150</sup>	35.223 <sup>22</sup>	38.17 <sup>33</sup>	35.252 <sup>42</sup>	61.06 <sup>142</sup>
Aug. 7.0	15.984 <sup>7</sup>	49.19 <sup>69</sup>	17.802 <sup>4</sup>	42.78 <sup>175</sup>	35.228 <sup>5</sup>	37.68 <sup>49</sup>	35.243 <sup>9</sup>	59.41 <sup>165</sup>
17.0	16.019 <sup>35</sup>	48.33 <sup>86</sup>	17.835 <sup>33</sup>	40.84 <sup>194</sup>	35.260 <sup>32</sup>	37.06 <sup>63</sup>	35.269 <sup>26</sup>	57.53 <sup>188</sup>
27.0	16.084 <sup>65</sup>	47.29 <sup>104</sup>	17.907 <sup>73</sup>	38.71 <sup>213</sup>	35.321 <sup>61</sup>	36.16 <sup>84</sup>	35.335 <sup>66</sup>	55.49 <sup>204</sup>
Sept. 6.0	16.179 <sup>95</sup>	46.07 <sup>122</sup>	18.018 <sup>111</sup>	36.46 <sup>225</sup>	35.321 <sup>90</sup>	36.16 <sup>103</sup>	35.335 <sup>101</sup>	53.28 <sup>221</sup>
15.9	16.307 <sup>128</sup>	44.69 <sup>138</sup>	18.170 <sup>152</sup>	34.09 <sup>237</sup>	35.532 <sup>121</sup>	33.97 <sup>117</sup>	35.436 <sup>142</sup>	53.28 <sup>232</sup>
25.9	16.469 <sup>162</sup>	43.16 <sup>153</sup>	18.363 <sup>193</sup>	31.65 <sup>244</sup>	35.690 <sup>158</sup>	32.59 <sup>138</sup>	35.578 <sup>182</sup>	50.96 <sup>240</sup>
Oct. 5.9	16.666 <sup>197</sup>	41.46 <sup>170</sup>	18.596 <sup>233</sup>	29.19 <sup>246</sup>	35.879 <sup>190</sup>	31.02 <sup>157</sup>	35.985 <sup>225</sup>	48.56 <sup>244</sup>
15.9	16.896 <sup>230</sup>	39.65 <sup>181</sup>	18.872 <sup>276</sup>	26.74 <sup>245</sup>	36.104 <sup>225</sup>	29.33 <sup>169</sup>	36.250 <sup>265</sup>	46.12 <sup>244</sup>
25.8	16.996 <sup>263</sup>	37.75 <sup>190</sup>	19.151 <sup>315</sup>	24.36 <sup>238</sup>	36.360 <sup>256</sup>	28.03 <sup>182</sup>	36.503 <sup>303</sup>	43.67 <sup>240</sup>
Nov. 4.8	17.159 <sup>293</sup>	35.79 <sup>196</sup>	19.388 <sup>351</sup>	22.11 <sup>225</sup>	36.646 <sup>286</sup>	27.51 <sup>183</sup>	36.563 <sup>340</sup>	41.27 <sup>226</sup>
14.8	17.452 <sup>317</sup>	33.83 <sup>196</sup>	19.538 <sup>378</sup>	20.06 <sup>205</sup>	36.846 <sup>312</sup>	25.63 <sup>194</sup>	36.893 <sup>369</sup>	39.01 <sup>211</sup>
24.7	17.769 <sup>335</sup>	31.93 <sup>190</sup>	19.716 <sup>400</sup>	18.25 <sup>181</sup>	36.958 <sup>337</sup>	23.69 <sup>194</sup>	37.262 <sup>390</sup>	36.90 <sup>186</sup>
Dec. 4.7	18.104 <sup>344</sup>	30.18 <sup>180</sup>	20.316 <sup>419</sup>	16.76 <sup>149</sup>	37.285 <sup>327</sup>	21.75 <sup>184</sup>	37.652 <sup>402</sup>	35.04 <sup>158</sup>
14.7	18.448 <sup>344</sup>	30.18 <sup>101</sup>	20.726 <sup>411</sup>	16.76 <sup>113</sup>	37.623 <sup>338</sup>	19.89 <sup>171</sup>	38.054 <sup>405</sup>	33.46 <sup>121</sup>
24.7	18.792 <sup>332</sup>	28.52 <sup>139</sup>	21.137 <sup>396</sup>	15.68 <sup>73</sup>	37.961 <sup>327</sup>	18.18 <sup>153</sup>	38.456 <sup>392</sup>	32.25 <sup>82</sup>
34.6	19.124 <sup>309</sup>	27.13 <sup>111</sup>	21.533 <sup>370</sup>	14.91 <sup>29</sup>	38.236 <sup>306</sup>	16.65 <sup>126</sup>	38.851 <sup>367</sup>	31.43 <sup>40</sup>
34.6	19.433 <sup>309</sup>	26.02 <sup>111</sup>	21.903 <sup>370</sup>	14.62 <sup>29</sup>	38.594 <sup>306</sup>	15.39 <sup>126</sup>	39.218 <sup>367</sup>	31.03 <sup>40</sup>
Mean Place	14.663	59.51	16.786	69.24	33.871	48.26	34.200	68.60
Sec δ, Tan δ	1.093	+0.441	1.374	+0.948	1.066	+0.369	1.343	+0.897
D <sub>α</sub> , D <sub>αα</sub>	+0.066	+0.026	+0.073	+0.056	+0.065	+0.022	+0.071	+0.054
D <sub>β</sub> , D <sub>ββ</sub>	-0.35	+0.45	-0.35	+0.45	-0.39	+0.44	-0.36	+0.43

# APPARENT PLACES OF STARS, 1920.

401

## FOR THE UPPER TRANSIT AT WASHINGTON.

Washington Mean Time.	$\beta^9$ H. Ursae Majoris. Mag. 4.9		$\mu$ Hydrae. Mag. 4.1		$\beta^1$ Leonis Minoris. Mag. 4.4		$\alpha$ Antiles. Mag. 4.4	
	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.
	h m 10 18	° ' " +65 57	h m 10 22	° ' " -16 25	h m 10 23	° ' " +87 6	h m 10 23	° ' " -30 30
Jan. 0.7	25.52	54.14	14.954	42.83	17.449	44.13	31.207	37.40
10.6	26.00 <sup>57</sup>	54.99 <sup>85</sup>	15.228 <sup>274</sup>	45.38 <sup>265</sup>	17.782 <sup>233</sup>	43.72 <sup>41</sup>	31.497 <sup>290</sup>	40.51 <sup>291</sup>
20.6	26.57 <sup>48</sup>	56.36 <sup>137</sup>	15.462 <sup>234</sup>	47.91 <sup>253</sup>	18.073 <sup>261</sup>	43.70 <sup>2</sup>	31.745 <sup>248</sup>	43.52 <sup>301</sup>
30.6	26.97 <sup>40</sup>	58.18 <sup>182</sup>	15.658 <sup>196</sup>	50.36 <sup>245</sup>	18.315 <sup>242</sup>	44.10 <sup>40</sup>	31.945 <sup>200</sup>	46.54 <sup>302</sup>
Feb. 9.5	27.26 <sup>29</sup>	60.89 <sup>234</sup>	15.806 <sup>148</sup>	52.68 <sup>232</sup>	18.500 <sup>185</sup>	44.66 <sup>76</sup>	32.095 <sup>150</sup>	49.51 <sup>297</sup>
19.5	27.45 <sup>19</sup>	62.88 <sup>243</sup>	15.992 <sup>96</sup>	54.81 <sup>213</sup>	18.626 <sup>126</sup>	45.94 <sup>196</sup>	32.192 <sup>97</sup>	52.34 <sup>283</sup>
29.5	27.52 <sup>7</sup>	65.58 <sup>265</sup>	15.952 <sup>89</sup>	56.70 <sup>190</sup>	18.691 <sup>64</sup>	47.26 <sup>122</sup>	32.238 <sup>46</sup>	54.97 <sup>263</sup>
Mar. 10.5	27.49 <sup>3</sup>	68.24 <sup>271</sup>	15.955 <sup>3</sup>	58.36 <sup>166</sup>	18.700 <sup>9</sup>	48.75 <sup>149</sup>	32.235 <sup>3</sup>	57.39 <sup>242</sup>
20.4	27.34 <sup>15</sup>	70.90 <sup>266</sup>	15.921 <sup>34</sup>	59.73 <sup>157</sup>	18.655 <sup>45</sup>	50.35 <sup>160</sup>	32.189 <sup>46</sup>	59.49 <sup>210</sup>
30.4	27.11 <sup>28</sup>	73.88 <sup>248</sup>	15.851 <sup>70</sup>	60.82 <sup>160</sup>	18.566 <sup>39</sup>	51.96 <sup>161</sup>	32.105 <sup>84</sup>	61.30 <sup>181</sup>
Apr. 9.4	26.81 <sup>30</sup>	75.60 <sup>282</sup>	15.755 <sup>96</sup>	61.66 <sup>84</sup>	18.441 <sup>125</sup>	53.51 <sup>155</sup>	31.995 <sup>110</sup>	62.79 <sup>149</sup>
19.4	26.44 <sup>37</sup>	77.48 <sup>188</sup>	15.640 <sup>115</sup>	62.19 <sup>86</sup>	18.289 <sup>132</sup>	54.94 <sup>145</sup>	31.860 <sup>135</sup>	63.92 <sup>113</sup>
29.3	26.04 <sup>40</sup>	78.95 <sup>147</sup>	15.511 <sup>129</sup>	62.46 <sup>37</sup>	18.119 <sup>170</sup>	56.20 <sup>126</sup>	31.711 <sup>149</sup>	64.70 <sup>78</sup>
May 9.3	25.61 <sup>48</sup>	79.96 <sup>101</sup>	15.377 <sup>134</sup>	62.48 <sup>2</sup>	17.941 <sup>128</sup>	57.22 <sup>162</sup>	31.556 <sup>155</sup>	65.12 <sup>42</sup>
19.3	25.19 <sup>48</sup>	80.49 <sup>53</sup>	15.240 <sup>137</sup>	62.25 <sup>23</sup>	17.762 <sup>179</sup>	57.98 <sup>76</sup>	31.395 <sup>161</sup>	65.19 <sup>7</sup>
29.2	24.78 <sup>43</sup>	80.52 <sup>3</sup>	15.108 <sup>182</sup>	61.78 <sup>47</sup>	17.589 <sup>173</sup>	58.47 <sup>46</sup>	31.238 <sup>157</sup>	64.88 <sup>31</sup>
June 8.2	24.37 <sup>39</sup>	80.06 <sup>46</sup>	14.985 <sup>123</sup>	61.07 <sup>71</sup>	17.430 <sup>159</sup>	58.66 <sup>19</sup>	31.066 <sup>152</sup>	64.24 <sup>64</sup>
18.2	24.01 <sup>36</sup>	79.12 <sup>94</sup>	14.872 <sup>113</sup>	60.19 <sup>88</sup>	17.287 <sup>143</sup>	58.57 <sup>9</sup>	30.945 <sup>141</sup>	63.31 <sup>93</sup>
28.2	23.69 <sup>32</sup>	77.74 <sup>126</sup>	14.776 <sup>96</sup>	59.12 <sup>107</sup>	17.166 <sup>121</sup>	58.19 <sup>28</sup>	30.820 <sup>125</sup>	62.05 <sup>126</sup>
July 8.1	23.43 <sup>26</sup>	75.94 <sup>180</sup>	14.693 <sup>88</sup>	57.90 <sup>122</sup>	17.068 <sup>122</sup>	57.53 <sup>66</sup>	30.714 <sup>106</sup>	60.54 <sup>151</sup>
18.1	23.22 <sup>21</sup>	73.78 <sup>216</sup>	14.632 <sup>61</sup>	56.57 <sup>133</sup>	16.998 <sup>90</sup>	56.61 <sup>82</sup>	30.627 <sup>87</sup>	58.84 <sup>170</sup>
28.1	23.09 <sup>18</sup>	71.80 <sup>243</sup>	14.592 <sup>40</sup>	55.17 <sup>140</sup>	16.956 <sup>42</sup>	55.44 <sup>117</sup>	30.568 <sup>59</sup>	56.96 <sup>188</sup>
Aug. 7.1	23.02 <sup>7</sup>	68.56 <sup>274</sup>	14.578 <sup>14</sup>	53.76 <sup>141</sup>	16.945 <sup>11</sup>	54.04 <sup>160</sup>	30.535 <sup>33</sup>	54.96 <sup>201</sup>
17.0	23.02 <sup>0</sup>	65.61 <sup>265</sup>	14.587 <sup>9</sup>	52.39 <sup>137</sup>	16.966 <sup>21</sup>	52.42 <sup>162</sup>	30.534 <sup>1</sup>	52.95 <sup>200</sup>
27.0	23.09 <sup>7</sup>	62.49 <sup>312</sup>	14.631 <sup>44</sup>	51.11 <sup>128</sup>	17.021 <sup>55</sup>	50.62 <sup>180</sup>	30.566 <sup>32</sup>	50.97 <sup>198</sup>
Sept. 6.0	23.24 <sup>15</sup>	59.29 <sup>320</sup>	14.705 <sup>74</sup>	49.98 <sup>113</sup>	17.111 <sup>90</sup>	48.66 <sup>196</sup>	30.636 <sup>70</sup>	49.13 <sup>184</sup>
15.9	23.46 <sup>23</sup>	56.05 <sup>324</sup>	14.810 <sup>105</sup>	49.09 <sup>89</sup>	17.239 <sup>128</sup>	46.54 <sup>212</sup>	30.744 <sup>108</sup>	47.49 <sup>164</sup>
25.9	23.76 <sup>30</sup>	52.85 <sup>320</sup>	14.953 <sup>143</sup>	48.46 <sup>63</sup>	17.405 <sup>166</sup>	44.32 <sup>222</sup>	30.895 <sup>151</sup>	46.13 <sup>136</sup>
Oct. 5.9	24.13 <sup>37</sup>	49.75 <sup>310</sup>	15.130 <sup>177</sup>	48.15 <sup>31</sup>	17.611 <sup>205</sup>	42.02 <sup>230</sup>	31.084 <sup>189</sup>	45.12 <sup>101</sup>
15.9	24.56 <sup>43</sup>	46.90 <sup>295</sup>	15.345 <sup>215</sup>	48.22 <sup>7</sup>	17.856 <sup>245</sup>	39.68 <sup>234</sup>	31.317 <sup>223</sup>	44.53 <sup>59</sup>
25.8	25.06 <sup>50</sup>	44.09 <sup>271</sup>	15.594 <sup>249</sup>	46.68 <sup>45</sup>	18.138 <sup>282</sup>	37.35 <sup>233</sup>	31.586 <sup>299</sup>	44.12 <sup>12</sup>
Nov. 4.8	25.63 <sup>57</sup>	41.68 <sup>241</sup>	15.870 <sup>276</sup>	49.53 <sup>85</sup>	18.456 <sup>318</sup>	35.08 <sup>227</sup>	31.889 <sup>303</sup>	44.78 <sup>37</sup>
14.8	26.23 <sup>60</sup>	39.65 <sup>203</sup>	16.173 <sup>302</sup>	50.79 <sup>126</sup>	18.803 <sup>347</sup>	32.94 <sup>214</sup>	32.216 <sup>327</sup>	45.64 <sup>86</sup>
24.8	26.88 <sup>66</sup>	38.05 <sup>160</sup>	16.493 <sup>320</sup>	52.42 <sup>163</sup>	19.171 <sup>368</sup>	30.99 <sup>195</sup>	32.561 <sup>345</sup>	47.02 <sup>128</sup>
Dec. 4.7	27.54 <sup>66</sup>	36.95 <sup>110</sup>	16.822 <sup>329</sup>	54.37 <sup>195</sup>	19.552 <sup>381</sup>	29.29 <sup>170</sup>	32.913 <sup>352</sup>	48.83 <sup>181</sup>
14.7	28.20 <sup>66</sup>	36.37 <sup>58</sup>	17.150 <sup>328</sup>	56.57 <sup>229</sup>	19.935 <sup>323</sup>	27.89 <sup>140</sup>	33.263 <sup>350</sup>	51.01 <sup>218</sup>
24.7	28.84 <sup>64</sup>	36.35 <sup>2</sup>	17.462 <sup>312</sup>	58.96 <sup>299</sup>	20.809 <sup>374</sup>	26.85 <sup>104</sup>	33.596 <sup>333</sup>	53.54 <sup>258</sup>
34.6	29.44 <sup>60</sup>	36.89 <sup>54</sup>	17.752 <sup>290</sup>	61.44 <sup>248</sup>	20.659 <sup>350</sup>	26.20 <sup>65</sup>	33.905 <sup>309</sup>	56.31 <sup>277</sup>
Mean Place	23.235	77.86	15.239	58.64	15.812	63.23	29.943	37.49
Sec $\delta$ , Tan $\delta$	2.455	+2.242	1.043	-0.295	1.254	+0.757	1.163	-0.593
$D_{\psi a}$ , $D_{\psi \alpha}$	+0.087	+0.135	+0.068	-0.018	+0.069	+0.046	+0.055	-0.036
$D_{\psi \delta}$ , $D_{\psi \delta}$	-0.36	+0.43	-0.36	+0.41	-0.36	+0.41	-0.36	+0.41

APPARENT PLACES OF STARS, 1920.

FOR THE UPPER TRANSIT AT WASHINGTON,

Washington Mean Time.	36 Ursae Majoris. Mag. 4.8		9 H. Draconis. Mag. 5.0		ρ Leonis. Mag. 3.8		38 Sciantis. Mag. 6.4	
	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.
	h m 10 25	° ' " +56 22	h m 10 28	° ' " +76 6	h m 10 28	° ' " + 9 42	h m 10 37	° ' " - 1 19
Jan. 0.7	33.004	65.79	23.21	67.86	37.600	55.63	21.589	21.80
10.6	33.448 <sup>444</sup>	66.19 <sup>40</sup>	24.11 <sup>90</sup>	68.95 <sup>100</sup>	37.884 <sup>284</sup>	54.00 <sup>168</sup>	21.823 <sup>284</sup>	23.87 <sup>207</sup>
20.6	33.837 <sup>390</sup>	67.08 <sup>80</sup>	24.90 <sup>70</sup>	70.59 <sup>164</sup>	38.133 <sup>240</sup>	52.59 <sup>141</sup>	22.071 <sup>248</sup>	25.81 <sup>194</sup>
30.6	34.158 <sup>321</sup>	68.44 <sup>136</sup>	25.55 <sup>65</sup>	72.70 <sup>311</sup>	38.340 <sup>202</sup>	51.44 <sup>115</sup>	22.279 <sup>208</sup>	27.56 <sup>175</sup>
Feb. 9.6	34.402 <sup>193</sup>	70.19 <sup>176</sup>	26.04 <sup>49</sup>	75.21 <sup>261</sup>	38.501 <sup>161</sup>	50.57 <sup>87</sup>	22.443 <sup>164</sup>	29.06 <sup>153</sup>
19.5	34.565 <sup>78</sup>	72.26 <sup>236</sup>	26.35 <sup>12</sup>	77.99 <sup>265</sup>	38.613 <sup>63</sup>	49.98 <sup>32</sup>	22.559 <sup>69</sup>	30.35 <sup>103</sup>
29.5	34.643 <sup>4</sup>	74.54 <sup>238</sup>	26.47 <sup>7</sup>	80.94 <sup>290</sup>	38.676 <sup>17</sup>	49.06 <sup>9</sup>	22.628 <sup>25</sup>	31.38 <sup>76</sup>
Mar. 10.5	34.639 <sup>80</sup>	76.92 <sup>240</sup>	26.40 <sup>28</sup>	83.93 <sup>291</sup>	38.693 <sup>28</sup>	49.57 <sup>13</sup>	22.653 <sup>16</sup>	32.14 <sup>53</sup>
20.4	34.559 <sup>147</sup>	79.32 <sup>231</sup>	26.17 <sup>39</sup>	86.84 <sup>241</sup>	38.670 <sup>59</sup>	49.70 <sup>31</sup>	22.637 <sup>49</sup>	32.67 <sup>29</sup>
30.4	34.412 <sup>201</sup>	81.63 <sup>211</sup>	25.78 <sup>54</sup>	89.55 <sup>202</sup>	38.611 <sup>88</sup>	50.01 <sup>44</sup>	22.588 <sup>78</sup>	32.96 <sup>10</sup>
Apr. 9.4	34.211 <sup>243</sup>	83.74 <sup>183</sup>	25.24 <sup>68</sup>	91.96 <sup>156</sup>	38.525 <sup>107</sup>	50.45 <sup>54</sup>	22.510 <sup>98</sup>	33.06 <sup>8</sup>
19.4	33.966 <sup>273</sup>	85.59 <sup>151</sup>	24.61 <sup>71</sup>	93.98 <sup>105</sup>	38.418 <sup>121</sup>	50.39 <sup>59</sup>	22.412 <sup>112</sup>	32.98 <sup>24</sup>
29.3	33.693 <sup>290</sup>	87.10 <sup>112</sup>	23.90 <sup>77</sup>	95.54 <sup>52</sup>	38.297 <sup>127</sup>	51.58 <sup>68</sup>	22.300 <sup>121</sup>	32.74 <sup>38</sup>
May 9.3	33.403 <sup>288</sup>	88.22 <sup>27</sup>	23.13 <sup>78</sup>	96.59 <sup>78</sup>	38.170 <sup>123</sup>	52.21 <sup>68</sup>	22.179 <sup>123</sup>	32.96 <sup>48</sup>
19.3	33.109 <sup>271</sup>	88.93 <sup>16</sup>	22.35 <sup>75</sup>	97.11 <sup>57</sup>	38.042 <sup>108</sup>	52.85 <sup>68</sup>	22.056 <sup>119</sup>	31.88 <sup>57</sup>
29.3	32.821 <sup>246</sup>	89.20 <sup>60</sup>	21.57 <sup>70</sup>	97.07 <sup>110</sup>	37.919 <sup>168</sup>	53.48 <sup>54</sup>	21.987 <sup>104</sup>	31.31 <sup>72</sup>
June 8.2	32.550 <sup>216</sup>	89.04 <sup>101</sup>	20.82 <sup>63</sup>	96.50 <sup>158</sup>	37.805 <sup>87</sup>	54.07 <sup>49</sup>	21.824 <sup>95</sup>	30.67 <sup>64</sup>
18.2	32.304 <sup>178</sup>	88.44 <sup>174</sup>	20.12 <sup>60</sup>	95.40 <sup>206</sup>	37.702 <sup>30</sup>	54.61 <sup>32</sup>	21.720 <sup>20</sup>	29.95 <sup>74</sup>
28.2	32.068 <sup>139</sup>	87.43 <sup>206</sup>	19.49 <sup>44</sup>	93.82 <sup>248</sup>	37.615 <sup>62</sup>	55.10 <sup>33</sup>	21.628 <sup>60</sup>	29.21 <sup>75</sup>
July 8.1	31.910 <sup>94</sup>	86.05 <sup>233</sup>	18.96 <sup>33</sup>	91.79 <sup>277</sup>	37.545 <sup>8</sup>	55.51 <sup>10</sup>	21.553 <sup>18</sup>	28.45 <sup>66</sup>
18.1	31.771 <sup>46</sup>	84.31 <sup>286</sup>	18.52 <sup>22</sup>	89.36 <sup>306</sup>	37.493 <sup>17</sup>	55.83 <sup>5</sup>	21.493 <sup>5</sup>	27.70 <sup>56</sup>
28.1	31.677 <sup>8</sup>	82.25 <sup>256</sup>	18.19 <sup>4</sup>	86.59 <sup>341</sup>	37.463 <sup>43</sup>	56.03 <sup>22</sup>	21.453 <sup>32</sup>	26.99 <sup>42</sup>
Aug. 7.1	31.681 <sup>54</sup>	79.92 <sup>287</sup>	17.97 <sup>17</sup>	83.53 <sup>351</sup>	37.455 <sup>78</sup>	56.18 <sup>40</sup>	21.435 <sup>61</sup>	26.33 <sup>25</sup>
17.0	31.634 <sup>160</sup>	77.36 <sup>298</sup>	17.89 <sup>30</sup>	80.27 <sup>345</sup>	37.472 <sup>136</sup>	56.08 <sup>82</sup>	21.440 <sup>124</sup>	25.77 <sup>21</sup>
27.0	31.688 <sup>271</sup>	74.62 <sup>285</sup>	17.93 <sup>55</sup>	76.86 <sup>333</sup>	37.515 <sup>170</sup>	55.86 <sup>105</sup>	21.472 <sup>161</sup>	25.35 <sup>47</sup>
Sept. 6.0	31.795 <sup>325</sup>	71.75 <sup>270</sup>	18.10 <sup>78</sup>	78.35 <sup>285</sup>	37.588 <sup>206</sup>	55.46 <sup>148</sup>	21.533 <sup>229</sup>	25.10 <sup>77</sup>
16.0	31.955 <sup>377</sup>	68.80 <sup>285</sup>	18.40 <sup>30</sup>	69.84 <sup>351</sup>	37.691 <sup>108</sup>	54.85 <sup>61</sup>	21.625 <sup>92</sup>	25.06 <sup>4</sup>
25.9	32.172 <sup>217</sup>	65.82 <sup>298</sup>	18.82 <sup>49</sup>	66.39 <sup>345</sup>	37.827 <sup>136</sup>	54.03 <sup>82</sup>	21.749 <sup>124</sup>	25.27 <sup>21</sup>
Oct. 5.9	32.443 <sup>271</sup>	62.87 <sup>285</sup>	19.37 <sup>55</sup>	63.07 <sup>333</sup>	37.997 <sup>170</sup>	52.98 <sup>105</sup>	21.910 <sup>161</sup>	25.74 <sup>47</sup>
15.9	32.768 <sup>325</sup>	60.01 <sup>286</sup>	20.04 <sup>67</sup>	59.96 <sup>311</sup>	38.202 <sup>206</sup>	51.70 <sup>128</sup>	22.106 <sup>196</sup>	26.51 <sup>77</sup>
25.8	33.145 <sup>377</sup>	57.31 <sup>270</sup>	20.82 <sup>78</sup>	57.11 <sup>285</sup>	38.438 <sup>206</sup>	50.22 <sup>148</sup>	22.335 <sup>229</sup>	27.57 <sup>106</sup>
Nov. 4.8	33.567 <sup>422</sup>	54.83 <sup>248</sup>	21.70 <sup>88</sup>	54.63 <sup>248</sup>	38.707 <sup>209</sup>	48.54 <sup>166</sup>	22.596 <sup>261</sup>	28.90 <sup>133</sup>
14.8	34.029 <sup>491</sup>	52.66 <sup>217</sup>	22.65 <sup>95</sup>	52.58 <sup>205</sup>	39.000 <sup>203</sup>	46.72 <sup>162</sup>	22.883 <sup>237</sup>	30.51 <sup>161</sup>
24.8	34.520 <sup>462</sup>	50.84 <sup>182</sup>	23.67 <sup>102</sup>	51.01 <sup>157</sup>	39.314 <sup>314</sup>	44.79 <sup>183</sup>	23.192 <sup>309</sup>	32.32 <sup>181</sup>
Dec. 4.7	35.028 <sup>508</sup>	49.43 <sup>141</sup>	24.72 <sup>105</sup>	49.99 <sup>102</sup>	39.638 <sup>324</sup>	42.61 <sup>196</sup>	23.511 <sup>319</sup>	34.30 <sup>198</sup>
14.7	35.539 <sup>511</sup>	48.50 <sup>98</sup>	25.77 <sup>105</sup>	49.55 <sup>44</sup>	39.964 <sup>336</sup>	40.85 <sup>196</sup>	23.833 <sup>322</sup>	36.40 <sup>210</sup>
24.7	36.037 <sup>498</sup>	48.08 <sup>42</sup>	26.79 <sup>102</sup>	49.70 <sup>15</sup>	40.281 <sup>317</sup>	38.98 <sup>187</sup>	24.148 <sup>315</sup>	38.53 <sup>213</sup>
34.7	36.507 <sup>470</sup>	48.17 <sup>9</sup>	27.76 <sup>97</sup>	50.45 <sup>75</sup>	40.579 <sup>286</sup>	37.24 <sup>174</sup>	24.443 <sup>295</sup>	40.62 <sup>209</sup>
Mean Place	31.148	88.55	20.275	92.64	36.043	67.51	19.992	13.38
Sec δ, Tan δ	1.806	+1.504	4.169	+4.047	1.015	+0.171	1.000	-0.023
D <sub>ψa</sub> , D <sub>ωa</sub>	+0.077	+0.092	+0.103	+0.249	+0.063	+0.010	+0.061	-0.001
D <sub>ψδ</sub> , D <sub>ωδ</sub>	-0.36	+0.40	-0.37	+0.39	-0.37	+0.39	-0.37	+0.35

FOR THE UPPER TRANSIT AT WASHINGTON.

Washington Mean Time.	41 Leonis Minoris. Mag. 5.0		θ Argus. Mag. 3.0		42 Leonis Minoris. Mag. 5.4		γ Argus. Var. 1.6-6.6	
	Right Ascension.	Declination.	Right Ascension.	Declination.	Right Ascension.	Declination.	Right Ascension.	Declination.
	h m	° ' "	h m	° ' "	h m	° ' "	h m	° ' "
	10 30	+23 35	10 40	-63 58	10 41	+31 5	10 41	-59 15
	s	" "	s	" "	s	" "	s	" "
Jan. 0.7	5.658	71.70	8.78	24.25	26.713	56.74	59.773	41.94
10.6	5.965 <sup>307</sup>	70.59	9.26 <sup>48</sup>	27.27 <sup>302</sup>	27.039 <sup>326</sup>	55.93 <sup>81</sup>	60.202 <sup>429</sup>	44.94 <sup>300</sup>
20.6	6.238 <sup>278</sup>	69.82	9.67 <sup>41</sup>	30.61 <sup>334</sup>	27.329 <sup>290</sup>	55.50 <sup>43</sup>	60.571 <sup>369</sup>	48.28 <sup>334</sup>
30.6	6.468 <sup>281</sup>	69.39	10.00 <sup>33</sup>	34.23 <sup>362</sup>	27.574 <sup>245</sup>	55.46 <sup>4</sup>	60.870 <sup>299</sup>	51.86 <sup>358</sup>
Feb. 9.6	6.651 <sup>182</sup>	69.31	10.23 <sup>28</sup>	37.98 <sup>375</sup>	27.769 <sup>185</sup>	55.81 <sup>35</sup>	61.069 <sup>219</sup>	55.55 <sup>369</sup>
	181	24	15	352		68	144	373
19.5	6.782 <sup>78</sup>	69.55	10.38	41.80	27.908	56.49	61.233	59.28
29.5	6.860 <sup>29</sup>	70.07	10.44	45.56 <sup>375</sup>	27.993 <sup>85</sup>	57.45 <sup>96</sup>	61.297 <sup>64</sup>	62.96 <sup>368</sup>
Mar. 10.5	6.889 <sup>17</sup>	70.83	10.41	49.21 <sup>385</sup>	28.024 <sup>31</sup>	58.64 <sup>119</sup>	61.288 <sup>9</sup>	66.50 <sup>354</sup>
20.4	6.872 <sup>17</sup>	71.76	10.31	52.65 <sup>344</sup>	28.005 <sup>19</sup>	59.98 <sup>134</sup>	61.208 <sup>80</sup>	69.82 <sup>332</sup>
30.4	6.815 <sup>87</sup>	72.80	10.13	55.83 <sup>318</sup>	27.944 <sup>61</sup>	61.39 <sup>141</sup>	61.070 <sup>138</sup>	72.87 <sup>305</sup>
	86	110	28	283		143	192	270
Apr. 9.4	6.727	73.80	9.90	58.65	27.848	62.82	60.878	75.57
19.4	6.613 <sup>114</sup>	75.00	9.61 <sup>29</sup>	61.09 <sup>244</sup>	27.724 <sup>124</sup>	64.18 <sup>136</sup>	60.641 <sup>237</sup>	77.90 <sup>233</sup>
29.3	6.484 <sup>129</sup>	76.05	9.28 <sup>33</sup>	63.10 <sup>201</sup>	27.582 <sup>142</sup>	65.43 <sup>125</sup>	60.372 <sup>209</sup>	79.77 <sup>187</sup>
May 9.3	6.345 <sup>189</sup>	77.00	8.92 <sup>36</sup>	64.62 <sup>152</sup>	27.429 <sup>158</sup>	66.51 <sup>108</sup>	60.076 <sup>296</sup>	81.20 <sup>143</sup>
19.3	6.203 <sup>142</sup>	77.83	8.54 <sup>38</sup>	65.67 <sup>105</sup>	27.272 <sup>187</sup>	67.41 <sup>90</sup>	59.763 <sup>318</sup>	82.14 <sup>94</sup>
	138	66	39	58		66	322	44
29.3	6.065	78.49	8.15	66.20	27.118	68.07	59.441	82.58
June 8.2	5.934 <sup>181</sup>	78.99	7.76 <sup>39</sup>	66.20 <sup>0</sup>	26.972 <sup>146</sup>	68.50 <sup>43</sup>	59.121 <sup>320</sup>	82.53 <sup>5</sup>
18.2	5.816 <sup>118</sup>	79.30	7.38 <sup>38</sup>	65.68 <sup>52</sup>	26.838 <sup>134</sup>	68.67 <sup>17</sup>	58.809 <sup>312</sup>	81.95 <sup>58</sup>
28.2	5.712 <sup>104</sup>	79.43	7.02 <sup>36</sup>	64.67 <sup>101</sup>	26.721 <sup>117</sup>	68.60 <sup>7</sup>	58.514 <sup>296</sup>	80.91 <sup>104</sup>
July 8.1	5.626 <sup>86</sup>	79.37	6.68 <sup>34</sup>	63.18 <sup>149</sup>	26.623 <sup>96</sup>	68.26 <sup>34</sup>	58.241 <sup>273</sup>	79.41 <sup>150</sup>
	66	27	29	192		57	239	191
18.1	5.500 <sup>44</sup>	79.10	6.39 <sup>25</sup>	61.26	26.547 <sup>54</sup>	67.69	58.002 <sup>200</sup>	77.50
28.1	5.516 <sup>19</sup>	78.65	6.14 <sup>18</sup>	58.98 <sup>228</sup>	26.493 <sup>37</sup>	68.87 <sup>82</sup>	57.802 <sup>151</sup>	75.22 <sup>228</sup>
Aug. 7.1	5.497 <sup>6</sup>	77.99	5.96 <sup>12</sup>	56.38 <sup>280</sup>	26.466 <sup>27</sup>	68.82 <sup>105</sup>	57.651 <sup>94</sup>	72.68 <sup>254</sup>
17.0	5.503 <sup>35</sup>	77.15	5.84 <sup>5</sup>	53.57 <sup>281</sup>	26.468 <sup>2</sup>	64.55 <sup>127</sup>	57.557 <sup>22</sup>	69.92 <sup>284</sup>
27.0	5.588 <sup>66</sup>	76.11	5.79 <sup>4</sup>	50.63 <sup>295</sup>	26.500 <sup>65</sup>	63.08 <sup>167</sup>	57.525 <sup>37</sup>	67.08 <sup>286</sup>
Sept. 6.0	5.604	74.87	5.83	47.68	26.565	61.41	57.562	64.22
16.0	5.701 <sup>97</sup>	73.45	5.95 <sup>12</sup>	44.81 <sup>287</sup>	26.665 <sup>100</sup>	59.57 <sup>184</sup>	57.669 <sup>107</sup>	61.47 <sup>275</sup>
25.9	5.894 <sup>183</sup>	71.84	6.16 <sup>21</sup>	42.14 <sup>267</sup>	26.802 <sup>137</sup>	57.58 <sup>199</sup>	57.854 <sup>185</sup>	58.93 <sup>254</sup>
Oct. 5.9	6.003 <sup>169</sup>	70.08	6.45 <sup>29</sup>	39.79 <sup>235</sup>	26.977 <sup>175</sup>	55.45 <sup>213</sup>	58.110 <sup>256</sup>	56.69 <sup>224</sup>
15.9	6.209 <sup>205</sup>	68.17	6.82 <sup>37</sup>	37.85 <sup>194</sup>	27.191 <sup>214</sup>	53.23 <sup>222</sup>	58.438 <sup>328</sup>	54.88 <sup>181</sup>
	241	201	45	143		227	391	132
25.8	6.450	66.16	7.27	36.42	27.443	50.96	58.829	53.56
Nov. 4.8	6.724 <sup>274</sup>	64.08	7.78 <sup>51</sup>	35.55 <sup>87</sup>	27.730 <sup>287</sup>	48.68 <sup>228</sup>	59.274 <sup>445</sup>	52.83 <sup>73</sup>
14.8	7.029 <sup>305</sup>	61.97	8.34 <sup>56</sup>	35.30 <sup>25</sup>	28.049 <sup>319</sup>	46.46 <sup>222</sup>	59.765 <sup>491</sup>	52.68 <sup>15</sup>
24.8	7.356 <sup>327</sup>	59.91	8.93 <sup>59</sup>	35.70 <sup>40</sup>	28.392 <sup>348</sup>	44.36 <sup>210</sup>	60.283 <sup>518</sup>	53.17 <sup>49</sup>
Dec. 4.7	7.697 <sup>341</sup>	57.94	9.53 <sup>60</sup>	36.74 <sup>104</sup>	28.751 <sup>359</sup>	42.43 <sup>193</sup>	60.813 <sup>530</sup>	54.29 <sup>112</sup>
	346	179	59	166		167	522	173
14.7	8.043	56.15	10.12	38.40	29.115	40.76	61.335	56.02
24.7	8.382 <sup>339</sup>	54.59	10.68 <sup>56</sup>	40.62 <sup>222</sup>	29.473 <sup>358</sup>	39.38 <sup>138</sup>	61.836 <sup>501</sup>	58.28 <sup>226</sup>
34.7	8.705 <sup>323</sup>	53.31	11.19	43.34 <sup>272</sup>	29.814 <sup>341</sup>	38.35 <sup>103</sup>	62.293 <sup>457</sup>	61.03 <sup>275</sup>
Mean Place	4.175	87.53	5.888	32.30	25.239	74.58	57.199	49.28
Sec δ, Tan δ	1.091	+0.437	2.230	-2.048	1.168	+0.603	1.957	-1.682
D <sub>v</sub> α, D <sub>ω</sub> α	+0.065	+0.027	+0.043	-0.128	+0.067	+0.038	+0.046	-0.106
D <sub>v</sub> δ, D <sub>ω</sub> δ	-0.37	+0.35	-0.37	+0.34	-0.37	+0.34	-0.38	+0.36

APPARENT PLACES OF STARS, 1920.

FOR THE UPPER TRANSIT AT WASHINGTON.

Washington Mean Time.	$\mu$ Argus. Mag. 2.3		$\zeta^2$ Chamaeleontis. Mag. 4.6		$\zeta$ Leo <sup>is</sup> . Mag. 5.3		$\nu$ Hydras. Mag. 3.3	
	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.
	h m 10 43	° ' " -48 59	h m 10 44	° ' " -80 6	h m 10 45	° ' " +10 57	h m 10 45	° ' " -15 46
Jan. 0.7	21.628	45.64	68.87	55.32	4.717	55.50	42.165	31.75
10.6	21.991 <sup>363</sup>	48.64 <sup>300</sup>	69.94 <sup>107</sup>	58.07 <sup>275</sup>	5.010 <sup>293</sup>	53.86 <sup>164</sup>	42.455 <sup>390</sup>	34.23 <sup>245</sup>
20.6	22.305 <sup>814</sup>	51.91 <sup>327</sup>	70.85 <sup>91</sup>	61.26 <sup>319</sup>	5.273 <sup>263</sup>	52.46 <sup>140</sup>	42.711 <sup>256</sup>	36.71 <sup>245</sup>
30.6	22.561 <sup>256</sup>	55.33 <sup>343</sup>	71.56 <sup>71</sup>	64.77 <sup>351</sup>	5.494 <sup>221</sup>	51.34 <sup>113</sup>	42.926 <sup>215</sup>	39.12 <sup>241</sup>
Feb. 9.6	22.757 <sup>196</sup>	58.85 <sup>353</sup>	72.08 <sup>53</sup>	68.51 <sup>374</sup>	5.671 <sup>177</sup>	50.50 <sup>64</sup>	43.006 <sup>170</sup>	41.40 <sup>228</sup>
19.5	22.888	62.35	72.37	72.39	5.799 <sup>128</sup>	49.96 <sup>54</sup>	43.006 <sup>123</sup>	41.40 <sup>209</sup>
29.5	22.965	65.74	72.45	76.31	5.799 <sup>82</sup>	49.96 <sup>25</sup>	43.219 <sup>76</sup>	43.49
Mar. 10.5	22.964 <sup>9</sup>	68.96 <sup>323</sup>	72.32 <sup>13</sup>	80.18 <sup>367</sup>	5.881 <sup>33</sup>	49.71 <sup>3</sup>	43.295 <sup>30</sup>	45.36 <sup>187</sup>
20.5	22.917 <sup>47</sup>	71.95 <sup>299</sup>	72.00 <sup>23</sup>	83.87 <sup>369</sup>	5.914 <sup>6</sup>	49.68 <sup>30</sup>	43.325 <sup>11</sup>	46.98 <sup>162</sup>
30.4	22.823 <sup>136</sup>	74.65 <sup>285</sup>	71.50 <sup>50</sup>	87.39 <sup>352</sup>	5.908 <sup>45</sup>	49.88 <sup>40</sup>	43.314 <sup>45</sup>	48.36 <sup>138</sup>
Apr. 9.4	22.687	77.00	70.84	90.62	5.893 <sup>72</sup>	50.28 <sup>53</sup>	43.289 <sup>74</sup>	49.45 <sup>109</sup>
19.4	22.518 <sup>169</sup>	78.98 <sup>198</sup>	70.04 <sup>80</sup>	93.49 <sup>267</sup>	5.791	59.80	43.195	50.28
29.3	22.324	80.56	69.12	95.95	5.694 <sup>97</sup>	51.43 <sup>63</sup>	43.099 <sup>96</sup>	50.84 <sup>56</sup>
May 9.3	22.112 <sup>213</sup>	81.68 <sup>113</sup>	68.11 <sup>101</sup>	97.94 <sup>199</sup>	5.582 <sup>112</sup>	52.11 <sup>68</sup>	42.986 <sup>113</sup>	51.15 <sup>31</sup>
19.3	21.887 <sup>226</sup>	82.37 <sup>69</sup>	67.02 <sup>109</sup>	99.42 <sup>148</sup>	5.463 <sup>119</sup>	52.82 <sup>71</sup>	42.864 <sup>122</sup>	51.22 <sup>7</sup>
29.3	21.659 <sup>226</sup>	82.37 <sup>23</sup>	65.88	100.38	5.338 <sup>123</sup>	53.51 <sup>69</sup>	42.737 <sup>126</sup>	51.05 <sup>17</sup>
June 8.2	21.432 <sup>227</sup>	82.37 <sup>23</sup>	64.73 <sup>115</sup>	100.79 <sup>41</sup>	5.216	54.17	42.611	50.66
18.2	21.212 <sup>220</sup>	81.69 <sup>68</sup>	63.60 <sup>113</sup>	100.64 <sup>15</sup>	5.099 <sup>117</sup>	54.79 <sup>62</sup>	42.489 <sup>122</sup>	50.05 <sup>61</sup>
28.2	21.006	80.59 <sup>110</sup>	62.51 <sup>109</sup>	99.95	4.991 <sup>108</sup>	55.35 <sup>55</sup>	42.376 <sup>113</sup>	49.25 <sup>80</sup>
July 8.2	20.818 <sup>188</sup>	79.07 <sup>184</sup>	61.49 <sup>102</sup>	98.74 <sup>121</sup>	4.897 <sup>94</sup>	55.82 <sup>47</sup>	42.272 <sup>94</sup>	48.29 <sup>96</sup>
18.1	20.654 <sup>133</sup>	77.23	60.57	97.08	4.815 <sup>63</sup>	56.21 <sup>39</sup>	42.181 <sup>73</sup>	47.18 <sup>111</sup>
28.1	20.521 <sup>99</sup>	75.07 <sup>216</sup>	59.77 <sup>80</sup>	94.87 <sup>216</sup>	4.752 <sup>43</sup>	56.49 <sup>16</sup>	42.108	45.96
Aug. 7.1	20.422 <sup>56</sup>	72.68 <sup>230</sup>	59.15 <sup>60</sup>	92.34 <sup>263</sup>	4.709 <sup>24</sup>	56.65	42.062	44.66
17.0	20.366 <sup>10</sup>	70.15 <sup>253</sup>	58.69 <sup>46</sup>	89.52 <sup>292</sup>	4.685 <sup>8</sup>	56.66	42.019	43.34
27.0	20.356 <sup>41</sup>	67.55 <sup>280</sup>	58.45 <sup>24</sup>	86.49 <sup>303</sup>	4.688 <sup>3</sup>	56.52 <sup>14</sup>	42.009	42.05
Sept. 6.0	20.397	64.98	58.41	83.37	4.714 <sup>26</sup>	56.23 <sup>39</sup>	42.028	40.83
16.0	20.491 <sup>94</sup>	62.54 <sup>244</sup>	58.61 <sup>20</sup>	80.28 <sup>309</sup>	4.714 <sup>57</sup>	56.23 <sup>39</sup>	42.028	40.83
25.9	20.643 <sup>152</sup>	60.33 <sup>221</sup>	59.03 <sup>42</sup>	77.31 <sup>267</sup>	4.771 <sup>86</sup>	55.73	42.077	39.75
Oct. 5.9	20.853 <sup>210</sup>	58.45 <sup>188</sup>	59.68 <sup>65</sup>	74.61 <sup>270</sup>	4.857 <sup>86</sup>	55.03 <sup>70</sup>	42.160	38.87
15.9	21.118 <sup>317</sup>	56.99 <sup>146</sup>	60.53 <sup>85</sup>	72.25 <sup>236</sup>	4.979 <sup>123</sup>	54.11 <sup>92</sup>	42.280	38.24
25.9	21.435 <sup>361</sup>	56.02 <sup>43</sup>	61.57	70.36	5.135 <sup>156</sup>	52.98 <sup>113</sup>	42.437	37.91
Nov. 4.8	21.796 <sup>399</sup>	55.59 <sup>16</sup>	62.76 <sup>119</sup>	69.04 <sup>132</sup>	5.327 <sup>192</sup>	51.62 <sup>136</sup>	42.632	37.93
14.8	22.195 <sup>421</sup>	55.75 <sup>16</sup>	64.07 <sup>131</sup>	68.33 <sup>71</sup>	5.327 <sup>226</sup>	51.62 <sup>157</sup>	42.632	37.93
24.8	22.616 <sup>435</sup>	56.49 <sup>74</sup>	65.43 <sup>136</sup>	68.26 <sup>59</sup>	4.771 <sup>86</sup>	55.03 <sup>70</sup>	42.160	38.87
Dec. 4.7	23.061 <sup>430</sup>	57.83 <sup>187</sup>	66.81 <sup>137</sup>	68.85 <sup>124</sup>	4.979 <sup>123</sup>	54.11 <sup>92</sup>	42.280	38.24
14.7	23.481 <sup>415</sup>	59.70	68.18	70.09	5.135 <sup>156</sup>	52.98 <sup>113</sup>	42.437	37.91
24.7	23.896 <sup>386</sup>	62.05 <sup>235</sup>	69.45 <sup>127</sup>	71.95 <sup>241</sup>	5.327 <sup>226</sup>	51.62 <sup>157</sup>	42.632	37.93
34.7	24.282	64.83 <sup>278</sup>	70.60	74.36	4.771 <sup>86</sup>	55.03 <sup>70</sup>	42.160	38.87
Mean Place	19.481	50.97	62.788	65.60	4.771	55.03	42.160	38.87
Sec $\delta$ , Tan $\delta$	1.524	-1.150	5.830	-5.744	4.979	54.11	42.280	38.24
$D_{\mu\alpha}$ , $D_{\mu\delta}$	+0.051	-0.072	+0.012	-0.363	5.135	52.98	42.437	37.91
$D_{\delta\delta}$ , $D_{\delta\alpha}$	-0.38	+0.33	-0.38	+0.32	5.327	51.62	42.632	37.93

# APPARENT PLACES OF STARS, 1920.

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## FOR THE UPPER TRANSIT AT WASHINGTON.

Washington Mean Time.	43 Leonis Minors. Mag. 3.9		54 Leonis. Mag. 4.5		Antlia. Mag. 4.7		Greenbridge 1706. Mag. 6.3	
	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.
	h m 10 48	+84 38	h m 10 51	+25 10	h m 10 52	-36 42	h m 10 53	+78 11
Jan. 0.7	51.984	28.84	18.478	20.15	61.314	24.17	38.25	31.33
10.6	52.324 <sup>340</sup>	28.11 <sup>78</sup>	18.795 <sup>817</sup>	19.03 <sup>112</sup>	61.641 <sup>337</sup>	27.01 <sup>294</sup>	39.34 <sup>100</sup>	32.16 <sup>83</sup>
20.6	52.623 <sup>306</sup>	27.80 <sup>31</sup>	19.079 <sup>284</sup>	18.37 <sup>76</sup>	61.929 <sup>268</sup>	30.04 <sup>303</sup>	40.32 <sup>96</sup>	33.58 <sup>142</sup>
30.6	52.889 <sup>209</sup>	27.90 <sup>10</sup>	19.322 <sup>263</sup>	17.86 <sup>41</sup>	62.170 <sup>241</sup>	33.16 <sup>312</sup>	41.16 <sup>84</sup>	35.52 <sup>194</sup>
Feb. 9.6	53.098 <sup>209</sup>	28.29 <sup>49</sup>	19.517 <sup>105</sup>	17.83 <sup>3</sup>	62.360 <sup>190</sup>	36.30 <sup>314</sup>	41.81 <sup>45</sup>	37.91 <sup>239</sup>
19.5	53.251 <sup>158</sup>	29.25 <sup>86</sup>	19.662 <sup>145</sup>	18.14 <sup>31</sup>	62.496 <sup>196</sup>	39.36 <sup>306</sup>	42.27 <sup>46</sup>	40.64 <sup>273</sup>
29.5	53.346 <sup>95</sup>	30.40 <sup>115</sup>	19.754 <sup>92</sup>	18.74 <sup>69</sup>	62.579 <sup>83</sup>	42.29 <sup>298</sup>	42.51 <sup>24</sup>	43.59 <sup>295</sup>
Mar. 10.5	53.386 <sup>40</sup>	31.77 <sup>137</sup>	19.796 <sup>42</sup>	19.59 <sup>85</sup>	62.610 <sup>31</sup>	45.63 <sup>274</sup>	42.55 <sup>4</sup>	46.65 <sup>306</sup>
20.5	53.374 <sup>12</sup>	33.29 <sup>152</sup>	19.792 <sup>4</sup>	20.61 <sup>102</sup>	62.595 <sup>15</sup>	47.52 <sup>240</sup>	42.37 <sup>18</sup>	49.67 <sup>302</sup>
30.4	53.316 <sup>58</sup>	34.89 <sup>160</sup>	19.745 <sup>47</sup>	21.77 <sup>116</sup>	62.589 <sup>56</sup>	49.72 <sup>230</sup>	42.01 <sup>36</sup>	52.56 <sup>289</sup>
Apr. 9.4	53.221 <sup>95</sup>	36.48 <sup>159</sup>	19.666 <sup>79</sup>	22.98 <sup>121</sup>	62.449 <sup>90</sup>	51.62 <sup>190</sup>	41.47 <sup>54</sup>	55.18 <sup>262</sup>
19.4	53.095 <sup>128</sup>	37.99 <sup>161</sup>	19.560 <sup>106</sup>	24.19 <sup>124</sup>	62.331 <sup>118</sup>	53.16 <sup>184</sup>	41.47 <sup>68</sup>	57.46 <sup>228</sup>
29.3	52.950 <sup>145</sup>	39.37 <sup>132</sup>	19.435 <sup>125</sup>	25.34 <sup>115</sup>	62.192 <sup>139</sup>	54.35 <sup>119</sup>	40.00 <sup>79</sup>	59.30 <sup>184</sup>
May 9.3	52.791 <sup>159</sup>	40.55 <sup>118</sup>	19.299 <sup>136</sup>	26.38 <sup>104</sup>	62.038 <sup>154</sup>	55.16 <sup>81</sup>	39.12 <sup>88</sup>	60.65 <sup>135</sup>
19.3	52.625 <sup>166</sup>	41.52 <sup>97</sup>	19.159 <sup>140</sup>	27.29 <sup>91</sup>	61.874 <sup>164</sup>	55.60 <sup>44</sup>	38.20 <sup>92</sup>	61.47 <sup>82</sup>
29.3	52.462 <sup>168</sup>	42.22 <sup>70</sup>	19.019 <sup>140</sup>	28.03 <sup>74</sup>	61.707 <sup>167</sup>	55.85 <sup>5</sup>	37.27 <sup>93</sup>	61.74 <sup>27</sup>
June 8.2	52.306 <sup>156</sup>	42.65 <sup>43</sup>	18.884 <sup>135</sup>	28.58 <sup>55</sup>	61.541 <sup>166</sup>	56.32 <sup>23</sup>	36.34 <sup>98</sup>	61.44 <sup>30</sup>
18.2	52.161 <sup>145</sup>	42.79 <sup>14</sup>	18.759 <sup>135</sup>	28.94 <sup>26</sup>	61.381 <sup>160</sup>	54.62 <sup>70</sup>	35.46 <sup>88</sup>	60.62 <sup>32</sup>
28.2	52.032 <sup>129</sup>	42.64 <sup>15</sup>	18.648 <sup>111</sup>	29.67 <sup>13</sup>	61.280 <sup>151</sup>	53.58 <sup>104</sup>	34.64 <sup>82</sup>	59.27 <sup>135</sup>
July 8.2	51.921 <sup>111</sup>	42.22 <sup>42</sup>	18.552 <sup>96</sup>	29.00 <sup>7</sup>	61.093 <sup>137</sup>	52.23 <sup>135</sup>	33.92 <sup>72</sup>	57.44 <sup>133</sup>
18.1	51.833 <sup>88</sup>	41.51 <sup>71</sup>	18.476 <sup>78</sup>	28.71 <sup>29</sup>	60.974 <sup>119</sup>	50.59 <sup>194</sup>	33.92 <sup>62</sup>	55.16 <sup>228</sup>
28.1	51.769 <sup>64</sup>	40.55 <sup>96</sup>	18.420 <sup>56</sup>	28.21 <sup>50</sup>	60.877 <sup>97</sup>	48.73 <sup>186</sup>	32.79 <sup>51</sup>	52.50 <sup>266</sup>
Aug. 7.1	51.733 <sup>36</sup>	39.83 <sup>122</sup>	18.388 <sup>82</sup>	27.49 <sup>72</sup>	60.806 <sup>71</sup>	46.70 <sup>203</sup>	32.41 <sup>38</sup>	49.52 <sup>298</sup>
17.0	51.724 <sup>9</sup>	37.87 <sup>146</sup>	18.381 <sup>7</sup>	26.57 <sup>92</sup>	60.768 <sup>40</sup>	44.56 <sup>214</sup>	32.17 <sup>24</sup>	46.28 <sup>324</sup>
27.0	51.747 <sup>23</sup>	36.20 <sup>167</sup>	18.403 <sup>22</sup>	25.43 <sup>114</sup>	60.761 <sup>5</sup>	42.40 <sup>216</sup>	32.08 <sup>9</sup>	42.85 <sup>343</sup>
Sept. 6.0	51.804 <sup>57</sup>	34.83 <sup>197</sup>	18.455 <sup>52</sup>	24.10 <sup>133</sup>	60.761 <sup>36</sup>	40.32 <sup>206</sup>	32.08 <sup>5</sup>	42.85 <sup>358</sup>
16.0	51.897 <sup>92</sup>	32.28 <sup>206</sup>	18.540 <sup>85</sup>	22.55 <sup>155</sup>	60.797 <sup>77</sup>	40.32 <sup>194</sup>	32.13 <sup>21</sup>	39.27 <sup>368</sup>
25.9	52.023 <sup>131</sup>	30.09 <sup>269</sup>	18.659 <sup>119</sup>	20.84 <sup>171</sup>	60.874 <sup>124</sup>	38.37 <sup>172</sup>	32.34 <sup>21</sup>	35.64 <sup>368</sup>
Oct. 5.9	52.200 <sup>172</sup>	27.78 <sup>231</sup>	18.819 <sup>160</sup>	18.98 <sup>186</sup>	60.998 <sup>134</sup>	36.65 <sup>172</sup>	32.70 <sup>26</sup>	32.04 <sup>360</sup>
15.9	52.412 <sup>212</sup>	25.39 <sup>263</sup>	19.014 <sup>195</sup>	16.65 <sup>208</sup>	61.168 <sup>170</sup>	35.25 <sup>140</sup>	33.21 <sup>51</sup>	28.54 <sup>350</sup>
25.9	52.665 <sup>253</sup>	22.93 <sup>243</sup>	19.247 <sup>233</sup>	14.83 <sup>212</sup>	61.385 <sup>217</sup>	34.24 <sup>191</sup>	33.87 <sup>66</sup>	25.19 <sup>336</sup>
Nov. 4.8	52.955 <sup>290</sup>	20.58 <sup>240</sup>	19.247 <sup>269</sup>	14.83 <sup>212</sup>	61.647 <sup>262</sup>	33.69 <sup>55</sup>	34.07 <sup>80</sup>	22.11 <sup>308</sup>
14.8	53.277 <sup>323</sup>	18.23 <sup>233</sup>	19.516 <sup>300</sup>	12.64 <sup>279</sup>	61.949 <sup>309</sup>	33.69 <sup>6</sup>	34.07 <sup>92</sup>	22.11 <sup>377</sup>
24.8	53.623 <sup>358</sup>	16.67 <sup>244</sup>	19.817 <sup>361</sup>	10.45 <sup>319</sup>	62.284 <sup>335</sup>	34.10 <sup>47</sup>	35.59 <sup>103</sup>	19.34 <sup>336</sup>
Dec. 4.7	53.996 <sup>393</sup>	14.10 <sup>197</sup>	20.142 <sup>395</sup>	8.60 <sup>355</sup>	62.645 <sup>361</sup>	35.09 <sup>99</sup>	36.62 <sup>103</sup>	16.98 <sup>236</sup>
14.7	54.371 <sup>375</sup>	12.42 <sup>168</sup>	20.484 <sup>423</sup>	6.28 <sup>392</sup>	63.045 <sup>373</sup>	36.57 <sup>148</sup>	37.75 <sup>113</sup>	15.11 <sup>187</sup>
24.7	54.742 <sup>391</sup>	11.68 <sup>134</sup>	20.834 <sup>450</sup>	4.43 <sup>430</sup>	63.018 <sup>378</sup>	36.57 <sup>194</sup>	38.93 <sup>118</sup>	13.77 <sup>134</sup>
34.7	55.098 <sup>398</sup>	10.11 <sup>97</sup>	21.180 <sup>480</sup>	2.83 <sup>460</sup>	63.394 <sup>383</sup>	38.51 <sup>234</sup>	40.14 <sup>119</sup>	13.01 <sup>15</sup>
			21.510 <sup>483</sup>	1.51 <sup>483</sup>	63.759 <sup>383</sup>	40.85 <sup>267</sup>	41.33 <sup>114</sup>	12.86 <sup>48</sup>
					64.102 <sup>343</sup>	43.52 <sup>267</sup>	42.47 <sup>114</sup>	13.34 <sup>48</sup>
Mean Place	50.581	-47.50	17.976	36.42	59.497	36.87	35.883	56.82
Sec $\delta$ , Tan $\delta$	1.215	+0.691	1.105	+0.470	1.247	-0.746	4.887	+4.784
D $\delta$ , D $\alpha$	+0.067	+0.044	+0.065	+0.030	+0.055	-0.048	+0.097	+0.306
D $\delta$ , D $\alpha$	-0.88	+0.81	-0.98	+0.89	-0.38	+0.29	-0.38	+0.29

APPARENT PLACES OF STARS, 1920.

FOR THE UPPER TRANSIT AT WASHINGTON.

Washington Mean Time.	$\alpha$ Crateris. Mag. 4.2		$\delta$ Leonis. Mag. 5.0		$\beta$ Ursae Majoris. Mag. 2.4		$\alpha$ Ursae Majoris. Mag. 2.0	
	Right Ascension.	Declination.	Right Ascension.	Declination.	Right Ascension.	Declination.	Right Ascension.	Declination.
	h m 10 55	° ' " -17 52	h m 10 56	° ' " + 4 2	h m 10 57	° ' " +56 47	h m 10 58	° ' " +62 10
Jan. 0.7	54.067	24.50	27.202	40.38	2.972	78.15	49.82	35.29
10.7	54.364 <sup>297</sup>	27.01 <sup>251</sup>	27.496 <sup>294</sup>	38.47 <sup>191</sup>	3.443 <sup>471</sup>	78.21 <sup>6</sup>	50.36 <sup>54</sup>	35.54 <sup>25</sup>
20.6	54.628 <sup>264</sup>	29.54 <sup>253</sup>	27.761 <sup>265</sup>	36.74 <sup>178</sup>	3.871 <sup>426</sup>	78.33 <sup>63</sup>	50.84 <sup>48</sup>	36.32 <sup>78</sup>
30.6	54.853 <sup>225</sup>	32.03 <sup>249</sup>	27.968 <sup>227</sup>	35.24 <sup>150</sup>	4.237 <sup>366</sup>	79.97 <sup>114</sup>	51.26 <sup>42</sup>	37.66 <sup>134</sup>
Feb. 9.6	55.032 <sup>179</sup>	34.41 <sup>236</sup>	28.170 <sup>182</sup>	33.99 <sup>126</sup>	4.532 <sup>295</sup>	81.54 <sup>157</sup>	51.60 <sup>24</sup>	39.45 <sup>179</sup>
19.5	55.165 <sup>133</sup>	36.61 <sup>200</sup>	28.307 <sup>187</sup>	33.02 <sup>97</sup>	4.748 <sup>216</sup>	83.51 <sup>197</sup>	51.84 <sup>24</sup>	41.63 <sup>218</sup>
29.5	55.249 <sup>84</sup>	38.61 <sup>200</sup>	28.397 <sup>90</sup>	32.32 <sup>70</sup>	4.880 <sup>133</sup>	85.75 <sup>224</sup>	51.99 <sup>15</sup>	44.07 <sup>244</sup>
Mar. 10.5	55.289 <sup>40</sup>	40.37 <sup>176</sup>	28.442 <sup>45</sup>	31.87 <sup>45</sup>	4.931 <sup>61</sup>	88.18 <sup>263</sup>	52.04 <sup>5</sup>	46.71 <sup>264</sup>
20.5	55.289 <sup>0</sup>	41.86 <sup>149</sup>	28.446 <sup>4</sup>	31.67 <sup>20</sup>	4.992 <sup>29</sup>	90.70 <sup>263</sup>	52.01 <sup>3</sup>	49.39 <sup>265</sup>
30.4	55.251 <sup>38</sup>	43.10 <sup>124</sup>	28.415 <sup>31</sup>	31.69 <sup>2</sup>	4.893 <sup>99</sup>	93.17 <sup>267</sup>	51.88 <sup>13</sup>	52.02 <sup>263</sup>
Apr. 9.4	55.184 <sup>67</sup>	44.06 <sup>96</sup>	28.353 <sup>62</sup>	31.87 <sup>18</sup>	4.643 <sup>160</sup>	95.52 <sup>285</sup>	51.69 <sup>19</sup>	54.50 <sup>248</sup>
19.4	55.094 <sup>90</sup>	44.75 <sup>69</sup>	28.269 <sup>84</sup>	32.20 <sup>33</sup>	4.433 <sup>210</sup>	97.44 <sup>262</sup>	51.69 <sup>26</sup>	56.72 <sup>222</sup>
29.4	54.986 <sup>108</sup>	45.19 <sup>44</sup>	28.167 <sup>102</sup>	32.06 <sup>48</sup>	4.183 <sup>260</sup>	99.48 <sup>184</sup>	51.13 <sup>30</sup>	58.61 <sup>189</sup>
May 9.3	54.866 <sup>130</sup>	45.35 <sup>16</sup>	28.055 <sup>112</sup>	33.18 <sup>52</sup>	3.906 <sup>275</sup>	100.95 <sup>147</sup>	50.79 <sup>24</sup>	60.12 <sup>151</sup>
19.3	54.740 <sup>126</sup>	45.28 <sup>7</sup>	27.939 <sup>116</sup>	33.78 <sup>60</sup>	3.620 <sup>268</sup>	102.01 <sup>166</sup>	50.44 <sup>25</sup>	61.15 <sup>163</sup>
29.3	54.614 <sup>126</sup>	44.96 <sup>32</sup>	27.822 <sup>117</sup>	34.41 <sup>63</sup>	3.328 <sup>292</sup>	102.63 <sup>82</sup>	50.08 <sup>36</sup>	61.75 <sup>60</sup>
June 8.2	54.488 <sup>126</sup>	44.41 <sup>55</sup>	27.709 <sup>113</sup>	35.06 <sup>65</sup>	3.045 <sup>263</sup>	102.31 <sup>18</sup>	49.73 <sup>35</sup>	61.85 <sup>10</sup>
18.2	54.370 <sup>118</sup>	43.65 <sup>76</sup>	27.601 <sup>106</sup>	35.70 <sup>64</sup>	2.776 <sup>269</sup>	102.55 <sup>26</sup>	49.39 <sup>34</sup>	61.48 <sup>37</sup>
28.2	54.259 <sup>111</sup>	42.70 <sup>95</sup>	27.506 <sup>96</sup>	36.34 <sup>64</sup>	2.529 <sup>247</sup>	101.83 <sup>72</sup>	49.09 <sup>30</sup>	60.61 <sup>57</sup>
July 8.2	54.162 <sup>97</sup>	41.60 <sup>110</sup>	27.421 <sup>85</sup>	36.93 <sup>69</sup>	2.312 <sup>217</sup>	100.70 <sup>112</sup>	48.81 <sup>28</sup>	59.32 <sup>129</sup>
18.1	54.078 <sup>84</sup>	40.36 <sup>124</sup>	27.352 <sup>69</sup>	37.48 <sup>55</sup>	2.130 <sup>182</sup>	99.17 <sup>188</sup>	48.58 <sup>23</sup>	57.62 <sup>170</sup>
28.1	54.011 <sup>67</sup>	39.08 <sup>136</sup>	27.369 <sup>52</sup>	37.94 <sup>46</sup>	1.966 <sup>144</sup>	97.28 <sup>169</sup>	48.39 <sup>19</sup>	55.54 <sup>208</sup>
Aug. 7.1	53.966 <sup>45</sup>	37.66 <sup>137</sup>	27.269 <sup>31</sup>	38.32 <sup>38</sup>	1.865 <sup>104</sup>	95.07 <sup>221</sup>	48.26 <sup>13</sup>	53.11 <sup>243</sup>
17.1	53.945 <sup>21</sup>	36.30 <sup>126</sup>	27.256 <sup>11</sup>	38.57 <sup>25</sup>	1.830 <sup>55</sup>	92.59 <sup>248</sup>	48.18 <sup>8</sup>	50.42 <sup>269</sup>
27.0	53.952 <sup>7</sup>	34.99 <sup>181</sup>	27.273 <sup>15</sup>	38.66 <sup>9</sup>	1.824 <sup>6</sup>	89.86 <sup>273</sup>	48.16 <sup>2</sup>	47.47 <sup>295</sup>
Sept. 6.0	53.990 <sup>36</sup>	33.81 <sup>118</sup>	27.316 <sup>43</sup>	38.66 <sup>8</sup>	1.871 <sup>47</sup>	86.94 <sup>292</sup>	48.20 <sup>4</sup>	44.34 <sup>313</sup>
16.0	54.063 <sup>78</sup>	32.82 <sup>99</sup>	27.391 <sup>76</sup>	38.28 <sup>39</sup>	1.973 <sup>108</sup>	83.89 <sup>305</sup>	48.31 <sup>11</sup>	41.12 <sup>322</sup>
25.9	54.172 <sup>109</sup>	32.06 <sup>76</sup>	27.499 <sup>108</sup>	37.76 <sup>63</sup>	2.132 <sup>169</sup>	80.77 <sup>312</sup>	48.48 <sup>17</sup>	37.81 <sup>331</sup>
Oct. 5.9	54.319 <sup>147</sup>	31.60 <sup>46</sup>	27.641 <sup>142</sup>	36.99 <sup>77</sup>	2.349 <sup>217</sup>	77.62 <sup>315</sup>	48.72 <sup>24</sup>	34.52 <sup>329</sup>
15.9	54.506 <sup>187</sup>	31.49 <sup>11</sup>	27.822 <sup>181</sup>	35.96 <sup>103</sup>	2.625 <sup>276</sup>	74.53 <sup>300</sup>	49.03 <sup>31</sup>	31.29 <sup>323</sup>
25.9	54.732 <sup>236</sup>	30.29 <sup>29</sup>	27.822 <sup>215</sup>	35.96 <sup>129</sup>	2.969 <sup>334</sup>	71.55 <sup>298</sup>	49.03 <sup>38</sup>	28.24 <sup>305</sup>
Nov. 4.8	54.991 <sup>299</sup>	31.78 <sup>66</sup>	28.087 <sup>259</sup>	34.97 <sup>152</sup>	3.269 <sup>398</sup>	68.76 <sup>279</sup>	49.41 <sup>44</sup>	23.24 <sup>285</sup>
14.8	55.263 <sup>392</sup>	32.44 <sup>86</sup>	28.287 <sup>299</sup>	33.15 <sup>162</sup>	3.347 <sup>462</sup>	68.76 <sup>279</sup>	49.85 <sup>44</sup>	25.39 <sup>285</sup>
24.8	55.597 <sup>514</sup>	33.51 <sup>107</sup>	28.566 <sup>379</sup>	31.41 <sup>174</sup>	3.780 <sup>523</sup>	66.24 <sup>262</sup>	50.34 <sup>40</sup>	22.86 <sup>263</sup>
Dec. 4.8	55.927 <sup>633</sup>	34.96 <sup>145</sup>	28.870 <sup>504</sup>	29.52 <sup>189</sup>	4.255 <sup>573</sup>	64.05 <sup>249</sup>	50.88 <sup>54</sup>	20.70 <sup>216</sup>
14.7	56.260 <sup>833</sup>	36.74 <sup>178</sup>	29.167 <sup>617</sup>	27.49 <sup>208</sup>	4.764 <sup>639</sup>	62.26 <sup>179</sup>	51.44 <sup>59</sup>	18.96 <sup>172</sup>
24.7	56.587 <sup>927</sup>	38.81 <sup>207</sup>	29.513 <sup>736</sup>	25.42 <sup>237</sup>	5.299 <sup>715</sup>	60.96 <sup>130</sup>	52.03 <sup>59</sup>	17.77 <sup>121</sup>
34.7	56.897 <sup>1010</sup>	41.10 <sup>239</sup>	29.834 <sup>891</sup>	23.36 <sup>268</sup>	5.780 <sup>811</sup>	60.15 <sup>82</sup>	52.61 <sup>59</sup>	17.10 <sup>67</sup>
Mean Place	52.500	21.78	25.778	50.19	1.510	101.56	48.310	59.49
Sec $\delta$ , Tan $\delta$	1.051	-0.823	1.002	+0.071	1.827	+1.539	2.143	+1.895
$D_{\alpha}, D_{\delta}$	+0.059	-0.021	+0.062	+0.004	+0.072	+0.068	+0.074	+0.122
$D_{\delta}, D_{\alpha}$	-0.38	+0.28	-0.38	+0.27	-0.36	+0.27	-0.38	+0.26



# APPARENT PLACES OF STARS, 1920.

407

## FOR THE UPPER TRANSIT AT WASHINGTON.

Washington Mean Time.	χ Leonis. Mag. 4.7		ρ <sup>4</sup> Leonis. Mag. 5.7		ψ Ursae Majoris. Mag. 3.2		β Crateris. Mag. 4.5	
	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.
	h m 11 0	° ' " + 7 45	h m 11 2	° ' " + 2 22	h m 11 5	° ' " +44 55	h m 11 7	° ' " -22 23
Jan. 0.7	54.875	87.18	50.828	75.50	11.694	37.04	44.820	21.27
10.7	55.173 <sup>286</sup>	55.30 <sup>170</sup>	51.125 <sup>200</sup>	73.90 <sup>190</sup>	12.082 <sup>308</sup>	36.58 <sup>46</sup>	45.129 <sup>309</sup>	23.83 <sup>256</sup>
20.6	55.442 <sup>209</sup>	56.81 <sup>158</sup>	51.369 <sup>204</sup>	71.81 <sup>179</sup>	12.435 <sup>353</sup>	36.62 <sup>4</sup>	45.406 <sup>277</sup>	26.46 <sup>263</sup>
30.6	55.673 <sup>231</sup>	52.47 <sup>134</sup>	51.619 <sup>200</sup>	70.22 <sup>159</sup>	12.741 <sup>308</sup>	37.13 <sup>51</sup>	45.645 <sup>239</sup>	29.10 <sup>264</sup>
Feb. 9.6	55.861 <sup>188</sup>	51.42 <sup>105</sup>	51.805 <sup>188</sup>	68.87 <sup>124</sup>	12.994 <sup>288</sup>	38.09 <sup>96</sup>	45.889 <sup>184</sup>	31.65 <sup>255</sup>
19.5	56.004 <sup>148</sup>	50.06 <sup>70</sup>	51.947 <sup>149</sup>	67.77 <sup>119</sup>	18.184 <sup>190</sup>	38.09 <sup>186</sup>	45.889 <sup>147</sup>	31.65 <sup>244</sup>
29.5	56.004 <sup>95</sup>	50.06 <sup>45</sup>	51.947 <sup>95</sup>	67.77 <sup>89</sup>	18.184 <sup>123</sup>	38.09 <sup>167</sup>	45.889 <sup>100</sup>	34.09 <sup>100</sup>
Mar. 10.5	56.099 <sup>40</sup>	50.18 <sup>23</sup>	52.042 <sup>50</sup>	66.95 <sup>45</sup>	13.307 <sup>60</sup>	41.12 <sup>190</sup>	46.066 <sup>52</sup>	36.32 <sup>223</sup>
20.5	56.148 <sup>8</sup>	49.96 <sup>2</sup>	52.092 <sup>11</sup>	66.40 <sup>80</sup>	13.367 <sup>1</sup>	43.02 <sup>207</sup>	46.138 <sup>12</sup>	38.34 <sup>179</sup>
30.4	56.156 <sup>26</sup>	49.96 <sup>24</sup>	52.103 <sup>25</sup>	66.10 <sup>7</sup>	13.368 <sup>55</sup>	45.09 <sup>209</sup>	46.150 <sup>26</sup>	40.13 <sup>151</sup>
Apr. 9.4	56.128 <sup>50</sup>	50.22 <sup>37</sup>	52.078 <sup>58</sup>	66.08 <sup>8</sup>	18.313 <sup>108</sup>	47.18 <sup>204</sup>	46.124 <sup>57</sup>	41.64 <sup>123</sup>
19.4	56.069 <sup>88</sup>	50.59 <sup>53</sup>	52.020 <sup>78</sup>	66.11 <sup>27</sup>	13.210 <sup>141</sup>	49.22 <sup>193</sup>	46.067 <sup>83</sup>	42.87 <sup>94</sup>
29.4	55.986 <sup>103</sup>	51.11 <sup>83</sup>	51.942 <sup>98</sup>	66.38 <sup>40</sup>	13.089 <sup>168</sup>	51.15 <sup>174</sup>	45.984 <sup>102</sup>	43.81 <sup>67</sup>
May 9.3	55.884 <sup>111</sup>	51.69 <sup>97</sup>	51.844 <sup>108</sup>	66.78 <sup>47</sup>	12.901 <sup>189</sup>	52.89 <sup>145</sup>	45.882 <sup>116</sup>	44.48 <sup>38</sup>
19.3	55.773 <sup>117</sup>	52.36 <sup>97</sup>	51.736 <sup>114</sup>	67.25 <sup>57</sup>	12.712 <sup>200</sup>	54.34 <sup>116</sup>	45.766 <sup>129</sup>	44.86 <sup>10</sup>
29.3	55.656 <sup>124</sup>	53.03 <sup>98</sup>	51.622 <sup>117</sup>	67.82 <sup>63</sup>	12.512 <sup>208</sup>	55.50 <sup>80</sup>	45.641 <sup>129</sup>	44.96 <sup>17</sup>
June 8.2	55.538	53.71	51.505	68.45	12.307	56.30	45.512	44.79
18.2	55.422 <sup>116</sup>	54.37 <sup>88</sup>	51.392 <sup>113</sup>	69.10 <sup>65</sup>	12.107 <sup>200</sup>	56.76 <sup>46</sup>	45.384 <sup>128</sup>	44.36 <sup>43</sup>
28.2	55.313 <sup>109</sup>	55.00 <sup>88</sup>	51.283 <sup>109</sup>	69.77 <sup>67</sup>	11.919 <sup>188</sup>	56.85 <sup>9</sup>	45.259 <sup>125</sup>	43.68 <sup>68</sup>
July 8.2	55.215 <sup>98</sup>	55.56 <sup>85</sup>	51.185 <sup>98</sup>	70.44 <sup>67</sup>	11.744 <sup>175</sup>	56.84 <sup>61</sup>	45.139 <sup>120</sup>	42.76 <sup>92</sup>
18.1	55.127 <sup>86</sup>	56.06 <sup>80</sup>	51.095 <sup>80</sup>	71.06 <sup>64</sup>	11.589 <sup>155</sup>	56.86 <sup>58</sup>	45.081 <sup>108</sup>	41.65 <sup>111</sup>
28.1	55.054 <sup>73</sup>	56.47 <sup>69</sup>	51.022 <sup>67</sup>	71.67 <sup>54</sup>	11.459 <sup>108</sup>	56.86 <sup>101</sup>	45.081 <sup>95</sup>	41.65 <sup>127</sup>
Aug. 7.1	54.999 <sup>56</sup>	56.77 <sup>59</sup>	50.965 <sup>56</sup>	72.21 <sup>48</sup>	11.353 <sup>78</sup>	54.85 <sup>135</sup>	44.936 <sup>80</sup>	40.38 <sup>142</sup>
17.1	54.933 <sup>44</sup>	56.96 <sup>49</sup>	50.927 <sup>47</sup>	72.64 <sup>43</sup>	11.353 <sup>78</sup>	53.50 <sup>164</sup>	44.856 <sup>58</sup>	38.96 <sup>150</sup>
27.0	54.948 <sup>31</sup>	56.99 <sup>3</sup>	50.917 <sup>17</sup>	72.99 <sup>35</sup>	11.280 <sup>48</sup>	51.86 <sup>193</sup>	44.798 <sup>35</sup>	37.46 <sup>152</sup>
Sept. 6.0	54.968 <sup>10</sup>	56.98 <sup>11</sup>	50.919 <sup>9</sup>	73.18 <sup>17</sup>	11.238 <sup>5</sup>	49.93 <sup>217</sup>	44.763 <sup>6</sup>	35.94 <sup>150</sup>
16.0	54.968 <sup>20</sup>	56.98 <sup>21</sup>	50.919 <sup>26</sup>	73.18 <sup>1</sup>	11.233 <sup>34</sup>	47.76 <sup>240</sup>	44.757 <sup>25</sup>	34.44 <sup>139</sup>
26.9	54.997 <sup>70</sup>	56.87 <sup>53</sup>	50.954 <sup>68</sup>	73.17 <sup>18</sup>	11.267 <sup>79</sup>	45.36 <sup>267</sup>	44.782 <sup>60</sup>	33.05 <sup>125</sup>
Oct. 5.9	55.087 <sup>108</sup>	56.05 <sup>75</sup>	51.022 <sup>101</sup>	72.99 <sup>45</sup>	11.346 <sup>122</sup>	42.79 <sup>272</sup>	44.842 <sup>99</sup>	31.80 <sup>99</sup>
15.9	55.170 <sup>140</sup>	55.30 <sup>98</sup>	51.123 <sup>139</sup>	72.54 <sup>60</sup>	11.468 <sup>189</sup>	40.07 <sup>278</sup>	44.941 <sup>142</sup>	30.81 <sup>73</sup>
25.9	55.310 <sup>176</sup>	54.32 <sup>122</sup>	51.262 <sup>173</sup>	71.85 <sup>95</sup>	11.637 <sup>217</sup>	37.29 <sup>288</sup>	45.083 <sup>181</sup>	30.08 <sup>35</sup>
Nov. 4.8	55.485 <sup>213</sup>	53.10 <sup>145</sup>	51.435 <sup>211</sup>	70.90 <sup>129</sup>	11.854 <sup>263</sup>	34.46 <sup>280</sup>	45.264 <sup>223</sup>	29.73 <sup>1</sup>
14.8	55.698	51.65	51.646	69.70	12.117	31.66	45.487	29.74
24.8	55.944 <sup>246</sup>	49.39 <sup>188</sup>	51.888 <sup>242</sup>	68.23 <sup>147</sup>	12.425 <sup>308</sup>	28.94 <sup>273</sup>	45.746 <sup>259</sup>	30.17 <sup>43</sup>
Dec. 4.8	56.223 <sup>279</sup>	48.16 <sup>163</sup>	52.165 <sup>277</sup>	66.53 <sup>170</sup>	12.772 <sup>347</sup>	26.40 <sup>263</sup>	45.040 <sup>294</sup>	31.03 <sup>86</sup>
14.7	56.524 <sup>301</sup>	46.17 <sup>139</sup>	52.465 <sup>300</sup>	64.65 <sup>188</sup>	13.155 <sup>388</sup>	24.07 <sup>268</sup>	46.358 <sup>318</sup>	32.30 <sup>127</sup>
24.7	56.843 <sup>319</sup>	44.12 <sup>108</sup>	52.780 <sup>315</sup>	62.63 <sup>203</sup>	13.560 <sup>403</sup>	22.06 <sup>201</sup>	46.694 <sup>336</sup>	33.96 <sup>166</sup>
34.7	57.199 <sup>336</sup>	42.07 <sup>76</sup>	53.105 <sup>338</sup>	60.55 <sup>208</sup>	13.978 <sup>418</sup>	20.41 <sup>166</sup>	46.994 <sup>343</sup>	33.96 <sup>198</sup>
Mean Place	53.493	63.12	49.429	54.75	10.339	56.29	43.269	20.30
Sec δ, Tan δ	1.000	+0.126	1.001	+0.942	1.412	+0.997	1.082	-0.412
D <sub>γ</sub> α, D <sub>γ</sub> δ	+0.062	+0.990	+0.041	+0.093	+0.067	+0.965	+0.059	-0.027
D <sub>γ</sub> β, D <sub>γ</sub> ε	-0.36	+0.26	-0.36	+0.25	-0.36	+0.24	-0.36	+0.23

APPARENT PLACES OF STARS, 1920.

FOR THE UPPER TRANSIT AT WASHINGTON.

Washington Mean Time.	δ Leonis. Mag. 2.6		θ Leonis. Mag. 3.4		ν Ursae Majoris. Mag. 3.7		δ Crateris. Mag. 3.8	
	Right Ascension.	Declination.	Right Ascension.	Declination.	Right Ascension.	Declination.	Right Ascension.	Declination.
	h m	° ' "	h m	° ' "	h m	° ' "	h m	° ' "
	11 9	+20 57	11 10	+15 51	11 14	+83 31	11 15	-14 20
	s	"	s	"	s	"	s	"
Jan. 0.7	52.892	28.95	3.907	47.90	10.963	33.40	21.804	46.93
10.7	53.010 <sup>318</sup>	27.57 <sup>138</sup>	4.219 <sup>313</sup>	46.42 <sup>157</sup>	11.311 <sup>348</sup>	32.43 <sup>97</sup>	22.110 <sup>306</sup>	49.30 <sup>237</sup>
20.6	53.299 <sup>289</sup>	26.51 <sup>108</sup>	4.500 <sup>281</sup>	45.15 <sup>127</sup>	11.629 <sup>318</sup>	31.89 <sup>54</sup>	22.386 <sup>276</sup>	51.69 <sup>229</sup>
30.6	53.550 <sup>251</sup>	25.32 <sup>89</sup>	4.746 <sup>246</sup>	44.19 <sup>96</sup>	11.907 <sup>278</sup>	31.79 <sup>10</sup>	22.627 <sup>241</sup>	54.00 <sup>231</sup>
Feb. 9.6	53.758 <sup>208</sup>	25.47 <sup>25</sup>	4.948 <sup>202</sup>	43.57 <sup>83</sup>	12.138 <sup>231</sup>	32.12 <sup>33</sup>	22.825 <sup>198</sup>	56.19 <sup>219</sup>
19.6	53.917 <sup>180</sup>	25.46 <sup>1</sup>	5.104 <sup>156</sup>	43.27 <sup>30</sup>	12.316 <sup>178</sup>	32.83 <sup>71</sup>	22.978 <sup>153</sup>	58.18 <sup>199</sup>
29.5	54.028 <sup>111</sup>	25.78 <sup>32</sup>	5.211 <sup>107</sup>	43.27 <sup>0</sup>	12.440 <sup>124</sup>	33.87 <sup>104</sup>	23.085 <sup>107</sup>	60.00 <sup>182</sup>
Mar. 10.5	54.091 <sup>63</sup>	26.36 <sup>58</sup>	5.271 <sup>60</sup>	43.55 <sup>28</sup>	12.509 <sup>69</sup>	35.18 <sup>131</sup>	23.147 <sup>62</sup>	61.56 <sup>156</sup>
20.5	54.107 <sup>16</sup>	27.18 <sup>82</sup>	5.289 <sup>18</sup>	44.06 <sup>51</sup>	12.526 <sup>17</sup>	36.69 <sup>151</sup>	23.169 <sup>22</sup>	62.87 <sup>131</sup>
30.4	54.062 <sup>25</sup>	28.12 <sup>94</sup>	5.267 <sup>22</sup>	44.75 <sup>89</sup>	12.497 <sup>29</sup>	38.32 <sup>163</sup>	23.155 <sup>14</sup>	63.94 <sup>107</sup>
Apr. 9.4	54.025 <sup>87</sup>	29.19 <sup>107</sup>	5.213 <sup>54</sup>	45.56 <sup>81</sup>	12.429 <sup>68</sup>	39.99 <sup>167</sup>	23.109 <sup>46</sup>	64.75 <sup>51</sup>
19.4	53.941 <sup>84</sup>	30.30 <sup>111</sup>	5.133 <sup>80</sup>	46.46 <sup>90</sup>	12.328 <sup>101</sup>	41.60 <sup>161</sup>	23.037 <sup>72</sup>	65.30 <sup>55</sup>
29.4	53.835 <sup>106</sup>	31.40 <sup>110</sup>	5.032 <sup>101</sup>	47.39 <sup>98</sup>	12.202 <sup>126</sup>	43.13 <sup>153</sup>	22.949 <sup>88</sup>	65.63 <sup>23</sup>
May 9.3	53.715 <sup>120</sup>	32.45 <sup>105</sup>	4.920 <sup>112</sup>	48.30 <sup>91</sup>	12.000 <sup>142</sup>	44.49 <sup>136</sup>	22.844 <sup>105</sup>	65.72 <sup>9</sup>
19.3	53.589 <sup>126</sup>	33.42 <sup>97</sup>	4.799 <sup>121</sup>	49.17 <sup>87</sup>	11.907 <sup>153</sup>	45.64 <sup>115</sup>	22.732 <sup>112</sup>	65.61 <sup>11</sup>
29.3	53.459 <sup>130</sup>	34.23 <sup>81</sup>	4.676 <sup>123</sup>	49.94 <sup>77</sup>	11.751 <sup>156</sup>	46.55 <sup>91</sup>	22.614 <sup>118</sup>	65.29 <sup>22</sup>
June 8.3	53.332 <sup>137</sup>	34.90 <sup>67</sup>	4.556 <sup>130</sup>	50.62 <sup>68</sup>	11.596 <sup>155</sup>	47.19 <sup>64</sup>	22.496 <sup>113</sup>	64.78 <sup>51</sup>
18.2	53.210 <sup>122</sup>	35.89 <sup>49</sup>	4.440 <sup>116</sup>	51.19 <sup>57</sup>	11.448 <sup>148</sup>	47.54 <sup>35</sup>	22.380 <sup>116</sup>	64.07 <sup>71</sup>
28.2	53.099 <sup>111</sup>	35.72 <sup>33</sup>	4.334 <sup>108</sup>	51.62 <sup>43</sup>	11.310 <sup>138</sup>	47.61 <sup>7</sup>	22.270 <sup>110</sup>	63.23 <sup>84</sup>
July 8.2	53.000 <sup>99</sup>	35.86 <sup>14</sup>	4.238 <sup>96</sup>	51.90 <sup>28</sup>	11.187 <sup>123</sup>	47.88 <sup>23</sup>	22.170 <sup>100</sup>	62.25 <sup>96</sup>
18.1	52.913 <sup>87</sup>	35.79 <sup>7</sup>	4.159 <sup>79</sup>	52.03 <sup>13</sup>	11.080 <sup>107</sup>	46.86 <sup>52</sup>	22.081 <sup>89</sup>	61.18 <sup>107</sup>
28.1	52.847 <sup>66</sup>	35.51 <sup>23</sup>	4.094 <sup>65</sup>	52.00 <sup>3</sup>	10.994 <sup>93</sup>	46.96 <sup>36</sup>	22.006 <sup>75</sup>	60.04 <sup>114</sup>
Aug. 7.1	52.801 <sup>46</sup>	35.06 <sup>45</sup>	4.049 <sup>45</sup>	51.78 <sup>22</sup>	10.931 <sup>68</sup>	44.98 <sup>106</sup>	21.950 <sup>56</sup>	58.88 <sup>116</sup>
17.1	52.777 <sup>24</sup>	34.37 <sup>69</sup>	4.027 <sup>22</sup>	51.88 <sup>40</sup>	10.895 <sup>36</sup>	43.65 <sup>133</sup>	21.917 <sup>33</sup>	57.72 <sup>116</sup>
27.0	52.779 <sup>2</sup>	33.47 <sup>90</sup>	4.029 <sup>2</sup>	50.78 <sup>60</sup>	10.887 <sup>8</sup>	42.97 <sup>158</sup>	21.905 <sup>12</sup>	56.64 <sup>108</sup>
Sept. 6.0	52.811 <sup>32</sup>	32.38 <sup>109</sup>	4.000 <sup>81</sup>	49.98 <sup>80</sup>	10.912 <sup>25</sup>	40.27 <sup>180</sup>	21.905 <sup>21</sup>	55.67 <sup>97</sup>
16.0	52.875 <sup>64</sup>	31.07 <sup>131</sup>	4.121 <sup>61</sup>	48.98 <sup>160</sup>	10.972 <sup>60</sup>	38.27 <sup>200</sup>	21.979 <sup>53</sup>	54.88 <sup>79</sup>
26.0	52.973 <sup>96</sup>	29.54 <sup>153</sup>	4.216 <sup>95</sup>	47.74 <sup>124</sup>	11.071 <sup>99</sup>	36.08 <sup>219</sup>	22.069 <sup>90</sup>	54.31 <sup>57</sup>
Oct. 5.9	53.109 <sup>136</sup>	27.81 <sup>173</sup>	4.350 <sup>134</sup>	46.31 <sup>143</sup>	11.210 <sup>139</sup>	33.75 <sup>233</sup>	22.198 <sup>129</sup>	54.02 <sup>29</sup>
15.9	53.233 <sup>174</sup>	25.94 <sup>187</sup>	4.520 <sup>179</sup>	44.66 <sup>165</sup>	11.392 <sup>182</sup>	31.30 <sup>245</sup>	22.385 <sup>167</sup>	54.07 <sup>5</sup>
25.9	53.397 <sup>214</sup>	23.93 <sup>201</sup>	4.729 <sup>269</sup>	42.85 <sup>181</sup>	11.617 <sup>225</sup>	28.79 <sup>251</sup>	22.574 <sup>209</sup>	54.43 <sup>26</sup>
Nov. 4.8	53.746 <sup>249</sup>	21.79 <sup>214</sup>	4.975 <sup>244</sup>	40.88 <sup>197</sup>	11.882 <sup>268</sup>	26.27 <sup>262</sup>	22.819 <sup>245</sup>	55.18 <sup>75</sup>
14.8	54.080 <sup>284</sup>	19.59 <sup>220</sup>	5.252 <sup>277</sup>	38.81 <sup>207</sup>	12.135 <sup>308</sup>	23.80 <sup>247</sup>	23.096 <sup>277</sup>	56.29 <sup>111</sup>
24.8	54.341 <sup>311</sup>	17.38 <sup>221</sup>	5.556 <sup>304</sup>	36.68 <sup>213</sup>	12.518 <sup>338</sup>	21.44 <sup>236</sup>	23.491 <sup>305</sup>	57.73 <sup>144</sup>
Dec. 4.8	54.672 <sup>331</sup>	15.25 <sup>213</sup>	5.880 <sup>324</sup>	34.56 <sup>212</sup>	12.875 <sup>367</sup>	19.29 <sup>215</sup>	23.723 <sup>323</sup>	59.49 <sup>176</sup>
14.7	55.011 <sup>339</sup>	13.25 <sup>200</sup>	6.214 <sup>334</sup>	32.52 <sup>204</sup>	13.244 <sup>399</sup>	17.33 <sup>181</sup>	24.056 <sup>333</sup>	61.51 <sup>203</sup>
24.7	55.353 <sup>342</sup>	11.42 <sup>183</sup>	6.547 <sup>333</sup>	30.61 <sup>191</sup>	13.614 <sup>379</sup>	15.81 <sup>157</sup>	24.384 <sup>328</sup>	63.72 <sup>221</sup>
34.7	55.682 <sup>339</sup>	9.88 <sup>164</sup>	6.868 <sup>321</sup>	28.91 <sup>179</sup>	13.974 <sup>360</sup>	14.62 <sup>119</sup>	24.702 <sup>313</sup>	66.04 <sup>232</sup>
Mean Place	51.408	43.89	2.610	61.86	9.789	51.89	30.368	43.00
Sec δ, Tan δ	1.071	+0.383	1.040	+0.284	1.200	+0.863	1.082	-0.266
D <sub>α</sub> , D <sub>β</sub>	+0.063	+0.025	+0.063	+0.018	+0.065	+0.043	+0.060	-0.017
D <sub>γ</sub> , D <sub>δ</sub>	-0.39	+0.22	-0.39	+0.22	-0.39	+0.29	-0.39	+0.19

# APPARENT PLACES OF STARS, 1920.

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## FOR THE UPPER TRANSIT AT WASHINGTON.

Washington Mean Time.	$\sigma$ Leonis. Mag. 4.1			$\tau$ Centauri. Mag. 4.3			$\iota$ Leonis. Mag. 4.0			$\gamma$ Leonis. Mag. 5.2		
	Right Ascension.		Declina- tion.	Right Ascension.		Declina- tion.	Right Ascension.		Declina- tion.	Right Ascension.		Declina- tion.
	h 11	m 17	° + 6 27	h 11	m 17	° -54 3	h 11	m 19	° +10 57	h 11	m 23	° + 3 17
	s	"	"	s	"	"	s	"	"	s	"	"
Jan. 0.7	2.040	54.74	28.287	0.72	46.583	60.58	50.686	40.18				
10.7	2.345 <sup>805</sup>	52.86 <sup>188</sup>	23.716 <sup>420</sup>	3.42 <sup>270</sup>	46.842 <sup>800</sup>	58.78 <sup>175</sup>	50.994 <sup>308</sup>	38.21 <sup>197</sup>				
20.6	2.624 <sup>279</sup>	51.19 <sup>167</sup>	24.099 <sup>383</sup>	6.46 <sup>304</sup>	47.126 <sup>234</sup>	57.27 <sup>151</sup>	51.273 <sup>379</sup>	36.41 <sup>180</sup>				
30.6	2.866 <sup>242</sup>	49.76 <sup>143</sup>	24.426 <sup>337</sup>	9.76 <sup>330</sup>	47.374 <sup>248</sup>	56.05 <sup>122</sup>	51.519 <sup>246</sup>	34.83 <sup>158</sup>				
Feb. 9.6	3.068 <sup>202</sup>	48.00 <sup>116</sup>	24.691 <sup>295</sup>	18.22 <sup>346</sup>	47.561 <sup>207</sup>	55.12 <sup>93</sup>	51.724 <sup>208</sup>	33.50 <sup>133</sup>				
19.6	3.225 <sup>157</sup>	47.78 <sup>87</sup>	24.889 <sup>258</sup>	16.76 <sup>354</sup>	47.744 <sup>168</sup>	54.51 <sup>61</sup>	51.888 <sup>164</sup>	32.44 <sup>106</sup>				
29.5	3.336 <sup>111</sup>	47.16 <sup>57</sup>	25.021 <sup>123</sup>	20.26 <sup>350</sup>	47.860 <sup>116</sup>	54.21 <sup>30</sup>	52.004 <sup>116</sup>	31.67 <sup>77</sup>				
Mar. 10.5	3.408 <sup>67</sup>	46.87 <sup>26</sup>	25.086 <sup>65</sup>	23.69 <sup>343</sup>	47.930 <sup>70</sup>	54.18 <sup>3</sup>	52.077 <sup>78</sup>	31.18 <sup>49</sup>				
20.5	3.427 <sup>24</sup>	46.81 <sup>6</sup>	25.090 <sup>4</sup>	26.94 <sup>325</sup>	47.968 <sup>28</sup>	54.40 <sup>22</sup>	52.109 <sup>32</sup>	30.93 <sup>25</sup>				
30.4	3.415 <sup>12</sup>	46.97 <sup>16</sup>	25.037 <sup>53</sup>	29.95 <sup>301</sup>	47.947 <sup>11</sup>	54.82 <sup>42</sup>	52.106 <sup>3</sup>	30.91 <sup>2</sup>				
Apr. 9.4	3.372 <sup>43</sup>	47.31 <sup>34</sup>	24.935 <sup>102</sup>	32.69 <sup>274</sup>	47.905 <sup>42</sup>	55.40 <sup>58</sup>	52.068 <sup>38</sup>	31.08 <sup>17</sup>				
19.4	3.302 <sup>70</sup>	47.78 <sup>47</sup>	24.792 <sup>143</sup>	36.09 <sup>240</sup>	47.836 <sup>69</sup>	56.11 <sup>71</sup>	52.006 <sup>62</sup>	31.38 <sup>30</sup>				
29.4	3.214 <sup>88</sup>	48.36 <sup>58</sup>	24.611 <sup>181</sup>	37.10 <sup>201</sup>	47.747 <sup>98</sup>	56.87 <sup>76</sup>	51.924 <sup>82</sup>	31.85 <sup>47</sup>				
May 9.3	3.112 <sup>102</sup>	49.00 <sup>64</sup>	24.401 <sup>210</sup>	38.71 <sup>161</sup>	47.645 <sup>102</sup>	57.66 <sup>79</sup>	51.828 <sup>96</sup>	32.39 <sup>54</sup>				
19.3	3.002 <sup>110</sup>	49.69 <sup>69</sup>	24.172 <sup>230</sup>	39.87 <sup>116</sup>	47.584 <sup>111</sup>	58.46 <sup>80</sup>	51.723 <sup>106</sup>	33.01 <sup>62</sup>				
29.3	2.889 <sup>113</sup>	50.38 <sup>69</sup>	23.927 <sup>245</sup>	40.57 <sup>70</sup>	47.418 <sup>116</sup>	59.22 <sup>76</sup>	51.613 <sup>110</sup>	33.67 <sup>66</sup>				
June 8.3	2.776 <sup>113</sup>	51.07 <sup>69</sup>	23.673 <sup>284</sup>	40.81 <sup>24</sup>	47.303 <sup>115</sup>	59.92 <sup>70</sup>	51.502 <sup>111</sup>	34.35 <sup>68</sup>				
18.2	2.666 <sup>110</sup>	51.72 <sup>65</sup>	23.418 <sup>265</sup>	40.57 <sup>24</sup>	47.192 <sup>111</sup>	60.55 <sup>63</sup>	51.393 <sup>109</sup>	35.02 <sup>67</sup>				
28.2	2.564 <sup>103</sup>	52.33 <sup>61</sup>	23.166 <sup>252</sup>	39.86 <sup>71</sup>	47.087 <sup>105</sup>	61.10 <sup>55</sup>	51.290 <sup>103</sup>	35.68 <sup>66</sup>				
July 8.2	2.470 <sup>94</sup>	52.88 <sup>55</sup>	22.926 <sup>240</sup>	38.71 <sup>115</sup>	46.991 <sup>96</sup>	61.53 <sup>43</sup>	51.195 <sup>95</sup>	36.30 <sup>62</sup>				
18.1	2.389 <sup>81</sup>	53.34 <sup>46</sup>	22.706 <sup>230</sup>	37.16 <sup>155</sup>	46.907 <sup>84</sup>	61.85 <sup>32</sup>	51.109 <sup>86</sup>	36.89 <sup>59</sup>				
28.1	2.328 <sup>68</sup>	53.77 <sup>37</sup>	22.511 <sup>195</sup>	35.25 <sup>191</sup>	46.840 <sup>67</sup>	62.02 <sup>17</sup>	51.039 <sup>70</sup>	37.37 <sup>48</sup>				
Aug. 7.1	2.274 <sup>49</sup>	53.95 <sup>24</sup>	22.351 <sup>160</sup>	33.02 <sup>223</sup>	46.789 <sup>51</sup>	62.06 <sup>4</sup>	50.987 <sup>52</sup>	37.77 <sup>40</sup>				
17.1	2.247 <sup>27</sup>	54.06 <sup>11</sup>	22.232 <sup>119</sup>	30.56 <sup>246</sup>	46.759 <sup>36</sup>	61.93 <sup>13</sup>	50.952 <sup>35</sup>	38.01 <sup>24</sup>				
27.0	2.241 <sup>6</sup>	54.01 <sup>5</sup>	22.161 <sup>71</sup>	27.94 <sup>262</sup>	46.752 <sup>7</sup>	61.61 <sup>32</sup>	50.941 <sup>11</sup>	38.13 <sup>12</sup>				
Sept. 6.0	2.265 <sup>24</sup>	53.76 <sup>25</sup>	22.146 <sup>15</sup>	25.27 <sup>267</sup>	46.752 <sup>21</sup>	61.61 <sup>30</sup>	50.941 <sup>15</sup>	38.13 <sup>4</sup>				
16.0	2.318 <sup>53</sup>	53.32 <sup>44</sup>	22.193 <sup>47</sup>	22.66 <sup>261</sup>	46.824 <sup>51</sup>	61.11 <sup>73</sup>	50.956 <sup>48</sup>	38.09 <sup>27</sup>				
26.0	2.406 <sup>87</sup>	52.64 <sup>68</sup>	22.303 <sup>110</sup>	20.18 <sup>248</sup>	46.909 <sup>85</sup>	60.38 <sup>94</sup>	51.004 <sup>80</sup>	37.82 <sup>50</sup>				
Oct. 5.9	2.529 <sup>124</sup>	51.73 <sup>91</sup>	22.482 <sup>179</sup>	17.95 <sup>223</sup>	47.031 <sup>122</sup>	59.44 <sup>118</sup>	51.084 <sup>117</sup>	37.32 <sup>74</sup>				
15.9	2.690 <sup>161</sup>	50.56 <sup>117</sup>	22.727 <sup>245</sup>	16.06 <sup>199</sup>	47.191 <sup>160</sup>	58.26 <sup>138</sup>	51.201 <sup>156</sup>	36.58 <sup>98</sup>				
25.9	2.890 <sup>200</sup>	49.17 <sup>139</sup>	23.036 <sup>309</sup>	14.62 <sup>144</sup>	47.390 <sup>199</sup>	56.87 <sup>163</sup>	51.357 <sup>195</sup>	35.60 <sup>127</sup>				
Nov. 4.8	3.125 <sup>235</sup>	47.53 <sup>164</sup>	23.402 <sup>366</sup>	13.69 <sup>93</sup>	47.624 <sup>234</sup>	55.24 <sup>180</sup>	51.552 <sup>232</sup>	34.33 <sup>151</sup>				
14.8	3.394 <sup>269</sup>	45.72 <sup>181</sup>	23.817 <sup>415</sup>	13.32 <sup>37</sup>	47.894 <sup>270</sup>	53.44 <sup>196</sup>	51.784 <sup>263</sup>	32.82 <sup>171</sup>				
24.8	3.691 <sup>297</sup>	43.76 <sup>197</sup>	24.269 <sup>452</sup>	13.54 <sup>22</sup>	48.191 <sup>307</sup>	51.48 <sup>206</sup>	52.047 <sup>302</sup>	31.11 <sup>190</sup>				
Dec. 4.8	4.006 <sup>315</sup>	41.69 <sup>206</sup>	24.742 <sup>473</sup>	14.36 <sup>82</sup>	48.568 <sup>317</sup>	49.42 <sup>206</sup>	52.339 <sup>302</sup>	29.21 <sup>190</sup>				
14.7	4.331 <sup>326</sup>	39.59 <sup>210</sup>	25.222 <sup>490</sup>	15.77 <sup>141</sup>	48.837 <sup>329</sup>	47.90 <sup>212</sup>	52.652 <sup>313</sup>	27.18 <sup>203</sup>				
24.7	4.657 <sup>326</sup>	37.54 <sup>205</sup>	25.694 <sup>472</sup>	17.71 <sup>194</sup>	49.166 <sup>329</sup>	45.20 <sup>210</sup>	52.976 <sup>324</sup>	25.09 <sup>209</sup>				
34.7	4.972 <sup>315</sup>	35.58 <sup>196</sup>	26.141 <sup>447</sup>	20.13 <sup>242</sup>	49.486 <sup>320</sup>	48.19 <sup>201</sup>	53.301 <sup>325</sup>	22.99 <sup>210</sup>				
34.7	4.972 <sup>315</sup>	35.58 <sup>196</sup>	26.141 <sup>447</sup>	20.13 <sup>242</sup>	49.486 <sup>320</sup>	41.33 <sup>186</sup>	53.616 <sup>315</sup>	20.96 <sup>203</sup>				
Mean Place	0.745	64.98	21.181	8.79	45.276	72.21	49.413	49.24				
Sec $\delta$ , Tan $\delta$	1.006	+0.113	1.704	-1.379	1.019	+0.194	1.002	+0.057				
$D_{\alpha}, D_{\omega\alpha}$	+0.062	+0.007	+0.054	-0.090	+0.062	+0.013	+0.061	+0.004				
$D_{\delta}, D_{\omega\delta}$	-0.39	+0.19	-0.39	+0.19	-0.39	+0.17	-0.39	+0.16				

FOR THE UPPER TRANSIT AT WASHINGTON.

Washington Mean Time.	λ Draconis. Mag. 4.1		ξ Hydræ. Mag. 3.7		λ Centauri. Mag. 3.3		ν Leonis. Mag. 4.5	
	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.
	h m	° '	h m	° '	h m	° '	h m	° '
	11 26	+69 45	11 29	-31 24	11 32	-62 34	11 32	- 0 22
	s	"	s	"	s	"	s	"
Jan. 0.7	41.50	56.73	5.389	51.19	7.27	27.21	52.908	62.53
10.7	42.21 <sup>71</sup>	56.87 <sup>14</sup>	5.729 <sup>840</sup>	58.74 <sup>255</sup>	7.81 <sup>54</sup>	29.69 <sup>248</sup>	52.709 <sup>311</sup>	64.59 <sup>208</sup>
20.6	42.87 <sup>66</sup>	57.64 <sup>77</sup>	6.034 <sup>805</sup>	56.48 <sup>274</sup>	8.29 <sup>48</sup>	32.58 <sup>280</sup>	52.902 <sup>283</sup>	66.54 <sup>195</sup>
30.6	43.46 <sup>59</sup>	58.98 <sup>124</sup>	6.303 <sup>269</sup>	59.30 <sup>293</sup>	8.71 <sup>42</sup>	35.80 <sup>322</sup>	53.243 <sup>261</sup>	68.29 <sup>175</sup>
Feb. 9.6	43.94 <sup>48</sup>	60.84 <sup>186</sup>	6.526 <sup>223</sup>	62.14 <sup>284</sup>	9.06 <sup>34</sup>	39.26 <sup>246</sup>	53.454 <sup>211</sup>	69.80 <sup>151</sup>
	38	227	177	279	27	268	172	127
19.6	44.32	63.11	6.768	64.93	9.32	42.89	53.626	71.07
29.5	44.58 <sup>26</sup>	65.73 <sup>262</sup>	6.827 <sup>80</sup>	67.59 <sup>268</sup>	9.50 <sup>18</sup>	46.56 <sup>367</sup>	53.753 <sup>81</sup>	72.07 <sup>100</sup>
Mar. 10.5	44.71 <sup>13</sup>	68.56 <sup>283</sup>	6.907 <sup>34</sup>	70.10 <sup>251</sup>	9.60 <sup>10</sup>	50.19 <sup>363</sup>	53.834 <sup>40</sup>	72.79 <sup>72</sup>
20.5	44.71 <sup>0</sup>	71.49 <sup>298</sup>	6.941 <sup>8</sup>	72.36 <sup>236</sup>	9.63 <sup>3</sup>	53.72 <sup>334</sup>	53.874 <sup>4</sup>	73.27 <sup>48</sup>
30.5	44.60 <sup>11</sup>	74.40 <sup>291</sup>	6.935 <sup>41</sup>	74.40 <sup>176</sup>	9.58 <sup>5</sup>	57.06 <sup>310</sup>	53.878 <sup>26</sup>	73.50 <sup>23</sup>
	22	279	176	176	11	310	26	4
Apr. 9.4	44.38	77.19	6.894	76.16	9.47	60.16	53.852	73.54
19.4	44.07 <sup>31</sup>	79.71 <sup>252</sup>	6.822 <sup>72</sup>	77.61 <sup>145</sup>	9.31 <sup>16</sup>	62.94 <sup>278</sup>	53.799 <sup>53</sup>	73.38 <sup>16</sup>
29.4	43.68 <sup>29</sup>	81.92 <sup>221</sup>	6.728 <sup>94</sup>	78.77 <sup>116</sup>	9.09 <sup>22</sup>	65.37 <sup>242</sup>	53.724 <sup>75</sup>	73.06 <sup>30</sup>
May 9.3	43.24 <sup>44</sup>	83.73 <sup>181</sup>	6.613 <sup>115</sup>	79.60 <sup>83</sup>	8.82 <sup>27</sup>	67.38 <sup>201</sup>	53.634 <sup>90</sup>	72.67 <sup>41</sup>
19.3	42.76 <sup>49</sup>	85.05 <sup>132</sup>	6.485 <sup>128</sup>	80.09 <sup>49</sup>	8.53 <sup>29</sup>	68.96 <sup>158</sup>	53.585 <sup>99</sup>	72.16 <sup>51</sup>
	50	85	138	18	22	199	107	60
29.3	42.25	85.90	6.347	80.27	8.21	70.65	53.428	71.56
June 8.3	41.73 <sup>52</sup>	86.21 <sup>31</sup>	6.204 <sup>143</sup>	80.12 <sup>15</sup>	7.87 <sup>34</sup>	70.65 <sup>60</sup>	53.320 <sup>108</sup>	70.91 <sup>65</sup>
18.2	41.23 <sup>50</sup>	86.01 <sup>20</sup>	6.060 <sup>144</sup>	79.64 <sup>48</sup>	7.52 <sup>35</sup>	70.75 <sup>10</sup>	53.210 <sup>110</sup>	70.22 <sup>69</sup>
28.2	40.75 <sup>48</sup>	85.26 <sup>75</sup>	5.919 <sup>141</sup>	78.86 <sup>78</sup>	7.17 <sup>35</sup>	70.35 <sup>40</sup>	53.106 <sup>104</sup>	69.53 <sup>69</sup>
July 8.2	40.30 <sup>45</sup>	84.05 <sup>121</sup>	5.785 <sup>124</sup>	77.81 <sup>105</sup>	6.83 <sup>34</sup>	69.45 <sup>90</sup>	53.008 <sup>98</sup>	68.83 <sup>70</sup>
	40	169	126	122	32	137	99	66
18.2	39.90	82.36	5.659	76.49	6.51	68.08	52.918	68.17
28.1	39.56 <sup>34</sup>	80.24 <sup>212</sup>	5.550 <sup>109</sup>	74.96 <sup>152</sup>	6.22 <sup>29</sup>	66.28 <sup>130</sup>	52.843 <sup>75</sup>	67.54 <sup>63</sup>
Aug. 7.1	39.28 <sup>28</sup>	77.73 <sup>251</sup>	5.458 <sup>92</sup>	73.28 <sup>168</sup>	5.97 <sup>25</sup>	64.11 <sup>217</sup>	52.781 <sup>62</sup>	66.99 <sup>55</sup>
17.1	39.07 <sup>21</sup>	74.89 <sup>284</sup>	5.393 <sup>65</sup>	71.48 <sup>180</sup>	5.78 <sup>19</sup>	61.64 <sup>247</sup>	52.768 <sup>43</sup>	66.54 <sup>45</sup>
27.0	38.94 <sup>13</sup>	71.78 <sup>811</sup>	5.356 <sup>27</sup>	69.65 <sup>182</sup>	5.64 <sup>14</sup>	58.94 <sup>270</sup>	52.719 <sup>19</sup>	66.22 <sup>32</sup>
	5	332	2	179	6	232	6	15
Sept. 6.0	38.89	68.45	5.354	67.86	5.58	56.12	52.725	66.07
16.0	38.93 <sup>4</sup>	64.98 <sup>247</sup>	5.390 <sup>38</sup>	66.17 <sup>160</sup>	5.59 <sup>1</sup>	53.27 <sup>285</sup>	52.763 <sup>38</sup>	66.10 <sup>3</sup>
26.0	39.06 <sup>13</sup>	61.43 <sup>355</sup>	5.470 <sup>80</sup>	64.64 <sup>153</sup>	5.69 <sup>10</sup>	50.50 <sup>277</sup>	52.806 <sup>73</sup>	66.37 <sup>27</sup>
Oct. 5.9	39.28 <sup>22</sup>	57.86 <sup>357</sup>	5.593 <sup>122</sup>	63.41 <sup>128</sup>	5.88 <sup>19</sup>	47.94 <sup>256</sup>	52.944 <sup>108</sup>	66.90 <sup>53</sup>
15.9	39.60 <sup>32</sup>	54.35 <sup>351</sup>	5.767 <sup>174</sup>	62.49 <sup>92</sup>	6.15 <sup>27</sup>	45.66 <sup>226</sup>	53.092 <sup>148</sup>	67.69 <sup>79</sup>
	42	335	213	52	24	186	185	106
25.9	40.02	51.00	5.985	61.96	6.50	43.80	53.277	68.74
Nov. 4.9	40.52 <sup>50</sup>	47.86 <sup>314</sup>	6.244 <sup>259</sup>	61.87 <sup>9</sup>	6.98 <sup>42</sup>	42.42 <sup>138</sup>	53.593 <sup>226</sup>	70.06 <sup>122</sup>
14.8	41.10 <sup>58</sup>	45.07 <sup>279</sup>	6.546 <sup>362</sup>	62.26 <sup>39</sup>	7.43 <sup>50</sup>	41.69 <sup>82</sup>	53.761 <sup>258</sup>	71.66 <sup>100</sup>
24.8	41.75 <sup>65</sup>	42.65 <sup>242</sup>	6.876 <sup>320</sup>	63.12 <sup>96</sup>	7.97 <sup>54</sup>	41.37 <sup>23</sup>	54.050 <sup>299</sup>	73.46 <sup>190</sup>
Dec. 4.8	42.45 <sup>70</sup>	40.70 <sup>195</sup>	7.228 <sup>352</sup>	64.42 <sup>120</sup>	8.55 <sup>58</sup>	41.79 <sup>42</sup>	54.262 <sup>322</sup>	75.45 <sup>199</sup>
	73	142	362	173	59	102	322	207
14.7	43.18	39.28	7.590	66.15	9.14	42.81	54.684	77.52
24.7	43.93 <sup>75</sup>	38.43 <sup>85</sup>	7.953 <sup>363</sup>	68.23 <sup>206</sup>	9.72 <sup>58</sup>	44.42 <sup>161</sup>	55.099 <sup>325</sup>	79.85 <sup>213</sup>
34.7	44.67 <sup>74</sup>	38.22 <sup>21</sup>	8.300 <sup>347</sup>	70.64 <sup>241</sup>	10.27 <sup>55</sup>	46.57 <sup>215</sup>	55.328 <sup>317</sup>	81.76 <sup>211</sup>
Mean Place	40.407	81.99	3.845	53.77	4.898	37.64	51.156	54.93
Sec δ, Tan δ	2.892	+2.713	1.172	-0.611	2.172	-1.028	1.090	-0.097
Dψ <sub>a</sub> , D <sub>ω</sub> <sub>a</sub>	+0.071	+0.179	+0.059	-0.040	+0.055	-0.128	+0.061	0.000
Dψ <sub>δ</sub> , D <sub>ω</sub> <sub>δ</sub>	-0.39	+0.15	-0.39	+0.13	-0.39	+0.12	-0.40	+0.12

# APPARENT PLACES OF STARS, 1920.

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FOR THE UPPER TRANSIT AT WASHINGTON.

Washington Mean Time.	α Chamaeleontis, Mag. 5.7			β Draconis, Mag. 5.5			γ Crateris, Mag. 4.9			χ Ursae Majoris, Mag. 3.8		
	Right Ascension.		Declina- tion.	Right Ascension.		Declina- tion.	Right Ascension.		Declina- tion.	Right Ascension.		Declina- tion.
	h	m	°	h	m	°	h	m	°	h	m	°
	11	33	-75 27	11	38	+67 10	11	40	-17 54	11	41	+48 12
	s	"	"	s	"	"	s	"	"	s	"	"
Jan. 0.7	00.81	0.91	2.37	50.84	43.676	22.71	50.911	60.99				
10.7	01.71 <sup>09</sup>	3.17 <sup>298</sup>	3.02 <sup>65</sup>	50.76 <sup>8</sup>	43.997 <sup>831</sup>	25.07 <sup>226</sup>	51.334 <sup>423</sup>	60.26 <sup>73</sup>				
20.7	02.52 <sup>01</sup>	5.91 <sup>374</sup>	3.63 <sup>61</sup>	51.31 <sup>55</sup>	44.203 <sup>206</sup>	27.48 <sup>241</sup>	51.729 <sup>395</sup>	60.06 <sup>18</sup>				
30.6	03.21 <sup>09</sup>	9.07 <sup>316</sup>	4.18 <sup>54</sup>	52.44 <sup>113</sup>	44.555 <sup>293</sup>	29.87 <sup>230</sup>	52.083 <sup>354</sup>	60.44 <sup>36</sup>				
Feb. 9.6	03.78 <sup>57</sup>	12.54 <sup>247</sup>	4.64 <sup>48</sup>	54.10 <sup>106</sup>	44.778 <sup>223</sup>	32.18 <sup>221</sup>	52.387 <sup>304</sup>	61.30 <sup>86</sup>				
	48	268	37	214	179	218	244	133				
19.6	04.21	16.22	5.01	56.24	44.957	34.86	52.681	62.63				
29.5	04.49	20.03	5.27	56.72	45.091	36.94	52.810	64.35				
Mar. 10.5	04.64	23.87	5.42	61.46	45.182	38.12	52.923	66.38				
20.5	04.66	27.66	5.45	64.34	45.231	39.65	52.971	68.60				
30.5	04.55	31.81	5.38	67.24	45.242	40.94	52.960	70.93				
	25	344	16	261	21	108	66	224				
Apr. 9.4	04.80	34.75	5.22	70.05	45.221	41.97	52.894	73.27				
19.4	03.95	37.90	4.97	72.64	45.173	42.76	52.762	75.53				
29.4	03.51	40.72	4.66	74.95	45.101	43.30	52.631	77.60				
May 9.4	02.98	43.18	4.29	76.88	45.013	43.61	52.452	79.43				
19.3	02.38	45.09	3.86	78.37	44.911	43.68	52.253	80.95				
	67	147	44	101	169	15	214	117				
29.3	01.71	46.56	3.42	79.38	44.802	43.53	52.039	82.12				
June 8.3	01.01	47.51	2.98	79.89	44.687	43.17	51.821	82.90				
18.2	00.29	47.92	2.53	79.87	44.569	42.61	51.605	83.28				
28.2	59.57	47.77	2.12	79.34	44.454	41.85	51.397	83.28				
July 8.2	58.86	47.09	1.72	78.32	44.342	40.95	51.201	82.81				
	67	121	37	149	104	164	176	85				
18.2	58.19	45.68	1.35	76.83	44.238	39.91	51.022	81.96				
28.1	57.58	44.19	1.09	74.90	44.145	38.76	50.867	80.72				
Aug. 7.1	57.05	42.05	0.76	72.57	44.068	37.54	50.738	79.13				
17.1	56.62	39.55	0.55	69.89	44.010	36.31	50.638	77.21				
27.1	56.31	36.76	0.41	66.90	43.976	35.11	50.575	74.97				
	27	207	7	321	6	113	24	249				
Sept. 6.0	56.14	33.79	0.34	63.69	43.970	33.98	50.551	72.48				
16.0	56.11	30.70	0.36	60.29	43.998	33.01	50.570	69.77				
26.0	56.24	27.67	0.45	56.77	44.061	32.24	50.637	66.88				
Oct. 5.9	56.52	24.79	0.62	53.21	44.167	31.70	50.754	63.85				
15.9	56.98	22.16	0.88	49.70	44.313	31.50	50.924	60.76				
	69	236	34	341	191	12	224	300				
25.9	57.58	19.90	1.22	46.29	44.504	31.62	51.148	57.67				
Nov. 4.9	58.30	18.12	1.65	43.06	44.735	32.11	51.425	54.65				
14.8	59.16	16.88	2.16	40.13	45.002	32.98	51.751	51.77				
24.8	60.06	16.26	2.73	37.56	45.302	34.92	52.120	49.12				
Dec. 4.8	61.06	15.29	3.35	35.43	45.624	35.80	52.524	46.78				
	99	67	62	152	325	126	426	198				
14.8	62.04	13.96	4.01	33.81	45.959	37.68	52.950	44.78				
24.7	63.02	12.26	4.69	32.76	46.297	39.79	53.386	43.25				
34.7	63.96	10.16	5.38	32.32	46.626	42.07	53.819	42.22				
Mean Place	57.099	13.27	1.503	75.84	43.343	31.38	49.986	82.85				
Sec δ, Tan δ	3.982	-3.855	2.579	+2.377	1.051	-0.323	1.501	+1.119				
D <sub>α</sub> , D <sub>ω</sub>	+0.050	-0.255	+0.067	+0.158	+0.060	-0.021	+0.064	+0.074				
D <sub>γ</sub> , D <sub>δ</sub>	-0.40	+0.11	-0.40	+0.09	-0.40	+0.06	-0.40	+0.06				

APPARENT PLACES OF STARS, 1920.

FOR THE UPPER TRANSIT AT WASHINGTON.

Washington Mean Time.	ε Ursæ Majoris. (Alioth.) Mag. 1.7		δ Virginis. Mag. 3.7		α Can. Ven. seq. Mag. 2.9		δ Muscæ. Mag. 3.6	
	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.
	h m 12 50	° ' " +56 22	h m 12 51	° ' " + 3 49	h m 12 52	° ' " +38 44	h m 12 56	° ' " -71 6
Jan. 0.8	30.868	75.80	35.117	48.10	17.645	42.57	46.41	48.79
10.7	31.363 <sup>495</sup>	74.52 <sup>128</sup>	35.442 <sup>325</sup>	46.04 <sup>206</sup>	18.028 <sup>383</sup>	40.93 <sup>164</sup>	47.23 <sup>82</sup>	50.01 <sup>122</sup>
20.7	31.849 <sup>498</sup>	73.87 <sup>65</sup>	35.757 <sup>315</sup>	44.16 <sup>188</sup>	18.400 <sup>372</sup>	39.81 <sup>112</sup>	48.02 <sup>79</sup>	51.77 <sup>176</sup>
30.7	32.310 <sup>461</sup>	73.82 <sup>5</sup>	36.052 <sup>305</sup>	42.49 <sup>167</sup>	18.753 <sup>353</sup>	39.19 <sup>62</sup>	48.76 <sup>74</sup>	54.02 <sup>225</sup>
Feb. 9.6	32.731 <sup>421</sup>	74.40 <sup>58</sup>	36.320 <sup>288</sup>	41.09 <sup>140</sup>	19.075 <sup>322</sup>	39.11 <sup>8</sup>	49.44 <sup>68</sup>	56.69 <sup>267</sup>
19.6	33.101 <sup>370</sup>	75.55 <sup>115</sup>	36.554 <sup>234</sup>	39.97 <sup>112</sup>	19.359 <sup>284</sup>	39.54 <sup>43</sup>	50.04 <sup>60</sup>	59.70 <sup>301</sup>
29.6	33.407 <sup>306</sup>	77.22 <sup>167</sup>	36.751 <sup>197</sup>	39.17 <sup>89</sup>	19.594 <sup>235</sup>	40.48 <sup>94</sup>	50.53 <sup>40</sup>	62.95 <sup>325</sup>
Mar. 10.6	33.644 <sup>287</sup>	79.31 <sup>200</sup>	36.910 <sup>159</sup>	38.67 <sup>50</sup>	19.780 <sup>186</sup>	41.82 <sup>134</sup>	50.94 <sup>41</sup>	66.38 <sup>343</sup>
20.5	33.809 <sup>165</sup>	81.76 <sup>245</sup>	37.029 <sup>119</sup>	38.47 <sup>20</sup>	19.916 <sup>136</sup>	43.55 <sup>173</sup>	51.25 <sup>31</sup>	69.91 <sup>353</sup>
30.5	33.901 <sup>92</sup>	84.42 <sup>266</sup>	37.119 <sup>84</sup>	38.51 <sup>4</sup>	19.999 <sup>88</sup>	45.52 <sup>197</sup>	51.45 <sup>20</sup>	73.47 <sup>356</sup>
Apr. 9.5	33.923 <sup>22</sup>	87.21 <sup>279</sup>	37.160 <sup>47</sup>	38.80 <sup>29</sup>	20.037 <sup>38</sup>	47.66 <sup>214</sup>	51.55 <sup>10</sup>	76.94 <sup>347</sup>
19.5	33.880 <sup>43</sup>	90.01 <sup>280</sup>	37.178 <sup>18</sup>	39.28 <sup>48</sup>	20.031 <sup>6</sup>	49.89 <sup>223</sup>	51.56 <sup>1</sup>	80.29 <sup>335</sup>
29.4	33.777 <sup>103</sup>	92.71 <sup>270</sup>	37.168 <sup>19</sup>	39.89 <sup>61</sup>	19.984 <sup>47</sup>	52.12 <sup>223</sup>	51.48 <sup>8</sup>	83.44 <sup>315</sup>
May 9.4	33.625 <sup>152</sup>	95.22 <sup>261</sup>	37.134 <sup>34</sup>	40.61 <sup>72</sup>	19.905 <sup>79</sup>	54.26 <sup>214</sup>	51.32 <sup>16</sup>	86.32 <sup>288</sup>
19.4	33.423 <sup>197</sup>	97.44 <sup>232</sup>	37.080 <sup>54</sup>	41.40 <sup>79</sup>	19.797 <sup>108</sup>	56.24 <sup>198</sup>	51.07 <sup>25</sup>	88.88 <sup>256</sup>
29.3	33.196 <sup>232</sup>	99.33 <sup>189</sup>	37.009 <sup>71</sup>	42.22 <sup>82</sup>	19.666 <sup>121</sup>	57.97 <sup>178</sup>	50.74 <sup>33</sup>	91.06 <sup>218</sup>
June 8.3	32.939 <sup>257</sup>	100.82 <sup>149</sup>	36.924 <sup>85</sup>	43.04 <sup>82</sup>	19.515 <sup>151</sup>	59.44 <sup>147</sup>	50.35 <sup>39</sup>	92.81 <sup>175</sup>
18.3	32.663 <sup>276</sup>	101.87 <sup>105</sup>	36.827 <sup>97</sup>	43.84 <sup>80</sup>	19.351 <sup>164</sup>	60.60 <sup>116</sup>	49.91 <sup>44</sup>	94.11 <sup>180</sup>
28.3	32.376 <sup>287</sup>	102.44 <sup>57</sup>	36.722 <sup>105</sup>	44.58 <sup>74</sup>	19.179 <sup>172</sup>	61.37 <sup>77</sup>	49.42 <sup>49</sup>	94.90 <sup>79</sup>
July 8.2	32.086 <sup>290</sup>	102.54 <sup>10</sup>	36.610 <sup>112</sup>	45.27 <sup>69</sup>	18.003 <sup>176</sup>	61.79 <sup>42</sup>	48.91 <sup>51</sup>	95.18 <sup>28</sup>
18.2	31.800 <sup>286</sup>	102.15 <sup>39</sup>	36.496 <sup>114</sup>	45.88 <sup>61</sup>	18.826 <sup>177</sup>	61.82 <sup>3</sup>	48.38 <sup>53</sup>	94.94 <sup>24</sup>
28.2	31.524 <sup>276</sup>	101.29 <sup>86</sup>	36.382 <sup>114</sup>	46.38 <sup>50</sup>	18.655 <sup>171</sup>	61.47 <sup>35</sup>	47.86 <sup>52</sup>	94.17 <sup>77</sup>
Aug. 7.2	31.266 <sup>268</sup>	99.98 <sup>121</sup>	36.272 <sup>110</sup>	46.78 <sup>40</sup>	18.492 <sup>163</sup>	60.73 <sup>74</sup>	47.35 <sup>47</sup>	92.91 <sup>126</sup>
17.1	31.033 <sup>282</sup>	98.24 <sup>174</sup>	36.172 <sup>100</sup>	47.03 <sup>25</sup>	18.345 <sup>147</sup>	59.64 <sup>109</sup>	46.88 <sup>51</sup>	91.18 <sup>173</sup>
27.1	30.832 <sup>201</sup>	96.09 <sup>215</sup>	36.066 <sup>86</sup>	47.13 <sup>10</sup>	18.218 <sup>127</sup>	58.19 <sup>145</sup>	46.48 <sup>40</sup>	89.05 <sup>213</sup>
Sept. 6.1	30.669 <sup>168</sup>	93.57 <sup>262</sup>	36.020 <sup>66</sup>	47.05 <sup>8</sup>	18.115 <sup>108</sup>	56.89 <sup>180</sup>	46.48 <sup>32</sup>	86.57 <sup>248</sup>
16.0	30.552 <sup>117</sup>	90.74 <sup>283</sup>	35.979 <sup>41</sup>	46.77 <sup>28</sup>	18.047 <sup>66</sup>	54.30 <sup>209</sup>	45.16 <sup>23</sup>	83.85 <sup>272</sup>
26.0	30.489 <sup>68</sup>	87.65 <sup>309</sup>	35.970 <sup>9</sup>	46.28 <sup>49</sup>	18.014 <sup>35</sup>	51.90 <sup>240</sup>	45.93 <sup>12</sup>	80.97 <sup>288</sup>
Oct. 6.0	30.485 <sup>4</sup>	84.33 <sup>322</sup>	35.997 <sup>27</sup>	45.54 <sup>74</sup>	18.028 <sup>14</sup>	49.29 <sup>261</sup>	45.81 <sup>0</sup>	78.04 <sup>293</sup>
16.0	30.546 <sup>61</sup>	80.88 <sup>345</sup>	36.066 <sup>69</sup>	44.56 <sup>96</sup>	18.063 <sup>60</sup>	46.45 <sup>234</sup>	45.95 <sup>14</sup>	75.18 <sup>286</sup>
25.9	30.675 <sup>129</sup>	77.35 <sup>353</sup>	36.177 <sup>111</sup>	43.33 <sup>123</sup>	18.200 <sup>112</sup>	48.47 <sup>286</sup>	46.22 <sup>27</sup>	72.51 <sup>267</sup>
Nov. 4.9	30.874 <sup>199</sup>	73.82 <sup>353</sup>	36.334 <sup>157</sup>	41.85 <sup>148</sup>	18.365 <sup>165</sup>	40.40 <sup>307</sup>	46.61 <sup>39</sup>	70.13 <sup>233</sup>
14.9	31.141 <sup>267</sup>	70.38 <sup>344</sup>	36.534 <sup>200</sup>	40.15 <sup>170</sup>	18.581 <sup>216</sup>	37.82 <sup>306</sup>	47.13 <sup>52</sup>	68.15 <sup>193</sup>
24.9	31.475 <sup>334</sup>	67.14 <sup>324</sup>	36.773 <sup>239</sup>	38.27 <sup>188</sup>	18.848 <sup>267</sup>	34.30 <sup>302</sup>	47.76 <sup>63</sup>	66.65 <sup>150</sup>
Dec. 4.8	31.865 <sup>390</sup>	64.18 <sup>296</sup>	37.048 <sup>275</sup>	36.23 <sup>204</sup>	19.155 <sup>307</sup>	31.43 <sup>287</sup>	48.47 <sup>71</sup>	65.70 <sup>95</sup>
14.8	32.303 <sup>438</sup>	61.58 <sup>290</sup>	37.349 <sup>301</sup>	34.10 <sup>213</sup>	19.492 <sup>344</sup>	28.79 <sup>264</sup>	48.47 <sup>77</sup>	65.70 <sup>35</sup>
24.8	32.775 <sup>472</sup>	59.43 <sup>215</sup>	37.666 <sup>817</sup>	31.95 <sup>215</sup>	19.866 <sup>367</sup>	26.50 <sup>239</sup>	49.24 <sup>81</sup>	65.35 <sup>25</sup>
34.7	33.266 <sup>491</sup>	57.82 <sup>161</sup>	37.991 <sup>325</sup>	29.83 <sup>212</sup>	20.246 <sup>380</sup>	24.58 <sup>192</sup>	50.05 <sup>81</sup>	65.60 <sup>25</sup>
34.7	33.266 <sup>491</sup>	57.82 <sup>161</sup>	37.991 <sup>325</sup>	29.83 <sup>212</sup>	20.246 <sup>380</sup>	24.58 <sup>192</sup>	50.86 <sup>81</sup>	66.45 <sup>85</sup>
Mean Place	30.878	97.74	34.371	54.99	17.286	60.55	44.489	63.57
Sec δ, Tan δ	1.807	+1.504	1.002	+0.067	1.282	+0.802	3.090	-2.924
D <sub>γ</sub> α, D <sub>ω</sub> α	+0.052	+0.098	+0.061	+0.004	+0.056	+0.052	+0.080	-0.189
D <sub>γ</sub> δ, D <sub>ω</sub> δ	-0.39	-0.22	-0.39	-0.22	-0.39	-0.23	-0.39	-0.25

FOR THE UPPER TRANSIT AT WASHINGTON.

Washington Mean Time.	ε Virginis. Mag. 3.0		θ Virginis. Mag. 4.4		43 Comae. Mag. 4.3		20 Canum Venet. Mag. 4.7	
	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.
	h m 12 58	° ' " +11 22	h m 13 5	° ' " - 5 6	h m 13 8	° ' " +28 16	h m 13 13	° ' " +40 59
Jan. 0.8	12.310 <sup>328</sup>	70.48 <sup>201</sup>	49.065 <sup>337</sup>	47.34 <sup>205</sup>	8.910 <sup>349</sup>	45.76 <sup>190</sup>	57.667 <sup>367</sup>	18.95 <sup>179</sup>
10.7	12.638 <sup>320</sup>	68.47 <sup>178</sup>	49.412 <sup>321</sup>	49.39 <sup>197</sup>	9.259 <sup>344</sup>	43.86 <sup>147</sup>	58.054 <sup>385</sup>	17.16 <sup>129</sup>
20.7	12.958 <sup>302</sup>	66.89 <sup>147</sup>	49.733 <sup>293</sup>	51.36 <sup>188</sup>	9.603 <sup>328</sup>	42.39 <sup>108</sup>	58.439 <sup>370</sup>	15.87 <sup>74</sup>
30.7	13.260 <sup>276</sup>	65.22 <sup>115</sup>	50.036 <sup>277</sup>	53.24 <sup>170</sup>	9.931 <sup>268</sup>	41.36 <sup>8</sup>	58.809 <sup>342</sup>	15.13 <sup>19</sup>
Feb. 9.7	13.586 <sup>242</sup>	64.07 <sup>78</sup>	50.313 <sup>245</sup>	54.94 <sup>147</sup>	10.232 <sup>208</sup>	40.80 <sup>8</sup>	59.151 <sup>307</sup>	14.04 <sup>37</sup>
19.6	13.778 <sup>205</sup>	63.29 <sup>44</sup>	50.558 <sup>211</sup>	56.41 <sup>123</sup>	10.500 <sup>228</sup>	40.72 <sup>39</sup>	59.458 <sup>262</sup>	15.31 <sup>89</sup>
29.6	13.983 <sup>167</sup>	62.85 <sup>6</sup>	50.789 <sup>173</sup>	57.63 <sup>100</sup>	10.728 <sup>187</sup>	41.11 <sup>81</sup>	59.721 <sup>214</sup>	16.20 <sup>126</sup>
Mar. 10.6	14.150 <sup>126</sup>	62.79 <sup>28</sup>	50.941 <sup>137</sup>	58.63 <sup>72</sup>	10.915 <sup>142</sup>	41.92 <sup>118</sup>	59.935 <sup>164</sup>	17.56 <sup>175</sup>
20.6	14.276 <sup>91</sup>	63.02 <sup>49</sup>	51.078 <sup>99</sup>	59.35 <sup>47</sup>	11.057 <sup>99</sup>	43.10 <sup>147</sup>	60.099 <sup>113</sup>	19.31 <sup>205</sup>
30.5	14.367 <sup>52</sup>	63.51 <sup>76</sup>	51.177 <sup>68</sup>	59.82 <sup>24</sup>	11.156 <sup>58</sup>	44.57 <sup>171</sup>	60.212 <sup>64</sup>	21.36 <sup>226</sup>
Apr. 9.5	14.419 <sup>24</sup>	64.27 <sup>91</sup>	51.245 <sup>34</sup>	60.06 <sup>6</sup>	11.214 <sup>19</sup>	46.28 <sup>184</sup>	60.276 <sup>17</sup>	23.62 <sup>238</sup>
19.5	14.443 <sup>10</sup>	65.18 <sup>104</sup>	51.279 <sup>9</sup>	60.12 <sup>13</sup>	11.233 <sup>15</sup>	48.12 <sup>190</sup>	60.293 <sup>26</sup>	26.00 <sup>240</sup>
29.4	14.433 <sup>31</sup>	66.22 <sup>110</sup>	51.288 <sup>19</sup>	59.99 <sup>30</sup>	11.218 <sup>44</sup>	50.02 <sup>189</sup>	60.267 <sup>63</sup>	28.40 <sup>233</sup>
May 9.4	14.402 <sup>54</sup>	67.32 <sup>113</sup>	51.269 <sup>38</sup>	59.70 <sup>41</sup>	11.174 <sup>71</sup>	51.91 <sup>181</sup>	60.204 <sup>95</sup>	30.72 <sup>217</sup>
19.4	14.346 <sup>74</sup>	68.45 <sup>110</sup>	51.231 <sup>59</sup>	59.29 <sup>51</sup>	11.103 <sup>96</sup>	53.72 <sup>166</sup>	60.109 <sup>125</sup>	32.89 <sup>196</sup>
29.4	14.272 <sup>87</sup>	69.55 <sup>103</sup>	51.172 <sup>75</sup>	58.78 <sup>55</sup>	11.010 <sup>111</sup>	55.38 <sup>146</sup>	59.984 <sup>146</sup>	34.85 <sup>166</sup>
June 8.3	14.185 <sup>98</sup>	70.58 <sup>98</sup>	51.097 <sup>89</sup>	58.23 <sup>62</sup>	10.899 <sup>128</sup>	56.86 <sup>123</sup>	59.838 <sup>165</sup>	36.51 <sup>134</sup>
18.3	14.085 <sup>110</sup>	71.53 <sup>84</sup>	51.008 <sup>102</sup>	57.61 <sup>68</sup>	10.773 <sup>128</sup>	58.09 <sup>98</sup>	59.673 <sup>178</sup>	37.85 <sup>99</sup>
28.3	13.975 <sup>116</sup>	72.87 <sup>62</sup>	50.906 <sup>109</sup>	56.93 <sup>65</sup>	10.635 <sup>145</sup>	59.07 <sup>68</sup>	59.495 <sup>187</sup>	38.84 <sup>59</sup>
July 8.3	13.859 <sup>120</sup>	73.06 <sup>58</sup>	50.797 <sup>115</sup>	56.25 <sup>68</sup>	10.490 <sup>150</sup>	59.75 <sup>37</sup>	59.308 <sup>192</sup>	39.43 <sup>18</sup>
18.2	13.739 <sup>130</sup>	73.59 <sup>36</sup>	50.682 <sup>117</sup>	55.57 <sup>65</sup>	10.340 <sup>149</sup>	60.12 <sup>7</sup>	59.116 <sup>191</sup>	39.61 <sup>22</sup>
28.2	13.619 <sup>116</sup>	73.95 <sup>20</sup>	50.565 <sup>114</sup>	54.91 <sup>62</sup>	10.191 <sup>145</sup>	60.19 <sup>27</sup>	58.925 <sup>185</sup>	39.39 <sup>62</sup>
Aug. 7.2	13.503 <sup>108</sup>	74.15 <sup>1</sup>	50.451 <sup>109</sup>	54.29 <sup>57</sup>	10.046 <sup>136</sup>	59.92 <sup>59</sup>	58.740 <sup>173</sup>	38.77 <sup>102</sup>
17.1	13.395 <sup>98</sup>	74.14 <sup>24</sup>	50.342 <sup>97</sup>	53.72 <sup>47</sup>	9.910 <sup>120</sup>	59.33 <sup>50</sup>	58.567 <sup>155</sup>	37.75 <sup>140</sup>
27.1	13.302 <sup>78</sup>	73.90 <sup>44</sup>	50.245 <sup>74</sup>	53.25 <sup>38</sup>	9.790 <sup>100</sup>	58.43 <sup>123</sup>	58.412 <sup>132</sup>	36.35 <sup>177</sup>
Sept. 6.1	13.227 <sup>48</sup>	73.46 <sup>69</sup>	50.170 <sup>54</sup>	52.87 <sup>28</sup>	9.690 <sup>78</sup>	57.21 <sup>152</sup>	58.280 <sup>101</sup>	34.58 <sup>211</sup>
16.1	13.179 <sup>17</sup>	72.77 <sup>94</sup>	50.116 <sup>18</sup>	52.66 <sup>2</sup>	9.617 <sup>40</sup>	55.69 <sup>180</sup>	58.179 <sup>64</sup>	32.47 <sup>240</sup>
26.0	13.162 <sup>18</sup>	71.83 <sup>116</sup>	50.098 <sup>14</sup>	52.64 <sup>19</sup>	9.577 <sup>2</sup>	58.89 <sup>206</sup>	58.115 <sup>20</sup>	30.07 <sup>269</sup>
Oct. 6.0	13.180 <sup>61</sup>	70.67 <sup>144</sup>	50.112 <sup>58</sup>	52.83 <sup>42</sup>	9.575 <sup>42</sup>	51.81 <sup>220</sup>	58.095 <sup>29</sup>	27.88 <sup>290</sup>
16.0	13.241 <sup>104</sup>	69.23 <sup>165</sup>	50.170 <sup>102</sup>	53.25 <sup>68</sup>	9.617 <sup>89</sup>	49.51 <sup>251</sup>	58.124 <sup>82</sup>	24.48 <sup>306</sup>
25.9	13.345 <sup>149</sup>	67.57 <sup>183</sup>	50.272 <sup>147</sup>	53.93 <sup>94</sup>	9.706 <sup>133</sup>	47.00 <sup>266</sup>	58.206 <sup>138</sup>	21.40 <sup>317</sup>
Nov. 4.9	13.494 <sup>193</sup>	65.71 <sup>207</sup>	50.419 <sup>194</sup>	54.87 <sup>123</sup>	9.844 <sup>188</sup>	44.34 <sup>278</sup>	58.344 <sup>193</sup>	18.28 <sup>321</sup>
14.9	13.687 <sup>235</sup>	63.64 <sup>219</sup>	50.613 <sup>238</sup>	56.10 <sup>148</sup>	10.032 <sup>233</sup>	41.58 <sup>278</sup>	58.537 <sup>246</sup>	15.02 <sup>316</sup>
24.9	13.922 <sup>279</sup>	61.45 <sup>239</sup>	50.846 <sup>271</sup>	57.58 <sup>167</sup>	10.265 <sup>275</sup>	38.80 <sup>274</sup>	58.783 <sup>294</sup>	11.86 <sup>280</sup>
Dec. 4.8	14.192 <sup>309</sup>	59.17 <sup>269</sup>	51.117 <sup>299</sup>	59.25 <sup>187</sup>	10.540 <sup>306</sup>	36.06 <sup>289</sup>	59.077 <sup>334</sup>	8.84 <sup>290</sup>
14.8	14.491 <sup>316</sup>	56.67 <sup>285</sup>	51.416 <sup>317</sup>	61.12 <sup>198</sup>	10.848 <sup>332</sup>	33.46 <sup>299</sup>	59.411 <sup>365</sup>	6.04 <sup>247</sup>
24.8	14.809 <sup>327</sup>	54.62 <sup>311</sup>	51.733 <sup>325</sup>	63.10 <sup>204</sup>	11.180 <sup>345</sup>	31.07 <sup>300</sup>	59.776 <sup>382</sup>	3.57 <sup>297</sup>
34.8	15.136 <sup>327</sup>	52.51 <sup>321</sup>	52.058 <sup>325</sup>	65.14 <sup>204</sup>	11.525 <sup>345</sup>	28.98 <sup>300</sup>	60.158 <sup>382</sup>	1.50 <sup>307</sup>
Mean Place	11.673	79.79	48.346	44.06	8.525	60.18	57.583	36.62
Sec δ, Tan δ	1.020	+0.201	1.004	-0.690	1.136	+0.538	1.925	+0.869
D <sub>δ</sub> , D <sub>α</sub>	+0.060	+0.013	+0.062	-0.006	+0.057	+0.634	+0.054	+0.055
D <sub>δ</sub> , D <sub>α</sub>	-0.39	-0.25	-0.38	+0.23	-0.38	-0.29	-0.38	-0.32

APPARENT PLACES OF STARS, 1920.

FOR THE UPPER TRANSIT AT WASHINGTON.

Washington Mean Time.	$\beta$ Leonis. (Denebola.) Mag. 2.2		$\beta$ Virginis: Mag. 3.8		Greenbridge 1536: Mag. 6.5		7 Ursae Majoris. Mag. 2.5	
	Right Ascension.	Declination.	Right Ascension.	Declination.	Right Ascension.	Declination.	Right Ascension.	Declination.
	h m s	° ' "	h m s	° ' "	h m s	° ' "	h m s	° ' "
	11 44	+15 0	11 46	+ 2 12	11 48	+38 16	11 49	+54 7
Jan. 0.7	59.918	57.92	32.832	48.14	23.329	75.24	58.053	59.43
10.7	60.289 <sup>321</sup>	55.23 <sup>174</sup>	33.148 <sup>316</sup>	46.12 <sup>202</sup>	23.714 <sup>365</sup>	74.00 <sup>124</sup>	59.124 <sup>471</sup>	58.83 <sup>60</sup>
20.7	60.587 <sup>298</sup>	53.85 <sup>143</sup>	33.441 <sup>293</sup>	44.24 <sup>188</sup>	24.076 <sup>363</sup>	73.21 <sup>79</sup>	59.566 <sup>442</sup>	58.79 <sup>4</sup>
30.6	60.806 <sup>280</sup>	52.73 <sup>112</sup>	33.705 <sup>284</sup>	42.58 <sup>166</sup>	24.403 <sup>327</sup>	72.94 <sup>27</sup>	59.965 <sup>390</sup>	59.31 <sup>52</sup>
Feb. 9.6	61.034 <sup>228</sup>	51.94 <sup>79</sup>	33.931 <sup>226</sup>	41.15 <sup>143</sup>	24.686 <sup>288</sup>	73.14 <sup>346</sup>	40.311 <sup>346</sup>	60.34 <sup>103</sup>
19.6	61.222 <sup>188</sup>	51.59 <sup>44</sup>	34.115 <sup>184</sup>	40.02 <sup>113</sup>	24.919 <sup>233</sup>	73.78 <sup>94</sup>	40.591 <sup>280</sup>	61.90 <sup>156</sup>
29.6	61.363 <sup>141</sup>	51.40 <sup>19</sup>	34.256 <sup>141</sup>	39.15 <sup>87</sup>	25.095 <sup>178</sup>	74.83 <sup>105</sup>	40.798 <sup>207</sup>	63.84 <sup>194</sup>
Mar. 10.5	61.459 <sup>98</sup>	51.61 <sup>21</sup>	34.353 <sup>97</sup>	38.57 <sup>56</sup>	25.216 <sup>121</sup>	76.21 <sup>133</sup>	40.984 <sup>136</sup>	66.11 <sup>227</sup>
20.5	61.510 <sup>51</sup>	52.08 <sup>47</sup>	34.409 <sup>56</sup>	38.24 <sup>33</sup>	25.284 <sup>68</sup>	77.82 <sup>161</sup>	40.994 <sup>60</sup>	68.57 <sup>246</sup>
30.5	61.524 <sup>14</sup>	52.74 <sup>66</sup>	34.429 <sup>20</sup>	38.16 <sup>8</sup>	25.300 <sup>16</sup>	79.58 <sup>178</sup>	40.968 <sup>6</sup>	71.13 <sup>256</sup>
Apr. 9.4	61.503 <sup>21</sup>	53.59 <sup>85</sup>	34.415 <sup>14</sup>	38.28 <sup>12</sup>	25.270 <sup>30</sup>	81.41 <sup>183</sup>	40.918 <sup>70</sup>	73.69 <sup>256</sup>
19.4	61.451 <sup>52</sup>	54.54 <sup>95</sup>	34.374 <sup>41</sup>	38.58 <sup>30</sup>	25.202 <sup>68</sup>	83.21 <sup>180</sup>	40.791 <sup>137</sup>	76.13 <sup>244</sup>
29.4	61.378 <sup>73</sup>	55.55 <sup>101</sup>	34.311 <sup>63</sup>	39.00 <sup>42</sup>	25.103 <sup>99</sup>	84.93 <sup>172</sup>	40.620 <sup>171</sup>	78.38 <sup>225</sup>
May 9.4	61.285 <sup>93</sup>	56.56 <sup>101</sup>	34.231 <sup>80</sup>	39.53 <sup>53</sup>	24.977 <sup>126</sup>	86.49 <sup>156</sup>	40.412 <sup>208</sup>	80.37 <sup>199</sup>
19.3	61.180 <sup>105</sup>	57.54 <sup>98</sup>	34.138 <sup>98</sup>	40.13 <sup>66</sup>	24.836 <sup>141</sup>	87.80 <sup>181</sup>	40.179 <sup>233</sup>	81.99 <sup>162</sup>
29.3	61.066 <sup>114</sup>	58.45 <sup>91</sup>	34.037 <sup>101</sup>	40.78 <sup>66</sup>	24.682 <sup>154</sup>	88.85 <sup>106</sup>	39.925 <sup>254</sup>	83.24 <sup>125</sup>
June 8.3	60.951 <sup>115</sup>	59.28 <sup>81</sup>	33.932 <sup>105</sup>	41.46 <sup>68</sup>	24.525 <sup>157</sup>	89.59 <sup>74</sup>	39.666 <sup>269</sup>	84.04 <sup>80</sup>
18.3	60.834 <sup>117</sup>	59.95 <sup>69</sup>	33.825 <sup>107</sup>	42.14 <sup>68</sup>	24.365 <sup>100</sup>	90.00 <sup>41</sup>	39.404 <sup>262</sup>	84.43 <sup>39</sup>
28.2	60.719 <sup>115</sup>	60.52 <sup>57</sup>	33.721 <sup>104</sup>	42.82 <sup>68</sup>	24.211 <sup>154</sup>	90.07 <sup>7</sup>	39.152 <sup>262</sup>	84.35 <sup>8</sup>
July 8.2	60.608 <sup>111</sup>	60.94 <sup>42</sup>	33.620 <sup>101</sup>	43.45 <sup>68</sup>	24.066 <sup>145</sup>	89.79 <sup>26</sup>	38.912 <sup>240</sup>	83.81 <sup>54</sup>
18.2	60.509 <sup>99</sup>	61.17 <sup>23</sup>	33.528 <sup>92</sup>	44.05 <sup>60</sup>	23.933 <sup>133</sup>	89.16 <sup>68</sup>	38.690 <sup>222</sup>	82.84 <sup>97</sup>
28.1	60.423 <sup>85</sup>	61.22 <sup>5</sup>	33.445 <sup>83</sup>	44.56 <sup>51</sup>	23.816 <sup>117</sup>	88.20 <sup>95</sup>	38.490 <sup>210</sup>	81.47 <sup>137</sup>
Aug. 7.1	60.349 <sup>74</sup>	61.11 <sup>11</sup>	33.378 <sup>69</sup>	44.99 <sup>48</sup>	23.720 <sup>95</sup>	86.91 <sup>139</sup>	38.325 <sup>165</sup>	79.68 <sup>179</sup>
17.1	60.294 <sup>55</sup>	60.78 <sup>33</sup>	33.324 <sup>52</sup>	45.29 <sup>30</sup>	23.647 <sup>73</sup>	85.90 <sup>161</sup>	38.191 <sup>134</sup>	77.55 <sup>213</sup>
27.1	60.261 <sup>33</sup>	60.26 <sup>52</sup>	33.294 <sup>30</sup>	45.46 <sup>17</sup>	23.604 <sup>43</sup>	83.40 <sup>190</sup>	38.100 <sup>91</sup>	75.10 <sup>245</sup>
Sept. 6.0	60.255 <sup>6</sup>	59.51 <sup>75</sup>	33.290 <sup>4</sup>	45.45 <sup>1</sup>	23.591 <sup>13</sup>	81.24 <sup>215</sup>	38.051 <sup>49</sup>	72.88 <sup>272</sup>
16.0	60.280 <sup>25</sup>	58.55 <sup>96</sup>	33.315 <sup>25</sup>	45.25 <sup>20</sup>	23.615 <sup>24</sup>	78.84 <sup>240</sup>	38.053 <sup>2</sup>	69.44 <sup>294</sup>
26.0	60.338 <sup>58</sup>	57.35 <sup>129</sup>	33.373 <sup>58</sup>	44.82 <sup>43</sup>	23.681 <sup>66</sup>	76.22 <sup>262</sup>	38.109 <sup>56</sup>	66.30 <sup>314</sup>
Oct. 6.0	60.484 <sup>96</sup>	55.91 <sup>144</sup>	33.469 <sup>96</sup>	44.14 <sup>68</sup>	23.790 <sup>109</sup>	73.45 <sup>277</sup>	38.223 <sup>114</sup>	63.06 <sup>324</sup>
15.9	60.570 <sup>136</sup>	54.29 <sup>162</sup>	33.605 <sup>136</sup>	43.20 <sup>94</sup>	23.945 <sup>155</sup>	70.53 <sup>202</sup>	38.895 <sup>172</sup>	59.77 <sup>329</sup>
25.9	60.746 <sup>176</sup>	52.45 <sup>184</sup>	33.781 <sup>176</sup>	42.01 <sup>119</sup>	24.148 <sup>203</sup>	67.55 <sup>206</sup>	38.629 <sup>234</sup>	56.49 <sup>328</sup>
Nov. 4.9	60.982 <sup>216</sup>	50.44 <sup>201</sup>	33.996 <sup>215</sup>	40.56 <sup>145</sup>	24.398 <sup>250</sup>	64.57 <sup>208</sup>	38.922 <sup>293</sup>	53.30 <sup>319</sup>
14.8	61.216 <sup>254</sup>	48.30 <sup>214</sup>	34.249 <sup>263</sup>	38.88 <sup>108</sup>	24.693 <sup>295</sup>	61.05 <sup>202</sup>	39.269 <sup>347</sup>	50.31 <sup>299</sup>
24.8	61.501 <sup>285</sup>	46.09 <sup>221</sup>	34.530 <sup>281</sup>	37.01 <sup>167</sup>	25.026 <sup>333</sup>	58.85 <sup>202</sup>	39.671 <sup>462</sup>	47.56 <sup>275</sup>
Dec. 4.8	61.811 <sup>310</sup>	43.86 <sup>223</sup>	34.839 <sup>300</sup>	34.98 <sup>206</sup>	25.390 <sup>394</sup>	56.27 <sup>206</sup>	40.108 <sup>437</sup>	45.17 <sup>238</sup>
14.8	62.138 <sup>327</sup>	41.70 <sup>216</sup>	35.161 <sup>322</sup>	32.87 <sup>211</sup>	25.775 <sup>385</sup>	58.98 <sup>239</sup>	40.574 <sup>466</sup>	43.18 <sup>199</sup>
24.7	62.471 <sup>353</sup>	39.65 <sup>205</sup>	35.488 <sup>327</sup>	30.75 <sup>223</sup>	26.170 <sup>395</sup>	52.04 <sup>194</sup>	41.054 <sup>480</sup>	41.70 <sup>148</sup>
34.7	62.798 <sup>327</sup>	37.78 <sup>167</sup>	35.812 <sup>324</sup>	28.66 <sup>209</sup>	26.562 <sup>392</sup>	50.52 <sup>162</sup>	41.583 <sup>479</sup>	40.73 <sup>97</sup>
Mean Place	58.839	69.56	31.686	56.31	22.410	94.69	37.859	82.41
Sec $\delta$ , Tan $\delta$	1.035	+0.268	1.001	+0.039	1.274	+0.789	1.707	+1.363
$D_{\alpha}$ , $D_{\delta}$	+0.062	+0.018	+0.061	+0.003	+0.062	+0.053	+0.063	+0.062
$D_{\alpha}$ , $D_{\delta}$	-0.49	+0.07	-0.40	+0.06	-0.40	+0.06	-0.40	+0.05



FOR THE UPPER TRANSIT AT WASHINGTON.

Washington Mean Time.	γ Virginia. Mag. 4.6		ο Virginia. Mag. 4.2		δ Centauri. Mag. 2.9		ε Corvi. Mag. 3.2	
	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.
	h m 11 56	° ' " + 7 3	h m 12 1	° ' " + 9 10	h m 12 4	° ' " -50 16	h m 12 6	° ' " -22 10
Jan. 0.7	47.457	27.90	9.091	27.70	13.942	28.29	1.685	28.84
10.7	47.775 <sup>318</sup>	25.96 <sup>104</sup>	9.411 <sup>230</sup>	25.80 <sup>180</sup>	14.381 <sup>480</sup>	30.53 <sup>224</sup>	2.020 <sup>335</sup>	31.13 <sup>220</sup>
20.7	48.074 <sup>280</sup>	24.24 <sup>172</sup>	9.712 <sup>201</sup>	24.11 <sup>160</sup>	14.790 <sup>400</sup>	33.14 <sup>261</sup>	2.338 <sup>316</sup>	33.51 <sup>238</sup>
30.6	48.345 <sup>271</sup>	22.75 <sup>149</sup>	9.987 <sup>278</sup>	22.71 <sup>140</sup>	15.157 <sup>367</sup>	36.02 <sup>288</sup>	2.621 <sup>285</sup>	35.94 <sup>243</sup>
Feb. 9.6	48.578 <sup>233</sup>	21.56 <sup>119</sup>	10.224 <sup>237</sup>	21.61 <sup>110</sup>	15.474 <sup>317</sup>	39.13 <sup>311</sup>	2.870 <sup>249</sup>	38.33 <sup>239</sup>
19.6	48.772 <sup>194</sup>	20.66 <sup>90</sup>	10.421 <sup>197</sup>	20.61 <sup>80</sup>	15.735 <sup>268</sup>	42.34 <sup>321</sup>	3.075 <sup>205</sup>	40.64 <sup>231</sup>
29.6	48.921 <sup>140</sup>	20.08 <sup>58</sup>	10.577 <sup>156</sup>	20.35 <sup>46</sup>	15.938 <sup>208</sup>	45.61 <sup>337</sup>	3.240 <sup>165</sup>	42.81 <sup>217</sup>
Mar. 10.5	49.030 <sup>100</sup>	19.81 <sup>27</sup>	10.687 <sup>110</sup>	20.19 <sup>16</sup>	16.084 <sup>16</sup>	48.83 <sup>322</sup>	3.358 <sup>118</sup>	44.79 <sup>198</sup>
20.5	49.095 <sup>65</sup>	19.78 <sup>3</sup>	10.756 <sup>69</sup>	20.31 <sup>12</sup>	16.171 <sup>87</sup>	51.94 <sup>261</sup>	3.437 <sup>79</sup>	46.57 <sup>178</sup>
30.5	49.120 <sup>25</sup>	20.00 <sup>22</sup>	10.787 <sup>31</sup>	20.66 <sup>35</sup>	16.268 <sup>37</sup>	54.89 <sup>295</sup>	3.476 <sup>39</sup>	48.12 <sup>155</sup>
Apr. 9.5	49.116 <sup>4</sup>	20.42 <sup>42</sup>	10.787 <sup>0</sup>	21.20 <sup>54</sup>	16.195 <sup>13</sup>	57.63 <sup>274</sup>	3.481 <sup>5</sup>	49.40 <sup>128</sup>
19.4	49.080 <sup>28</sup>	20.98 <sup>86</sup>	10.754 <sup>38</sup>	21.37 <sup>67</sup>	16.137 <sup>58</sup>	60.10 <sup>247</sup>	3.458 <sup>25</sup>	50.44 <sup>104</sup>
29.4	49.022 <sup>58</sup>	21.65 <sup>67</sup>	10.698 <sup>54</sup>	22.68 <sup>81</sup>	16.041 <sup>96</sup>	62.25 <sup>215</sup>	3.407 <sup>49</sup>	51.26 <sup>82</sup>
May 9.4	48.944 <sup>78</sup>	22.41 <sup>76</sup>	10.621 <sup>77</sup>	23.52 <sup>94</sup>	15.911 <sup>180</sup>	64.05 <sup>180</sup>	3.334 <sup>73</sup>	51.81 <sup>55</sup>
19.3	48.855 <sup>89</sup>	23.19 <sup>73</sup>	10.532 <sup>89</sup>	24.39 <sup>87</sup>	15.753 <sup>158</sup>	65.48 <sup>143</sup>	3.245 <sup>89</sup>	52.10 <sup>29</sup>
29.3	48.754 <sup>101</sup>	23.98 <sup>79</sup>	10.432 <sup>100</sup>	25.25 <sup>86</sup>	15.572 <sup>181</sup>	66.50 <sup>102</sup>	3.145 <sup>100</sup>	52.17 <sup>7</sup>
June 8.3	48.647 <sup>107</sup>	24.75 <sup>77</sup>	10.324 <sup>208</sup>	26.06 <sup>81</sup>	15.372 <sup>260</sup>	67.11 <sup>61</sup>	3.033 <sup>112</sup>	52.00 <sup>17</sup>
18.3	48.539 <sup>108</sup>	25.48 <sup>73</sup>	10.214 <sup>110</sup>	26.80 <sup>74</sup>	15.180 <sup>212</sup>	67.29 <sup>18</sup>	2.913 <sup>120</sup>	51.59 <sup>41</sup>
28.2	48.428 <sup>111</sup>	26.14 <sup>66</sup>	10.108 <sup>111</sup>	27.45 <sup>66</sup>	14.941 <sup>219</sup>	67.08 <sup>26</sup>	2.791 <sup>122</sup>	50.99 <sup>60</sup>
July 8.2	48.324 <sup>104</sup>	26.72 <sup>58</sup>	9.995 <sup>108</sup>	28.03 <sup>58</sup>	14.720 <sup>231</sup>	66.86 <sup>67</sup>	2.669 <sup>122</sup>	50.17 <sup>82</sup>
18.2	48.225 <sup>99</sup>	27.21 <sup>49</sup>	9.883 <sup>102</sup>	28.47 <sup>44</sup>	14.504 <sup>216</sup>	65.27 <sup>160</sup>	2.548 <sup>121</sup>	49.18 <sup>99</sup>
28.2	48.132 <sup>93</sup>	27.59 <sup>38</sup>	9.798 <sup>95</sup>	28.77 <sup>30</sup>	14.300 <sup>204</sup>	63.80 <sup>147</sup>	2.436 <sup>112</sup>	48.04 <sup>114</sup>
Aug. 7.1	48.055 <sup>87</sup>	27.83 <sup>24</sup>	9.717 <sup>81</sup>	28.93 <sup>16</sup>	14.118 <sup>182</sup>	62.00 <sup>180</sup>	2.338 <sup>98</sup>	46.81 <sup>123</sup>
17.1	47.995 <sup>80</sup>	27.89 <sup>6</sup>	9.652 <sup>65</sup>	28.92 <sup>1</sup>	13.965 <sup>158</sup>	59.93 <sup>267</sup>	2.254 <sup>84</sup>	45.51 <sup>130</sup>
27.1	47.953 <sup>43</sup>	27.82 <sup>7</sup>	9.606 <sup>44</sup>	28.72 <sup>20</sup>	13.847 <sup>118</sup>	57.66 <sup>237</sup>	2.195 <sup>59</sup>	44.18 <sup>133</sup>
Sept. 6.0	47.939 <sup>14</sup>	27.54 <sup>28</sup>	9.587 <sup>19</sup>	28.32 <sup>40</sup>	13.775 <sup>72</sup>	55.28 <sup>240</sup>	2.163 <sup>32</sup>	42.87 <sup>131</sup>
16.0	47.952 <sup>13</sup>	27.04 <sup>50</sup>	9.593 <sup>6</sup>	27.69 <sup>63</sup>	13.754 <sup>21</sup>	52.82 <sup>244</sup>	2.163 <sup>0</sup>	41.68 <sup>119</sup>
26.0	48.000 <sup>48</sup>	26.34 <sup>70</sup>	9.636 <sup>43</sup>	26.87 <sup>82</sup>	13.792 <sup>38</sup>	50.45 <sup>237</sup>	2.200 <sup>37</sup>	40.68 <sup>100</sup>
Oct. 6.0	48.082 <sup>82</sup>	25.38 <sup>96</sup>	9.714 <sup>78</sup>	25.79 <sup>108</sup>	13.893 <sup>101</sup>	48.22 <sup>223</sup>	2.282 <sup>82</sup>	39.88 <sup>80</sup>
15.9	48.208 <sup>126</sup>	24.17 <sup>121</sup>	9.834 <sup>120</sup>	24.47 <sup>132</sup>	14.059 <sup>166</sup>	46.27 <sup>195</sup>	2.409 <sup>127</sup>	39.35 <sup>53</sup>
25.9	48.372 <sup>144</sup>	22.74 <sup>143</sup>	9.995 <sup>161</sup>	22.93 <sup>154</sup>	14.291 <sup>232</sup>	44.66 <sup>161</sup>	2.579 <sup>170</sup>	39.17 <sup>18</sup>
Nov. 4.9	48.579 <sup>207</sup>	21.06 <sup>163</sup>	10.196 <sup>201</sup>	21.16 <sup>177</sup>	14.291 <sup>208</sup>	44.66 <sup>118</sup>	2.579 <sup>217</sup>	39.17 <sup>18</sup>
14.9	48.821 <sup>242</sup>	19.20 <sup>186</sup>	10.435 <sup>269</sup>	19.21 <sup>195</sup>	14.584 <sup>249</sup>	43.48 <sup>60</sup>	2.796 <sup>255</sup>	39.85 <sup>18</sup>
24.8	49.098 <sup>277</sup>	17.19 <sup>201</sup>	10.711 <sup>276</sup>	17.13 <sup>206</sup>	14.933 <sup>249</sup>	42.79 <sup>16</sup>	3.051 <sup>294</sup>	39.92 <sup>57</sup>
Dec. 4.8	49.401 <sup>308</sup>	15.06 <sup>223</sup>	11.013 <sup>302</sup>	14.96 <sup>217</sup>	15.329 <sup>306</sup>	42.63 <sup>16</sup>	3.345 <sup>294</sup>	40.87 <sup>96</sup>
14.8	49.401 <sup>319</sup>	15.06 <sup>215</sup>	11.013 <sup>318</sup>	14.96 <sup>218</sup>	15.759 <sup>430</sup>	43.03 <sup>40</sup>	3.665 <sup>320</sup>	42.17 <sup>130</sup>
24.7	49.720 <sup>327</sup>	12.91 <sup>214</sup>	11.331 <sup>328</sup>	12.78 <sup>213</sup>	16.211 <sup>466</sup>	43.98 <sup>148</sup>	4.002 <sup>345</sup>	43.82 <sup>196</sup>
34.7	50.047 <sup>323</sup>	10.77 <sup>201</sup>	11.659 <sup>328</sup>	10.65 <sup>198</sup>	16.667 <sup>448</sup>	45.46 <sup>198</sup>	4.347 <sup>345</sup>	45.78 <sup>196</sup>
	50.372 <sup>323</sup>	8.76 <sup>201</sup>	11.983 <sup>324</sup>	8.67 <sup>198</sup>	17.115 <sup>448</sup>	47.41 <sup>198</sup>	4.689 <sup>342</sup>	47.95 <sup>217</sup>
Mean Place	46.403	37.50	8.078	37.91	12.277	37.41	0.452	29.70
Sec δ, Tan δ	1.008	+0.124	1.013	+0.162	1.565	-1.204	1.080	-0.408
D <sub>α</sub> , D <sub>ω</sub>	+0.061	+0.008	+0.061	+0.011	+0.062	-0.060	+0.061	-0.027
D <sub>δ</sub> , D <sub>ε</sub>	-0.40	+0.01	-0.40	-0.01	-0.40	-0.02	-0.40	-0.03

FOR THE UPPER TRANSIT AT WASHINGTON.

Washington Mean Time.	ε H. Draconis. Mag. 5.1		δ Cruxis. Mag. 3.1		δ Ursae Majoris. Mag. 3.4		γ Cervi. Mag. 2.8	
	Right Ascension.	Declination.	Right Ascension.	Declination.	Right Ascension.	Declination.	Right Ascension.	Declination.
	h m 12 8	° ' " +78 2	h m 12 10	° ' " -58 18	h m 12 11	° ' " +57 27	h m 12 11	° ' " -17 5
Jan. 0.7	27.84	73.11	55.438	4.35	29.037	74.23	42.503	52.54
10.7	28.99 <sup>115</sup>	72.93 <sup>18</sup>	55.956 <sup>518</sup>	6.42 <sup>207</sup>	29.545 <sup>508</sup>	73.45 <sup>78</sup>	42.834 <sup>331</sup>	54.78 <sup>224</sup>
20.7	30.10 <sup>111</sup>	73.42 <sup>49</sup>	56.438 <sup>493</sup>	8.92 <sup>200</sup>	30.032 <sup>497</sup>	73.27 <sup>18</sup>	43.145 <sup>311</sup>	57.06 <sup>223</sup>
30.6	31.11 <sup>101</sup>	74.52 <sup>110</sup>	56.873 <sup>483</sup>	11.77 <sup>268</sup>	30.480 <sup>448</sup>	73.70 <sup>43</sup>	43.423 <sup>284</sup>	59.34 <sup>228</sup>
Feb. 9.6	32.00 <sup>80</sup>	76.22 <sup>170</sup>	57.251 <sup>378</sup>	14.91 <sup>314</sup>	30.873 <sup>398</sup>	74.70 <sup>100</sup>	43.676 <sup>247</sup>	61.54 <sup>220</sup>
	75	220	314	351	391	180	308	207
19.6	32.75	78.42	57.565	18.22	31.204	76.20	43.884	63.61
29.6	33.30 <sup>55</sup>	81.03 <sup>261</sup>	57.812 <sup>247</sup>	21.64 <sup>342</sup>	31.461 <sup>267</sup>	78.18 <sup>198</sup>	44.050 <sup>166</sup>	65.52 <sup>191</sup>
Mar. 10.5	33.67 <sup>37</sup>	83.93 <sup>290</sup>	57.991 <sup>179</sup>	25.08 <sup>344</sup>	31.640 <sup>170</sup>	80.49 <sup>231</sup>	44.173 <sup>123</sup>	67.21 <sup>169</sup>
20.5	33.83 <sup>16</sup>	87.03 <sup>310</sup>	58.102 <sup>111</sup>	28.46 <sup>328</sup>	31.742 <sup>102</sup>	83.06 <sup>267</sup>	44.256 <sup>83</sup>	68.68 <sup>147</sup>
30.5	33.80 <sup>3</sup>	90.17 <sup>314</sup>	58.148 <sup>46</sup>	31.72 <sup>220</sup>	31.766 <sup>24</sup>	85.77 <sup>271</sup>	44.301 <sup>45</sup>	69.92 <sup>124</sup>
	23	305	12	305	46	273	11	101
Apr. 9.5	33.57	93.22	58.136	34.77	31.720	88.50	44.312	70.93
19.4	33.16 <sup>41</sup>	96.10 <sup>208</sup>	58.069 <sup>67</sup>	37.59 <sup>282</sup>	31.611 <sup>160</sup>	91.16 <sup>206</sup>	44.294 <sup>18</sup>	71.69 <sup>76</sup>
29.4	32.61 <sup>55</sup>	98.88 <sup>258</sup>	57.952 <sup>117</sup>	40.10 <sup>251</sup>	31.446 <sup>166</sup>	93.63 <sup>247</sup>	44.251 <sup>43</sup>	72.24 <sup>55</sup>
May 9.4	31.92 <sup>60</sup>	100.88 <sup>220</sup>	57.793 <sup>180</sup>	42.26 <sup>216</sup>	31.236 <sup>210</sup>	95.82 <sup>219</sup>	44.187 <sup>64</sup>	72.55 <sup>31</sup>
19.3	31.12 <sup>80</sup>	102.64 <sup>176</sup>	57.595 <sup>196</sup>	44.04 <sup>178</sup>	30.990 <sup>246</sup>	97.69 <sup>187</sup>	44.106 <sup>81</sup>	72.67 <sup>12</sup>
	86	126	220	135	271	148	94	8
29.3	30.26	103.90	57.366	45.39	30.739	99.17	44.612	72.59
June 8.3	29.34 <sup>92</sup>	104.62 <sup>72</sup>	57.110 <sup>286</sup>	46.30 <sup>91</sup>	30.481 <sup>288</sup>	100.21 <sup>164</sup>	43.908 <sup>104</sup>	72.30 <sup>29</sup>
18.3	28.41 <sup>93</sup>	104.79 <sup>17</sup>	56.837 <sup>273</sup>	46.74 <sup>44</sup>	30.136 <sup>265</sup>	100.78 <sup>57</sup>	43.797 <sup>111</sup>	71.84 <sup>46</sup>
28.2	27.49 <sup>92</sup>	104.41 <sup>38</sup>	56.552 <sup>285</sup>	46.70 <sup>4</sup>	29.843 <sup>208</sup>	100.87 <sup>9</sup>	43.682 <sup>115</sup>	71.22 <sup>62</sup>
July 8.2	26.59 <sup>90</sup>	103.47 <sup>94</sup>	56.263 <sup>290</sup>	46.21 <sup>49</sup>	29.559 <sup>284</sup>	100.49 <sup>38</sup>	43.596 <sup>116</sup>	70.44 <sup>78</sup>
	84	144	286	97	270	84	114	90
18.2	25.75	102.03	55.977	45.24	29.289	99.65	43.452	69.54
28.2	24.98 <sup>77</sup>	100.10 <sup>193</sup>	55.707 <sup>270</sup>	43.85 <sup>180</sup>	29.041 <sup>248</sup>	98.35 <sup>190</sup>	43.345 <sup>107</sup>	68.53 <sup>101</sup>
Aug. 7.1	24.30 <sup>68</sup>	97.73 <sup>237</sup>	55.461 <sup>246</sup>	42.06 <sup>179</sup>	28.821 <sup>220</sup>	96.63 <sup>172</sup>	43.248 <sup>97</sup>	67.46 <sup>107</sup>
17.1	23.72 <sup>56</sup>	94.97 <sup>276</sup>	55.249 <sup>212</sup>	39.93 <sup>213</sup>	28.637 <sup>184</sup>	94.52 <sup>211</sup>	43.167 <sup>81</sup>	66.36 <sup>110</sup>
27.1	23.25 <sup>47</sup>	91.66 <sup>311</sup>	55.061 <sup>168</sup>	37.54 <sup>280</sup>	28.491 <sup>146</sup>	92.07 <sup>245</sup>	43.106 <sup>61</sup>	65.27 <sup>100</sup>
	32	326	111	258	98	277	35	103
Sept. 6.0	22.93	88.50	54.970	34.96	28.393	89.30	43.071	64.24
16.0	22.74 <sup>19</sup>	84.91 <sup>359</sup>	54.922 <sup>48</sup>	32.30 <sup>266</sup>	28.346 <sup>47</sup>	86.27 <sup>263</sup>	43.066 <sup>5</sup>	63.33 <sup>91</sup>
26.0	22.70 <sup>4</sup>	81.20 <sup>371</sup>	54.945 <sup>23</sup>	29.65 <sup>265</sup>	28.358 <sup>12</sup>	83.04 <sup>323</sup>	43.008 <sup>22</sup>	62.59 <sup>74</sup>
Oct. 6.0	22.82 <sup>12</sup>	77.42 <sup>378</sup>	55.046 <sup>101</sup>	27.12 <sup>253</sup>	28.432 <sup>74</sup>	79.67 <sup>337</sup>	43.170 <sup>72</sup>	62.08 <sup>51</sup>
15.9	23.10 <sup>28</sup>	73.67 <sup>375</sup>	55.227 <sup>181</sup>	24.80 <sup>232</sup>	28.571 <sup>180</sup>	76.23 <sup>244</sup>	43.286 <sup>116</sup>	61.84 <sup>24</sup>
	44	364	260	196	205	246	161	3
25.9	23.54	70.03	55.487	22.82	28.776	72.77	43.447	61.92
Nov. 4.9	24.15 <sup>61</sup>	66.58 <sup>345</sup>	55.823 <sup>336</sup>	21.25 <sup>157</sup>	29.052 <sup>276</sup>	69.41 <sup>336</sup>	43.651 <sup>204</sup>	62.34 <sup>42</sup>
14.9	24.90 <sup>75</sup>	63.42 <sup>316</sup>	56.226 <sup>403</sup>	20.17 <sup>198</sup>	29.390 <sup>338</sup>	66.22 <sup>319</sup>	43.897 <sup>246</sup>	63.11 <sup>77</sup>
24.8	25.78 <sup>88</sup>	60.63 <sup>279</sup>	56.685 <sup>450</sup>	19.64 <sup>53</sup>	29.787 <sup>397</sup>	63.27 <sup>265</sup>	44.178 <sup>281</sup>	64.24 <sup>113</sup>
Dec. 4.8	26.78 <sup>100</sup>	58.31 <sup>232</sup>	57.186 <sup>501</sup>	19.71 <sup>7</sup>	30.233 <sup>446</sup>	60.63 <sup>311</sup>	44.489 <sup>311</sup>	65.68 <sup>144</sup>
	110	180	528	64	493	219	329	175
14.8	27.88	56.51	57.714	20.35	30.716	58.49	44.818	67.43
24.7	29.03 <sup>115</sup>	55.30 <sup>121</sup>	58.249 <sup>535</sup>	21.56 <sup>121</sup>	31.223 <sup>507</sup>	56.80 <sup>160</sup>	45.156 <sup>338</sup>	69.40 <sup>197</sup>
34.7	30.20 <sup>117</sup>	54.74 <sup>56</sup>	58.775 <sup>526</sup>	23.31 <sup>175</sup>	31.735 <sup>512</sup>	55.68 <sup>112</sup>	45.491 <sup>335</sup>	71.55 <sup>215</sup>
Mean Place	28.181	98.67	53.595	15.51	28.568	97.46	41.351	51.84
Sec δ, Tan δ	4.832	+4.727	1.903	-1.620	1.860	+1.568	1.046	-0.306
D <sub>α</sub> , D <sub>α</sub>	+0.056	+0.915	+0.063	-0.108	+0.059	+0.164	+0.062	-0.021
D <sub>β</sub> , D <sub>β</sub>	-0.40	-0.04	-0.40	-0.05	-0.40	-0.05	-0.40	-0.05

FOR THE UPPER TRANSIT AT WASHINGTON.

Washington Mean Time.	$\epsilon$ Canum Venat. Mag. 5.8		$\beta$ Chamalepentis. Mag. 4.4		$\gamma$ Virginis. Mag. 4.0		$\alpha^1$ Crucis. Mag. 1.6	
	Right Ascension.	Declination.	Right Ascension.	Declination.	Right Ascension.	Declination.	Right Ascension.	Declination.
	h m 12 12	° ' " +41 5	h m 12 13	° ' " -78 51	h m 12 15	° ' " - 0 13	h m 12 22	° ' " -62 39
Jan. 0.7	8.065	59.37	40.93	50.53	49.768	26.92	10.03	8.99
10.7	8.476 <sup>391</sup>	58.13 <sup>124</sup>	42.17 <sup>124</sup>	52.20 <sup>167</sup>	50.092 <sup>234</sup>	28.99 <sup>207</sup>	10.62 <sup>59</sup>	10.84 <sup>185</sup>
20.7	8.860 <sup>374</sup>	57.41 <sup>73</sup>	43.32 <sup>115</sup>	54.39 <sup>219</sup>	50.395 <sup>303</sup>	30.94 <sup>195</sup>	11.17 <sup>55</sup>	13.17 <sup>233</sup>
30.7	9.193 <sup>343</sup>	57.20 <sup>21</sup>	44.35 <sup>103</sup>	57.08 <sup>269</sup>	50.671 <sup>276</sup>	32.70 <sup>176</sup>	11.67 <sup>50</sup>	15.92 <sup>275</sup>
Feb. 9.6	9.495 <sup>362</sup>	57.52 <sup>32</sup>	45.25 <sup>90</sup>	60.17 <sup>369</sup>	50.918 <sup>247</sup>	34.25 <sup>156</sup>	12.11 <sup>44</sup>	18.97 <sup>305</sup>
19.6	9.749 <sup>264</sup>	58.22 <sup>80</sup>	46.00 <sup>75</sup>	63.57 <sup>340</sup>	51.125 <sup>207</sup>	35.53 <sup>126</sup>	12.48 <sup>37</sup>	22.26 <sup>329</sup>
29.6	9.950 <sup>204</sup>	59.56 <sup>124</sup>	46.58 <sup>58</sup>	67.19 <sup>369</sup>	51.292 <sup>167</sup>	36.53 <sup>100</sup>	12.78 <sup>30</sup>	25.69 <sup>343</sup>
Mar. 10.5	10.094 <sup>144</sup>	61.17 <sup>141</sup>	46.98 <sup>40</sup>	70.96 <sup>377</sup>	51.416 <sup>124</sup>	37.27 <sup>74</sup>	13.00 <sup>22</sup>	29.17 <sup>348</sup>
20.5	10.182 <sup>86</sup>	62.06 <sup>183</sup>	47.22 <sup>24</sup>	74.75 <sup>379</sup>	51.502 <sup>86</sup>	37.72 <sup>45</sup>	13.15 <sup>15</sup>	32.67 <sup>350</sup>
30.5	10.216 <sup>24</sup>	65.18 <sup>206</sup>	47.28 <sup>6</sup>	78.50 <sup>375</sup>	51.549 <sup>47</sup>	37.93 <sup>21</sup>	13.22 <sup>7</sup>	36.07 <sup>340</sup>
Apr. 9.5	10.202	67.31	47.17 <sup>11</sup>	82.13 <sup>263</sup>	51.564 <sup>15</sup>	37.92 <sup>1</sup>	13.23 <sup>1</sup>	39.30 <sup>323</sup>
19.4	10.145 <sup>57</sup>	69.49 <sup>218</sup>	46.91 <sup>26</sup>	85.58 <sup>345</sup>	51.550 <sup>14</sup>	37.75 <sup>17</sup>	13.17 <sup>6</sup>	42.31 <sup>301</sup>
29.4	10.052 <sup>98</sup>	71.58 <sup>309</sup>	46.51 <sup>40</sup>	88.74 <sup>316</sup>	51.509 <sup>41</sup>	37.40 <sup>35</sup>	13.05 <sup>12</sup>	45.04 <sup>273</sup>
May 9.4	9.928 <sup>124</sup>	73.51 <sup>198</sup>	45.96 <sup>55</sup>	91.60 <sup>296</sup>	51.452 <sup>57</sup>	36.92 <sup>48</sup>	12.88 <sup>17</sup>	47.44 <sup>240</sup>
19.4	9.782 <sup>146</sup>	75.22 <sup>171</sup>	45.30 <sup>66</sup>	94.03 <sup>243</sup>	51.375 <sup>77</sup>	36.85 <sup>57</sup>	12.66 <sup>22</sup>	49.47 <sup>203</sup>
29.3	9.618 <sup>164</sup>	76.66 <sup>144</sup>	44.54 <sup>78</sup>	96.03 <sup>200</sup>	51.286 <sup>89</sup>	35.73 <sup>62</sup>	12.40 <sup>26</sup>	51.08 <sup>161</sup>
June 8.3	9.445 <sup>173</sup>	77.76 <sup>119</sup>	43.69 <sup>85</sup>	97.55 <sup>162</sup>	51.190 <sup>96</sup>	35.07 <sup>66</sup>	12.11 <sup>29</sup>	52.21 <sup>113</sup>
18.3	9.265 <sup>180</sup>	78.52 <sup>76</sup>	42.78 <sup>91</sup>	98.55 <sup>109</sup>	51.085 <sup>106</sup>	34.37 <sup>70</sup>	11.79 <sup>82</sup>	52.89 <sup>66</sup>
28.2	9.086 <sup>179</sup>	78.90 <sup>38</sup>	41.84 <sup>94</sup>	98.98 <sup>43</sup>	50.978 <sup>107</sup>	33.67 <sup>70</sup>	11.45 <sup>34</sup>	53.06 <sup>17</sup>
July 8.2	8.912 <sup>174</sup>	78.92 <sup>3</sup>	40.88 <sup>96</sup>	98.88 <sup>10</sup>	50.870 <sup>108</sup>	32.99 <sup>68</sup>	11.11 <sup>34</sup>	52.74 <sup>32</sup>
18.2	8.746 <sup>166</sup>	78.92 <sup>37</sup>	40.88 <sup>96</sup>	98.88 <sup>66</sup>	50.870 <sup>104</sup>	32.99 <sup>64</sup>	11.11 <sup>35</sup>	52.74 <sup>79</sup>
28.2	8.593 <sup>153</sup>	77.81 <sup>74</sup>	39.93 <sup>89</sup>	98.22 <sup>120</sup>	50.766 <sup>100</sup>	32.95 <sup>62</sup>	10.76 <sup>33</sup>	51.95 <sup>125</sup>
Aug. 7.1	8.457 <sup>136</sup>	77.78 <sup>111</sup>	39.04 <sup>89</sup>	97.02 <sup>167</sup>	50.666 <sup>100</sup>	31.73 <sup>62</sup>	10.43 <sup>33</sup>	50.70 <sup>125</sup>
17.1	8.343 <sup>114</sup>	76.70 <sup>145</sup>	38.22 <sup>82</sup>	95.35 <sup>216</sup>	50.576 <sup>90</sup>	31.23 <sup>50</sup>	10.13 <sup>30</sup>	49.00 <sup>170</sup>
27.1	8.255 <sup>88</sup>	75.25 <sup>178</sup>	37.51 <sup>71</sup>	93.19 <sup>250</sup>	50.500 <sup>76</sup>	30.80 <sup>43</sup>	9.86 <sup>27</sup>	46.96 <sup>204</sup>
Sept. 6.1	8.200 <sup>55</sup>	73.47 <sup>208</sup>	36.93 <sup>41</sup>	90.69 <sup>281</sup>	50.444 <sup>36</sup>	30.53 <sup>15</sup>	9.64 <sup>15</sup>	44.57 <sup>239</sup>
16.0	8.181 <sup>19</sup>	71.89 <sup>234</sup>	36.52 <sup>24</sup>	87.88 <sup>301</sup>	50.408 <sup>4</sup>	30.38 <sup>7</sup>	9.49 <sup>8</sup>	41.98 <sup>273</sup>
26.0	8.203 <sup>22</sup>	69.05 <sup>258</sup>	36.28 <sup>9</sup>	84.87 <sup>309</sup>	50.404 <sup>27</sup>	30.45 <sup>26</sup>	9.41 <sup>1</sup>	39.25 <sup>278</sup>
Oct. 6.0	8.270 <sup>67</sup>	66.47 <sup>276</sup>	36.25 <sup>18</sup>	81.78 <sup>305</sup>	50.431 <sup>67</sup>	30.73 <sup>52</sup>	9.40 <sup>9</sup>	36.47 <sup>278</sup>
15.9	8.386 <sup>116</sup>	63.71 <sup>290</sup>	36.43 <sup>40</sup>	78.73 <sup>292</sup>	50.498 <sup>105</sup>	31.25 <sup>76</sup>	9.49 <sup>18</sup>	33.79 <sup>268</sup>
25.9	8.386 <sup>168</sup>	60.81 <sup>299</sup>	36.83 <sup>60</sup>	75.81 <sup>263</sup>	50.603 <sup>147</sup>	32.00 <sup>104</sup>	9.67 <sup>27</sup>	31.28 <sup>251</sup>
Nov. 4.9	8.554 <sup>218</sup>	57.82 <sup>302</sup>	37.43 <sup>79</sup>	73.19 <sup>226</sup>	50.750 <sup>191</sup>	33.04 <sup>130</sup>	9.94 <sup>36</sup>	29.08 <sup>183</sup>
14.9	8.772 <sup>268</sup>	54.80 <sup>297</sup>	38.22 <sup>96</sup>	70.93 <sup>179</sup>	50.941 <sup>230</sup>	34.34 <sup>154</sup>	10.30 <sup>43</sup>	27.25 <sup>135</sup>
24.8	9.040 <sup>312</sup>	51.83 <sup>283</sup>	39.18 <sup>110</sup>	69.14 <sup>122</sup>	51.171 <sup>266</sup>	35.88 <sup>177</sup>	10.73 <sup>50</sup>	25.90 <sup>81</sup>
Dec. 4.8	9.352 <sup>350</sup>	49.00 <sup>261</sup>	40.28 <sup>121</sup>	67.92 <sup>63</sup>	51.437 <sup>295</sup>	37.65 <sup>196</sup>	11.23 <sup>55</sup>	25.09 <sup>23</sup>
14.8	9.702 <sup>375</sup>	46.39 <sup>223</sup>	41.40 <sup>126</sup>	67.29 <sup>2</sup>	51.732 <sup>314</sup>	39.61 <sup>205</sup>	11.78 <sup>59</sup>	24.86 <sup>38</sup>
24.8	10.077 <sup>392</sup>	44.06 <sup>195</sup>	42.75 <sup>128</sup>	67.31 <sup>66</sup>	52.046 <sup>327</sup>	41.66 <sup>212</sup>	12.37 <sup>60</sup>	25.24 <sup>95</sup>
34.7	10.469 <sup>396</sup>	42.11 <sup>151</sup>	44.08 <sup>126</sup>	67.97 <sup>126</sup>	52.373 <sup>325</sup>	43.78 <sup>206</sup>	12.97 <sup>59</sup>	26.19 <sup>95</sup>
34.7	10.865 <sup>396</sup>	40.80	45.29 <sup>126</sup>	69.25	52.698 <sup>325</sup>	45.86	13.56	27.71 <sup>152</sup>
Mean Place	7.401	79.08	37.188	64.91	48.776	20.38	8.125	21.40
Sec $\delta$ , Tan $\delta$	1.327	+0.872	5.181	-5.083	1.000	-0.004	2.177	-1.934
$D_{\mu\alpha}$ , $D_{\mu\delta}$	+0.060	+0.058	+0.069	-0.838	+0.061	0.000	+0.066	-0.128
$D_{\mu\delta}$ , $D_{\mu\alpha}$	-0.40	-0.05	-0.40	-0.06	-0.40	-0.07	-0.40	-0.10

FOR THE UPPER TRANSIT AT WASHINGTON.

Washington Mean Time.	20 Comae. Mag. 5.7		δ Corvi. Mag. 3.1		γ Crania. Mag. 1.6		ε Capam Venat. Mag. 4.3	
	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.
	h m 12 25	° ' " +21 19	h m 12 25	° ' " -16 4	h m 12 26	° ' " -56 39	h m 12 29	° ' " +41 46
Jan. 0.7	43.031	66.66	44.433	13.32	44.800	43.41	57.418	71.58
10.7	43.370 <sup>339</sup>	64.89 <sup>177</sup>	44.766 <sup>332</sup>	15.50 <sup>218</sup>	45.109 <sup>509</sup>	45.31 <sup>190</sup>	57.811 <sup>393</sup>	70.21 <sup>137</sup>
20.7	43.694 <sup>334</sup>	63.46 <sup>143</sup>	45.082 <sup>316</sup>	17.70 <sup>220</sup>	45.589 <sup>490</sup>	47.64 <sup>233</sup>	58.192 <sup>381</sup>	69.35 <sup>96</sup>
30.7	43.994 <sup>300</sup>	62.42 <sup>104</sup>	45.373 <sup>291</sup>	19.91 <sup>231</sup>	46.028 <sup>480</sup>	50.35 <sup>271</sup>	58.546 <sup>354</sup>	69.03 <sup>32</sup>
Feb. 9.6	44.260 <sup>295</sup>	61.79 <sup>63</sup>	45.629 <sup>256</sup>	22.04 <sup>213</sup>	46.417 <sup>389</sup>	53.34 <sup>299</sup>	58.863 <sup>317</sup>	69.25 <sup>22</sup>
19.6	44.488 <sup>228</sup>	61.56 <sup>23</sup>	45.850 <sup>231</sup>	24.05 <sup>201</sup>	46.746 <sup>339</sup>	56.52 <sup>318</sup>	59.134 <sup>271</sup>	69.98 <sup>73</sup>
29.6	44.673 <sup>185</sup>	61.73 <sup>17</sup>	46.029 <sup>179</sup>	25.88 <sup>183</sup>	47.014 <sup>285</sup>	59.82 <sup>330</sup>	59.354 <sup>220</sup>	71.18 <sup>130</sup>
Mar. 10.6	44.813 <sup>140</sup>	62.24 <sup>51</sup>	46.168 <sup>139</sup>	27.50 <sup>162</sup>	47.217 <sup>208</sup>	63.16 <sup>364</sup>	59.519 <sup>165</sup>	72.77 <sup>159</sup>
20.5	44.910 <sup>97</sup>	63.08 <sup>84</sup>	46.263 <sup>95</sup>	28.91 <sup>141</sup>	47.357 <sup>149</sup>	66.46 <sup>330</sup>	59.629 <sup>110</sup>	74.67 <sup>190</sup>
30.5	44.965 <sup>55</sup>	64.15 <sup>107</sup>	46.326 <sup>63</sup>	30.11 <sup>130</sup>	47.436 <sup>79</sup>	69.65 <sup>319</sup>	59.684 <sup>55</sup>	76.80 <sup>213</sup>
Apr. 9.5	44.982 <sup>17</sup>	65.41 <sup>126</sup>	46.351 <sup>26</sup>	31.05 <sup>94</sup>	47.457 <sup>21</sup>	72.67 <sup>302</sup>	59.690 <sup>6</sup>	79.06 <sup>226</sup>
19.4	44.965 <sup>17</sup>	66.78 <sup>137</sup>	46.349 <sup>2</sup>	31.76 <sup>71</sup>	47.424 <sup>33</sup>	75.47 <sup>280</sup>	59.651 <sup>39</sup>	81.34 <sup>228</sup>
29.4	44.920 <sup>45</sup>	68.20 <sup>142</sup>	46.319 <sup>30</sup>	32.28 <sup>52</sup>	47.343 <sup>81</sup>	78.00 <sup>263</sup>	59.572 <sup>79</sup>	83.57 <sup>233</sup>
May 9.4	44.850 <sup>70</sup>	69.62 <sup>142</sup>	46.265 <sup>54</sup>	32.55 <sup>27</sup>	47.219 <sup>134</sup>	80.20 <sup>280</sup>	59.460 <sup>112</sup>	85.64 <sup>307</sup>
19.4	44.762 <sup>88</sup>	70.96 <sup>134</sup>	46.197 <sup>66</sup>	32.65 <sup>10</sup>	47.055 <sup>104</sup>	82.04 <sup>184</sup>	59.323 <sup>137</sup>	87.52 <sup>186</sup>
29.3	44.660 <sup>102</sup>	72.18 <sup>123</sup>	46.110 <sup>87</sup>	32.58 <sup>7</sup>	46.857 <sup>198</sup>	83.49 <sup>145</sup>	59.165 <sup>158</sup>	89.12 <sup>160</sup>
June 8.3	44.546 <sup>114</sup>	73.26 <sup>106</sup>	46.014 <sup>96</sup>	32.90 <sup>28</sup>	46.633 <sup>234</sup>	84.50 <sup>101</sup>	58.992 <sup>173</sup>	90.40 <sup>126</sup>
18.3	44.425 <sup>121</sup>	74.16 <sup>90</sup>	45.907 <sup>107</sup>	31.85 <sup>45</sup>	46.385 <sup>248</sup>	85.07 <sup>57</sup>	58.810 <sup>182</sup>	91.34 <sup>94</sup>
28.3	44.301 <sup>124</sup>	74.84 <sup>68</sup>	45.794 <sup>113</sup>	31.28 <sup>57</sup>	46.121 <sup>264</sup>	85.18 <sup>11</sup>	58.624 <sup>186</sup>	91.89 <sup>55</sup>
July 8.2	44.175 <sup>126</sup>	75.32 <sup>48</sup>	45.678 <sup>116</sup>	30.55 <sup>73</sup>	45.850 <sup>271</sup>	84.63 <sup>35</sup>	58.438 <sup>186</sup>	92.06 <sup>17</sup>
18.2	44.053 <sup>122</sup>	75.54 <sup>23</sup>	45.559 <sup>119</sup>	29.72 <sup>83</sup>	45.578 <sup>272</sup>	84.03 <sup>80</sup>	58.258 <sup>180</sup>	91.83 <sup>23</sup>
28.2	43.937 <sup>116</sup>	75.53 <sup>1</sup>	45.448 <sup>111</sup>	28.79 <sup>93</sup>	45.315 <sup>283</sup>	82.80 <sup>128</sup>	58.067 <sup>171</sup>	91.21 <sup>62</sup>
Aug. 7.1	43.831 <sup>106</sup>	75.26 <sup>27</sup>	45.345 <sup>108</sup>	27.79 <sup>109</sup>	45.070 <sup>345</sup>	81.18 <sup>162</sup>	57.931 <sup>156</sup>	90.21 <sup>100</sup>
17.1	43.739 <sup>92</sup>	74.75 <sup>51</sup>	45.255 <sup>90</sup>	26.77 <sup>102</sup>	44.853 <sup>217</sup>	79.21 <sup>197</sup>	57.795 <sup>136</sup>	88.85 <sup>136</sup>
27.1	43.666 <sup>73</sup>	73.97 <sup>78</sup>	45.182 <sup>73</sup>	25.77 <sup>160</sup>	44.675 <sup>178</sup>	76.97 <sup>294</sup>	57.683 <sup>112</sup>	87.14 <sup>171</sup>
Sept. 6.1	43.617 <sup>49</sup>	72.94 <sup>103</sup>	45.136 <sup>46</sup>	24.83 <sup>94</sup>	44.547 <sup>139</sup>	74.53 <sup>244</sup>	57.601 <sup>82</sup>	85.11 <sup>203</sup>
16.0	43.597 <sup>20</sup>	71.64 <sup>130</sup>	45.118 <sup>18</sup>	24.00 <sup>83</sup>	44.478 <sup>69</sup>	71.96 <sup>257</sup>	57.554 <sup>47</sup>	82.80 <sup>231</sup>
26.0	43.611 <sup>14</sup>	70.10 <sup>164</sup>	45.136 <sup>16</sup>	23.32 <sup>68</sup>	44.476 <sup>2</sup>	69.38 <sup>258</sup>	57.549 <sup>5</sup>	80.22 <sup>256</sup>
Oct. 6.0	43.663 <sup>52</sup>	68.33 <sup>177</sup>	45.193 <sup>57</sup>	22.87 <sup>45</sup>	44.547 <sup>71</sup>	66.28 <sup>250</sup>	57.569 <sup>40</sup>	77.44 <sup>278</sup>
16.0	43.756 <sup>93</sup>	66.34 <sup>199</sup>	45.296 <sup>108</sup>	22.68 <sup>19</sup>	44.695 <sup>148</sup>	64.58 <sup>280</sup>	57.679 <sup>90</sup>	74.49 <sup>295</sup>
25.9	43.894 <sup>138</sup>	64.15 <sup>219</sup>	45.441 <sup>145</sup>	22.78 <sup>30</sup>	44.922 <sup>237</sup>	62.58 <sup>300</sup>	57.823 <sup>144</sup>	71.43 <sup>306</sup>
Nov. 4.9	43.894 <sup>183</sup>	64.15 <sup>233</sup>	45.441 <sup>193</sup>	22.78 <sup>44</sup>	44.922 <sup>301</sup>	62.58 <sup>161</sup>	57.823 <sup>196</sup>	71.43 <sup>309</sup>
14.9	44.077 <sup>226</sup>	61.82 <sup>244</sup>	45.634 <sup>285</sup>	23.22 <sup>77</sup>	45.223 <sup>371</sup>	60.97 <sup>115</sup>	58.018 <sup>248</sup>	68.34 <sup>305</sup>
24.8	44.303 <sup>265</sup>	59.38 <sup>249</sup>	45.869 <sup>290</sup>	23.99 <sup>112</sup>	45.594 <sup>439</sup>	59.82 <sup>64</sup>	58.266 <sup>295</sup>	65.29 <sup>295</sup>
Dec. 4.8	44.568 <sup>296</sup>	56.89 <sup>246</sup>	46.138 <sup>304</sup>	25.11 <sup>143</sup>	46.023 <sup>473</sup>	59.18 <sup>7</sup>	58.561 <sup>336</sup>	62.34 <sup>375</sup>
14.8	44.866 <sup>332</sup>	54.43 <sup>237</sup>	46.442 <sup>324</sup>	26.53 <sup>170</sup>	46.496 <sup>504</sup>	59.11 <sup>51</sup>	58.897 <sup>367</sup>	59.59 <sup>246</sup>
24.8	45.188 <sup>336</sup>	52.06 <sup>218</sup>	46.766 <sup>335</sup>	28.23 <sup>191</sup>	47.000 <sup>518</sup>	59.62 <sup>108</sup>	59.264 <sup>337</sup>	57.13 <sup>300</sup>
34.7	45.524 <sup>341</sup>	49.88 <sup>195</sup>	47.101 <sup>335</sup>	30.14 <sup>210</sup>	47.518 <sup>514</sup>	60.68 <sup>139</sup>	59.651 <sup>305</sup>	55.04 <sup>166</sup>
34.7	45.865 <sup>341</sup>	47.93 <sup>195</sup>	47.436 <sup>335</sup>	32.24 <sup>210</sup>	48.082 <sup>514</sup>	62.27 <sup>139</sup>	60.046 <sup>305</sup>	53.38 <sup>166</sup>
Mean Place	42.271	80.32	43.370	12.69	42.944	54.75	56.905	91.03
Sec δ, Tan δ	1.074	+0.391	1.041	-0.288	1.820	-1.520	1.341	+0.894
D <sub>1</sub> δ, D <sub>2</sub> δ	+0.060	+0.026	+0.062	-0.019	+0.066	-0.101	+0.068	+0.059
D <sub>3</sub> δ, D <sub>4</sub> δ	-0.40	-0.11	-0.40	-0.11	-0.40	-0.12	-0.39	-0.13

# APPARENT PLACES OF STARS, 1920.

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FOR THE UPPER TRANSIT AT WASHINGTON.

Washington Mean Time.	$\alpha$ Draconis. Mag. 3.9		$\beta$ Corvi. Mag. 2.8		$\gamma$ Comae seq. Mag. 5.2		$\alpha$ Muscae. Mag. 2.9	
	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.
	h m 12 30	° ' " +70 13	h m 12 30	° ' " -22 57	h m 12 31	° ' " +18 48	h m 12 32	° ' " -68 41
	s	"	s	"	s	"	s	"
Jan. 0.7	4.36	20.16	11.944	14.34	7.809	49.28	25.81	28.03
10.7	5.11 <sup>75</sup>	19.48 <sup>68</sup>	12.289 <sup>345</sup>	16.50 <sup>216</sup>	8.144 <sup>325</sup>	47.44 <sup>184</sup>	26.54 <sup>73</sup>	29.64 <sup>161</sup>
20.7	5.83 <sup>72</sup>	19.47 <sup>1</sup>	12.616 <sup>327</sup>	18.76 <sup>226</sup>	8.467 <sup>323</sup>	45.93 <sup>151</sup>	27.22 <sup>68</sup>	31.77 <sup>213</sup>
30.7	6.50 <sup>67</sup>	20.06 <sup>61</sup>	12.919 <sup>308</sup>	21.11 <sup>235</sup>	8.765 <sup>298</sup>	44.77 <sup>116</sup>	27.85 <sup>63</sup>	34.35 <sup>258</sup>
Feb. 9.6	7.12 <sup>62</sup>	21.32 <sup>124</sup>	13.186 <sup>267</sup>	23.43 <sup>232</sup>	9.082 <sup>267</sup>	44.01 <sup>76</sup>	28.41 <sup>56</sup>	37.30 <sup>295</sup>
19.6	7.64 <sup>52</sup>	23.11 <sup>179</sup>	13.419 <sup>232</sup>	25.69 <sup>226</sup>	9.261 <sup>229</sup>	43.64 <sup>37</sup>	28.88 <sup>47</sup>	40.54 <sup>324</sup>
29.6	8.06 <sup>42</sup>	25.37 <sup>226</sup>	13.606 <sup>186</sup>	27.82 <sup>213</sup>	9.449 <sup>188</sup>	43.65 <sup>1</sup>	29.27 <sup>39</sup>	43.98 <sup>344</sup>
Mar. 10.6	8.36 <sup>30</sup>	28.01 <sup>264</sup>	13.753 <sup>148</sup>	29.81 <sup>199</sup>	9.593 <sup>144</sup>	44.03 <sup>38</sup>	29.57 <sup>30</sup>	47.54 <sup>356</sup>
20.5	8.53 <sup>17</sup>	30.90 <sup>289</sup>	13.861 <sup>108</sup>	31.59 <sup>178</sup>	9.695 <sup>102</sup>	44.71 <sup>68</sup>	29.77 <sup>20</sup>	51.12 <sup>358</sup>
30.5	8.59 <sup>6</sup>	33.95 <sup>305</sup>	13.926 <sup>65</sup>	33.17 <sup>158</sup>	9.755 <sup>158</sup>	45.65 <sup>94</sup>	29.89 <sup>12</sup>	54.66 <sup>354</sup>
Apr. 9.5	8.54 <sup>5</sup>	36.99 <sup>304</sup>	13.959 <sup>33</sup>	34.51 <sup>134</sup>	9.779 <sup>20</sup>	46.78 <sup>113</sup>	29.91 <sup>2</sup>	58.09 <sup>343</sup>
19.4	8.37 <sup>17</sup>	39.93 <sup>294</sup>	13.959 <sup>0</sup>	35.64 <sup>113</sup>	9.770 <sup>9</sup>	48.04 <sup>126</sup>	29.85 <sup>6</sup>	61.33 <sup>324</sup>
29.4	8.09 <sup>28</sup>	42.68 <sup>275</sup>	13.934 <sup>25</sup>	36.52 <sup>88</sup>	9.732 <sup>88</sup>	49.37 <sup>133</sup>	29.72 <sup>13</sup>	64.32 <sup>299</sup>
May 9.4	7.75 <sup>24</sup>	45.12 <sup>244</sup>	13.882 <sup>52</sup>	37.16 <sup>64</sup>	9.669 <sup>63</sup>	50.70 <sup>133</sup>	29.51 <sup>21</sup>	66.99 <sup>267</sup>
19.4	7.33 <sup>42</sup>	47.17 <sup>205</sup>	13.812 <sup>70</sup>	37.56 <sup>40</sup>	9.589 <sup>80</sup>	51.99 <sup>129</sup>	29.24 <sup>27</sup>	69.30 <sup>231</sup>
29.3	6.86 <sup>47</sup>	48.79 <sup>162</sup>	13.724 <sup>88</sup>	37.75 <sup>19</sup>	9.492 <sup>97</sup>	53.19 <sup>120</sup>	28.90 <sup>34</sup>	71.19 <sup>189</sup>
June 8.3	6.35 <sup>51</sup>	49.92 <sup>113</sup>	13.621 <sup>108</sup>	37.71 <sup>4</sup>	9.385 <sup>107</sup>	54.28 <sup>107</sup>	28.53 <sup>37</sup>	72.64 <sup>145</sup>
18.3	5.83 <sup>52</sup>	50.53 <sup>61</sup>	13.509 <sup>112</sup>	37.42 <sup>29</sup>	9.268 <sup>117</sup>	55.18 <sup>92</sup>	28.11 <sup>42</sup>	73.59 <sup>96</sup>
28.3	5.29 <sup>54</sup>	50.60 <sup>7</sup>	13.387 <sup>122</sup>	36.92 <sup>50</sup>	9.147 <sup>121</sup>	55.90 <sup>72</sup>	27.66 <sup>45</sup>	74.03 <sup>44</sup>
July 8.2	4.76 <sup>53</sup>	50.14 <sup>46</sup>	13.263 <sup>124</sup>	36.25 <sup>67</sup>	9.025 <sup>122</sup>	56.43 <sup>58</sup>	27.21 <sup>45</sup>	73.96 <sup>7</sup>
18.2	4.25 <sup>51</sup>	49.16 <sup>98</sup>	13.137 <sup>126</sup>	35.38 <sup>87</sup>	8.904 <sup>121</sup>	56.74 <sup>81</sup>	26.74 <sup>47</sup>	73.38 <sup>58</sup>
28.2	3.77 <sup>48</sup>	47.69 <sup>147</sup>	13.014 <sup>123</sup>	34.34 <sup>104</sup>	8.789 <sup>115</sup>	56.83 <sup>9</sup>	26.30 <sup>44</sup>	72.29 <sup>109</sup>
Aug. 7.1	3.34 <sup>43</sup>	45.75 <sup>194</sup>	12.900 <sup>114</sup>	33.19 <sup>115</sup>	8.682 <sup>107</sup>	56.67 <sup>16</sup>	25.88 <sup>42</sup>	70.73 <sup>156</sup>
17.1	2.96 <sup>38</sup>	43.40 <sup>235</sup>	12.801 <sup>99</sup>	31.95 <sup>124</sup>	8.587 <sup>95</sup>	56.29 <sup>38</sup>	25.50 <sup>38</sup>	68.74 <sup>199</sup>
27.1	2.65 <sup>31</sup>	40.65 <sup>275</sup>	12.719 <sup>82</sup>	30.68 <sup>127</sup>	8.512 <sup>75</sup>	55.65 <sup>64</sup>	25.19 <sup>31</sup>	66.41 <sup>233</sup>
Sept. 6.1	2.40 <sup>25</sup>	37.58 <sup>307</sup>	12.666 <sup>53</sup>	29.42 <sup>126</sup>	8.459 <sup>53</sup>	54.76 <sup>89</sup>	25.19 <sup>23</sup>	66.41 <sup>263</sup>
16.0	2.24 <sup>16</sup>	34.24 <sup>334</sup>	12.641 <sup>25</sup>	28.23 <sup>119</sup>	8.434 <sup>25</sup>	53.62 <sup>114</sup>	24.96 <sup>15</sup>	63.78 <sup>232</sup>
26.0	2.16 <sup>8</sup>	30.70 <sup>354</sup>	12.652 <sup>11</sup>	27.18 <sup>105</sup>	8.433 <sup>9</sup>	52.24 <sup>138</sup>	24.81 <sup>4</sup>	60.96 <sup>232</sup>
Oct. 6.0	2.18 <sup>2</sup>	27.03 <sup>367</sup>	12.652 <sup>56</sup>	26.30 <sup>88</sup>	8.443 <sup>45</sup>	52.24 <sup>164</sup>	24.77 <sup>7</sup>	58.07 <sup>239</sup>
16.0	2.31 <sup>13</sup>	23.30 <sup>373</sup>	12.708 <sup>102</sup>	26.30 <sup>59</sup>	8.488 <sup>88</sup>	50.60 <sup>185</sup>	24.84 <sup>19</sup>	55.20 <sup>237</sup>
25.9	2.54 <sup>23</sup>	19.60 <sup>370</sup>	12.810 <sup>148</sup>	25.71 <sup>33</sup>	8.576 <sup>132</sup>	48.75 <sup>207</sup>	25.03 <sup>30</sup>	52.46 <sup>274</sup>
Nov. 4.9	2.87 <sup>23</sup>	16.02 <sup>358</sup>	12.958 <sup>195</sup>	25.38 <sup>5</sup>	8.708 <sup>177</sup>	46.68 <sup>223</sup>	25.33 <sup>41</sup>	49.98 <sup>212</sup>
14.9	3.31 <sup>44</sup>	12.64 <sup>338</sup>	13.153 <sup>241</sup>	25.43 <sup>39</sup>	8.885 <sup>220</sup>	44.45 <sup>235</sup>	25.74 <sup>52</sup>	47.86 <sup>167</sup>
24.8	3.83 <sup>52</sup>	9.57 <sup>307</sup>	13.394 <sup>280</sup>	25.82 <sup>81</sup>	9.105 <sup>259</sup>	42.10 <sup>242</sup>	26.26 <sup>60</sup>	46.19 <sup>115</sup>
Dec. 4.8	4.44 <sup>61</sup>	6.88 <sup>269</sup>	13.674 <sup>311</sup>	26.63 <sup>114</sup>	9.364 <sup>292</sup>	39.68 <sup>243</sup>	26.86 <sup>66</sup>	45.04 <sup>55</sup>
14.8	4.44 <sup>69</sup>	4.66 <sup>222</sup>	13.985 <sup>335</sup>	27.77 <sup>149</sup>	9.656 <sup>316</sup>	37.25 <sup>236</sup>	27.52 <sup>71</sup>	44.49 <sup>4</sup>
24.8	5.13 <sup>72</sup>	4.66 <sup>167</sup>	14.320 <sup>344</sup>	29.26 <sup>178</sup>	9.972 <sup>332</sup>	34.89 <sup>232</sup>	28.23 <sup>74</sup>	44.53 <sup>66</sup>
34.7	5.85 <sup>75</sup>	2.99 <sup>108</sup>	14.664 <sup>350</sup>	31.04 <sup>203</sup>	10.304 <sup>337</sup>	32.67 <sup>199</sup>	28.97 <sup>73</sup>	45.19 <sup>126</sup>
34.7	6.60	1.93	15.014	33.07	10.641	30.68	29.70	46.45
Mean Place	4.652	44.66	10.843	16.21	7.063	61.96	23.709	41.80
Sec $\delta$ , Tan $\delta$	2.956	+2.781	1.086	-0.424	1.056	+0.341	2.753	-2.565
$D\alpha$ , $D\omega$	+0.052	+0.184	+0.063	-0.028	+0.060	+0.022	+0.071	-0.169
$D\psi$ , $D\omega$	-0.39	-0.13	-0.39	-0.13	-0.39	-0.14	-0.39	-0.14

FOR THE UPPER TRANSIT AT WASHINGTON.

Washington Mean Time.	χ Virginis. Mag. 4.8		γ Centauri. Mag. 2.4		γ Virginis (mean). Mag. 2.9		ρ Virginis. Mag. 5.0	
	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.
	h m 12 35	° ' " - 7 33	h m 12 37	° ' " -48 31	h m 12 37	° ' " - 1 0	h m 12 37	° ' " +10 40
Jan. 0.7	7.856	23.22	7.225	4.70	37.278	44.55	50.932	24.51
10.7	8.183 <sup>327</sup>	25.32 <sup>210</sup>	7.670 <sup>445</sup>	6.80 <sup>190</sup>	37.603 <sup>325</sup>	46.62 <sup>207</sup>	51.260 <sup>328</sup>	22.53 <sup>198</sup>
20.7	8.495 <sup>312</sup>	27.39 <sup>207</sup>	8.092 <sup>422</sup>	8.87 <sup>227</sup>	37.913 <sup>310</sup>	48.59 <sup>197</sup>	51.576 <sup>316</sup>	20.79 <sup>174</sup>
30.7	8.786 <sup>291</sup>	29.37 <sup>198</sup>	8.482 <sup>390</sup>	11.46 <sup>259</sup>	38.202 <sup>289</sup>	50.39 <sup>180</sup>	51.869 <sup>293</sup>	19.35 <sup>144</sup>
Feb. 9.6	9.045 <sup>250</sup>	31.19 <sup>182</sup>	8.829 <sup>347</sup>	14.27 <sup>281</sup>	38.461 <sup>259</sup>	51.96 <sup>157</sup>	52.134 <sup>265</sup>	18.22 <sup>113</sup>
19.6	9.268 <sup>223</sup>	32.80 <sup>161</sup>	9.129 <sup>300</sup>	17.22 <sup>295</sup>	38.684 <sup>223</sup>	53.29 <sup>133</sup>	52.362 <sup>228</sup>	17.44 <sup>78</sup>
29.6	9.453 <sup>185</sup>	34.20 <sup>140</sup>	9.376 <sup>247</sup>	20.26 <sup>304</sup>	38.870 <sup>186</sup>	54.33 <sup>104</sup>	52.550 <sup>188</sup>	17.00 <sup>44</sup>
Mar. 10.6	9.598 <sup>145</sup>	35.33 <sup>113</sup>	9.570 <sup>194</sup>	23.30 <sup>304</sup>	39.015 <sup>145</sup>	55.10 <sup>77</sup>	52.698 <sup>148</sup>	16.90 <sup>10</sup>
20.5	9.703 <sup>105</sup>	36.23 <sup>90</sup>	9.710 <sup>140</sup>	26.28 <sup>298</sup>	39.120 <sup>105</sup>	55.60 <sup>50</sup>	52.804 <sup>106</sup>	17.11 <sup>21</sup>
30.5	9.771 <sup>68</sup>	36.88 <sup>65</sup>	9.800 <sup>90</sup>	29.14 <sup>286</sup>	39.189 <sup>69</sup>	55.85 <sup>25</sup>	52.873 <sup>69</sup>	17.56 <sup>45</sup>
Apr. 9.5	9.806 <sup>35</sup>	37.80 <sup>42</sup>	9.842 <sup>42</sup>	31.82 <sup>268</sup>	39.224 <sup>35</sup>	55.87 <sup>2</sup>	52.907 <sup>34</sup>	18.23 <sup>67</sup>
19.4	9.812 <sup>6</sup>	37.51 <sup>21</sup>	9.839 <sup>3</sup>	34.29 <sup>247</sup>	39.230 <sup>6</sup>	55.69 <sup>18</sup>	52.909 <sup>2</sup>	19.06 <sup>53</sup>
29.4	9.790 <sup>22</sup>	37.55 <sup>4</sup>	9.796 <sup>43</sup>	36.49 <sup>220</sup>	39.208 <sup>22</sup>	55.36 <sup>33</sup>	52.883 <sup>26</sup>	20.02 <sup>96</sup>
May 9.4	9.748 <sup>42</sup>	37.42 <sup>13</sup>	9.716 <sup>80</sup>	38.40 <sup>191</sup>	39.165 <sup>43</sup>	54.91 <sup>45</sup>	52.835 <sup>48</sup>	21.03 <sup>101</sup>
19.4	9.686 <sup>62</sup>	37.14 <sup>28</sup>	9.605 <sup>111</sup>	39.97 <sup>157</sup>	39.104 <sup>61</sup>	54.35 <sup>56</sup>	52.767 <sup>68</sup>	22.06 <sup>103</sup>
29.3	9.609 <sup>77</sup>	36.74 <sup>40</sup>	9.464 <sup>141</sup>	41.18 <sup>121</sup>	39.026 <sup>78</sup>	53.72 <sup>63</sup>	52.685 <sup>82</sup>	23.05 <sup>98</sup>
June 8.3	9.520 <sup>80</sup>	36.25 <sup>49</sup>	9.299 <sup>165</sup>	42.02 <sup>84</sup>	38.936 <sup>90</sup>	53.05 <sup>67</sup>	52.589 <sup>96</sup>	24.00 <sup>95</sup>
18.3	9.421 <sup>90</sup>	35.67 <sup>58</sup>	9.114 <sup>185</sup>	42.46 <sup>44</sup>	38.837 <sup>99</sup>	52.35 <sup>70</sup>	52.485 <sup>104</sup>	24.86 <sup>86</sup>
28.3	9.315 <sup>106</sup>	35.01 <sup>66</sup>	8.914 <sup>200</sup>	42.49 <sup>3</sup>	38.731 <sup>106</sup>	51.65 <sup>70</sup>	52.375 <sup>110</sup>	25.62 <sup>76</sup>
July 8.2	9.204 <sup>111</sup>	34.31 <sup>70</sup>	8.705 <sup>209</sup>	42.10 <sup>39</sup>	38.622 <sup>109</sup>	50.96 <sup>69</sup>	52.261 <sup>114</sup>	26.24 <sup>62</sup>
18.2	9.093 <sup>111</sup>	33.58 <sup>73</sup>	8.494 <sup>211</sup>	41.34 <sup>76</sup>	38.511 <sup>111</sup>	50.31 <sup>65</sup>	52.147 <sup>114</sup>	26.73 <sup>49</sup>
28.2	8.984 <sup>109</sup>	32.83 <sup>75</sup>	8.286 <sup>208</sup>	40.19 <sup>115</sup>	38.403 <sup>108</sup>	49.70 <sup>61</sup>	52.035 <sup>112</sup>	27.06 <sup>33</sup>
Aug. 7.1	8.882 <sup>102</sup>	32.10 <sup>73</sup>	8.089 <sup>197</sup>	38.69 <sup>150</sup>	38.300 <sup>103</sup>	49.16 <sup>54</sup>	51.932 <sup>163</sup>	27.21 <sup>15</sup>
17.1	8.791 <sup>91</sup>	31.42 <sup>68</sup>	7.913 <sup>176</sup>	36.91 <sup>178</sup>	38.209 <sup>91</sup>	48.72 <sup>44</sup>	51.839 <sup>93</sup>	27.17 <sup>4</sup>
27.1	8.717 <sup>74</sup>	30.81 <sup>61</sup>	7.766 <sup>147</sup>	34.88 <sup>203</sup>	38.134 <sup>75</sup>	48.40 <sup>32</sup>	51.763 <sup>76</sup>	26.94 <sup>23</sup>
Sept. 6.1	8.665 <sup>62</sup>	30.30 <sup>51</sup>	7.656 <sup>110</sup>	32.69 <sup>219</sup>	38.079 <sup>55</sup>	48.24 <sup>16</sup>	51.708 <sup>55</sup>	26.50 <sup>44</sup>
16.0	8.641 <sup>24</sup>	29.93 <sup>37</sup>	7.594 <sup>62</sup>	30.40 <sup>229</sup>	38.052 <sup>27</sup>	48.24 <sup>0</sup>	51.680 <sup>28</sup>	25.83 <sup>67</sup>
26.0	8.649 <sup>8</sup>	29.76 <sup>17</sup>	7.585 <sup>9</sup>	28.13 <sup>227</sup>	38.056 <sup>4</sup>	48.46 <sup>22</sup>	51.684 <sup>4</sup>	24.91 <sup>92</sup>
Oct. 6.0	8.695 <sup>46</sup>	29.81 <sup>5</sup>	7.636 <sup>51</sup>	25.96 <sup>217</sup>	38.098 <sup>42</sup>	48.90 <sup>44</sup>	51.725 <sup>41</sup>	23.75 <sup>116</sup>
16.0	8.784 <sup>80</sup>	30.11 <sup>30</sup>	7.752 <sup>116</sup>	23.98 <sup>198</sup>	38.181 <sup>63</sup>	49.60 <sup>70</sup>	51.806 <sup>81</sup>	22.35 <sup>140</sup>
25.9	8.916 <sup>132</sup>	30.70 <sup>59</sup>	7.934 <sup>182</sup>	22.27 <sup>171</sup>	38.308 <sup>127</sup>	50.56 <sup>96</sup>	51.931 <sup>125</sup>	20.72 <sup>163</sup>
Nov. 4.9	9.093 <sup>177</sup>	31.66 <sup>86</sup>	8.180 <sup>246</sup>	20.94 <sup>183</sup>	38.479 <sup>171</sup>	51.79 <sup>123</sup>	52.100 <sup>160</sup>	18.88 <sup>184</sup>
14.9	9.313 <sup>220</sup>	32.73 <sup>117</sup>	8.487 <sup>307</sup>	20.06 <sup>89</sup>	38.692 <sup>213</sup>	53.26 <sup>147</sup>	52.312 <sup>212</sup>	16.86 <sup>202</sup>
24.8	9.571 <sup>258</sup>	34.16 <sup>143</sup>	8.847 <sup>360</sup>	19.64 <sup>41</sup>	38.944 <sup>252</sup>	54.97 <sup>171</sup>	52.563 <sup>251</sup>	14.69 <sup>217</sup>
Dec. 4.8	9.860 <sup>289</sup>	35.85 <sup>169</sup>	9.248 <sup>401</sup>	19.75 <sup>11</sup>	39.227 <sup>283</sup>	56.86 <sup>189</sup>	52.847 <sup>284</sup>	12.45 <sup>224</sup>
14.8	10.173 <sup>313</sup>	37.72 <sup>187</sup>	9.678 <sup>430</sup>	20.38 <sup>68</sup>	39.534 <sup>307</sup>	58.88 <sup>202</sup>	53.156 <sup>300</sup>	10.19 <sup>226</sup>
24.8	10.499 <sup>326</sup>	39.73 <sup>201</sup>	10.124 <sup>446</sup>	21.53 <sup>115</sup>	39.856 <sup>321</sup>	60.98 <sup>210</sup>	53.479 <sup>323</sup>	7.99 <sup>220</sup>
34.7	10.827 <sup>328</sup>	41.83 <sup>210</sup>	10.569 <sup>445</sup>	23.14 <sup>161</sup>	40.181 <sup>326</sup>	63.08 <sup>210</sup>	53.808 <sup>329</sup>	5.90 <sup>209</sup>
Mean Place	6.918	19.86	5.841	14.49	36.409	38.94	50.160	34.24
Sec δ, Tan δ	1.009	-0.133	1.510	-1.131	1.000	-0.018	1.018	+0.188
D <sub>α</sub> , D <sub>ω</sub>	+0.062	-0.009	+0.066	-0.074	+0.061	-0.001	+0.060	+0.012
D <sub>γ</sub> , D <sub>δ</sub>	-0.39	-0.15	-0.39	-0.16	-0.39	-0.16	-0.39	-0.16

# APPARENT PLACES OF STARS, 1920.

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FOR THE UPPER TRANSIT AT WASHINGTON.

Washington Mean Time.	76 Ursae Majoris. Mag. 5.9		β Crucis. Mag. 1.5		31 Comae. Mag. 5.1		γ Centauri. Mag. 4.3	
	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.
	h m 12 88	° ' " +63 8	h m 12 43	° ' " -59 14	h m 12 47	° ' " +27 57	h m 12 49	° ' " -39 44
Jan. 0.8	4.46 <sup>50</sup>	44.09 <sup>95</sup>	3.683 <sup>540</sup>	53.91 <sup>105</sup>	48.717 <sup>350</sup>	77.55 <sup>180</sup>	1.173 <sup>399</sup>	30.92 <sup>187</sup>
10.7	5.05 <sup>57</sup>	43.14 <sup>33</sup>	4.232 <sup>535</sup>	55.56 <sup>212</sup>	49.067 <sup>343</sup>	75.75 <sup>137</sup>	1.572 <sup>384</sup>	32.79 <sup>220</sup>
20.7	5.62 <sup>54</sup>	42.81 <sup>30</sup>	4.757 <sup>486</sup>	57.68 <sup>254</sup>	49.410 <sup>320</sup>	74.38 <sup>94</sup>	1.956 <sup>357</sup>	34.99 <sup>242</sup>
30.7	6.16 <sup>48</sup>	43.11 <sup>94</sup>	5.243 <sup>435</sup>	60.19 <sup>284</sup>	49.730 <sup>290</sup>	73.44 <sup>47</sup>	2.313 <sup>322</sup>	37.41 <sup>260</sup>
Feb. 9.6	6.64 <sup>42</sup>	44.05 <sup>140</sup>	5.678 <sup>377</sup>	63.03 <sup>308</sup>	50.020 <sup>254</sup>	72.97 <sup>1</sup>	2.635 <sup>282</sup>	40.01 <sup>268</sup>
19.6	7.06 <sup>34</sup>	45.54 <sup>199</sup>	6.055 <sup>813</sup>	66.11 <sup>323</sup>	50.274 <sup>214</sup>	72.96 <sup>44</sup>	2.917 <sup>237</sup>	42.69 <sup>271</sup>
29.6	7.40 <sup>25</sup>	47.53 <sup>289</sup>	6.368 <sup>248</sup>	69.34 <sup>331</sup>	50.488 <sup>187</sup>	73.40 <sup>84</sup>	3.154 <sup>190</sup>	45.40 <sup>267</sup>
Mar. 10.6	7.65 <sup>17</sup>	49.92 <sup>270</sup>	6.616 <sup>180</sup>	72.65 <sup>332</sup>	50.655 <sup>123</sup>	74.24 <sup>116</sup>	3.344 <sup>144</sup>	48.07 <sup>257</sup>
20.5	7.82 <sup>7</sup>	52.62 <sup>287</sup>	6.796 <sup>117</sup>	75.97 <sup>325</sup>	50.778 <sup>78</sup>	75.40 <sup>145</sup>	3.488 <sup>100</sup>	50.64 <sup>245</sup>
30.5	7.89 <sup>1</sup>	55.49 <sup>294</sup>	6.913 <sup>55</sup>	79.22 <sup>312</sup>	50.856 <sup>38</sup>	76.85 <sup>165</sup>	3.583 <sup>58</sup>	53.09 <sup>226</sup>
Apr. 9.5	7.88 <sup>10</sup>	58.43 <sup>299</sup>	6.968 <sup>5</sup>	82.34 <sup>293</sup>	50.894 <sup>0</sup>	78.50 <sup>175</sup>	3.646 <sup>20</sup>	55.35 <sup>204</sup>
19.5	7.78 <sup>17</sup>	61.32 <sup>273</sup>	6.963 <sup>59</sup>	85.27 <sup>270</sup>	50.894 <sup>38</sup>	80.25 <sup>173</sup>	3.666 <sup>15</sup>	57.39 <sup>181</sup>
29.4	7.61 <sup>22</sup>	64.05 <sup>248</sup>	6.904 <sup>110</sup>	87.97 <sup>237</sup>	50.861 <sup>61</sup>	82.03 <sup>176</sup>	3.651 <sup>45</sup>	59.20 <sup>153</sup>
May 9.4	7.39 <sup>28</sup>	66.53 <sup>214</sup>	6.794 <sup>154</sup>	90.34 <sup>206</sup>	50.800 <sup>84</sup>	83.79 <sup>165</sup>	3.606 <sup>75</sup>	60.73 <sup>125</sup>
19.4	7.11 <sup>32</sup>	68.67 <sup>175</sup>	6.640 <sup>197</sup>	92.40 <sup>165</sup>	50.716 <sup>106</sup>	85.44 <sup>151</sup>	3.531 <sup>100</sup>	61.98 <sup>94</sup>
29.3	6.79 <sup>25</sup>	70.42 <sup>130</sup>	6.443 <sup>230</sup>	94.05 <sup>124</sup>	50.611 <sup>130</sup>	86.95 <sup>131</sup>	3.431 <sup>122</sup>	62.92 <sup>61</sup>
June 8.3	6.44 <sup>37</sup>	71.72 <sup>82</sup>	6.213 <sup>261</sup>	95.29 <sup>81</sup>	50.491 <sup>180</sup>	88.26 <sup>107</sup>	3.303 <sup>140</sup>	63.53 <sup>27</sup>
18.3	6.07 <sup>37</sup>	72.54 <sup>32</sup>	5.952 <sup>282</sup>	96.10 <sup>33</sup>	50.361 <sup>136</sup>	89.33 <sup>81</sup>	3.169 <sup>155</sup>	63.80 <sup>5</sup>
28.3	5.70 <sup>37</sup>	72.86 <sup>19</sup>	5.670 <sup>297</sup>	96.43 <sup>12</sup>	50.225 <sup>142</sup>	90.14 <sup>23</sup>	3.014 <sup>167</sup>	63.75 <sup>40</sup>
July 8.2	5.33 <sup>37</sup>	72.67 <sup>70</sup>	5.373 <sup>301</sup>	96.31 <sup>60</sup>	50.063 <sup>142</sup>	90.65 <sup>23</sup>	2.847 <sup>170</sup>	63.35 <sup>73</sup>
18.2	4.96 <sup>35</sup>	71.97 <sup>118</sup>	5.072 <sup>298</sup>	95.71 <sup>106</sup>	49.941 <sup>141</sup>	90.88 <sup>9</sup>	2.677 <sup>170</sup>	62.62 <sup>104</sup>
28.2	4.61 <sup>31</sup>	70.79 <sup>185</sup>	4.774 <sup>282</sup>	94.66 <sup>147</sup>	49.800 <sup>131</sup>	90.79 <sup>41</sup>	2.507 <sup>163</sup>	61.58 <sup>131</sup>
Aug. 7.2	4.30 <sup>29</sup>	69.14 <sup>206</sup>	4.492 <sup>257</sup>	93.19 <sup>184</sup>	49.669 <sup>117</sup>	90.38 <sup>60</sup>	2.344 <sup>150</sup>	60.27 <sup>156</sup>
17.1	4.01 <sup>23</sup>	67.06 <sup>248</sup>	4.235 <sup>216</sup>	91.35 <sup>217</sup>	49.552 <sup>101</sup>	89.69 <sup>102</sup>	2.194 <sup>126</sup>	58.71 <sup>173</sup>
27.1	3.78 <sup>19</sup>	64.58 <sup>281</sup>	4.019 <sup>167</sup>	89.18 <sup>241</sup>	49.451 <sup>78</sup>	88.67 <sup>130</sup>	2.068 <sup>99</sup>	56.98 <sup>186</sup>
Sept. 6.1	3.59 <sup>13</sup>	61.77 <sup>312</sup>	3.852 <sup>106</sup>	86.77 <sup>258</sup>	49.373 <sup>48</sup>	87.37 <sup>161</sup>	1.969 <sup>60</sup>	55.12 <sup>191</sup>
16.0	3.46 <sup>5</sup>	58.65 <sup>324</sup>	3.746 <sup>34</sup>	84.19 <sup>263</sup>	49.325 <sup>16</sup>	85.76 <sup>187</sup>	1.909 <sup>16</sup>	53.21 <sup>188</sup>
26.0	3.41 <sup>1</sup>	55.31 <sup>352</sup>	3.712 <sup>43</sup>	81.56 <sup>258</sup>	49.309 <sup>25</sup>	83.89 <sup>210</sup>	1.893 <sup>36</sup>	51.33 <sup>178</sup>
Oct. 6.0	3.42 <sup>6</sup>	51.79 <sup>362</sup>	3.755 <sup>126</sup>	78.98 <sup>244</sup>	49.334 <sup>68</sup>	81.79 <sup>224</sup>	1.929 <sup>92</sup>	49.56 <sup>157</sup>
16.0	3.50 <sup>17</sup>	48.17 <sup>368</sup>	3.881 <sup>212</sup>	76.54 <sup>219</sup>	49.402 <sup>115</sup>	79.45 <sup>262</sup>	2.021 <sup>149</sup>	47.98 <sup>130</sup>
25.9	3.67 <sup>25</sup>	44.54 <sup>358</sup>	4.093 <sup>294</sup>	74.35 <sup>185</sup>	49.517 <sup>163</sup>	76.92 <sup>265</sup>	2.170 <sup>207</sup>	46.68 <sup>97</sup>
Nov. 4.9	3.92 <sup>33</sup>	40.96 <sup>241</sup>	4.387 <sup>372</sup>	72.50 <sup>141</sup>	49.680 <sup>211</sup>	74.27 <sup>272</sup>	2.377 <sup>261</sup>	45.71 <sup>56</sup>
14.9	4.25 <sup>42</sup>	37.55 <sup>817</sup>	4.759 <sup>437</sup>	71.09 <sup>92</sup>	49.891 <sup>253</sup>	71.55 <sup>275</sup>	2.638 <sup>310</sup>	45.15 <sup>12</sup>
24.9	4.67 <sup>17</sup>	34.38 <sup>284</sup>	5.196 <sup>491</sup>	70.17 <sup>35</sup>	50.144 <sup>291</sup>	68.80 <sup>267</sup>	2.948 <sup>350</sup>	45.03 <sup>35</sup>
Dec. 4.8	5.14 <sup>58</sup>	31.54 <sup>241</sup>	5.687 <sup>530</sup>	69.82 <sup>20</sup>	50.435 <sup>321</sup>	66.13 <sup>252</sup>	3.298 <sup>373</sup>	45.38 <sup>80</sup>
14.8	5.67 <sup>56</sup>	29.13 <sup>180</sup>	6.216 <sup>548</sup>	70.02 <sup>79</sup>	50.756 <sup>341</sup>	63.61 <sup>229</sup>	3.676 <sup>397</sup>	46.18 <sup>125</sup>
24.8	6.23 <sup>58</sup>	27.24 <sup>133</sup>	6.764 <sup>552</sup>	70.81 <sup>131</sup>	51.097 <sup>351</sup>	61.32 <sup>202</sup>	4.073 <sup>401</sup>	47.43 <sup>165</sup>
34.7	6.81	25.91	7.316	72.12	51.448	59.30	4.474	49.08
Mean Place	4.542	67.52	2.100	66.32	48.178	92.61	0.003	38.64
Sec δ, Tan δ	2.214	+1.975	1.956	-1.681	1.132	+0.531	1.301	-0.832
D <sub>α</sub> δ, D <sub>ω</sub> α	+0.052	+0.130	+0.069	-0.110	+0.058	+0.035	+0.066	-0.054
D <sub>δ</sub> δ, D <sub>ω</sub> δ	-0.39	-0.17	-0.39	-0.19	-0.39	-0.21	-0.39	-0.21

# APPARENT PLACES OF STARS, 1920.

FOR THE UPPER TRANSIT AT WASHINGTON.

Washington Mean Time.	ε Ursæ Majoris. (Alioth.) Mag. 1.7		δ Virginis. Mag. 3.7		α Can. Ven. seq. Mag. 2.9		δ Muscæ. Mag. 3.6	
	Right Ascension.	Declination.	Right Ascension.	Declination.	Right Ascension.	Declination.	Right Ascension.	Declination.
	h m 12 50	° ' " +56 22	h m 12 51	° ' " + 3 49	h m 12 52	° ' " +38 44	h m 12 56	° ' " -71 6
Jan. 0.8	30.868	75.80	35.117	48.10	17.645	42.57	46.41	48.79
10.7	31.363 <sup>495</sup>	74.52 <sup>128</sup>	35.442 <sup>228</sup>	46.04 <sup>206</sup>	18.023 <sup>353</sup>	40.93 <sup>104</sup>	47.23 <sup>82</sup>	50.01 <sup>122</sup>
20.7	31.849 <sup>496</sup>	73.87 <sup>65</sup>	35.757 <sup>315</sup>	44.16 <sup>188</sup>	18.400 <sup>372</sup>	39.81 <sup>112</sup>	48.02 <sup>79</sup>	51.77 <sup>176</sup>
30.7	32.310 <sup>461</sup>	73.82 <sup>5</sup>	36.052 <sup>295</sup>	42.49 <sup>167</sup>	18.753 <sup>353</sup>	39.19 <sup>62</sup>	48.76 <sup>74</sup>	54.02 <sup>225</sup>
Feb. 9.6	32.731 <sup>431</sup>	74.40 <sup>58</sup>	36.320 <sup>288</sup>	41.09 <sup>140</sup>	19.075 <sup>322</sup>	39.11 <sup>8</sup>	49.44 <sup>66</sup>	56.69 <sup>267</sup>
19.6	33.101 <sup>370</sup>	75.55 <sup>115</sup>	36.554 <sup>284</sup>	39.97 <sup>112</sup>	19.359 <sup>284</sup>	39.54 <sup>43</sup>	50.04 <sup>60</sup>	59.70 <sup>301</sup>
29.6	33.407 <sup>306</sup>	77.22 <sup>167</sup>	36.751 <sup>197</sup>	39.17 <sup>86</sup>	19.594 <sup>235</sup>	40.48 <sup>94</sup>	50.53 <sup>49</sup>	62.95 <sup>325</sup>
Mar. 10.6	33.644 <sup>287</sup>	79.31 <sup>200</sup>	36.910 <sup>159</sup>	38.67 <sup>50</sup>	19.780 <sup>186</sup>	41.82 <sup>134</sup>	50.94 <sup>41</sup>	66.38 <sup>343</sup>
20.5	33.809 <sup>165</sup>	81.76 <sup>245</sup>	37.029 <sup>119</sup>	38.47 <sup>20</sup>	19.916 <sup>136</sup>	43.55 <sup>173</sup>	51.25 <sup>31</sup>	69.91 <sup>353</sup>
30.5	33.901 <sup>92</sup>	84.42 <sup>266</sup>	37.113 <sup>84</sup>	38.51 <sup>4</sup>	19.999 <sup>83</sup>	45.52 <sup>197</sup>	51.45 <sup>20</sup>	73.47 <sup>356</sup>
Apr. 9.5	33.923 <sup>22</sup>	87.21 <sup>279</sup>	37.160 <sup>47</sup>	38.80 <sup>20</sup>	20.037 <sup>38</sup>	47.66 <sup>214</sup>	51.55 <sup>10</sup>	76.94 <sup>347</sup>
19.5	33.890 <sup>43</sup>	90.01 <sup>280</sup>	37.178 <sup>18</sup>	39.28 <sup>48</sup>	20.031 <sup>6</sup>	49.89 <sup>223</sup>	51.56 <sup>1</sup>	80.29 <sup>335</sup>
29.4	33.777 <sup>103</sup>	92.71 <sup>270</sup>	37.168 <sup>10</sup>	39.89 <sup>61</sup>	19.984 <sup>47</sup>	52.12 <sup>223</sup>	51.48 <sup>8</sup>	83.44 <sup>315</sup>
May 9.4	33.625 <sup>152</sup>	95.22 <sup>261</sup>	37.134 <sup>34</sup>	40.61 <sup>72</sup>	19.905 <sup>79</sup>	54.26 <sup>214</sup>	51.32 <sup>16</sup>	86.32 <sup>288</sup>
19.4	33.423 <sup>197</sup>	97.44 <sup>222</sup>	37.080 <sup>54</sup>	41.40 <sup>79</sup>	19.797 <sup>108</sup>	56.24 <sup>196</sup>	51.07 <sup>25</sup>	88.88 <sup>256</sup>
29.3	33.196 <sup>223</sup>	99.33 <sup>189</sup>	37.009 <sup>71</sup>	42.22 <sup>82</sup>	19.666 <sup>131</sup>	57.97 <sup>173</sup>	50.74 <sup>33</sup>	91.06 <sup>218</sup>
June 8.3	32.939 <sup>257</sup>	100.82 <sup>149</sup>	36.924 <sup>85</sup>	43.04 <sup>82</sup>	19.666 <sup>151</sup>	57.97 <sup>147</sup>	50.74 <sup>39</sup>	91.06 <sup>175</sup>
18.3	32.663 <sup>276</sup>	101.87 <sup>105</sup>	36.827 <sup>97</sup>	43.84 <sup>80</sup>	19.515 <sup>151</sup>	59.44 <sup>116</sup>	50.35 <sup>38</sup>	92.81 <sup>175</sup>
28.3	32.376 <sup>287</sup>	102.44 <sup>57</sup>	36.722 <sup>105</sup>	44.58 <sup>74</sup>	19.351 <sup>164</sup>	60.60 <sup>77</sup>	49.91 <sup>44</sup>	94.11 <sup>139</sup>
July 8.2	32.086 <sup>290</sup>	102.54 <sup>10</sup>	36.610 <sup>112</sup>	45.27 <sup>60</sup>	19.179 <sup>176</sup>	61.37 <sup>42</sup>	49.42 <sup>51</sup>	94.90 <sup>28</sup>
18.2	31.800 <sup>286</sup>	102.15 <sup>39</sup>	36.496 <sup>114</sup>	45.88 <sup>61</sup>	19.003 <sup>177</sup>	61.79 <sup>8</sup>	48.91 <sup>53</sup>	95.18 <sup>24</sup>
28.2	31.524 <sup>276</sup>	101.29 <sup>86</sup>	36.382 <sup>114</sup>	46.38 <sup>50</sup>	18.826 <sup>171</sup>	61.82 <sup>35</sup>	48.38 <sup>52</sup>	94.94 <sup>77</sup>
Aug. 7.2	31.266 <sup>268</sup>	99.98 <sup>181</sup>	36.272 <sup>110</sup>	46.78 <sup>40</sup>	18.655 <sup>163</sup>	61.47 <sup>74</sup>	47.86 <sup>51</sup>	94.17 <sup>126</sup>
17.1	31.033 <sup>283</sup>	98.24 <sup>174</sup>	36.172 <sup>100</sup>	47.03 <sup>25</sup>	18.495 <sup>147</sup>	60.73 <sup>109</sup>	47.35 <sup>51</sup>	92.91 <sup>173</sup>
27.1	30.832 <sup>201</sup>	96.09 <sup>215</sup>	36.066 <sup>86</sup>	47.13 <sup>10</sup>	18.345 <sup>127</sup>	59.64 <sup>145</sup>	46.88 <sup>40</sup>	91.18 <sup>213</sup>
Sept. 6.1	30.669 <sup>163</sup>	93.57 <sup>252</sup>	36.020 <sup>66</sup>	47.13 <sup>8</sup>	18.218 <sup>108</sup>	58.19 <sup>180</sup>	46.48 <sup>32</sup>	89.05 <sup>243</sup>
16.0	30.552 <sup>117</sup>	93.57 <sup>283</sup>	36.020 <sup>41</sup>	47.05 <sup>28</sup>	18.115 <sup>68</sup>	56.89 <sup>209</sup>	46.16 <sup>28</sup>	86.57 <sup>272</sup>
26.0	30.489 <sup>63</sup>	90.74 <sup>309</sup>	35.979 <sup>9</sup>	46.77 <sup>40</sup>	18.047 <sup>38</sup>	54.80 <sup>240</sup>	45.93 <sup>12</sup>	83.85 <sup>288</sup>
Oct. 6.0	30.485 <sup>4</sup>	87.65 <sup>332</sup>	35.970 <sup>27</sup>	46.28 <sup>74</sup>	18.014 <sup>14</sup>	51.90 <sup>261</sup>	45.81 <sup>0</sup>	80.97 <sup>283</sup>
16.0	30.546 <sup>61</sup>	84.33 <sup>345</sup>	35.997 <sup>69</sup>	45.54 <sup>98</sup>	18.028 <sup>60</sup>	49.29 <sup>284</sup>	45.81 <sup>14</sup>	78.04 <sup>286</sup>
25.9	30.675 <sup>129</sup>	80.88 <sup>353</sup>	36.066 <sup>111</sup>	44.56 <sup>122</sup>	18.068 <sup>112</sup>	46.45 <sup>296</sup>	45.95 <sup>27</sup>	75.18 <sup>267</sup>
Nov. 4.9	30.675	77.35	36.177	43.33	18.200	43.47	46.22	72.51
14.9	30.874 <sup>199</sup>	73.82 <sup>353</sup>	36.334 <sup>157</sup>	41.85 <sup>146</sup>	18.365 <sup>165</sup>	40.40 <sup>307</sup>	46.61 <sup>30</sup>	70.13 <sup>238</sup>
24.9	31.141 <sup>267</sup>	70.38 <sup>344</sup>	36.534 <sup>300</sup>	40.15 <sup>170</sup>	18.581 <sup>216</sup>	37.82 <sup>306</sup>	46.61 <sup>82</sup>	68.15 <sup>196</sup>
Dec. 4.8	31.475 <sup>334</sup>	67.14 <sup>334</sup>	36.773 <sup>239</sup>	38.27 <sup>188</sup>	18.843 <sup>267</sup>	34.80 <sup>302</sup>	47.76 <sup>63</sup>	66.65 <sup>150</sup>
14.8	31.865 <sup>390</sup>	64.18 <sup>296</sup>	37.048 <sup>275</sup>	36.23 <sup>304</sup>	19.155 <sup>307</sup>	31.43 <sup>287</sup>	48.47 <sup>71</sup>	65.70 <sup>95</sup>
24.8	32.303 <sup>438</sup>	61.58 <sup>260</sup>	37.349 <sup>301</sup>	34.10 <sup>212</sup>	19.499 <sup>344</sup>	28.79 <sup>284</sup>	48.47 <sup>77</sup>	65.70 <sup>35</sup>
34.7	32.775 <sup>472</sup>	59.43 <sup>215</sup>	37.666 <sup>817</sup>	31.95 <sup>215</sup>	19.866 <sup>367</sup>	26.50 <sup>220</sup>	49.24 <sup>81</sup>	65.35 <sup>25</sup>
34.7	33.266 <sup>491</sup>	57.82 <sup>161</sup>	37.991 <sup>325</sup>	29.83 <sup>212</sup>	20.246 <sup>380</sup>	24.58 <sup>192</sup>	50.05 <sup>81</sup>	65.60 <sup>85</sup>
Mean Place	30.878	97.74	34.371	54.99	17.286	60.55	44.489	63.57
Sec δ, Tan δ	1.807	+1.504	1.002	+0.067	1.282	+0.802	3.090	-2.924
D <sub>α</sub> , D <sub>ω</sub>	+0.052	+0.098	+0.061	+0.004	+0.056	+0.052	+0.080	-0.189
D <sub>δ</sub> , D <sub>ε</sub>	-0.39	-0.22	-0.39	-0.22	-0.39	-0.23	-0.39	-0.25



# APPARENT PLACES OF STARS, 1920.

421

## FOR THE UPPER TRANSIT AT WASHINGTON.

Washington Mean Time.	ε Virginis. Mag. 3.0		θ Virginis. Mag. 4.4		49 Comae. Mag. 4.3		20 Canum Venat. Mag. 4.7	
	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.
	h m 12 58	° ' " +11 22	h m 13 5	° ' " - 5 6	h m 13 8	° ' " +28 16	h m 13 13	° ' " +40 59
	s	"	s	"	s	"	s	"
Jan. 0.8	12.310	70.48	49.085	47.34	8.910	45.76	57.087	18.95
10.7	12.638 <sup>328</sup>	68.47 <sup>201</sup>	49.412 <sup>337</sup>	49.39 <sup>206</sup>	9.259 <sup>349</sup>	43.86 <sup>190</sup>	58.054 <sup>387</sup>	17.16 <sup>179</sup>
20.7	12.958 <sup>330</sup>	66.69 <sup>178</sup>	49.733 <sup>331</sup>	51.36 <sup>197</sup>	9.603 <sup>344</sup>	42.89 <sup>147</sup>	58.439 <sup>325</sup>	15.87 <sup>120</sup>
30.7	13.260 <sup>302</sup>	65.22 <sup>147</sup>	50.036 <sup>268</sup>	53.24 <sup>186</sup>	9.931 <sup>326</sup>	41.36 <sup>168</sup>	58.809 <sup>370</sup>	15.13 <sup>74</sup>
Feb. 9.7	13.536 <sup>278</sup>	64.07 <sup>115</sup>	50.313 <sup>277</sup>	54.94 <sup>170</sup>	10.232 <sup>302</sup>	40.80 <sup>56</sup>	59.151 <sup>342</sup>	14.94 <sup>19</sup>
	242	78	245	147	266	8	307	37
19.6	13.778	63.29	50.558	56.41	10.560	40.72	59.458	15.31
29.6	13.983 <sup>205</sup>	62.85 <sup>44</sup>	50.769 <sup>211</sup>	57.63 <sup>132</sup>	10.728 <sup>238</sup>	41.11 <sup>30</sup>	59.721 <sup>263</sup>	16.20 <sup>80</sup>
Mar. 10.6	14.150 <sup>167</sup>	62.79 <sup>6</sup>	50.941 <sup>172</sup>	58.63 <sup>100</sup>	10.915 <sup>187</sup>	41.92 <sup>81</sup>	59.935 <sup>214</sup>	17.56 <sup>138</sup>
20.6	14.276 <sup>128</sup>	63.02 <sup>28</sup>	51.078 <sup>137</sup>	59.35 <sup>72</sup>	11.057 <sup>142</sup>	43.10 <sup>117</sup>	60.099 <sup>164</sup>	19.31 <sup>175</sup>
30.5	14.367 <sup>91</sup>	63.51 <sup>40</sup>	51.177 <sup>90</sup>	59.82 <sup>47</sup>	11.156 <sup>90</sup>	44.57 <sup>148</sup>	60.212 <sup>112</sup>	21.36 <sup>205</sup>
	82	76	68	24	58	171	64	226
Apr. 9.5	14.419	64.27	51.245	60.06	11.214	46.28	60.276	23.62
19.5	14.443 <sup>24</sup>	65.18 <sup>91</sup>	51.279 <sup>34</sup>	60.12 <sup>6</sup>	11.233 <sup>19</sup>	48.12 <sup>184</sup>	60.293 <sup>17</sup>	26.00 <sup>238</sup>
29.4	14.433 <sup>19</sup>	66.22 <sup>104</sup>	51.288 <sup>9</sup>	59.99 <sup>13</sup>	11.218 <sup>15</sup>	50.02 <sup>190</sup>	60.287 <sup>26</sup>	28.40 <sup>240</sup>
May 9.4	14.402 <sup>31</sup>	67.32 <sup>110</sup>	51.269 <sup>19</sup>	59.70 <sup>20</sup>	11.174 <sup>44</sup>	51.91 <sup>180</sup>	60.204 <sup>63</sup>	30.72 <sup>232</sup>
19.4	14.346 <sup>54</sup>	68.45 <sup>112</sup>	51.231 <sup>38</sup>	59.29 <sup>41</sup>	11.103 <sup>71</sup>	53.72 <sup>151</sup>	60.109 <sup>95</sup>	32.89 <sup>217</sup>
	74	110	59	51	98	166	125	196
29.4	14.272	69.55	51.172	56.78	11.010	55.38	59.984	34.85
June 8.3	14.185 <sup>87</sup>	70.58 <sup>108</sup>	51.097 <sup>75</sup>	58.23 <sup>55</sup>	10.899 <sup>111</sup>	56.86 <sup>148</sup>	59.838 <sup>146</sup>	36.51 <sup>166</sup>
18.3	14.085 <sup>100</sup>	71.53 <sup>95</sup>	51.008 <sup>89</sup>	57.61 <sup>62</sup>	10.773 <sup>126</sup>	58.09 <sup>128</sup>	59.673 <sup>165</sup>	37.85 <sup>134</sup>
28.3	13.975 <sup>110</sup>	72.37 <sup>84</sup>	50.906 <sup>102</sup>	56.93 <sup>66</sup>	10.635 <sup>136</sup>	59.07 <sup>96</sup>	59.495 <sup>178</sup>	38.84 <sup>90</sup>
July 8.3	13.859 <sup>116</sup>	73.06 <sup>90</sup>	50.797 <sup>109</sup>	56.25 <sup>68</sup>	10.490 <sup>145</sup>	59.75 <sup>68</sup>	59.308 <sup>187</sup>	39.43 <sup>50</sup>
	120	58	115	68	150	37	192	18
18.2	13.739	73.59	50.682	55.67	10.340	60.12	59.116	39.81
28.2	13.619 <sup>120</sup>	73.95 <sup>36</sup>	50.565 <sup>117</sup>	54.91 <sup>66</sup>	10.191 <sup>140</sup>	60.19 <sup>7</sup>	58.925 <sup>191</sup>	39.39 <sup>22</sup>
Aug. 7.2	13.503 <sup>116</sup>	74.15 <sup>20</sup>	50.451 <sup>114</sup>	54.29 <sup>62</sup>	10.046 <sup>145</sup>	59.92 <sup>27</sup>	58.740 <sup>185</sup>	38.77 <sup>62</sup>
17.1	13.395 <sup>108</sup>	74.14 <sup>1</sup>	50.342 <sup>109</sup>	53.72 <sup>57</sup>	9.910 <sup>136</sup>	59.33 <sup>60</sup>	58.567 <sup>173</sup>	37.75 <sup>102</sup>
27.1	13.302 <sup>99</sup>	73.90 <sup>24</sup>	50.245 <sup>97</sup>	53.25 <sup>47</sup>	9.790 <sup>120</sup>	58.43 <sup>50</sup>	58.412 <sup>155</sup>	36.35 <sup>140</sup>
	74	44	76	28	100	122	132	177
Sept. 6.1	13.227	73.46	50.170	52.87	9.690	57.21	58.290	34.58
16.1	13.179 <sup>48</sup>	72.77 <sup>69</sup>	50.116 <sup>54</sup>	52.66 <sup>21</sup>	9.617 <sup>78</sup>	55.69 <sup>152</sup>	58.179 <sup>101</sup>	32.47 <sup>211</sup>
26.0	13.162 <sup>17</sup>	71.83 <sup>94</sup>	50.098 <sup>18</sup>	52.64 <sup>2</sup>	9.577 <sup>40</sup>	58.89 <sup>180</sup>	58.115 <sup>64</sup>	30.07 <sup>240</sup>
Oct. 6.0	13.180 <sup>18</sup>	70.67 <sup>116</sup>	50.112 <sup>14</sup>	52.83 <sup>19</sup>	9.575 <sup>2</sup>	51.81 <sup>208</sup>	58.095 <sup>20</sup>	27.88 <sup>269</sup>
16.0	13.241 <sup>61</sup>	69.23 <sup>144</sup>	50.170 <sup>56</sup>	53.25 <sup>42</sup>	9.617 <sup>42</sup>	49.51 <sup>220</sup>	58.124 <sup>29</sup>	24.48 <sup>290</sup>
	104	166	102	68	80	261	82	268
25.9	13.345	67.57	50.272	53.93	9.706	47.00	58.206	21.40
Nov. 4.9	13.494 <sup>149</sup>	65.71 <sup>186</sup>	50.419 <sup>147</sup>	54.87 <sup>94</sup>	9.844 <sup>133</sup>	44.34 <sup>266</sup>	58.344 <sup>128</sup>	18.23 <sup>317</sup>
14.9	13.687 <sup>193</sup>	63.64 <sup>207</sup>	50.613 <sup>194</sup>	56.10 <sup>123</sup>	10.082 <sup>188</sup>	41.58 <sup>276</sup>	58.537 <sup>193</sup>	15.02 <sup>321</sup>
24.9	13.922 <sup>235</sup>	61.45 <sup>210</sup>	50.846 <sup>228</sup>	57.58 <sup>143</sup>	10.265 <sup>233</sup>	38.80 <sup>278</sup>	58.783 <sup>246</sup>	11.86 <sup>316</sup>
Dec. 4.8	14.192 <sup>279</sup>	59.17 <sup>228</sup>	51.117 <sup>271</sup>	59.25 <sup>167</sup>	10.540 <sup>273</sup>	36.06 <sup>274</sup>	59.077 <sup>294</sup>	8.84 <sup>302</sup>
	299	280	289	187	308	280	334	280
14.8	14.491	56.67	51.416	61.12	10.848	33.46	59.411	6.04
24.8	14.809 <sup>316</sup>	54.62 <sup>285</sup>	51.733 <sup>317</sup>	63.10 <sup>198</sup>	11.180 <sup>322</sup>	31.07 <sup>280</sup>	59.776 <sup>365</sup>	3.57 <sup>247</sup>
34.8	15.136 <sup>327</sup>	52.51 <sup>211</sup>	52.058 <sup>326</sup>	65.14 <sup>204</sup>	11.525 <sup>345</sup>	28.98 <sup>269</sup>	60.158 <sup>382</sup>	1.50 <sup>307</sup>
Mean Place	11.673	79.79	48.346	44.06	8.525	60.18	57.593	36.62
Sec δ, Tan δ	1.020	+0.201	1.004	-0.690	1.186	+0.538	1.325	+0.869
D <sub>12</sub> , D <sub>22</sub>	+0.060	+0.013	+0.062	-0.006	+0.057	+0.634	+0.054	+0.055
D <sub>12</sub> , D <sub>22</sub>	-0.39	+0.25	-0.38	+0.28	-0.38	-0.29	-0.38	-0.32

APPARENT PLACES OF STARS, 1920.

FOR THE UPPER TRANSIT AT WASHINGTON.

Washington Mean Time.	γ Hydræ. Mag. 3.3			ε Centauri. Mag. 2.9			ζ <sup>1</sup> Ursæ Majoris. (Mizar.) Mag. 2.4			α Virginis. (Spica.) Mag. 1.2		
	Right Ascension.		Declina- tion.	Right Ascension.		Declina- tion.	Right Ascension.		Declina- tion.	Right Ascension.		Declina- tion.
	h m	s	° ' "	h m	s	° ' "	h m	s	° ' "	h m	s	° ' "
	13 14		-22 44	13 16		-36 17	13 20		+55 19	13 20		-10 44
			"			"			"			"
Jan. 0.8	34.946		56.27	6.506		19.13	42.177		73.66	59.262		39.55
10.7	35.296 <sup>350</sup>		58.14 <sup>187</sup>	6.894 <sup>388</sup>		20.81 <sup>108</sup>	42.652 <sup>475</sup>		72.02 <sup>104</sup>	59.594 <sup>332</sup>		41.53 <sup>198</sup>
20.7	35.639 <sup>343</sup>		60.17 <sup>203</sup>	7.273 <sup>379</sup>		22.77 <sup>196</sup>	43.130 <sup>478</sup>		70.98 <sup>104</sup>	59.919 <sup>325</sup>		43.51 <sup>196</sup>
30.7	35.963 <sup>324</sup>		62.26 <sup>209</sup>	7.633 <sup>360</sup>		24.95 <sup>218</sup>	43.593 <sup>463</sup>		70.58 <sup>40</sup>	60.230 <sup>311</sup>		45.42 <sup>191</sup>
Feb. 9.7	36.282 <sup>299</sup>		64.37 <sup>211</sup>	7.964 <sup>331</sup>		27.27 <sup>232</sup>	44.026 <sup>433</sup>		70.80 <sup>23</sup>	60.519 <sup>289</sup>		47.24 <sup>182</sup>
19.6	36.529 <sup>267</sup>		66.45 <sup>208</sup>	8.260 <sup>296</sup>		29.68 <sup>241</sup>	44.417 <sup>391</sup>		71.62 <sup>28</sup>	60.777 <sup>258</sup>		48.91 <sup>167</sup>
29.6	36.759 <sup>290</sup>		68.41 <sup>196</sup>	8.516 <sup>256</sup>		32.12 <sup>244</sup>	44.754 <sup>387</sup>		73.01 <sup>139</sup>	61.002 <sup>225</sup>		50.37 <sup>146</sup>
Mar. 10.6	36.952 <sup>198</sup>		70.25 <sup>184</sup>	8.731 <sup>215</sup>		34.52 <sup>240</sup>	45.029 <sup>275</sup>		74.89 <sup>188</sup>	61.190 <sup>188</sup>		51.61 <sup>124</sup>
20.6	37.107 <sup>155</sup>		71.92 <sup>167</sup>	8.903 <sup>172</sup>		36.84 <sup>232</sup>	45.238 <sup>200</sup>		77.18 <sup>289</sup>	61.345 <sup>155</sup>		52.61 <sup>100</sup>
30.5	37.224 <sup>117</sup>		73.41 <sup>149</sup>	9.035 <sup>132</sup>		39.04 <sup>230</sup>	45.379 <sup>141</sup>		79.76 <sup>268</sup>	61.461 <sup>116</sup>		53.39 <sup>78</sup>
Apr. 9.5	37.307 <sup>83</sup>		74.69 <sup>128</sup>	9.128 <sup>93</sup>		41.09 <sup>206</sup>	45.452 <sup>78</sup>		82.54 <sup>278</sup>	61.546 <sup>85</sup>		53.98 <sup>59</sup>
19.5	37.356 <sup>49</sup>		75.79 <sup>110</sup>	9.182 <sup>54</sup>		42.96 <sup>187</sup>	45.460 <sup>8</sup>		85.40 <sup>236</sup>	61.598 <sup>52</sup>		54.35 <sup>37</sup>
29.4	37.377 <sup>21</sup>		76.68 <sup>89</sup>	9.203 <sup>21</sup>		44.61 <sup>165</sup>	45.408 <sup>52</sup>		88.21 <sup>281</sup>	61.622 <sup>24</sup>		54.52 <sup>17</sup>
May 9.4	37.369 <sup>8</sup>		77.36 <sup>68</sup>	9.190 <sup>13</sup>		46.03 <sup>142</sup>	45.302 <sup>106</sup>		90.92 <sup>271</sup>	61.619 <sup>3</sup>		54.54 <sup>2</sup>
19.4	37.337 <sup>32</sup>		77.84 <sup>48</sup>	9.149 <sup>41</sup>		47.20 <sup>117</sup>	45.148 <sup>154</sup>		93.39 <sup>247</sup>	61.595 <sup>24</sup>		54.41 <sup>13</sup>
29.4	37.282 <sup>55</sup>		78.13 <sup>29</sup>	9.080 <sup>69</sup>		48.12 <sup>92</sup>	44.955 <sup>198</sup>		95.56 <sup>217</sup>	61.548 <sup>47</sup>		54.14 <sup>27</sup>
June 8.3	37.206 <sup>76</sup>		78.22 <sup>9</sup>	8.986 <sup>94</sup>		48.76 <sup>64</sup>	44.727 <sup>228</sup>		97.36 <sup>180</sup>	61.481 <sup>67</sup>		53.78 <sup>36</sup>
18.3	37.114 <sup>92</sup>		78.11 <sup>11</sup>	8.871 <sup>115</sup>		49.10 <sup>34</sup>	44.473 <sup>284</sup>		98.77 <sup>141</sup>	61.400 <sup>81</sup>		53.29 <sup>49</sup>
28.3	37.006 <sup>108</sup>		77.81 <sup>30</sup>	8.737 <sup>134</sup>		49.14 <sup>4</sup>	44.201 <sup>272</sup>		99.71 <sup>94</sup>	61.302 <sup>98</sup>		52.77 <sup>52</sup>
July 8.3	36.885 <sup>121</sup>		77.32 <sup>49</sup>	8.588 <sup>149</sup>		48.90 <sup>24</sup>	43.916 <sup>285</sup>		100.19 <sup>48</sup>	61.193 <sup>109</sup>		52.15 <sup>62</sup>
18.2	36.756 <sup>129</sup>		76.68 <sup>64</sup>	8.428 <sup>160</sup>		48.37 <sup>58</sup>	43.627 <sup>289</sup>		100.18 <sup>1</sup>	61.075 <sup>118</sup>		51.48 <sup>67</sup>
28.2	36.622 <sup>134</sup>		75.89 <sup>79</sup>	8.263 <sup>165</sup>		47.55 <sup>82</sup>	43.340 <sup>287</sup>		99.71 <sup>47</sup>	60.952 <sup>123</sup>		50.76 <sup>72</sup>
Aug. 7.2	36.468 <sup>134</sup>		74.94 <sup>95</sup>	8.098 <sup>165</sup>		46.47 <sup>108</sup>	43.062 <sup>278</sup>		98.74 <sup>97</sup>	60.827 <sup>125</sup>		50.05 <sup>71</sup>
17.1	36.362 <sup>126</sup>		73.91 <sup>103</sup>	7.942 <sup>139</sup>		45.18 <sup>129</sup>	42.802 <sup>260</sup>		97.32 <sup>142</sup>	60.709 <sup>118</sup>		49.34 <sup>71</sup>
27.1	36.247 <sup>115</sup>		72.81 <sup>110</sup>	7.801 <sup>141</sup>		43.70 <sup>148</sup>	42.566 <sup>236</sup>		95.45 <sup>187</sup>	60.602 <sup>107</sup>		48.68 <sup>66</sup>
Sept. 6.1	36.154 <sup>93</sup>		71.69 <sup>112</sup>	7.685 <sup>116</sup>		42.10 <sup>160</sup>	42.362 <sup>204</sup>		93.21 <sup>224</sup>	60.510 <sup>92</sup>		48.06 <sup>62</sup>
16.1	36.087 <sup>67</sup>		70.59 <sup>110</sup>	7.601 <sup>84</sup>		40.42 <sup>168</sup>	42.199 <sup>163</sup>		90.60 <sup>261</sup>	60.446 <sup>64</sup>		47.58 <sup>48</sup>
26.0	36.055 <sup>32</sup>		69.60 <sup>99</sup>	7.557 <sup>44</sup>		38.76 <sup>198</sup>	42.084 <sup>115</sup>		87.67 <sup>293</sup>	60.408 <sup>38</sup>		47.22 <sup>36</sup>
Oct. 6.0	36.063 <sup>8</sup>		68.73 <sup>87</sup>	7.560 <sup>3</sup>		37.17 <sup>159</sup>	42.026 <sup>58</sup>		84.47 <sup>320</sup>	60.412 <sup>4</sup>		47.06 <sup>16</sup>
16.0	36.118 <sup>55</sup>		68.07 <sup>66</sup>	7.616 <sup>56</sup>		35.75 <sup>142</sup>	42.029 <sup>8</sup>		81.06 <sup>330</sup>	60.454 <sup>42</sup>		47.13 <sup>7</sup>
26.0	36.221 <sup>103</sup>		67.44 <sup>44</sup>	7.728 <sup>112</sup>		34.54 <sup>121</sup>	42.100 <sup>71</sup>		81.06 <sup>353</sup>	60.454 <sup>91</sup>		47.13 <sup>29</sup>
Nov. 4.9	36.221 <sup>153</sup>		67.63 <sup>9</sup>	7.728 <sup>109</sup>		34.54 <sup>90</sup>	42.100 <sup>141</sup>		77.55 <sup>358</sup>	60.545 <sup>134</sup>		47.42 <sup>59</sup>
14.9	36.374 <sup>203</sup>		67.54 <sup>21</sup>	7.897 <sup>223</sup>		33.64 <sup>56</sup>	42.241 <sup>212</sup>		73.97 <sup>355</sup>	60.679 <sup>185</sup>		48.01 <sup>86</sup>
24.9	36.577 <sup>245</sup>		67.75 <sup>55</sup>	8.120 <sup>276</sup>		33.09 <sup>15</sup>	42.453 <sup>281</sup>		70.42 <sup>342</sup>	60.864 <sup>229</sup>		48.87 <sup>116</sup>
Dec. 4.8	36.825 <sup>286</sup>		68.30 <sup>90</sup>	8.396 <sup>319</sup>		32.94 <sup>68</sup>	42.734 <sup>366</sup>		67.00 <sup>298</sup>	61.063 <sup>264</sup>		50.03 <sup>140</sup>
14.8	37.111 <sup>318</sup>		69.20 <sup>123</sup>	8.715 <sup>358</sup>		33.22 <sup>68</sup>	43.076 <sup>396</sup>		63.80 <sup>298</sup>	61.357 <sup>296</sup>		51.43 <sup>163</sup>
24.8	37.429 <sup>387</sup>		70.43 <sup>150</sup>	9.068 <sup>374</sup>		33.90 <sup>109</sup>	43.472 <sup>438</sup>		60.92 <sup>247</sup>	61.653 <sup>317</sup>		53.06 <sup>190</sup>
34.8	37.766 <sup>448</sup>		71.93 <sup>178</sup>	9.442 <sup>385</sup>		34.99 <sup>146</sup>	43.910 <sup>467</sup>		56.45 <sup>196</sup>	61.970 <sup>329</sup>		54.86 <sup>192</sup>
34.8	38.114 <sup>348</sup>		73.68 <sup>178</sup>	9.827 <sup>385</sup>		36.45 <sup>146</sup>	44.377 <sup>467</sup>		56.49 <sup>196</sup>	62.299 <sup>329</sup>		56.78 <sup>192</sup>
Mean Place	34.107		59.35	5.563		26.55	42.514		94.14	58.562		33.72
Sec δ, Tan δ	1.064		-0.419	1.241		-0.734	1.768		+1.446	1.018		-0.190
D <sub>ψ</sub> , D <sub>ω</sub>	+0.065		-0.027	+0.068		-0.046	+0.048		+0.090	+0.063		-0.012
D <sub>φ</sub> , D <sub>ω</sub>	-0.38		-0.32	-0.38		-0.33	-0.37		-0.34	-0.37		-0.35

# APPARENT PLACES OF STARS, 1920.

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## FOR THE UPPER TRANSIT AT WASHINGTON.

Washington Mean Time.	Groombridge 3601. Mag. 6.1		70 Virginia. Mag. 5.2		5 Virginia. Mag. 3.4		17 H. Canum Venat. Mag. 5.0	
	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.
	h m 13 24	° ' " +72 47	h m 13 24	° ' " +14 11	h m 18 30	° ' " - 0 11	h m 13 31	° ' " +37 34
	s	"	s	"	s	"	s	"
Jan. 0.8	3.73	61.12	31.480	71.06	37.451	18.85	13.675	75.04
10.8	4.54	59.79	31.804	68.98	37.775	20.36	14.047	73.06
20.7	5.37	59.11	32.180	67.16	38.097	22.81	14.419	71.56
30.7	6.17	58.12	32.443	65.86	38.405	24.04	14.789	70.58
Feb. 9.7	6.93	56.78	32.783	64.52	38.693	25.56	15.119	70.16
19.6	7.62	61.07	32.993	63.77	38.962	26.86	15.426	70.27
29.6	8.22	62.98	33.220	63.40	39.178	27.98	15.694	70.91
Mar. 10.6	8.71	65.27	33.411	63.42	39.373	28.87	15.919	72.04
20.6	9.07	68.00	33.563	63.78	39.551	29.36	16.098	73.58
30.5	9.29	71.00	33.677	64.45	39.654	29.13	16.229	75.44
Apr. 9.5	9.33	74.13	33.757	65.36	39.743	29.06	16.314	77.57
19.5	9.34	77.29	33.803	66.46	39.800	28.77	16.355	79.84
29.5	9.17	80.38	33.819	67.70	39.829	28.30	16.357	82.18
May 9.4	8.90	83.22	33.807	69.00	39.831	27.73	16.320	84.40
19.4	8.52	86.78	33.770	70.32	39.811	27.06	16.251	86.69
29.4	8.06	87.97	33.712	71.59	39.767	26.30	16.153	88.70
June 8.3	7.53	89.73	33.634	72.78	39.706	25.54	16.030	90.47
18.3	6.94	91.00	33.540	73.88	39.626	24.77	15.887	91.94
28.3	6.31	91.76	33.434	74.82	39.531	24.00	15.726	93.10
July 8.3	5.66	91.68	33.315	75.59	39.423	23.27	15.554	93.88
18.2	5.01	91.66	33.189	76.17	39.307	22.59	15.374	94.28
28.2	4.37	90.30	33.059	76.55	39.184	21.99	15.191	94.30
Aug. 7.2	3.76	89.44	32.930	76.72	39.061	21.48	15.009	93.92
17.2	3.13	87.88	32.805	76.65	38.939	21.06	14.835	93.15
27.1	2.66	85.28	32.691	76.35	38.827	20.79	14.675	91.99
Sept. 6.1	2.20	82.53	32.586	75.89	38.733	20.66	14.534	90.47
16.1	1.82	79.51	32.519	76.01	38.659	20.70	14.422	88.61
26.0	1.53	76.17	32.474	73.96	38.614	20.92	14.343	86.42
Oct. 6.0	1.35	72.58	32.434	72.64	38.604	21.30	14.305	83.93
16.0	1.30	68.85	32.404	71.07	38.634	22.07	14.314	81.21
26.0	1.35	65.05	32.370	69.27	38.709	23.00	14.374	78.28
Nov. 4.9	1.53	61.25	32.392	67.25	38.832	24.20	14.488	75.20
14.9	1.84	57.57	32.361	65.04	38.999	25.54	14.656	72.06
24.9	2.23	54.19	32.074	62.71	39.211	27.31	14.878	68.91
Dec. 4.9	2.62	50.33	32.323	60.29	39.490	29.13	15.148	65.87
14.8	3.47	46.18	32.613	57.88	39.744	31.10	15.459	62.99
24.8	4.20	42.39	32.923	55.53	40.050	33.12	15.802	60.40
34.8	4.99	44.18	34.246	53.34	40.396	35.17	16.166	58.17
Mean Place	5.439	83.70	31.029	80.96	36.899	14.15	13.616	91.09
See $\delta$ , Tan $\delta$	3.882	+3.231	1.062	+0.253	1.000	-0.063	1.262	+0.770
$D_{\mu\alpha}$ , $D_{\mu\delta}$	+0.030	+0.201	+0.059	+0.016	+0.061	0.000	+0.053	+0.047
$D_{\nu\delta}$ , $D_{\nu\alpha}$	-0.87	-0.86	-0.37	-0.36	-0.37	-0.89	-0.37	-0.89

APPARENT PLACES OF STARS, 1920.

FOR THE UPPER TRANSIT AT WASHINGTON.

Washington Mean Time.	ε Centauri. Mag. 2.6		η Virginis. Mag. 5.2		γ Boötis. Mag. 4.5		γ Ursa Majoris. (Alkaid). Mag. 1.9	
	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.
	h m 13 34	° ' -53 3	h m 13 37	° ' - 8 17	h m 13 48	° ' +17 50	h m 13 44	° ' +49 42
Jan. 0.8	49.473	24.88	25.222	00.42	27.909	05.00	23.067	25.29
10.8	49.967 <sup>494</sup>	26.00	25.550 <sup>528</sup>	02.36 <sup>194</sup>	28.237 <sup>528</sup>	05.88 <sup>212</sup>	23.491 <sup>424</sup>	23.33 <sup>196</sup>
20.7	50.455 <sup>488</sup>	27.55	25.876 <sup>526</sup>	04.28 <sup>192</sup>	28.566 <sup>529</sup>	04.06 <sup>182</sup>	23.918 <sup>427</sup>	21.93 <sup>146</sup>
30.7	50.922 <sup>467</sup>	29.49	26.190 <sup>514</sup>	06.14 <sup>186</sup>	28.885 <sup>519</sup>	02.58 <sup>148</sup>	24.341 <sup>423</sup>	21.11 <sup>82</sup>
Feb. 9.7	51.359 <sup>437</sup>	31.74	26.485 <sup>295</sup>	07.56 <sup>173</sup>	29.185 <sup>300</sup>	01.49 <sup>108</sup>	24.742 <sup>401</sup>	20.92 <sup>19</sup>
19.7	51.757 <sup>398</sup>	34.25	26.751 <sup>298</sup>	09.39 <sup>168</sup>	29.459 <sup>274</sup>	00.83 <sup>98</sup>	25.110 <sup>368</sup>	21.33 <sup>41</sup>
29.6	52.109 <sup>352</sup>	36.94	26.987 <sup>236</sup>	11.23 <sup>133</sup>	29.703 <sup>244</sup>	00.60 <sup>28</sup>	25.436 <sup>326</sup>	22.36 <sup>108</sup>
Mar. 10.6	52.410 <sup>301</sup>	39.76	27.189 <sup>202</sup>	13.06 <sup>100</sup>	29.909 <sup>206</sup>	00.78 <sup>18</sup>	25.713 <sup>277</sup>	23.86 <sup>150</sup>
20.6	52.659 <sup>249</sup>	42.61	27.354 <sup>165</sup>	14.88 <sup>85</sup>	30.081 <sup>172</sup>	01.82 <sup>54</sup>	25.935 <sup>223</sup>	25.84 <sup>198</sup>
30.5	52.857 <sup>198</sup>	45.47	27.487 <sup>138</sup>	16.72 <sup>62</sup>	30.214 <sup>133</sup>	02.20 <sup>88</sup>	26.099 <sup>164</sup>	28.17 <sup>233</sup>
Apr. 9.5	53.008 <sup>146</sup>	48.26	27.587 <sup>100</sup>	18.56 <sup>39</sup>	30.311 <sup>97</sup>	03.35 <sup>115</sup>	26.293 <sup>104</sup>	30.74 <sup>257</sup>
19.5	53.097 <sup>94</sup>	50.93	27.656 <sup>69</sup>	20.42 <sup>18</sup>	30.375 <sup>64</sup>	04.69 <sup>124</sup>	26.255 <sup>52</sup>	33.47 <sup>273</sup>
29.5	53.142 <sup>45</sup>	53.44	27.695 <sup>39</sup>	22.28 <sup>2</sup>	30.405 <sup>30</sup>	06.16 <sup>147</sup>	26.253 <sup>2</sup>	36.24 <sup>277</sup>
May 9.4	53.141 <sup>1</sup>	55.73	27.708 <sup>13</sup>	24.13 <sup>13</sup>	30.406 <sup>1</sup>	07.72 <sup>158</sup>	26.200 <sup>53</sup>	38.97 <sup>273</sup>
19.4	53.095 <sup>48</sup>	57.76	27.695 <sup>13</sup>	26.00 <sup>28</sup>	30.382 <sup>24</sup>	09.27 <sup>155</sup>	26.105 <sup>96</sup>	41.53 <sup>256</sup>
29.4	53.007 <sup>88</sup>	59.52	27.660 <sup>35</sup>	27.46 <sup>88</sup>	30.332 <sup>59</sup>	11.55 <sup>153</sup>	26.099 <sup>136</sup>	43.85 <sup>232</sup>
June 8.4	52.879 <sup>128</sup>	60.93	27.604 <sup>56</sup>	29.08 <sup>43</sup>	30.261 <sup>71</sup>	13.40 <sup>149</sup>	25.969 <sup>169</sup>	45.85 <sup>201</sup>
18.3	52.716 <sup>163</sup>	62.00	27.529 <sup>75</sup>	30.58 <sup>58</sup>	30.170 <sup>91</sup>	15.26 <sup>127</sup>	25.804 <sup>196</sup>	47.54 <sup>168</sup>
28.3	52.522 <sup>194</sup>	62.88	27.440 <sup>89</sup>	32.00 <sup>69</sup>	30.064 <sup>106</sup>	17.10 <sup>110</sup>	25.383 <sup>221</sup>	48.78 <sup>124</sup>
July 8.3	52.302 <sup>220</sup>	62.95	27.384 <sup>106</sup>	33.03 <sup>82</sup>	29.942 <sup>123</sup>	18.58 <sup>88</sup>	25.148 <sup>235</sup>	49.63 <sup>85</sup>
18.2	52.064 <sup>268</sup>	62.82	27.217 <sup>117</sup>	34.06 <sup>96</sup>	29.810 <sup>132</sup>	20.07 <sup>67</sup>	25.000 <sup>248</sup>	49.99 <sup>36</sup>
28.2	51.814 <sup>299</sup>	62.27	27.090 <sup>127</sup>	35.06 <sup>106</sup>	29.671 <sup>139</sup>	21.45 <sup>48</sup>	24.846 <sup>254</sup>	49.89 <sup>10</sup>
Aug. 7.2	51.561 <sup>238</sup>	61.33	26.963 <sup>137</sup>	36.06 <sup>117</sup>	29.529 <sup>142</sup>	22.83 <sup>18</sup>	24.394 <sup>252</sup>	49.35 <sup>54</sup>
17.2	51.317 <sup>244</sup>	60.02	26.838 <sup>125</sup>	37.06 <sup>128</sup>	29.391 <sup>138</sup>	24.20 <sup>10</sup>	24.152 <sup>242</sup>	48.33 <sup>102</sup>
27.1	51.092 <sup>225</sup>	58.38	26.722 <sup>116</sup>	38.06 <sup>139</sup>	29.250 <sup>131</sup>	25.58 <sup>85</sup>	23.926 <sup>226</sup>	46.87 <sup>146</sup>
Sept. 6.1	50.898 <sup>194</sup>	56.45	26.590 <sup>108</sup>	39.06 <sup>148</sup>	29.117 <sup>117</sup>	27.00 <sup>68</sup>	23.926 <sup>201</sup>	46.87 <sup>196</sup>
16.1	50.746 <sup>152</sup>	54.32	26.542 <sup>78</sup>	40.06 <sup>159</sup>	28.984 <sup>94</sup>	28.30 <sup>91</sup>	23.725 <sup>170</sup>	45.01 <sup>227</sup>
26.1	50.647 <sup>99</sup>	52.05	26.491 <sup>51</sup>	41.06 <sup>170</sup>	28.853 <sup>66</sup>	29.59 <sup>119</sup>	23.555 <sup>132</sup>	42.74 <sup>227</sup>
Oct. 6.0	50.611 <sup>56</sup>	49.76	26.475 <sup>16</sup>	42.06 <sup>181</sup>	28.722 <sup>38</sup>	30.88 <sup>147</sup>	23.423 <sup>81</sup>	40.13 <sup>261</sup>
16.0	50.645 <sup>34</sup>	47.51	26.502 <sup>27</sup>	43.06 <sup>192</sup>	28.591 <sup>24</sup>	32.17 <sup>147</sup>	23.242 <sup>51</sup>	37.22 <sup>291</sup>
26.0	50.753 <sup>108</sup>	45.41	26.574 <sup>72</sup>	44.06 <sup>203</sup>	28.458 <sup>9</sup>	33.46 <sup>171</sup>	23.112 <sup>20</sup>	34.05 <sup>317</sup>
Nov. 4.9	50.967 <sup>134</sup>	43.55	26.594 <sup>120</sup>	45.06 <sup>214</sup>	28.327 <sup>64</sup>	34.75 <sup>197</sup>	23.012 <sup>34</sup>	30.70 <sup>335</sup>
14.9	50.967 <sup>289</sup>	43.55	26.694 <sup>190</sup>	46.06 <sup>225</sup>	28.196 <sup>36</sup>	36.04 <sup>218</sup>	22.846 <sup>95</sup>	27.23 <sup>347</sup>
24.9	51.196 <sup>289</sup>	42.03	26.860 <sup>106</sup>	47.06 <sup>236</sup>	28.065 <sup>95</sup>	37.33 <sup>239</sup>	22.601 <sup>160</sup>	23.72 <sup>351</sup>
Dec. 4.9	51.523 <sup>327</sup>	40.91	27.073 <sup>213</sup>	48.06 <sup>247</sup>	27.938 <sup>128</sup>	38.62 <sup>249</sup>	22.328 <sup>227</sup>	20.25 <sup>347</sup>
14.8	51.910 <sup>387</sup>	40.24	27.324 <sup>251</sup>	49.06 <sup>258</sup>	27.811 <sup>147</sup>	39.91 <sup>253</sup>	22.113 <sup>285</sup>	16.96 <sup>329</sup>
24.8	52.344 <sup>434</sup>	40.06	27.610 <sup>298</sup>	50.06 <sup>269</sup>	27.684 <sup>188</sup>	41.20 <sup>276</sup>	22.012 <sup>337</sup>	13.92 <sup>304</sup>
34.8	52.812 <sup>468</sup>	40.39	27.920 <sup>310</sup>	51.06 <sup>280</sup>	27.557 <sup>181</sup>	42.49 <sup>302</sup>	21.829 <sup>379</sup>	11.22 <sup>270</sup>
44.8	53.285 <sup>488</sup>	41.21	28.241 <sup>321</sup>	52.06 <sup>291</sup>	27.430 <sup>190</sup>	43.78 <sup>330</sup>	21.638 <sup>400</sup>	8.94 <sup>228</sup>
Mean Place	48.476	37.10	24.637	59.26	27.623	77.75	23.444	43.49
Sec δ, Tan δ	1.664	-1.330	1.011	-0.146	1.051	+0.322	1.546	+1.150
D <sub>α</sub> , D <sub>δ</sub>	+0.075	-0.061	+0.063	-0.009	+0.058	+0.019	+0.047	+0.071
D <sub>β</sub> , D <sub>δ</sub>	-0.36	-0.40	-0.36	-0.41	-0.36	-0.44	-0.36	-0.44

# APPARENT PLACES OF STARS, 1920.

425

FOR THE UPPER TRANSIT AT WASHINGTON.

Washington Mean Time.	♄ Virginia. Mag. 5.1		♄ Centauri. Mag. 3.1		♄ Boötis. Mag. 2.8		♄ Apodis. Var. 5.5-6.6	
	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.
	h m 13 45	° ' " -17 44	h m 13 50	° ' " -46 53	h m 13 50	° ' " +18 47	h m 13 57	° ' " -76 24
	s	"	s	"	s	"	s	"
Jan. 0.8	31.867	7.87	33.217	31.87	52.762	43.92	30.06	24.99
10.8	32.207 <sup>240</sup>	9.63 <sup>176</sup>	33.661 <sup>444</sup>	32.94 <sup>167</sup>	53.091 <sup>320</sup>	41.77 <sup>215</sup>	31.16 <sup>111</sup>	25.16 <sup>17</sup>
20.7	32.545 <sup>328</sup>	11.49 <sup>186</sup>	34.104 <sup>448</sup>	34.41 <sup>147</sup>	53.421 <sup>330</sup>	39.92 <sup>186</sup>	32.28 <sup>112</sup>	25.93 <sup>77</sup>
30.7	32.872 <sup>327</sup>	13.38 <sup>189</sup>	34.532 <sup>425</sup>	36.21 <sup>180</sup>	53.743 <sup>322</sup>	38.41 <sup>151</sup>	33.38 <sup>110</sup>	27.26 <sup>183</sup>
Feb. 9.7	33.178 <sup>305</sup>	15.25 <sup>187</sup>	34.936 <sup>404</sup>	38.30 <sup>208</sup>	54.049 <sup>308</sup>	37.31 <sup>110</sup>	34.42 <sup>104</sup>	29.06 <sup>180</sup>
19.7	33.458 <sup>280</sup>	17.04 <sup>179</sup>	35.307 <sup>371</sup>	40.58 <sup>238</sup>	54.329 <sup>280</sup>	36.84 <sup>67</sup>	35.40 <sup>98</sup>	31.31 <sup>225</sup>
29.6	33.707 <sup>240</sup>	18.69 <sup>183</sup>	35.640 <sup>338</sup>	43.02 <sup>264</sup>	54.579 <sup>260</sup>	36.40 <sup>24</sup>	36.29 <sup>89</sup>	33.94 <sup>263</sup>
Mar. 10.6	33.923 <sup>215</sup>	20.19 <sup>180</sup>	35.931 <sup>291</sup>	45.55 <sup>282</sup>	54.795 <sup>216</sup>	36.00 <sup>20</sup>	37.06 <sup>77</sup>	36.88 <sup>294</sup>
20.6	34.105 <sup>188</sup>	21.52 <sup>138</sup>	36.178 <sup>247</sup>	48.10 <sup>265</sup>	54.973 <sup>178</sup>	37.17 <sup>87</sup>	37.72 <sup>66</sup>	40.05 <sup>317</sup>
30.6	34.251 <sup>146</sup>	22.64 <sup>112</sup>	36.379 <sup>201</sup>	50.65 <sup>268</sup>	55.116 <sup>149</sup>	38.07 <sup>90</sup>	38.26 <sup>54</sup>	43.38 <sup>333</sup>
Apr. 9.5	34.384 <sup>113</sup>	23.58 <sup>94</sup>	36.536 <sup>157</sup>	53.10 <sup>262</sup>	55.221 <sup>105</sup>	39.26 <sup>119</sup>	38.26 <sup>40</sup>	43.38 <sup>341</sup>
19.5	34.445 <sup>81</sup>	25.58 <sup>74</sup>	36.693 <sup>112</sup>	55.10 <sup>236</sup>	55.221 <sup>72</sup>	39.26 <sup>140</sup>	38.66 <sup>27</sup>	46.79 <sup>342</sup>
29.5	34.497 <sup>48</sup>	27.32 <sup>57</sup>	36.849 <sup>69</sup>	55.46 <sup>219</sup>	55.293 <sup>30</sup>	40.66 <sup>182</sup>	38.93 <sup>13</sup>	50.21 <sup>334</sup>
May 9.4	34.519 <sup>22</sup>	28.89 <sup>40</sup>	36.981 <sup>26</sup>	57.65 <sup>202</sup>	55.332 <sup>8</sup>	42.18 <sup>161</sup>	39.06 <sup>0</sup>	53.55 <sup>324</sup>
19.4	34.517 <sup>2</sup>	30.29 <sup>28</sup>	37.145 <sup>18</sup>	59.67 <sup>179</sup>	55.340 <sup>30</sup>	43.79 <sup>161</sup>	39.06 <sup>13</sup>	56.79 <sup>303</sup>
29.4	34.517 <sup>28</sup>	31.52 <sup>8</sup>	37.282 <sup>49</sup>	61.46 <sup>164</sup>	55.320 <sup>43</sup>	45.40 <sup>166</sup>	38.93 <sup>27</sup>	59.82 <sup>278</sup>
June 8.4	34.498 <sup>50</sup>	33.00 <sup>0</sup>	37.403 <sup>87</sup>	63.00 <sup>125</sup>	55.277 <sup>68</sup>	46.96 <sup>145</sup>	38.66 <sup>38</sup>	62.60 <sup>241</sup>
18.3	34.438 <sup>78</sup>	34.54 <sup>22</sup>	37.506 <sup>139</sup>	64.25 <sup>94</sup>	55.209 <sup>89</sup>	48.43 <sup>123</sup>	38.28 <sup>49</sup>	65.01 <sup>205</sup>
28.3	34.365 <sup>82</sup>	35.83 <sup>33</sup>	37.577 <sup>149</sup>	65.19 <sup>61</sup>	55.120 <sup>105</sup>	49.75 <sup>113</sup>	37.79 <sup>59</sup>	67.06 <sup>160</sup>
July 8.3	34.274 <sup>100</sup>	36.90 <sup>45</sup>	37.628 <sup>176</sup>	65.80 <sup>26</sup>	55.015 <sup>122</sup>	50.88 <sup>98</sup>	37.20 <sup>67</sup>	68.66 <sup>114</sup>
18.3	34.165 <sup>123</sup>	37.86 <sup>56</sup>	37.662 <sup>196</sup>	66.05 <sup>80</sup>	54.893 <sup>132</sup>	51.81 <sup>72</sup>	36.53 <sup>72</sup>	69.80 <sup>60</sup>
28.2	34.043 <sup>121</sup>	38.99 <sup>67</sup>	37.686 <sup>211</sup>	65.95 <sup>45</sup>	54.761 <sup>141</sup>	52.53 <sup>44</sup>	35.81 <sup>77</sup>	70.40 <sup>8</sup>
Aug. 7.2	33.912 <sup>126</sup>	39.32 <sup>74</sup>	37.745 <sup>222</sup>	65.60 <sup>21</sup>	54.630 <sup>145</sup>	52.97 <sup>17</sup>	35.04 <sup>77</sup>	70.48 <sup>46</sup>
17.2	33.776 <sup>126</sup>	40.56 <sup>80</sup>	37.787 <sup>233</sup>	64.99 <sup>113</sup>	54.475 <sup>142</sup>	53.14 <sup>9</sup>	34.27 <sup>76</sup>	70.02 <sup>100</sup>
27.1	33.640 <sup>126</sup>	41.78 <sup>84</sup>	37.814 <sup>238</sup>	63.56 <sup>143</sup>	54.333 <sup>128</sup>	53.65 <sup>5</sup>	33.51 <sup>72</sup>	69.02 <sup>149</sup>
Sept. 6.1	33.512 <sup>118</sup>	42.94 <sup>83</sup>	37.811 <sup>208</sup>	62.14 <sup>187</sup>	54.195 <sup>120</sup>	52.70 <sup>67</sup>	32.79 <sup>64</sup>	67.53 <sup>195</sup>
16.1	33.400 <sup>90</sup>	44.11 <sup>79</sup>	37.833 <sup>146</sup>	60.47 <sup>187</sup>	54.075 <sup>100</sup>	52.08 <sup>92</sup>	32.15 <sup>53</sup>	65.58 <sup>233</sup>
26.1	33.310 <sup>60</sup>	45.32 <sup>69</sup>	37.877 <sup>102</sup>	58.90 <sup>197</sup>	53.975 <sup>76</sup>	51.11 <sup>124</sup>	31.62 <sup>40</sup>	63.25 <sup>266</sup>
Oct. 6.0	33.250 <sup>28</sup>	46.53 <sup>57</sup>	37.935 <sup>49</sup>	56.93 <sup>202</sup>	53.899 <sup>40</sup>	49.87 <sup>180</sup>	31.22 <sup>25</sup>	60.59 <sup>286</sup>
16.0	33.227 <sup>29</sup>	47.66 <sup>40</sup>	37.936 <sup>12</sup>	54.61 <sup>197</sup>	53.859 <sup>0</sup>	48.37 <sup>177</sup>	30.97 <sup>7</sup>	57.73 <sup>299</sup>
26.0	33.247 <sup>67</sup>	48.75 <sup>15</sup>	37.949 <sup>79</sup>	52.64 <sup>123</sup>	53.859 <sup>47</sup>	46.60 <sup>291</sup>	30.90 <sup>10</sup>	54.74 <sup>297</sup>
Nov. 5.0	33.314 <sup>117</sup>	49.81 <sup>9</sup>	37.929 <sup>146</sup>	50.81 <sup>161</sup>	53.806 <sup>82</sup>	44.59 <sup>294</sup>	31.00 <sup>30</sup>	51.77 <sup>286</sup>
14.9	33.481 <sup>108</sup>	50.89 <sup>38</sup>	37.874 <sup>218</sup>	49.20 <sup>180</sup>	54.001 <sup>148</sup>	42.36 <sup>240</sup>	31.90 <sup>48</sup>	48.91 <sup>261</sup>
24.9	33.593 <sup>238</sup>	51.98 <sup>86</sup>	37.806 <sup>277</sup>	47.90 <sup>26</sup>	54.149 <sup>102</sup>	39.65 <sup>253</sup>	31.78 <sup>64</sup>	46.30 <sup>227</sup>
Dec. 4.9	33.814 <sup>287</sup>	53.06 <sup>92</sup>	37.666 <sup>338</sup>	46.97 <sup>202</sup>	54.365 <sup>204</sup>	37.42 <sup>263</sup>	32.42 <sup>80</sup>	44.03 <sup>183</sup>
14.8	34.071 <sup>288</sup>	54.13 <sup>124</sup>	37.501 <sup>379</sup>	46.45 <sup>8</sup>	54.566 <sup>273</sup>	34.83 <sup>267</sup>	33.22 <sup>93</sup>	42.20 <sup>132</sup>
24.8	34.263 <sup>317</sup>	55.19 <sup>148</sup>	37.300 <sup>414</sup>	46.37 <sup>47</sup>	54.838 <sup>292</sup>	32.26 <sup>248</sup>	34.15 <sup>101</sup>	40.88 <sup>76</sup>
34.8	34.680 <sup>328</sup>	56.25 <sup>182</sup>	37.044 <sup>432</sup>	46.74 <sup>21</sup>	55.137 <sup>290</sup>	29.78 <sup>248</sup>	35.16 <sup>106</sup>	40.12 <sup>18</sup>
Mean Place	31.251	19.12	32.405	42.87	52.688	53.64	28.951	41.33
Sec & Tan s	1.050	-0.620	1.463	-1.069	1.056	+0.340	4.257	-4.136
D <sub>2</sub> s, D <sub>2</sub> s	+0.665	--0.019	+0.674	-0.063	+0.657	+0.020	+0.115	-0.241
D <sub>2</sub> Δ, D <sub>2</sub> Δ	-0.36	-0.44	-0.25	-0.46	-0.25	-0.47	-0.35	-0.49

# APPARENT PLACES OF STARS, 1920.

FOR THE UPPER TRANSIT AT WASHINGTON.

Washington Mean Time.	11 Boötis. Mag. 6.1		γ Virginia. Mag. 4.3		β Centauri. Mag. 0.9		τ Hydræ. Mag. 3.5	
	Right Ascension.	Declination.	Right Ascension.	Declination.	Right Ascension.	Declination.	Right Ascension.	Declination.
	h m	° ' "	h m	° ' "	h m	° ' "	h m	° ' "
	13 57	+27 45	13 57	+ 1 55	13 58	-59 59	14 1	-26 17
	s	"	s	"	s	"	s	"
Jan. 0.8	32.944	68.56	34.803	48.09	10.716	2.00	49.262	46.09
10.8	33.281 <sup>327</sup>	66.37 <sup>219</sup>	35.123 <sup>329</sup>	46.07 <sup>292</sup>	11.288 <sup>572</sup>	2.64 <sup>64</sup>	49.616 <sup>354</sup>	47.57 <sup>143</sup>
20.7	33.625 <sup>344</sup>	64.55 <sup>182</sup>	35.446 <sup>326</sup>	44.17 <sup>190</sup>	11.804 <sup>576</sup>	3.76 <sup>112</sup>	49.973 <sup>357</sup>	49.25 <sup>168</sup>
30.7	33.962 <sup>337</sup>	63.18 <sup>187</sup>	35.759 <sup>318</sup>	42.44 <sup>173</sup>	12.426 <sup>582</sup>	5.32 <sup>156</sup>	50.320 <sup>347</sup>	51.05 <sup>190</sup>
Feb. 9.7	34.284 <sup>322</sup>	62.27 <sup>91</sup>	36.057 <sup>298</sup>	40.96 <sup>149</sup>	12.957 <sup>581</sup>	7.26 <sup>194</sup>	50.649 <sup>329</sup>	52.92 <sup>157</sup>
19.7	34.580	61.69	36.331	39.76	13.483	9.54	50.983	54.81
29.6	34.846 <sup>266</sup>	61.99 <sup>10</sup>	36.577 <sup>285</sup>	38.86 <sup>90</sup>	13.898 <sup>445</sup>	12.09 <sup>265</sup>	51.229 <sup>276</sup>	56.67 <sup>166</sup>
Mar. 10.6	35.077 <sup>231</sup>	62.57 <sup>58</sup>	36.792 <sup>215</sup>	38.27 <sup>59</sup>	14.294 <sup>296</sup>	14.84 <sup>273</sup>	51.470 <sup>241</sup>	58.44 <sup>177</sup>
20.6	35.269 <sup>192</sup>	63.56 <sup>99</sup>	36.973 <sup>181</sup>	37.98 <sup>29</sup>	14.687 <sup>288</sup>	17.72 <sup>286</sup>	51.677 <sup>207</sup>	60.10 <sup>166</sup>
30.6	35.421 <sup>152</sup>	64.93 <sup>137</sup>	37.122 <sup>149</sup>	37.98 <sup>0</sup>	14.904 <sup>277</sup>	20.68 <sup>293</sup>	51.849 <sup>172</sup>	61.63 <sup>183</sup>
Apr. 9.5	35.534	66.58	37.237	38.23	15.121	23.63	51.988	63.02
19.5	35.808 <sup>74</sup>	68.45 <sup>187</sup>	37.321 <sup>84</sup>	38.69 <sup>46</sup>	15.276 <sup>155</sup>	26.53 <sup>290</sup>	52.093 <sup>105</sup>	64.23 <sup>121</sup>
29.5	35.648 <sup>40</sup>	70.44 <sup>199</sup>	37.375 <sup>54</sup>	39.31 <sup>02</sup>	15.368 <sup>99</sup>	29.32 <sup>279</sup>	52.166 <sup>72</sup>	65.29 <sup>106</sup>
May 9.4	35.654 <sup>-6</sup>	72.49 <sup>205</sup>	37.402 <sup>27</sup>	40.06 <sup>75</sup>	15.491 <sup>33</sup>	31.96 <sup>294</sup>	52.209 <sup>42</sup>	66.18 <sup>89</sup>
19.4	35.628 <sup>26</sup>	74.50 <sup>201</sup>	37.403 <sup>1</sup>	40.90 <sup>84</sup>	15.378 <sup>23</sup>	34.37 <sup>241</sup>	52.221 <sup>12</sup>	66.88 <sup>70</sup>
29.4	35.576 <sup>82</sup>	76.42 <sup>192</sup>	37.380 <sup>23</sup>	41.79 <sup>89</sup>	15.299 <sup>70</sup>	36.53 <sup>216</sup>	52.205 <sup>16</sup>	67.41 <sup>53</sup>
June 8.4	35.496 <sup>80</sup>	78.19 <sup>177</sup>	37.335 <sup>45</sup>	42.69 <sup>60</sup>	15.163 <sup>186</sup>	38.37 <sup>184</sup>	52.164 <sup>41</sup>	67.77 <sup>26</sup>
18.3	35.395 <sup>161</sup>	79.74 <sup>155</sup>	37.269 <sup>66</sup>	43.56 <sup>89</sup>	14.990 <sup>183</sup>	39.85 <sup>163</sup>	52.096 <sup>68</sup>	67.93 <sup>16</sup>
28.3	35.273 <sup>122</sup>	81.05 <sup>131</sup>	37.183 <sup>86</sup>	44.48 <sup>85</sup>	14.753 <sup>227</sup>	40.97 <sup>112</sup>	52.005 <sup>91</sup>	67.92 <sup>1</sup>
July 8.3	35.135 <sup>126</sup>	82.06 <sup>101</sup>	37.061 <sup>102</sup>	45.21 <sup>78</sup>	14.467 <sup>286</sup>	41.67 <sup>25</sup>	51.893 <sup>112</sup>	67.72 <sup>29</sup>
18.3	34.985 <sup>150</sup>	82.77 <sup>71</sup>	36.965 <sup>116</sup>	45.91 <sup>70</sup>	14.192 <sup>285</sup>	41.92 <sup>25</sup>	51.764 <sup>129</sup>	67.34 <sup>26</sup>
28.2	34.825 <sup>160</sup>	83.17 <sup>40</sup>	36.840 <sup>126</sup>	46.58 <sup>62</sup>	13.879 <sup>313</sup>	41.72 <sup>29</sup>	51.622 <sup>142</sup>	66.79 <sup>55</sup>
Aug. 7.2	34.661 <sup>164</sup>	83.23 <sup>6</sup>	36.709 <sup>131</sup>	47.02 <sup>69</sup>	13.553 <sup>326</sup>	41.05 <sup>67</sup>	51.471 <sup>151</sup>	66.07 <sup>72</sup>
17.2	34.499 <sup>182</sup>	82.94 <sup>29</sup>	36.577 <sup>122</sup>	47.39 <sup>37</sup>	13.233 <sup>320</sup>	39.96 <sup>199</sup>	51.319 <sup>162</sup>	65.21 <sup>86</sup>
27.1	34.343 <sup>156</sup>	82.30 <sup>64</sup>	36.450 <sup>127</sup>	47.92 <sup>28</sup>	12.990 <sup>308</sup>	38.50 <sup>189</sup>	51.172 <sup>147</sup>	64.23 <sup>96</sup>
Sept. 6.1	34.202	81.34	36.335	47.67	12.659	36.67	51.038	63.18
16.1	34.082 <sup>120</sup>	80.64 <sup>130</sup>	36.239 <sup>96</sup>	47.85 <sup>12</sup>	12.432 <sup>287</sup>	34.55 <sup>212</sup>	50.927 <sup>111</sup>	62.08 <sup>116</sup>
26.1	33.990 <sup>82</sup>	78.41 <sup>163</sup>	36.169 <sup>70</sup>	47.22 <sup>53</sup>	12.268 <sup>164</sup>	32.29 <sup>265</sup>	50.847 <sup>80</sup>	61.00 <sup>103</sup>
Oct. 6.0	33.934 <sup>86</sup>	76.49 <sup>192</sup>	36.133 <sup>26</sup>	46.67 <sup>55</sup>	12.175 <sup>98</sup>	29.73 <sup>247</sup>	50.806 <sup>41</sup>	59.98 <sup>102</sup>
16.0	33.919 <sup>15</sup>	74.28 <sup>221</sup>	36.136 <sup>2</sup>	45.89 <sup>78</sup>	12.162 <sup>13</sup>	27.23 <sup>250</sup>	50.809 <sup>2</sup>	59.09 <sup>89</sup>
26.0	33.952 <sup>26</sup>	71.84 <sup>244</sup>	36.133 <sup>47</sup>	45.29 <sup>108</sup>	12.162 <sup>79</sup>	27.23 <sup>262</sup>	50.809 <sup>54</sup>	58.30 <sup>70</sup>
Nov. 5.0	33.952	71.84	36.133	44.96	12.241	24.29	50.863	58.39
14.9	34.034 <sup>82</sup>	69.18 <sup>286</sup>	36.277 <sup>84</sup>	43.59 <sup>137</sup>	12.499 <sup>186</sup>	22.56 <sup>224</sup>	50.970 <sup>107</sup>	57.92 <sup>47</sup>
24.9	34.169 <sup>155</sup>	66.98 <sup>280</sup>	36.419 <sup>148</sup>	42.09 <sup>139</sup>	12.667 <sup>262</sup>	20.98 <sup>186</sup>	51.190 <sup>180</sup>	57.74 <sup>18</sup>
Dec. 4.9	34.354 <sup>156</sup>	63.50 <sup>268</sup>	36.666 <sup>157</sup>	40.96 <sup>171</sup>	13.013 <sup>246</sup>	18.98 <sup>185</sup>	51.344 <sup>214</sup>	57.86 <sup>12</sup>
14.8	34.586 <sup>232</sup>	60.62 <sup>268</sup>	36.837 <sup>221</sup>	38.51 <sup>187</sup>	13.431 <sup>428</sup>	17.93 <sup>128</sup>	51.605 <sup>269</sup>	58.30 <sup>44</sup>
24.8	34.859 <sup>273</sup>	57.82 <sup>290</sup>	37.103 <sup>266</sup>	36.50 <sup>201</sup>	13.913 <sup>493</sup>	17.02 <sup>71</sup>	51.902 <sup>299</sup>	59.07 <sup>77</sup>
34.8	35.165 <sup>306</sup>	55.17 <sup>265</sup>	37.397 <sup>294</sup>	34.44 <sup>208</sup>	14.438 <sup>525</sup>	16.30 <sup>29</sup>	52.229 <sup>327</sup>	60.15 <sup>108</sup>
44.8	35.493 <sup>338</sup>	52.77 <sup>240</sup>	37.709 <sup>312</sup>	32.37 <sup>207</sup>	14.999 <sup>561</sup>	15.13 <sup>28</sup>	52.574 <sup>345</sup>	61.48 <sup>122</sup>
Mean Place	32.893	80.64	34.422	52.07	9.550	15.95	48.874	51.47
Sec δ, Tan δ	1.130	+0.527	1.001	+0.084	1.999	-1.781	1.115	-0.494
D <sub>α</sub> , D <sub>αα</sub>	+0.054	+0.031	+0.061	+0.002	+0.064	-0.160	+0.068	-0.028
D <sub>β</sub> , D <sub>ββ</sub>	-0.35	-0.49	-0.35	-0.49	-0.35	-0.49	-0.34	-0.51

# APPARENT PLACES OF STARS, 1920.

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## FOR THE UPPER TRANSIT AT WASHINGTON.

Washington Mean Time.	θ Centauri. Mag. 2.3		α Draconis. Mag. 3.6		δ Boötis. Mag. 4.6		κ Virginis. Mag. 4.3	
	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.
	h m 14 1	° ' " -35 58	h m 14 2	° ' " +04 44	h m 14 6	° ' " +25 27	h m 14 8	° ' " - 9 54
Jan. 0.8	58.731 <sup>335</sup>	28.99 <sup>124</sup>	11.97 <sup>87</sup>	68.70 <sup>104</sup>	45.104 <sup>331</sup>	60.93 <sup>224</sup>	37.971 <sup>333</sup>	6.81 <sup>170</sup>
10.8	59.116 <sup>336</sup>	30.23 <sup>124</sup>	12.54 <sup>89</sup>	66.76 <sup>104</sup>	45.435 <sup>331</sup>	58.69 <sup>189</sup>	38.294 <sup>333</sup>	8.60 <sup>181</sup>
20.8	59.502 <sup>336</sup>	31.77 <sup>124</sup>	13.13 <sup>89</sup>	65.45 <sup>104</sup>	45.773 <sup>333</sup>	56.80 <sup>189</sup>	38.620 <sup>333</sup>	10.41 <sup>181</sup>
30.7	59.879 <sup>377</sup>	33.54 <sup>177</sup>	13.72 <sup>89</sup>	64.76 <sup>60</sup>	46.106 <sup>333</sup>	55.34 <sup>146</sup>	38.945 <sup>335</sup>	12.16 <sup>175</sup>
Feb. 9.7	60.266 <sup>337</sup>	35.49 <sup>195</sup>	14.29 <sup>87</sup>	64.76 <sup>6</sup>	46.426 <sup>330</sup>	54.53 <sup>101</sup>	39.251 <sup>306</sup>	13.82 <sup>166</sup>
19.7	60.566 <sup>330</sup>	37.54 <sup>206</sup>	14.83 <sup>84</sup>	65.40 <sup>64</sup>	46.722 <sup>296</sup>	53.81 <sup>83</sup>	39.554 <sup>283</sup>	15.31 <sup>149</sup>
29.6	60.863 <sup>297</sup>	39.66 <sup>213</sup>	15.32 <sup>49</sup>	66.68 <sup>128</sup>	46.990 <sup>298</sup>	53.78 <sup>3</sup>	39.793 <sup>259</sup>	16.62 <sup>131</sup>
Mar. 10.6	61.127 <sup>264</sup>	41.78 <sup>213</sup>	15.73 <sup>41</sup>	68.51 <sup>138</sup>	47.225 <sup>235</sup>	54.22 <sup>44</sup>	40.021 <sup>228</sup>	17.71 <sup>109</sup>
20.6	61.353 <sup>238</sup>	43.87 <sup>201</sup>	16.07 <sup>34</sup>	70.83 <sup>239</sup>	47.423 <sup>196</sup>	55.08 <sup>86</sup>	40.217 <sup>196</sup>	18.57 <sup>86</sup>
30.6	61.541 <sup>188</sup>	45.88 <sup>20</sup>	16.32 <sup>26</sup>	73.52 <sup>269</sup>	47.583 <sup>160</sup>	56.32 <sup>134</sup>	40.381 <sup>164</sup>	19.20 <sup>63</sup>
Apr. 9.5	61.692 <sup>151</sup>	47.79 <sup>191</sup>	16.49 <sup>17</sup>	76.47 <sup>206</sup>	47.705 <sup>132</sup>	57.86 <sup>154</sup>	40.513 <sup>132</sup>	19.20 <sup>42</sup>
19.5	61.806 <sup>114</sup>	49.55 <sup>176</sup>	16.56 <sup>7</sup>	79.56 <sup>309</sup>	47.790 <sup>85</sup>	59.62 <sup>170</sup>	40.615 <sup>102</sup>	19.62 <sup>28</sup>
29.5	61.883 <sup>77</sup>	51.18 <sup>163</sup>	16.55 <sup>1</sup>	82.69 <sup>313</sup>	47.842 <sup>313</sup>	61.52 <sup>190</sup>	40.687 <sup>72</sup>	19.85 <sup>7</sup>
May 9.5	61.926 <sup>43</sup>	52.63 <sup>145</sup>	16.46 <sup>9</sup>	85.73 <sup>304</sup>	47.859 <sup>17</sup>	63.49 <sup>197</sup>	40.687 <sup>43</sup>	19.92 <sup>10</sup>
19.4	61.936 <sup>10</sup>	53.88 <sup>135</sup>	16.30 <sup>18</sup>	88.58 <sup>285</sup>	47.846 <sup>13</sup>	65.46 <sup>197</sup>	40.729 <sup>13</sup>	19.82 <sup>23</sup>
29.4	61.915 <sup>31</sup>	55.88 <sup>108</sup>	16.30 <sup>94</sup>	88.58 <sup>285</sup>	47.846 <sup>41</sup>	65.46 <sup>189</sup>	40.747 <sup>10</sup>	19.59 <sup>33</sup>
June 8.4	61.961 <sup>54</sup>	57.75 <sup>82</sup>	16.06 <sup>29</sup>	91.16 <sup>235</sup>	47.895 <sup>68</sup>	67.35 <sup>175</sup>	40.787 <sup>33</sup>	19.26 <sup>42</sup>
18.3	61.961 <sup>29</sup>	59.57 <sup>57</sup>	15.77 <sup>94</sup>	93.41 <sup>138</sup>	47.737 <sup>91</sup>	69.10 <sup>185</sup>	40.704 <sup>88</sup>	18.84 <sup>43</sup>
28.3	61.779 <sup>109</sup>	56.32 <sup>33</sup>	15.43 <sup>99</sup>	95.24 <sup>126</sup>	47.646 <sup>113</sup>	70.66 <sup>135</sup>	40.646 <sup>78</sup>	18.36 <sup>54</sup>
July 8.3	61.670 <sup>128</sup>	56.65 <sup>6</sup>	15.04 <sup>41</sup>	96.59 <sup>89</sup>	47.583 <sup>130</sup>	72.01 <sup>107</sup>	40.568 <sup>96</sup>	17.82 <sup>61</sup>
18.3	61.588 <sup>128</sup>	56.71 <sup>39</sup>	14.63 <sup>46</sup>	97.48 <sup>94</sup>	47.408 <sup>144</sup>	73.08 <sup>78</sup>	40.472 <sup>113</sup>	17.24 <sup>61</sup>
28.2	61.386 <sup>167</sup>	56.51 <sup>47</sup>	14.20 <sup>44</sup>	97.83 <sup>15</sup>	47.259 <sup>135</sup>	73.86 <sup>49</sup>	40.359 <sup>130</sup>	16.63 <sup>63</sup>
Aug. 7.2	61.219 <sup>174</sup>	56.94 <sup>73</sup>	13.76 <sup>44</sup>	97.67 <sup>69</sup>	47.104 <sup>161</sup>	74.35 <sup>15</sup>	40.229 <sup>138</sup>	16.00 <sup>62</sup>
17.2	61.045 <sup>178</sup>	55.32 <sup>96</sup>	13.32 <sup>43</sup>	96.96 <sup>120</sup>	46.943 <sup>162</sup>	74.50 <sup>17</sup>	40.096 <sup>137</sup>	15.83 <sup>61</sup>
27.2	60.867 <sup>160</sup>	54.37 <sup>115</sup>	12.89 <sup>40</sup>	95.78 <sup>167</sup>	46.781 <sup>156</sup>	74.83 <sup>64</sup>	39.959 <sup>121</sup>	14.77 <sup>57</sup>
Sept. 6.1	60.698 <sup>138</sup>	53.22 <sup>133</sup>	12.49 <sup>97</sup>	94.11 <sup>214</sup>	46.625 <sup>144</sup>	73.88 <sup>80</sup>	39.824 <sup>121</sup>	14.20 <sup>49</sup>
16.1	60.545 <sup>128</sup>	51.90 <sup>144</sup>	12.12 <sup>33</sup>	91.97 <sup>254</sup>	46.461 <sup>134</sup>	72.99 <sup>116</sup>	39.703 <sup>106</sup>	13.71 <sup>42</sup>
26.1	60.417 <sup>94</sup>	50.46 <sup>150</sup>	11.80 <sup>27</sup>	89.43 <sup>292</sup>	46.357 <sup>98</sup>	71.83 <sup>147</sup>	39.598 <sup>77</sup>	13.29 <sup>37</sup>
Oct. 6.0	60.323 <sup>49</sup>	48.96 <sup>143</sup>	11.53 <sup>30</sup>	86.51 <sup>324</sup>	46.259 <sup>68</sup>	70.36 <sup>178</sup>	39.521 <sup>44</sup>	13.02 <sup>13</sup>
16.0	60.274 <sup>0</sup>	47.48 <sup>140</sup>	11.33 <sup>13</sup>	83.27 <sup>343</sup>	46.196 <sup>28</sup>	68.58 <sup>207</sup>	39.477 <sup>4</sup>	12.89 <sup>5</sup>
26.0	60.274 <sup>57</sup>	46.08 <sup>136</sup>	11.21 <sup>4</sup>	79.79 <sup>364</sup>	46.174 <sup>28</sup>	66.51 <sup>231</sup>	39.473 <sup>42</sup>	12.94 <sup>28</sup>
Nov. 5.0	60.361 <sup>115</sup>	44.83 <sup>108</sup>	11.17 <sup>6</sup>	76.15 <sup>377</sup>	46.197 <sup>73</sup>	64.20 <sup>254</sup>	39.515 <sup>89</sup>	13.22 <sup>54</sup>
14.9	60.446 <sup>178</sup>	43.30 <sup>78</sup>	11.23 <sup>15</sup>	72.36 <sup>376</sup>	46.270 <sup>126</sup>	61.66 <sup>270</sup>	39.604 <sup>133</sup>	13.76 <sup>77</sup>
24.9	60.621 <sup>289</sup>	43.05 <sup>41</sup>	11.38 <sup>26</sup>	68.62 <sup>367</sup>	46.395 <sup>175</sup>	58.96 <sup>260</sup>	39.742 <sup>187</sup>	14.53 <sup>103</sup>
Dec. 4.9	60.850 <sup>331</sup>	42.64 <sup>33</sup>	11.63 <sup>33</sup>	64.95 <sup>347</sup>	46.570 <sup>233</sup>	58.16 <sup>263</sup>	39.929 <sup>263</sup>	15.56 <sup>126</sup>
14.9	61.181 <sup>334</sup>	42.59 <sup>33</sup>	11.96 <sup>43</sup>	61.46 <sup>330</sup>	46.792 <sup>264</sup>	53.33 <sup>273</sup>	40.180 <sup>263</sup>	16.82 <sup>146</sup>
24.8	61.455 <sup>354</sup>	42.91 <sup>70</sup>	12.38 <sup>45</sup>	58.28 <sup>277</sup>	47.056 <sup>297</sup>	50.55 <sup>264</sup>	40.423 <sup>296</sup>	18.30 <sup>163</sup>
34.8	61.809 <sup>376</sup>	43.61 <sup>106</sup>	12.86 <sup>84</sup>	55.51 <sup>280</sup>	47.353 <sup>330</sup>	47.91 <sup>243</sup>	40.724 <sup>315</sup>	19.93 <sup>173</sup>
Mean Place	58.061	37.24	13.427	88.26	45.074	71.89	37.547	7.11
Sec δ, Tan δ	1.286	-0.726	2.845	+2.121	1.106	+0.476	1.015	-0.175
D <sub>α</sub> , D <sub>β</sub>	+0.071	-0.042	+0.033	+0.122	+0.065	+0.027	+0.064	-0.019
D <sub>γ</sub> , D <sub>δ</sub>	-0.34	-0.61	-0.34	-0.61	-0.34	-0.53	-0.34	-0.53

# APPARENT PLACES OF STARS, 1920.

## FOR THE UPPER TRANSIT AT WASHINGTON.

Washington Mean Time.	4 Ursae Minors. Mag. 5.0		ι Virginis. Mag. 4.2		α Boötis. (Arcturus). Mag. 0.2		λ Boötis. Mag. 4.3	
	Right Ascension.	Declination.	Right Ascension.	Declination.	Right Ascension.	Declination.	Right Ascension.	Declination.
	h m	° ' "	h m	° ' "	h m	° ' "	h m	° ' "
	14 8	+77 04	14 11	- 5 37	14 12	+19 35	14 13	+46 26
Jan. 0.0	68.06	68.96	49.392	10.55	0.800	44.93	20.184	62.65
10.0	64.08	68.17	49.712	12.44	1.117	42.06	20.522	60.39
20.0	60.07	61.01	50.036	14.39	1.443	40.68	20.925	58.65
30.0	57.18	60.58	50.358	16.05	1.767	39.09	21.327	57.48
Feb. 0.7	54.27	60.72	50.658	17.65	2.075	37.87	21.718	56.91
10.7	50.80	61.57	50.941	19.06	2.364	37.11	22.095	56.97
20.0	47.94	63.06	51.198	20.22	2.628	36.89	22.418	57.62
Mar. 10.0	41.08	65.09	51.436	21.15	2.856	36.89	22.709	58.83
20.0	37.71	67.59	51.621	21.82	3.051	37.48	22.954	60.53
30.0	32.10	70.44	51.765	22.22	3.212	38.32	23.148	62.64
Apr. 0.5	22.80	73.54	51.818	22.40	3.337	39.49	23.291	65.07
10.5	12.61	76.78	52.019	22.38	3.428	40.90	23.381	67.71
20.5	7.54	79.27	52.091	22.18	3.486	42.47	23.423	70.46
May 0.5	2.89	82.02	52.136	21.84	3.511	44.14	23.417	73.22
10.4	0.88	85.08	52.154	21.39	3.509	45.83	23.368	75.90
20.4	0.12	88.56	52.147	20.88	3.477	47.47	23.278	78.39
June 0.4	0.00	93.32	52.114	20.32	3.421	49.02	23.151	80.63
10.4	0.00	98.37	52.059	19.62	3.340	50.43	22.991	82.57
20.4	0.00	103.72	51.982	18.80	3.233	51.64	22.806	84.14
July 0.0	0.00	109.38	51.884	17.88	3.121	52.64	22.596	85.31
10.0	0.00	115.36	51.774	16.88	2.996	53.44	22.359	86.04
20.0	0.00	121.66	51.653	15.80	2.858	54.06	22.101	86.33
Aug. 0.0	0.00	128.28	51.522	14.56	2.708	54.17	21.823	86.16
10.0	0.00	135.22	51.381	13.28	2.546	54.12	21.635	85.54
20.0	0.00	142.48	51.230	11.96	2.373	53.79	21.411	84.47
Sept. 0.0	0.00	150.06	51.069	10.61	2.189	53.15	21.166	82.96
10.0	0.00	157.96	50.908	9.24	2.116	52.14	21.008	81.66
20.0	0.00	166.18	50.748	7.85	2.069	50.87	20.836	79.77
Oct. 0.0	0.00	174.72	50.589	6.45	2.051	49.36	20.651	77.13
10.0	0.00	183.58	50.431	5.04	2.063	47.63	20.454	73.79
20.0	0.00	192.76	50.274	3.62	2.103	45.70	20.246	70.08
Nov. 0.0	0.00	202.26	50.118	2.20	2.171	43.60	20.028	65.33
10.0	0.00	212.08	49.963	0.78	2.267	41.27	19.801	60.00
20.0	0.00	222.22	49.809	0.37	2.391	38.76	19.566	53.55
Dec. 0.0	0.00	232.68	49.656	0.00	2.543	36.12	19.323	46.44
10.0	0.00	243.46	49.504	0.00	2.724	33.40	19.073	38.19
20.0	0.00	254.56	49.352	0.00	2.935	30.66	18.817	28.46
Jan. 0.0	0.00	266.08	49.200	0.00	3.177	27.96	18.556	17.80
10.0	0.00	278.02	49.048	0.00	3.451	25.36	18.291	6.44
20.0	0.00	290.38	48.896	0.00	3.757	22.91	18.023	0.00



# APPARENT PLACES OF STARS, 1920.

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## FOR THE UPPER TRANSIT AT WASHINGTON.

Washington Mean Time.	λ Virginis. Mag. 4.6		β Libræ. Mag. 6.3		θ Boötis. Mag. 4.1		ζ Boötis. Mag. 5.4	
	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.
	h m 14 14	° ' " -13 0	h m 14 19	° ' " -11 20	h m 14 22	° ' " +52 12	h m 14 22	° ' " +19 34
	s	"	s	"	s	"	s	"
Jan. 0.8	47.052	11.19	7.530	56.41	27.624	55.77	44.101	60.84
10.8	47.379 <sup>327</sup>	12.91 <sup>172</sup>	7.853 <sup>323</sup>	58.15 <sup>174</sup>	28.038 <sup>414</sup>	53.45 <sup>232</sup>	44.418 <sup>317</sup>	58.58 <sup>236</sup>
20.8	47.703 <sup>330</sup>	14.65 <sup>174</sup>	8.183 <sup>330</sup>	59.91 <sup>176</sup>	28.472 <sup>424</sup>	51.68 <sup>177</sup>	44.744 <sup>326</sup>	56.61 <sup>197</sup>
30.7	48.033 <sup>326</sup>	16.39 <sup>174</sup>	8.507 <sup>334</sup>	61.64 <sup>173</sup>	28.911 <sup>433</sup>	50.50 <sup>118</sup>	45.070 <sup>326</sup>	55.01 <sup>160</sup>
Feb. 9.7	48.346 <sup>321</sup>	18.07 <sup>166</sup>	8.817 <sup>310</sup>	63.28 <sup>184</sup>	29.341 <sup>430</sup>	49.95 <sup>56</sup>	45.383 <sup>313</sup>	53.82 <sup>119</sup>
19.7	48.637 <sup>301</sup>	19.61 <sup>164</sup>	9.107 <sup>300</sup>	64.78 <sup>180</sup>	29.748 <sup>407</sup>	50.05 <sup>10</sup>	45.677 <sup>294</sup>	53.06 <sup>76</sup>
29.7	48.901 <sup>264</sup>	21.00 <sup>130</sup>	9.373 <sup>266</sup>	66.10 <sup>132</sup>	30.121 <sup>373</sup>	60.77 <sup>72</sup>	45.947 <sup>270</sup>	52.76 <sup>30</sup>
Mar. 10.6	49.135 <sup>234</sup>	22.20 <sup>120</sup>	9.609 <sup>265</sup>	67.23 <sup>113</sup>	30.450 <sup>339</sup>	52.08 <sup>131</sup>	46.186 <sup>239</sup>	52.89 <sup>13</sup>
20.6	49.337 <sup>202</sup>	23.20 <sup>100</sup>	9.814 <sup>206</sup>	68.13 <sup>90</sup>	30.727 <sup>277</sup>	53.89 <sup>131</sup>	46.391 <sup>206</sup>	53.45 <sup>56</sup>
30.6	49.509 <sup>173</sup>	23.99 <sup>79</sup>	9.989 <sup>175</sup>	68.62 <sup>69</sup>	30.950 <sup>233</sup>	56.14 <sup>226</sup>	46.564 <sup>173</sup>	54.37 <sup>173</sup>
Apr. 9.5	49.650 <sup>141</sup>	24.58 <sup>59</sup>	10.131 <sup>142</sup>	69.31 <sup>49</sup>	31.115 <sup>165</sup>	58.72 <sup>235</sup>	46.702 <sup>138</sup>	55.60 <sup>92</sup>
19.5	49.761 <sup>111</sup>	24.98 <sup>40</sup>	10.244 <sup>113</sup>	69.61 <sup>30</sup>	31.221 <sup>106</sup>	61.51 <sup>279</sup>	46.805 <sup>103</sup>	55.60 <sup>147</sup>
29.5	49.838 <sup>77</sup>	25.21 <sup>23</sup>	10.327 <sup>83</sup>	69.73 <sup>12</sup>	31.269 <sup>48</sup>	64.42 <sup>291</sup>	46.874 <sup>69</sup>	57.07 <sup>166</sup>
May 9.5	49.888 <sup>49</sup>	25.30 <sup>9</sup>	10.381 <sup>54</sup>	69.70 <sup>3</sup>	31.263 <sup>6</sup>	67.34 <sup>302</sup>	46.874 <sup>40</sup>	58.73 <sup>175</sup>
19.4	49.912 <sup>24</sup>	25.24 <sup>6</sup>	10.407 <sup>28</sup>	69.55 <sup>15</sup>	31.205 <sup>58</sup>	70.17 <sup>283</sup>	46.914 <sup>8</sup>	60.48 <sup>177</sup>
29.4	49.910 <sup>2</sup>	25.08 <sup>16</sup>	10.406 <sup>1</sup>	69.29 <sup>26</sup>	31.099 <sup>106</sup>	70.17 <sup>283</sup>	46.922 <sup>20</sup>	62.25 <sup>174</sup>
June 8.4	49.880 <sup>30</sup>	24.80 <sup>36</sup>	10.382 <sup>36</sup>	68.94 <sup>25</sup>	30.950 <sup>149</sup>	72.80 <sup>238</sup>	46.902 <sup>47</sup>	63.99 <sup>165</sup>
18.4	49.827 <sup>58</sup>	24.44 <sup>36</sup>	10.332 <sup>30</sup>	68.53 <sup>41</sup>	30.764 <sup>186</sup>	75.18 <sup>238</sup>	46.855 <sup>70</sup>	65.64 <sup>152</sup>
28.3	49.753 <sup>74</sup>	24.02 <sup>42</sup>	10.261 <sup>71</sup>	68.04 <sup>49</sup>	30.544 <sup>230</sup>	77.22 <sup>204</sup>	46.785 <sup>94</sup>	67.16 <sup>135</sup>
July 8.3	49.656 <sup>97</sup>	23.52 <sup>50</sup>	10.167 <sup>94</sup>	67.51 <sup>53</sup>	30.297 <sup>247</sup>	78.88 <sup>166</sup>	46.691 <sup>113</sup>	68.51 <sup>112</sup>
18.3	49.542 <sup>114</sup>	22.97 <sup>55</sup>	10.055 <sup>112</sup>	66.95 <sup>56</sup>	30.029 <sup>288</sup>	80.11 <sup>133</sup>	46.578 <sup>77</sup>	69.63 <sup>88</sup>
28.2	49.414 <sup>123</sup>	22.37 <sup>60</sup>	9.929 <sup>126</sup>	66.36 <sup>59</sup>	29.829 <sup>261</sup>	80.88 <sup>29</sup>	46.447 <sup>145</sup>	70.51 <sup>62</sup>
Aug. 7.2	49.278 <sup>136</sup>	21.74 <sup>68</sup>	9.793 <sup>136</sup>	65.74 <sup>62</sup>	29.748 <sup>261</sup>	81.17 <sup>29</sup>	46.302 <sup>145</sup>	71.13 <sup>34</sup>
17.2	49.138 <sup>140</sup>	21.10 <sup>64</sup>	9.651 <sup>142</sup>	65.15 <sup>59</sup>	29.458 <sup>300</sup>	80.98 <sup>19</sup>	46.149 <sup>152</sup>	71.47 <sup>28</sup>
27.2	48.999 <sup>159</sup>	20.47 <sup>63</sup>	9.512 <sup>150</sup>	64.56 <sup>59</sup>	29.170 <sup>288</sup>	80.92 <sup>66</sup>	45.993 <sup>156</sup>	71.55 <sup>24</sup>
Sept. 6.1	48.872 <sup>137</sup>	19.87 <sup>60</sup>	9.383 <sup>129</sup>	64.03 <sup>58</sup>	28.889 <sup>261</sup>	79.17 <sup>115</sup>	45.837 <sup>156</sup>	71.31 <sup>53</sup>
16.1	48.762 <sup>110</sup>	19.34 <sup>58</sup>	9.270 <sup>113</sup>	63.57 <sup>46</sup>	28.628 <sup>235</sup>	77.57 <sup>208</sup>	45.692 <sup>129</sup>	70.78 <sup>84</sup>
26.1	48.679 <sup>83</sup>	18.91 <sup>48</sup>	9.184 <sup>86</sup>	63.23 <sup>34</sup>	28.393 <sup>183</sup>	75.54 <sup>208</sup>	45.563 <sup>104</sup>	69.94 <sup>112</sup>
Oct. 6.1	48.629 <sup>50</sup>	18.62 <sup>29</sup>	9.129 <sup>55</sup>	63.02 <sup>21</sup>	28.195 <sup>153</sup>	73.12 <sup>242</sup>	45.459 <sup>72</sup>	68.82 <sup>144</sup>
16.0	48.619 <sup>10</sup>	18.50 <sup>12</sup>	9.115 <sup>14</sup>	63.00 <sup>2</sup>	28.042 <sup>96</sup>	70.34 <sup>278</sup>	45.387 <sup>34</sup>	67.38 <sup>170</sup>
26.0	48.655 <sup>26</sup>	18.57 <sup>7</sup>	9.115 <sup>30</sup>	63.00 <sup>18</sup>	27.944 <sup>28</sup>	67.25 <sup>309</sup>	45.353 <sup>10</sup>	65.68 <sup>198</sup>
Nov. 5.0	48.739 <sup>84</sup>	18.89 <sup>32</sup>	9.145 <sup>30</sup>	63.18 <sup>42</sup>	27.906 <sup>30</sup>	63.93 <sup>362</sup>	45.363 <sup>59</sup>	63.70 <sup>221</sup>
14.9	48.873 <sup>134</sup>	19.46 <sup>57</sup>	9.225 <sup>129</sup>	63.60 <sup>67</sup>	27.936 <sup>100</sup>	60.41 <sup>362</sup>	45.422 <sup>109</sup>	61.49 <sup>241</sup>
24.9	49.057 <sup>184</sup>	20.29 <sup>83</sup>	9.354 <sup>179</sup>	64.27 <sup>91</sup>	28.036 <sup>170</sup>	56.81 <sup>300</sup>	45.531 <sup>158</sup>	59.08 <sup>254</sup>
Dec. 4.9	49.236 <sup>229</sup>	21.36 <sup>107</sup>	9.533 <sup>222</sup>	65.18 <sup>116</sup>	28.206 <sup>238</sup>	53.21 <sup>360</sup>	45.689 <sup>206</sup>	56.54 <sup>262</sup>
14.9	49.553 <sup>287</sup>	22.68 <sup>122</sup>	9.756 <sup>262</sup>	66.34 <sup>138</sup>	28.444 <sup>300</sup>	49.70 <sup>331</sup>	45.895 <sup>248</sup>	53.92 <sup>263</sup>
24.8	49.843 <sup>305</sup>	24.19 <sup>161</sup>	10.018 <sup>263</sup>	67.72 <sup>155</sup>	28.744 <sup>364</sup>	46.39 <sup>301</sup>	46.143 <sup>281</sup>	51.29 <sup>257</sup>
34.8	50.165 <sup>317</sup>	25.84 <sup>165</sup>	10.311 <sup>313</sup>	69.27 <sup>169</sup>	29.098 <sup>365</sup>	43.38 <sup>301</sup>	46.424 <sup>305</sup>	48.72 <sup>257</sup>
			10.624 <sup>313</sup>	70.96 <sup>169</sup>	29.493 <sup>365</sup>	40.77 <sup>261</sup>	46.729 <sup>305</sup>	46.32 <sup>240</sup>
Mean Place	46.636	12.69	7.150	57.50	28.459	72.09	44.073	69.30
Sec δ, Tan δ	1.626	-0.231	1.620	-0.201	1.632	+1.290	1.061	+0.356
D <sub>α</sub> , D <sub>αα</sub>	+0.065	-0.013	+0.064	-0.011	+0.041	+0.070	+0.056	+0.019
D <sub>δ</sub> , D <sub>δδ</sub>	-0.33	-0.55	-0.33	-0.57	-0.32	-0.58	-0.32	-0.58

FOR THE UPPER TRANSIT AT WASHINGTON.

Washington Mean Time.	ϕ Virginis. Mag. 5.0		5 Ursæ Minoris. Mag. 4.4		ρ Boötis. Mag. 3.8		γ Boötis. Mag. 3.0	
	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.
	h m	° '	h m	° '	h m	° '	h m	° '
	14 24	- 1 52	14 27	+76 2	14 28	+30 42	14 28	+38 39
	s	"	s	"	s	"	s	"
Jan. 0.8	5.000	13.59	36.50	47.40	22.766	67.84	51.057	14.30
10.8	5.313 <sup>313</sup>	15.51 <sup>192</sup>	37.37 <sup>87</sup>	45.37 <sup>308</sup>	23.097 <sup>331</sup>	65.49 <sup>285</sup>	51.406 <sup>349</sup>	11.90 <sup>240</sup>
20.8	5.633 <sup>320</sup>	17.36 <sup>185</sup>	38.30 <sup>98</sup>	43.83 <sup>144</sup>	23.436 <sup>339</sup>	63.52 <sup>197</sup>	51.769 <sup>363</sup>	9.96 <sup>194</sup>
30.7	5.950 <sup>317</sup>	19.07 <sup>171</sup>	39.27 <sup>97</sup>	43.16 <sup>77</sup>	23.781 <sup>345</sup>	62.00 <sup>183</sup>	52.187 <sup>368</sup>	8.53 <sup>143</sup>
Feb. 9.7	6.254 <sup>304</sup>	20.60 <sup>168</sup>	40.23 <sup>96</sup>	43.07 <sup>0</sup>	24.113 <sup>333</sup>	60.98 <sup>182</sup>	52.494 <sup>357</sup>	7.66 <sup>87</sup>
	267	128	98	88	317	80	388	30
19.7	6.541	21.83	41.16	43.65	24.430	60.48	52.832	7.36
29.7	6.802 <sup>261</sup>	22.90 <sup>102</sup>	42.01 <sup>85</sup>	44.87 <sup>122</sup>	24.719 <sup>269</sup>	60.51 <sup>3</sup>	53.144 <sup>312</sup>	7.65 <sup>29</sup>
Mar. 10.6	7.036 <sup>284</sup>	23.63 <sup>73</sup>	42.77 <sup>76</sup>	46.68 <sup>131</sup>	24.979 <sup>290</sup>	61.06 <sup>26</sup>	53.421 <sup>277</sup>	8.47 <sup>82</sup>
20.6	7.240 <sup>304</sup>	24.09 <sup>46</sup>	43.41 <sup>64</sup>	49.00 <sup>232</sup>	25.202 <sup>223</sup>	62.10 <sup>104</sup>	53.661 <sup>240</sup>	9.81 <sup>134</sup>
30.6	7.412 <sup>172</sup>	24.27 <sup>18</sup>	43.90 <sup>49</sup>	51.72 <sup>373</sup>	25.387 <sup>185</sup>	63.51 <sup>141</sup>	53.857 <sup>196</sup>	11.57 <sup>176</sup>
	142	6	84	201	247	177	153	209
Apr. 9.6	7.554	24.21	44.24	54.73	25.534	65.28	54.010	13.66
19.5	7.666 <sup>112</sup>	23.92 <sup>29</sup>	44.42 <sup>18</sup>	57.91 <sup>318</sup>	25.643 <sup>109</sup>	67.30 <sup>202</sup>	54.120 <sup>110</sup>	16.02 <sup>236</sup>
29.5	7.748 <sup>82</sup>	23.47 <sup>45</sup>	44.44 <sup>2</sup>	61.15 <sup>334</sup>	25.714 <sup>71</sup>	69.47 <sup>217</sup>	54.187 <sup>67</sup>	18.52 <sup>250</sup>
May 9.5	7.802 <sup>54</sup>	22.88 <sup>59</sup>	44.30 <sup>14</sup>	64.35 <sup>330</sup>	25.749 <sup>35</sup>	71.74 <sup>237</sup>	54.213 <sup>26</sup>	21.10 <sup>253</sup>
19.4	7.828 <sup>26</sup>	22.17 <sup>71</sup>	44.02 <sup>28</sup>	67.37 <sup>302</sup>	25.749 <sup>0</sup>	74.00 <sup>236</sup>	54.200 <sup>13</sup>	23.63 <sup>253</sup>
	1	76	42	275	32	219	49	242
29.4	7.829	21.41	43.60	70.12	25.717	76.19	54.151	26.06
June 8.4	7.804 <sup>25</sup>	20.61 <sup>80</sup>	43.06 <sup>54</sup>	72.52 <sup>240</sup>	25.654 <sup>63</sup>	78.22 <sup>208</sup>	54.068 <sup>83</sup>	28.28 <sup>223</sup>
18.4	7.756 <sup>48</sup>	19.81 <sup>80</sup>	42.42 <sup>64</sup>	74.53 <sup>201</sup>	25.565 <sup>89</sup>	80.05 <sup>183</sup>	53.954 <sup>114</sup>	30.26 <sup>198</sup>
28.3	7.684 <sup>72</sup>	19.02 <sup>79</sup>	41.70 <sup>72</sup>	76.08 <sup>155</sup>	25.448 <sup>117</sup>	81.61 <sup>166</sup>	53.812 <sup>142</sup>	31.94 <sup>168</sup>
July 8.3	7.592 <sup>92</sup>	18.27 <sup>75</sup>	40.91 <sup>79</sup>	77.13 <sup>105</sup>	25.311 <sup>137</sup>	82.91 <sup>130</sup>	53.648 <sup>164</sup>	33.26 <sup>132</sup>
	111	69	84	80	136	96	184	95
18.3	7.481	17.56	40.07	77.83	25.155	83.37	53.464	34.21
28.3	7.357 <sup>194</sup>	16.94 <sup>64</sup>	39.21 <sup>86</sup>	77.62 <sup>1</sup>	24.985 <sup>170</sup>	84.46 <sup>69</sup>	53.266 <sup>196</sup>	34.75 <sup>54</sup>
Aug. 7.2	7.222 <sup>125</sup>	16.38 <sup>56</sup>	38.34 <sup>87</sup>	77.07 <sup>55</sup>	24.806 <sup>179</sup>	84.71 <sup>25</sup>	53.058 <sup>206</sup>	34.89 <sup>14</sup>
17.2	7.082 <sup>140</sup>	15.93 <sup>45</sup>	37.48 <sup>86</sup>	75.98 <sup>109</sup>	24.623 <sup>183</sup>	84.58 <sup>13</sup>	52.846 <sup>212</sup>	34.59 <sup>30</sup>
27.2	6.943 <sup>139</sup>	15.58 <sup>35</sup>	36.65 <sup>83</sup>	74.41 <sup>157</sup>	24.442 <sup>131</sup>	84.07 <sup>61</sup>	52.639 <sup>207</sup>	33.88 <sup>71</sup>
	131	21	77	206	171	86	196	112
Sept. 6.1	6.812	15.37	35.88	72.35	24.271	83.21	52.443	32.76
16.1	6.698 <sup>114</sup>	15.30 <sup>7</sup>	35.18 <sup>70</sup>	69.85 <sup>260</sup>	24.118 <sup>163</sup>	81.96 <sup>125</sup>	52.268 <sup>175</sup>	31.24 <sup>152</sup>
26.1	6.606 <sup>92</sup>	15.41 <sup>11</sup>	34.57 <sup>61</sup>	66.97 <sup>258</sup>	23.991 <sup>127</sup>	80.37 <sup>159</sup>	52.119 <sup>149</sup>	29.35 <sup>169</sup>
Oct. 6.1	6.546 <sup>60</sup>	15.72 <sup>31</sup>	34.07 <sup>50</sup>	63.76 <sup>321</sup>	23.896 <sup>95</sup>	78.45 <sup>192</sup>	52.006 <sup>113</sup>	27.09 <sup>226</sup>
16.0	6.524 <sup>22</sup>	16.23 <sup>51</sup>	33.70 <sup>37</sup>	60.28 <sup>348</sup>	23.843 <sup>53</sup>	76.20 <sup>225</sup>	51.938 <sup>68</sup>	24.53 <sup>256</sup>
	21	75	23	367	8	249	16	264
26.0	6.545	16.98	33.47	56.61	23.635	73.71	51.920	21.69
Nov. 5.0	6.614 <sup>69</sup>	17.97 <sup>99</sup>	33.39 <sup>8</sup>	52.82 <sup>379</sup>	23.881 <sup>46</sup>	70.97 <sup>274</sup>	51.958 <sup>36</sup>	18.64 <sup>305</sup>
15.0	6.732 <sup>118</sup>	19.19 <sup>122</sup>	33.47 <sup>8</sup>	49.02 <sup>380</sup>	23.977 <sup>96</sup>	68.05 <sup>293</sup>	52.052 <sup>94</sup>	15.44 <sup>320</sup>
24.9	6.898 <sup>166</sup>	20.63 <sup>144</sup>	33.72 <sup>25</sup>	45.30 <sup>672</sup>	24.130 <sup>133</sup>	65.08 <sup>297</sup>	52.205 <sup>153</sup>	12.17 <sup>327</sup>
Dec. 4.9	7.110 <sup>212</sup>	22.28 <sup>165</sup>	34.14 <sup>42</sup>	41.74 <sup>836</sup>	24.334 <sup>204</sup>	62.04 <sup>304</sup>	52.412 <sup>207</sup>	8.92 <sup>325</sup>
	250	179	56	236	248	297	258	315
14.9	7.360	24.07	34.70	38.48	24.562	59.07	52.670	5.77
24.8	7.640 <sup>280</sup>	25.96 <sup>189</sup>	35.40 <sup>70</sup>	35.61 <sup>367</sup>	24.870 <sup>268</sup>	56.24 <sup>283</sup>	52.970 <sup>300</sup>	2.83 <sup>294</sup>
34.8	7.944 <sup>304</sup>	27.89 <sup>193</sup>	36.21 <sup>81</sup>	33.22 <sup>239</sup>	25.186 <sup>316</sup>	53.68 <sup>236</sup>	53.305 <sup>335</sup>	0.19 <sup>264</sup>
Mean Place	4.726	11.81	40.503	66.12	22.967	79.09	51.451	27.44
Sec δ, Tan δ	1.001	-0.033	4.148	+4.925	1.163	+0.594	1.280	+0.800
D <sub>ψ</sub> α, D <sub>ω</sub> α	+0.032	-0.002	-0.003	+0.214	+0.052	+0.032	+0.048	+0.042
D <sub>ψ</sub> δ, D <sub>ω</sub> δ	-0.32	-0.59	-0.32	-0.60	-0.32	-0.60	-0.32	-0.60

# APPARENT PLACES OF STARS, 1920.

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## FOR THE UPPER TRANSIT AT WASHINGTON.

Washington Mean Time.	$\gamma$ Centauri. Mag. 2.6		$\sigma$ Boötis. Mag. 4.5		$\alpha^3$ Centauri. Mag. 0.3		$\beta$ Boötis. Mag. 5.4	
	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.
	h m 14 30	° ' " -41 48	h m 14 31	° ' " +30 5	h m 14 34	° ' " -60 30	h m 14 35	° ' " +44 44
	s	"	s	"	s	"	s	"
Jan. 0.8	25.714	15.51	11.669	20.54	10.40	2.20	51.038	42.65
10.8	26.120 <sup>400</sup>	16.29 <sup>78</sup>	11.997 <sup>326</sup>	18.17 <sup>237</sup>	10.97 <sup>57</sup>	2.42 <sup>22</sup>	51.404 <sup>366</sup>	40.21 <sup>244</sup>
20.8	26.533 <sup>413</sup>	17.41 <sup>112</sup>	12.338 <sup>341</sup>	16.17 <sup>200</sup>	11.54 <sup>57</sup>	3.11 <sup>69</sup>	51.788 <sup>384</sup>	38.24 <sup>197</sup>
30.7	26.942 <sup>409</sup>	18.80 <sup>139</sup>	12.680 <sup>342</sup>	14.63 <sup>154</sup>	12.11 <sup>57</sup>	4.24 <sup>113</sup>	52.180 <sup>392</sup>	36.83 <sup>141</sup>
Feb. 9.7	27.339 <sup>397</sup>	20.45 <sup>165</sup>	13.013 <sup>333</sup>	13.58 <sup>165</sup>	12.66 <sup>55</sup>	5.78 <sup>154</sup>	52.564 <sup>384</sup>	36.00 <sup>83</sup>
	374	184	340	54	62	191	368	21
19.7	27.713	22.29	13.329	13.04	13.18	7.69	52.932	35.79
29.7	28.057 <sup>344</sup>	24.27 <sup>198</sup>	13.621 <sup>292</sup>	13.04 <sup>0</sup>	13.67 <sup>49</sup>	9.88 <sup>239</sup>	53.271 <sup>339</sup>	36.19 <sup>40</sup>
Mar. 10.6	28.399 <sup>312</sup>	26.32 <sup>205</sup>	13.880 <sup>299</sup>	13.55 <sup>51</sup>	14.10 <sup>48</sup>	12.28 <sup>240</sup>	53.575 <sup>304</sup>	37.17 <sup>98</sup>
20.6	28.646 <sup>277</sup>	28.39 <sup>207</sup>	14.105 <sup>285</sup>	14.54 <sup>99</sup>	14.48 <sup>33</sup>	14.88 <sup>280</sup>	53.837 <sup>282</sup>	38.66 <sup>149</sup>
30.6	28.884 <sup>289</sup>	30.49 <sup>210</sup>	14.292 <sup>157</sup>	15.93 <sup>189</sup>	14.80 <sup>23</sup>	17.58 <sup>270</sup>	54.064 <sup>217</sup>	40.61 <sup>195</sup>
	200	204	181	174	26	277	170	229
Apr. 9.6	29.084	32.53	14.443	17.67	15.06	20.35	54.224	42.90
19.5	29.244 <sup>160</sup>	34.49 <sup>106</sup>	14.555 <sup>112</sup>	19.65 <sup>198</sup>	15.27 <sup>21</sup>	23.13 <sup>278</sup>	54.344 <sup>120</sup>	45.47 <sup>257</sup>
29.5	29.366 <sup>123</sup>	36.35 <sup>186</sup>	14.630 <sup>75</sup>	21.82 <sup>217</sup>	15.41 <sup>14</sup>	25.81 <sup>268</sup>	54.417 <sup>73</sup>	48.19 <sup>272</sup>
May 9.5	29.449 <sup>89</sup>	38.07 <sup>173</sup>	14.668 <sup>33</sup>	24.06 <sup>224</sup>	15.49 <sup>8</sup>	28.40 <sup>299</sup>	54.444 <sup>27</sup>	50.97 <sup>278</sup>
19.4	29.494 <sup>48</sup>	39.64 <sup>187</sup>	14.673 <sup>5</sup>	26.32 <sup>236</sup>	15.50 <sup>1</sup>	30.83 <sup>243</sup>	54.425 <sup>19</sup>	53.70 <sup>273</sup>
	8	139	28	236	4	233	59	260
29.4	29.500	41.03	14.645	28.50	15.46	33.06	54.369	56.30
June 8.4	29.470 <sup>89</sup>	42.20 <sup>117</sup>	14.587 <sup>58</sup>	30.53 <sup>206</sup>	15.36 <sup>10</sup>	35.03 <sup>197</sup>	54.269 <sup>97</sup>	58.70 <sup>240</sup>
18.4	29.403 <sup>67</sup>	43.14 <sup>94</sup>	14.501 <sup>86</sup>	32.38 <sup>185</sup>	15.20 <sup>16</sup>	36.70 <sup>167</sup>	54.136 <sup>133</sup>	60.82 <sup>212</sup>
28.3	29.301 <sup>109</sup>	43.82 <sup>68</sup>	14.390 <sup>111</sup>	33.95 <sup>187</sup>	14.98 <sup>22</sup>	38.00 <sup>180</sup>	53.972 <sup>164</sup>	62.59 <sup>177</sup>
July 8.3	29.163 <sup>123</sup>	44.23 <sup>41</sup>	14.257 <sup>133</sup>	35.25 <sup>130</sup>	14.72 <sup>26</sup>	38.97 <sup>97</sup>	53.781 <sup>191</sup>	63.99 <sup>140</sup>
	189	12	188	98	29	81	212	99
18.3	29.009	44.35	14.104	36.23	14.43	39.48	53.569	64.98
28.3	28.823 <sup>181</sup>	44.17 <sup>18</sup>	13.936 <sup>168</sup>	36.85 <sup>69</sup>	14.10 <sup>33</sup>	39.58 <sup>10</sup>	53.340 <sup>229</sup>	65.53 <sup>55</sup>
Aug. 7.2	28.632 <sup>196</sup>	43.70 <sup>47</sup>	13.759 <sup>177</sup>	37.12 <sup>27</sup>	13.75 <sup>35</sup>	39.22 <sup>36</sup>	53.101 <sup>239</sup>	65.63 <sup>10</sup>
17.2	28.428 <sup>204</sup>	42.92 <sup>78</sup>	13.577 <sup>182</sup>	37.04 <sup>8</sup>	13.40 <sup>35</sup>	38.46 <sup>76</sup>	52.857 <sup>244</sup>	65.28 <sup>35</sup>
27.2	28.226 <sup>202</sup>	41.88 <sup>104</sup>	13.397 <sup>180</sup>	36.57 <sup>47</sup>	13.06 <sup>34</sup>	37.27 <sup>119</sup>	52.617 <sup>240</sup>	64.47 <sup>81</sup>
	189	126	170	83	32	167	238	124
Sept. 6.1	28.037	40.62	13.227	35.74	12.74	35.70	52.389	63.23
16.1	27.871 <sup>166</sup>	39.16 <sup>146</sup>	13.073 <sup>154</sup>	34.54 <sup>120</sup>	12.46 <sup>28</sup>	33.80 <sup>190</sup>	52.182 <sup>207</sup>	61.56 <sup>167</sup>
26.1	27.733 <sup>133</sup>	37.56 <sup>160</sup>	12.945 <sup>160</sup>	32.98 <sup>156</sup>	12.24 <sup>22</sup>	31.62 <sup>218</sup>	52.004 <sup>178</sup>	59.49 <sup>207</sup>
Oct. 6.1	27.651 <sup>87</sup>	35.88 <sup>168</sup>	12.849 <sup>96</sup>	31.11 <sup>187</sup>	12.08 <sup>16</sup>	29.29 <sup>238</sup>	51.864 <sup>140</sup>	57.06 <sup>243</sup>
16.0	27.615 <sup>26</sup>	34.21 <sup>167</sup>	12.794 <sup>85</sup>	28.92 <sup>219</sup>	12.00 <sup>8</sup>	26.83 <sup>246</sup>	51.771 <sup>93</sup>	54.30 <sup>276</sup>
	24	189	9	247	2	245	40	304
26.0	27.639	32.62	12.785	26.45	12.02	24.38	51.731	51.26
Nov. 5.0	27.726 <sup>87</sup>	31.19 <sup>143</sup>	12.827 <sup>42</sup>	23.76 <sup>289</sup>	12.12 <sup>10</sup>	22.02 <sup>236</sup>	51.751 <sup>20</sup>	48.02 <sup>324</sup>
15.0	27.877 <sup>151</sup>	29.99 <sup>120</sup>	12.923 <sup>96</sup>	20.88 <sup>288</sup>	12.32 <sup>20</sup>	19.88 <sup>234</sup>	51.832 <sup>81</sup>	44.63 <sup>339</sup>
24.9	28.094 <sup>217</sup>	29.07 <sup>92</sup>	13.072 <sup>149</sup>	17.91 <sup>297</sup>	12.61 <sup>29</sup>	18.01 <sup>167</sup>	51.977 <sup>145</sup>	41.18 <sup>345</sup>
Dec. 4.9	28.365 <sup>271</sup>	28.49 <sup>58</sup>	13.272 <sup>200</sup>	14.90 <sup>301</sup>	12.98 <sup>37</sup>	16.54 <sup>147</sup>	52.183 <sup>206</sup>	37.76 <sup>342</sup>
	324	20	247	297	45	106	262	329
14.9	28.689	28.29	13.519	11.93	13.43	15.48	52.445	34.47
24.8	29.052 <sup>263</sup>	28.46 <sup>17</sup>	13.803 <sup>264</sup>	9.12 <sup>261</sup>	13.93 <sup>50</sup>	14.90 <sup>58</sup>	52.755 <sup>310</sup>	31.43 <sup>304</sup>
34.8	29.442 <sup>390</sup>	29.02 <sup>56</sup>	14.117 <sup>314</sup>	6.55 <sup>287</sup>	14.47 <sup>54</sup>	14.80 <sup>10</sup>	53.103 <sup>348</sup>	28.73 <sup>270</sup>
Mean Place	25.219	25.67	11.875	31.45	9.224	21.59	51.671	56.64
Sec $\delta$ , Tan $\delta$	1.342	-0.894	1.156	+0.579	2.031	-1.768	1.408	+0.991
$D_{\alpha}$ , $D_{\omega}$	+0.076	-0.047	+0.052	+0.031	+0.090	-0.092	+0.045	+0.051
$D_{\beta}$ , $D_{\gamma}$	-0.32	-0.61	-0.31	-0.61	-0.31	-0.62	-0.31	-0.63

APPARENT PLACES OF STARS, 1920.

FOR THE UPPER TRANSIT AT WASHINGTON.

Washington Mean Time.	$\alpha$ Apodis. Mag. 3.8		$\mu$ Virgins. Mag. 4.0		$\epsilon$ Boettis. Mag. 2.7		109 Virgins. Mag. 3.8	
	Right Ascension.	Declination.	Right Ascension.	Declination.	Right Ascension.	Declination.	Right Ascension.	Declination.
	h m	° ' "	h m	° ' "	h m	° ' "	h m	° ' "
	14 37	-78 42	14 38	- 5 18	14 41	+27 24	14 42	+ 2 13
Jan. 0.8	51.04	7.49	50.754	40.25	29.382	29.16	12.319	42.97
10.8	52.32 <sup>136</sup>	7.01 <sup>48</sup>	51.066 <sup>313</sup>	42.06 <sup>181</sup>	29.700 <sup>318</sup>	26.76 <sup>240</sup>	12.626 <sup>307</sup>	40.99 <sup>196</sup>
20.8	53.66 <sup>134</sup>	7.09 <sup>8</sup>	51.386 <sup>330</sup>	43.85 <sup>179</sup>	30.031 <sup>321</sup>	24.70 <sup>306</sup>	12.941 <sup>315</sup>	39.11 <sup>188</sup>
30.8	55.00 <sup>134</sup>	7.73 <sup>64</sup>	51.705 <sup>319</sup>	45.52 <sup>167</sup>	30.366 <sup>335</sup>	23.06 <sup>164</sup>	13.256 <sup>315</sup>	37.42 <sup>169</sup>
Feb. 9.7	56.32 <sup>132</sup>	8.90 <sup>117</sup>	52.014 <sup>309</sup>	47.07 <sup>155</sup>	30.694 <sup>338</sup>	21.91 <sup>115</sup>	13.563 <sup>307</sup>	35.95 <sup>147</sup>
19.7	57.59 <sup>137</sup>	10.56 <sup>166</sup>	52.307 <sup>293</sup>	48.41 <sup>134</sup>	31.007 <sup>313</sup>	21.27 <sup>64</sup>	13.854 <sup>291</sup>	34.77 <sup>118</sup>
29.7	58.77 <sup>118</sup>	12.65 <sup>209</sup>	52.579 <sup>272</sup>	49.50 <sup>109</sup>	31.297 <sup>290</sup>	21.12 <sup>15</sup>	14.125 <sup>271</sup>	33.88 <sup>89</sup>
Mar. 10.6	59.85 <sup>106</sup>	15.12 <sup>247</sup>	52.824 <sup>245</sup>	50.36 <sup>86</sup>	31.559 <sup>263</sup>	21.49 <sup>37</sup>	14.369 <sup>244</sup>	33.32 <sup>56</sup>
20.6	60.82 <sup>97</sup>	17.88 <sup>276</sup>	53.041 <sup>217</sup>	50.95 <sup>89</sup>	31.787 <sup>235</sup>	22.32 <sup>63</sup>	14.586 <sup>217</sup>	33.07 <sup>25</sup>
30.6	61.65 <sup>83</sup>	20.90 <sup>302</sup>	53.229 <sup>188</sup>	51.28 <sup>39</sup>	31.982 <sup>196</sup>	23.55 <sup>128</sup>	14.773 <sup>187</sup>	33.12 <sup>5</sup>
Apr. 9.6	62.33 <sup>68</sup>	24.08 <sup>318</sup>	53.387 <sup>168</sup>	51.40 <sup>12</sup>	32.141 <sup>169</sup>	25.15 <sup>160</sup>	14.930 <sup>157</sup>	33.44 <sup>32</sup>
19.5	62.85 <sup>52</sup>	27.36 <sup>326</sup>	53.515 <sup>129</sup>	51.30 <sup>10</sup>	32.264 <sup>123</sup>	27.00 <sup>185</sup>	15.057 <sup>127</sup>	33.99 <sup>55</sup>
29.5	63.22 <sup>37</sup>	30.69 <sup>338</sup>	53.615 <sup>100</sup>	51.02 <sup>28</sup>	32.361 <sup>87</sup>	29.05 <sup>205</sup>	15.158 <sup>101</sup>	34.72 <sup>73</sup>
May 9.5	63.41 <sup>19</sup>	33.97 <sup>328</sup>	53.686 <sup>71</sup>	50.61 <sup>41</sup>	32.402 <sup>51</sup>	31.21 <sup>218</sup>	15.224 <sup>66</sup>	35.59 <sup>87</sup>
19.4	63.43 <sup>2</sup>	37.15 <sup>318</sup>	53.729 <sup>43</sup>	50.09 <sup>52</sup>	32.421 <sup>19</sup>	33.40 <sup>289</sup>	15.266 <sup>42</sup>	36.55 <sup>96</sup>
29.4	63.30 <sup>13</sup>	40.14 <sup>299</sup>	53.744 <sup>15</sup>	49.48 <sup>61</sup>	32.405 <sup>16</sup>	35.52 <sup>212</sup>	15.279 <sup>12</sup>	37.56 <sup>101</sup>
June 8.4	62.99 <sup>31</sup>	42.88 <sup>274</sup>	53.732 <sup>13</sup>	48.83 <sup>65</sup>	32.390 <sup>45</sup>	37.53 <sup>291</sup>	15.265 <sup>14</sup>	38.59 <sup>103</sup>
18.4	62.54 <sup>45</sup>	45.31 <sup>243</sup>	53.695 <sup>37</sup>	48.16 <sup>67</sup>	32.288 <sup>72</sup>	39.38 <sup>185</sup>	15.226 <sup>39</sup>	39.59 <sup>100</sup>
28.3	61.95 <sup>59</sup>	47.36 <sup>205</sup>	53.632 <sup>66</sup>	47.47 <sup>69</sup>	32.187 <sup>104</sup>	40.99 <sup>161</sup>	15.161 <sup>65</sup>	40.54 <sup>95</sup>
July 8.3	61.23 <sup>72</sup>	49.98 <sup>123</sup>	53.547 <sup>85</sup>	46.79 <sup>68</sup>	32.062 <sup>125</sup>	42.34 <sup>135</sup>	15.074 <sup>87</sup>	41.43 <sup>89</sup>
18.3	60.41 <sup>32</sup>	50.12 <sup>114</sup>	53.442 <sup>106</sup>	46.14 <sup>68</sup>	31.918 <sup>144</sup>	43.37 <sup>188</sup>	14.967 <sup>107</sup>	42.22 <sup>79</sup>
28.3	59.51 <sup>90</sup>	50.75 <sup>68</sup>	53.318 <sup>124</sup>	45.53 <sup>61</sup>	31.759 <sup>159</sup>	44.09 <sup>72</sup>	14.841 <sup>126</sup>	42.22 <sup>67</sup>
Aug. 7.2	58.56 <sup>95</sup>	50.85 <sup>10</sup>	53.182 <sup>136</sup>	44.97 <sup>56</sup>	31.587 <sup>172</sup>	44.48 <sup>39</sup>	14.704 <sup>137</sup>	42.89 <sup>56</sup>
17.2	57.61 <sup>95</sup>	50.39 <sup>46</sup>	53.039 <sup>143</sup>	44.47 <sup>50</sup>	31.409 <sup>178</sup>	44.51 <sup>3</sup>	14.559 <sup>145</sup>	43.45 <sup>42</sup>
27.2	56.67 <sup>94</sup>	49.40 <sup>99</sup>	52.895 <sup>144</sup>	44.06 <sup>41</sup>	31.229 <sup>180</sup>	44.18 <sup>33</sup>	14.412 <sup>147</sup>	43.87 <sup>25</sup>
Sept. 6.1	55.79 <sup>88</sup>	47.90 <sup>130</sup>	52.757 <sup>136</sup>	43.74 <sup>38</sup>	31.057 <sup>173</sup>	44.18 <sup>66</sup>	14.412 <sup>141</sup>	44.12 <sup>10</sup>
16.1	55.02 <sup>77</sup>	45.93 <sup>197</sup>	52.633 <sup>124</sup>	43.55 <sup>19</sup>	30.901 <sup>166</sup>	43.80 <sup>104</sup>	14.271 <sup>128</sup>	44.22 <sup>7</sup>
26.1	54.37 <sup>65</sup>	43.57 <sup>236</sup>	52.531 <sup>102</sup>	43.50 <sup>5</sup>	30.789 <sup>132</sup>	42.46 <sup>139</sup>	14.143 <sup>106</sup>	44.15 <sup>29</sup>
Oct. 6.1	53.89 <sup>45</sup>	40.88 <sup>269</sup>	52.459 <sup>72</sup>	43.62 <sup>12</sup>	30.668 <sup>101</sup>	41.07 <sup>171</sup>	14.037 <sup>77</sup>	43.86 <sup>50</sup>
16.0	53.61 <sup>26</sup>	37.98 <sup>290</sup>	52.426 <sup>38</sup>	43.92 <sup>30</sup>	30.603 <sup>65</sup>	39.36 <sup>204</sup>	13.960 <sup>40</sup>	43.36 <sup>73</sup>
26.0	53.53 <sup>8</sup>	34.96 <sup>302</sup>	52.426 <sup>9</sup>	43.92 <sup>54</sup>	30.603 <sup>18</sup>	37.32 <sup>230</sup>	13.920 <sup>2</sup>	42.63 <sup>95</sup>
Nov. 5.0	53.53	34.96	52.435	44.46	30.585	35.02	13.922	41.68
15.0	53.68 <sup>15</sup>	31.96 <sup>300</sup>	52.491 <sup>56</sup>	45.22 <sup>76</sup>	30.618 <sup>33</sup>	32.46 <sup>256</sup>	13.971 <sup>49</sup>	40.47 <sup>121</sup>
24.9	54.06 <sup>38</sup>	29.07 <sup>289</sup>	52.598 <sup>107</sup>	46.21 <sup>99</sup>	30.704 <sup>86</sup>	29.72 <sup>274</sup>	14.068 <sup>97</sup>	39.05 <sup>142</sup>
Dec. 4.9	54.64 <sup>56</sup>	26.44 <sup>263</sup>	52.753 <sup>155</sup>	47.44 <sup>123</sup>	30.841 <sup>137</sup>	26.85 <sup>287</sup>	14.215 <sup>147</sup>	37.41 <sup>164</sup>
14.9	55.45 <sup>81</sup>	24.14 <sup>230</sup>	52.954 <sup>201</sup>	48.96 <sup>142</sup>	31.029 <sup>198</sup>	28.91 <sup>294</sup>	14.408 <sup>193</sup>	35.60 <sup>181</sup>
24.8	55.45 <sup>97</sup>	22.27 <sup>187</sup>	53.196 <sup>242</sup>	50.47 <sup>161</sup>	31.029 <sup>223</sup>	28.91 <sup>300</sup>	14.408 <sup>233</sup>	35.60 <sup>194</sup>
34.8	56.42 <sup>111</sup>	20.90 <sup>137</sup>	53.471 <sup>275</sup>	52.19 <sup>172</sup>	31.262 <sup>274</sup>	21.01 <sup>279</sup>	14.641 <sup>268</sup>	33.66 <sup>201</sup>
	57.53 <sup>128</sup>	20.06 <sup>84</sup>	53.769 <sup>296</sup>	53.98 <sup>179</sup>	31.536 <sup>304</sup>	18.22 <sup>258</sup>	14.906 <sup>292</sup>	31.65 <sup>201</sup>
	58.76 <sup>128</sup>	20.06 <sup>84</sup>	53.769 <sup>296</sup>	53.98 <sup>179</sup>	31.840	15.64	15.201	29.64
Mean Place	50.900	24.00	50.527	40.04	29.595	38.78	12.181	45.36
Sec $\delta$ , Tan $\delta$	5.107	-5.008	1.004	-0.093	1.126	+0.519	1.001	+0.089
$D_{\alpha}, D_{\omega}$	+0.146	-0.258	+0.063	-0.005	+0.052	+0.026	+0.061	+0.002
$D_{\delta}, D_{\omega}$	-0.31	-0.64	-0.31	-0.64	-0.30	-0.65	-0.30	-0.65

FOR THE UPPER TRANSIT AT WASHINGTON.

Washington Mean Time.	♄ Libræ. Mag. 5.3		♌ Libræ. Mag. 2.9		Groombridge 2164. Mag. 5.7		β Ursæ Minoris. Mag. 2.2	
	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.
	h m 14 46	° ' " -15 39	h m 14 46	° ' " -15 42	h m 14 49	° ' " +59 36	h m 14 50	° ' " +74 28
Jan. 0.8	15.772 <sup>2</sup>	52.14	27.219	33.26	22.930	51.62	51.50	39.88
10.8	16.092 <sup>320</sup>	53.62 <sup>148</sup>	27.539 <sup>320</sup>	34.75 <sup>149</sup>	23.380 <sup>450</sup>	49.13 <sup>249</sup>	52.24 <sup>74</sup>	37.54 <sup>234</sup>
20.8	16.423 <sup>331</sup>	55.19 <sup>157</sup>	27.869 <sup>330</sup>	36.30 <sup>158</sup>	23.865 <sup>485</sup>	47.17 <sup>196</sup>	53.07 <sup>83</sup>	35.81 <sup>173</sup>
30.8	16.752 <sup>329</sup>	56.76 <sup>157</sup>	28.199 <sup>330</sup>	37.88 <sup>158</sup>	24.368 <sup>503</sup>	45.84 <sup>133</sup>	53.93 <sup>86</sup>	34.70 <sup>111</sup>
Feb. 9.7	17.074 <sup>322</sup>	58.31 <sup>155</sup>	28.520 <sup>321</sup>	39.43 <sup>155</sup>	24.873 <sup>505</sup>	45.15 <sup>60</sup>	54.81 <sup>88</sup>	34.27 <sup>43</sup>
19.7	17.380	59.76	28.826	40.88	25.361	45.13	55.66	34.51 <sup>24</sup>
29.7	17.664 <sup>284</sup>	61.10 <sup>134</sup>	29.112 <sup>286</sup>	42.20 <sup>132</sup>	25.819 <sup>458</sup>	45.78 <sup>65</sup>	56.48 <sup>82</sup>	35.43 <sup>92</sup>
Mar. 10.6	17.923 <sup>259</sup>	62.27 <sup>117</sup>	29.371 <sup>259</sup>	43.38 <sup>118</sup>	26.234 <sup>415</sup>	47.04 <sup>126</sup>	57.21 <sup>73</sup>	36.94 <sup>151</sup>
20.6	18.154 <sup>231</sup>	63.28 <sup>101</sup>	29.603 <sup>232</sup>	44.40 <sup>102</sup>	26.595 <sup>361</sup>	48.86 <sup>182</sup>	57.84 <sup>63</sup>	39.03 <sup>209</sup>
30.6	18.356 <sup>202</sup>	64.09 <sup>81</sup>	29.804 <sup>201</sup>	45.21 <sup>81</sup>	26.864 <sup>299</sup>	51.16 <sup>230</sup>	58.36 <sup>52</sup>	41.56 <sup>253</sup>
Apr. 9.6	18.529	64.74	29.979	45.89	27.125	53.84	58.74	44.45
19.5	18.671 <sup>142</sup>	65.21 <sup>47</sup>	30.120 <sup>141</sup>	46.36 <sup>47</sup>	27.287 <sup>162</sup>	56.78 <sup>204</sup>	58.99	47.57 <sup>312</sup>
29.5	18.784 <sup>113</sup>	65.54 <sup>33</sup>	30.234 <sup>114</sup>	46.68 <sup>32</sup>	27.376 <sup>89</sup>	59.89 <sup>311</sup>	59.10 <sup>11</sup>	50.81 <sup>324</sup>
May 9.5	18.868 <sup>84</sup>	65.72 <sup>18</sup>	30.317 <sup>83</sup>	46.85 <sup>17</sup>	27.397 <sup>21</sup>	63.04 <sup>315</sup>	59.06 <sup>4</sup>	54.06 <sup>325</sup>
19.5	18.923 <sup>55</sup>	65.78 <sup>6</sup>	30.373 <sup>56</sup>	46.92 <sup>5</sup>	27.349 <sup>48</sup>	66.11 <sup>307</sup>	58.89 <sup>17</sup>	57.20 <sup>314</sup>
29.4	18.948 <sup>25</sup>	65.71 <sup>7</sup>	30.397 <sup>24</sup>	46.86 <sup>6</sup>	27.239 <sup>110</sup>	69.03 <sup>292</sup>	58.59 <sup>30</sup>	60.14 <sup>294</sup>
June 8.4	18.945 <sup>3</sup>	65.57 <sup>14</sup>	30.396 <sup>1</sup>	46.75 <sup>11</sup>	27.070 <sup>169</sup>	71.69 <sup>265</sup>	58.17 <sup>42</sup>	62.79 <sup>265</sup>
18.4	18.914 <sup>31</sup>	65.34 <sup>23</sup>	30.363 <sup>23</sup>	46.50 <sup>25</sup>	26.847 <sup>223</sup>	74.03 <sup>284</sup>	57.66 <sup>51</sup>	65.07 <sup>228</sup>
28.3	18.857 <sup>57</sup>	65.04 <sup>30</sup>	30.305 <sup>58</sup>	46.19 <sup>31</sup>	26.578 <sup>268</sup>	75.99 <sup>196</sup>	57.05 <sup>61</sup>	66.93 <sup>186</sup>
July 8.3	18.773 <sup>84</sup>	64.65 <sup>39</sup>	30.222 <sup>33</sup>	45.81 <sup>33</sup>	26.269 <sup>309</sup>	77.51 <sup>152</sup>	56.37 <sup>68</sup>	68.30 <sup>137</sup>
18.3	18.667 <sup>106</sup>	64.23 <sup>42</sup>	30.115 <sup>107</sup>	45.37 <sup>44</sup>	25.929 <sup>340</sup>	78.55 <sup>104</sup>	55.64 <sup>73</sup>	69.19 <sup>89</sup>
28.3	18.541 <sup>126</sup>	63.73 <sup>50</sup>	29.988 <sup>127</sup>	44.87 <sup>50</sup>	25.566 <sup>363</sup>	79.10 <sup>55</sup>	54.86 <sup>78</sup>	69.52 <sup>33</sup>
Aug. 7.2	18.400 <sup>141</sup>	63.18 <sup>55</sup>	29.848 <sup>140</sup>	44.34 <sup>53</sup>	25.187 <sup>379</sup>	79.15 <sup>5</sup>	54.07 <sup>79</sup>	69.34 <sup>18</sup>
17.2	18.250 <sup>150</sup>	62.60 <sup>58</sup>	29.697 <sup>151</sup>	43.76 <sup>58</sup>	24.804 <sup>383</sup>	78.67 <sup>48</sup>	53.27 <sup>80</sup>	68.63 <sup>71</sup>
27.2	18.098 <sup>152</sup>	62.00 <sup>60</sup>	29.546 <sup>151</sup>	43.15 <sup>61</sup>	24.425 <sup>379</sup>	77.69 <sup>98</sup>	52.50 <sup>77</sup>	67.40 <sup>123</sup>
Sept. 6.2	17.952 <sup>146</sup>	61.40 <sup>60</sup>	29.401 <sup>145</sup>	42.56 <sup>50</sup>	24.063 <sup>362</sup>	76.23 <sup>146</sup>	51.75 <sup>75</sup>	65.66 <sup>174</sup>
16.1	17.819 <sup>133</sup>	60.84 <sup>58</sup>	29.268 <sup>133</sup>	41.99 <sup>57</sup>	23.727 <sup>336</sup>	74.30 <sup>193</sup>	51.06 <sup>69</sup>	63.48 <sup>218</sup>
26.1	17.709 <sup>110</sup>	60.34 <sup>50</sup>	29.158 <sup>110</sup>	41.49 <sup>50</sup>	23.431 <sup>296</sup>	71.95 <sup>235</sup>	50.45 <sup>61</sup>	60.88 <sup>260</sup>
Oct. 6.1	17.630 <sup>79</sup>	59.92 <sup>43</sup>	29.078 <sup>80</sup>	41.07 <sup>43</sup>	23.184 <sup>247</sup>	69.20 <sup>275</sup>	49.92 <sup>53</sup>	57.88 <sup>300</sup>
16.0	17.590 <sup>40</sup>	59.65 <sup>27</sup>	29.039 <sup>39</sup>	40.79 <sup>28</sup>	22.999 <sup>185</sup>	66.11 <sup>309</sup>	49.51 <sup>41</sup>	54.58 <sup>330</sup>
26.0	17.505 <sup>5</sup>	59.35 <sup>10</sup>	28.999 <sup>4</sup>	40.50 <sup>10</sup>	22.882 <sup>117</sup>	62.75 <sup>336</sup>	49.22 <sup>29</sup>	51.04 <sup>354</sup>
Nov. 5.0	17.649 <sup>54</sup>	59.55 <sup>10</sup>	29.043 <sup>55</sup>	40.69 <sup>8</sup>	22.882 <sup>39</sup>	62.75 <sup>358</sup>	49.22 <sup>15</sup>	51.04 <sup>373</sup>
15.0	17.755 <sup>106</sup>	59.65 <sup>32</sup>	29.098 <sup>105</sup>	40.77 <sup>33</sup>	22.843 <sup>45</sup>	59.17 <sup>370</sup>	49.07 <sup>1</sup>	47.32 <sup>380</sup>
24.9	17.913 <sup>158</sup>	59.97 <sup>57</sup>	29.203 <sup>157</sup>	41.10 <sup>58</sup>	22.888 <sup>128</sup>	55.47 <sup>372</sup>	49.06 <sup>15</sup>	43.52 <sup>376</sup>
Dec. 4.9	17.913 <sup>204</sup>	60.54 <sup>81</sup>	29.360 <sup>205</sup>	41.68 <sup>81</sup>	23.016 <sup>212</sup>	51.75 <sup>366</sup>	49.21 <sup>39</sup>	39.76 <sup>366</sup>
14.9	18.117 <sup>247</sup>	61.35 <sup>104</sup>	29.565 <sup>247</sup>	42.49 <sup>105</sup>	23.228 <sup>292</sup>	48.09 <sup>347</sup>	49.50 <sup>44</sup>	36.10 <sup>342</sup>
24.9	18.364 <sup>282</sup>	62.39 <sup>126</sup>	29.812 <sup>282</sup>	43.54 <sup>123</sup>	23.529 <sup>361</sup>	44.62 <sup>318</sup>	49.94 <sup>58</sup>	32.68 <sup>309</sup>
34.8	18.646 <sup>307</sup>	63.64 <sup>141</sup>	30.094 <sup>305</sup>	44.77 <sup>141</sup>	23.881 <sup>422</sup>	41.44 <sup>370</sup>	50.52 <sup>69</sup>	29.59 <sup>309</sup>
34.8	18.953	65.05	30.399	46.18	24.303	38.65	51.21	26.93 <sup>266</sup>
Mean Place	15.503	55.27	26.951	36.41	24.486	67.12	55.457	56.65
Sec δ, Tan δ	1.039	-0.280	1.039	-0.281	1.977	+1.706	3.737	+3.601
D <sub>♄</sub> , D <sub>♌</sub>	+0.066	-0.014	+0.066	-0.014	+0.031	+0.084	-0.004	+0.176
D <sub>♄</sub> , D <sub>♌</sub>	-0.30	-0.66	-0.30	-0.66	-0.29	-0.67	-0.29	-0.68

APPARENT PLACES OF STARS, 1920.

FOR THE UPPER TRANSIT AT WASHINGTON.

Washington Mean Time.	ζ Libræ. Mag. 5.6		Piazzi 221. Mag. 5.8		β Lupi. Mag. 2.8		δ Libræ. Var. 4.8-6.2	
	Right Ascension.	Declination.	Right Ascension.	Declination.	Right Ascension.	Declination.	Right Ascension.	Declination.
	h m s	° ' "	h m s	° ' "	h m s	° ' "	h m s	° ' "
	14 52	-11 5	14 52	+14 45	14 53	-42 48	14 56	- 8 12
Jan. 0.8	25.638	13.51	26.520	62.27	17.266	35.48	41.861	7.11
10.8	25.951 <sup>313</sup>	15.11 <sup>100</sup>	26.823 <sup>308</sup>	60.01 <sup>226</sup>	17.668 <sup>402</sup>	35.98 <sup>50</sup>	42.167 <sup>306</sup>	8.78 <sup>167</sup>
20.8	26.273 <sup>322</sup>	16.72 <sup>161</sup>	27.137 <sup>314</sup>	58.00 <sup>201</sup>	18.082 <sup>414</sup>	36.80 <sup>82</sup>	42.485 <sup>318</sup>	10.44 <sup>166</sup>
30.8	26.597 <sup>324</sup>	18.32 <sup>100</sup>	27.454 <sup>317</sup>	56.28 <sup>172</sup>	18.499 <sup>417</sup>	37.94 <sup>114</sup>	42.805 <sup>320</sup>	12.05 <sup>161</sup>
Feb. 9.7	26.914 <sup>317</sup>	19.82 <sup>180</sup>	27.766 <sup>312</sup>	54.90 <sup>188</sup>	18.907 <sup>408</sup>	39.32 <sup>128</sup>	43.118 <sup>312</sup>	13.53 <sup>148</sup>
19.7	27.216 <sup>302</sup>	21.20 <sup>138</sup>	28.065 <sup>299</sup>	53.94 <sup>96</sup>	19.298 <sup>391</sup>	40.91 <sup>159</sup>	43.419 <sup>301</sup>	14.86 <sup>123</sup>
29.7	27.498 <sup>282</sup>	22.40 <sup>120</sup>	28.344 <sup>279</sup>	53.39 <sup>55</sup>	19.684 <sup>366</sup>	42.66 <sup>178</sup>	43.700 <sup>281</sup>	15.98 <sup>112</sup>
Mar. 10.7	27.756 <sup>258</sup>	23.41 <sup>101</sup>	28.597 <sup>258</sup>	53.27 <sup>12</sup>	20.002 <sup>338</sup>	44.53 <sup>187</sup>	43.958 <sup>258</sup>	16.88 <sup>90</sup>
20.6	27.986 <sup>230</sup>	24.20 <sup>79</sup>	28.824 <sup>227</sup>	53.56 <sup>29</sup>	20.304 <sup>302</sup>	46.45 <sup>192</sup>	44.188 <sup>230</sup>	17.54 <sup>68</sup>
30.6	28.189 <sup>208</sup>	24.78 <sup>58</sup>	29.021 <sup>197</sup>	54.22 <sup>66</sup>	20.574 <sup>270</sup>	48.41 <sup>196</sup>	44.393 <sup>205</sup>	17.97 <sup>43</sup>
Apr. 9.6	28.364 <sup>176</sup>	25.15 <sup>37</sup>	29.184 <sup>163</sup>	55.19 <sup>97</sup>	20.805 <sup>231</sup>	50.35 <sup>184</sup>	44.570 <sup>177</sup>	18.18 <sup>21</sup>
19.5	28.508 <sup>144</sup>	25.34 <sup>19</sup>	29.319 <sup>135</sup>	56.43 <sup>124</sup>	20.998 <sup>193</sup>	52.26 <sup>191</sup>	44.716 <sup>148</sup>	18.19 <sup>1</sup>
29.5	28.624 <sup>116</sup>	25.37 <sup>3</sup>	29.421 <sup>102</sup>	57.87 <sup>144</sup>	21.153 <sup>155</sup>	54.10 <sup>184</sup>	44.834 <sup>118</sup>	18.04 <sup>15</sup>
May 9.5	28.712 <sup>88</sup>	25.25 <sup>12</sup>	29.492 <sup>71</sup>	59.45 <sup>158</sup>	21.269 <sup>116</sup>	55.84 <sup>174</sup>	44.923 <sup>89</sup>	17.74 <sup>30</sup>
19.5	28.770 <sup>56</sup>	25.03 <sup>22</sup>	29.534 <sup>42</sup>	61.10 <sup>165</sup>	21.343 <sup>74</sup>	57.45 <sup>161</sup>	44.985 <sup>62</sup>	17.35 <sup>39</sup>
29.4	28.800 <sup>30</sup>	24.70 <sup>33</sup>	29.545 <sup>11</sup>	62.76 <sup>166</sup>	21.378 <sup>35</sup>	58.92 <sup>147</sup>	45.017 <sup>32</sup>	16.86 <sup>49</sup>
June 8.4	28.800 <sup>0</sup>	24.32 <sup>38</sup>	29.528 <sup>17</sup>	64.35 <sup>159</sup>	21.373 <sup>5</sup>	60.20 <sup>128</sup>	45.021 <sup>4</sup>	16.31 <sup>35</sup>
18.4	28.774 <sup>26</sup>	23.87 <sup>45</sup>	29.484 <sup>44</sup>	65.87 <sup>152</sup>	21.328 <sup>45</sup>	61.27 <sup>107</sup>	44.996 <sup>25</sup>	15.73 <sup>58</sup>
28.4	28.721 <sup>58</sup>	23.38 <sup>49</sup>	29.413 <sup>71</sup>	67.25 <sup>138</sup>	21.243 <sup>85</sup>	62.12 <sup>58</sup>	44.946 <sup>50</sup>	15.12 <sup>61</sup>
July 8.3	28.642 <sup>79</sup>	22.87 <sup>51</sup>	29.317 <sup>96</sup>	68.44 <sup>119</sup>	21.125 <sup>118</sup>	62.70 <sup>85</sup>	44.869 <sup>77</sup>	14.52 <sup>60</sup>
18.3	28.540 <sup>102</sup>	22.33 <sup>54</sup>	29.200 <sup>117</sup>	69.45 <sup>101</sup>	20.973 <sup>152</sup>	63.02 <sup>32</sup>	44.768 <sup>101</sup>	13.92 <sup>60</sup>
28.3	28.418 <sup>122</sup>	21.78 <sup>55</sup>	29.065 <sup>125</sup>	70.23 <sup>76</sup>	20.973 <sup>179</sup>	63.02 <sup>2</sup>	44.768 <sup>121</sup>	13.92 <sup>58</sup>
Aug. 7.2	28.280 <sup>138</sup>	21.23 <sup>56</sup>	28.916 <sup>149</sup>	70.77 <sup>54</sup>	20.794 <sup>199</sup>	63.04 <sup>27</sup>	44.647 <sup>127</sup>	13.34 <sup>56</sup>
17.2	28.132 <sup>148</sup>	20.70 <sup>58</sup>	28.759 <sup>167</sup>	71.07 <sup>30</sup>	20.595 <sup>211</sup>	62.77 <sup>57</sup>	44.510 <sup>147</sup>	12.78 <sup>52</sup>
27.2	27.982 <sup>150</sup>	20.18 <sup>52</sup>	28.599 <sup>160</sup>	71.10 <sup>3</sup>	20.384 <sup>214</sup>	62.20 <sup>86</sup>	44.363 <sup>151</sup>	12.26 <sup>45</sup>
Sept. 6.2	27.836 <sup>146</sup>	20.18 <sup>47</sup>	28.599 <sup>156</sup>	71.10 <sup>25</sup>	20.170 <sup>206</sup>	61.34 <sup>111</sup>	44.212 <sup>146</sup>	11.81 <sup>39</sup>
16.1	27.701 <sup>135</sup>	19.71 <sup>40</sup>	28.443 <sup>144</sup>	70.85 <sup>51</sup>	19.962 <sup>187</sup>	60.23 <sup>132</sup>	44.066 <sup>137</sup>	11.42 <sup>29</sup>
26.1	27.589 <sup>112</sup>	19.31 <sup>30</sup>	28.299 <sup>123</sup>	70.34 <sup>81</sup>	19.775 <sup>157</sup>	58.91 <sup>151</sup>	43.929 <sup>116</sup>	11.13 <sup>19</sup>
Oct. 6.1	27.506 <sup>88</sup>	19.01 <sup>19</sup>	28.177 <sup>96</sup>	69.53 <sup>110</sup>	19.618 <sup>115</sup>	57.40 <sup>161</sup>	43.814 <sup>98</sup>	10.94 <sup>4</sup>
16.1	27.461 <sup>45</sup>	18.82 <sup>3</sup>	28.081 <sup>58</sup>	68.43 <sup>136</sup>	19.503 <sup>66</sup>	55.79 <sup>166</sup>	43.728 <sup>51</sup>	10.90 <sup>14</sup>
26.0	27.461 <sup>2</sup>	18.79 <sup>16</sup>	28.023 <sup>17</sup>	67.07 <sup>164</sup>	19.437 <sup>6</sup>	54.13 <sup>162</sup>	43.677 <sup>8</sup>	11.04 <sup>23</sup>
Nov. 5.0	27.459 <sup>45</sup>	18.95 <sup>37</sup>	28.006 <sup>31</sup>	65.43 <sup>188</sup>	19.431 <sup>58</sup>	52.51 <sup>152</sup>	43.669 <sup>41</sup>	11.37 <sup>53</sup>
15.0	27.504 <sup>96</sup>	19.32 <sup>60</sup>	28.037 <sup>80</sup>	63.55 <sup>212</sup>	19.489 <sup>125</sup>	50.99 <sup>133</sup>	43.710 <sup>89</sup>	11.90 <sup>77</sup>
24.9	27.600 <sup>148</sup>	19.92 <sup>82</sup>	28.117 <sup>131</sup>	61.43 <sup>228</sup>	19.614 <sup>190</sup>	49.66 <sup>108</sup>	43.799 <sup>140</sup>	12.67 <sup>98</sup>
Dec. 4.9	27.748 <sup>194</sup>	20.74 <sup>106</sup>	28.248 <sup>178</sup>	59.15 <sup>240</sup>	19.804 <sup>251</sup>	48.57 <sup>79</sup>	43.939 <sup>183</sup>	13.65 <sup>120</sup>
14.9	27.942 <sup>237</sup>	21.80 <sup>126</sup>	28.426 <sup>221</sup>	56.75 <sup>247</sup>	20.055 <sup>305</sup>	47.79 <sup>44</sup>	44.127 <sup>221</sup>	14.85 <sup>139</sup>
24.9	28.179 <sup>272</sup>	23.06 <sup>142</sup>	28.647 <sup>260</sup>	54.28 <sup>246</sup>	20.360 <sup>349</sup>	47.35 <sup>0</sup>	44.358 <sup>266</sup>	16.24 <sup>154</sup>
34.8	28.451 <sup>297</sup>	24.48 <sup>155</sup>	28.906 <sup>296</sup>	51.82 <sup>235</sup>	20.709 <sup>384</sup>	47.26 <sup>30</sup>	44.624 <sup>292</sup>	17.78 <sup>163</sup>
	28.748	26.03	29.192	49.47	21.093	47.56	44.916	19.41
Mean Place	25.438	15.44	26.563	67.88	16.923	46.00	41.698	8.32
Sec δ, Tan δ	1.019	-0.196	1.034	+0.264	1.863	-0.926	1.010	-0.144
D <sub>α</sub> , D <sub>αα</sub>	+0.065	-0.010	+0.056	+0.013	+0.073	-0.045	+0.064	-0.007
D <sub>δ</sub> , D <sub>δδ</sub>	-0.29	-0.68	-0.29	-0.68	-0.29	-0.69	-0.29	-0.70

# APPARENT PLACES OF STARS, 1920.

435

FOR THE UPPER TRANSIT AT WASHINGTON.

Washington Mean Time.	β Boötis. Mag. 3.6		γ Scorpi. Mag. 3.4		ψ Boötis. Mag. 4.7		ο Boötis. Mag. 5.0	
	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.
	h m 14 58	° ' " +40 41	h m 14 59	° ' " -24 57	h m 15 1	° ' " +27 15	h m 15 3	° ' " +25 10
	s	"	s	"	s	"	s	"
Jan. 0.8	55.308	67.99	23.283	59.96	0.729	23.41	48.939	39.97
10.8	55.645 <sup>307</sup>	65.40 <sup>259</sup>	23.618 <sup>335</sup>	61.04 <sup>108</sup>	1.035 <sup>306</sup>	20.93 <sup>248</sup>	47.242 <sup>303</sup>	37.50 <sup>247</sup>
20.8	56.003 <sup>308</sup>	63.24 <sup>216</sup>	23.961 <sup>343</sup>	62.31 <sup>137</sup>	1.358 <sup>338</sup>	18.78 <sup>315</sup>	47.562 <sup>320</sup>	35.34 <sup>216</sup>
30.8	56.369 <sup>306</sup>	61.56 <sup>168</sup>	24.309 <sup>346</sup>	63.66 <sup>135</sup>	1.690 <sup>333</sup>	17.03 <sup>178</sup>	47.890 <sup>328</sup>	33.58 <sup>176</sup>
Feb. 9.7	56.737 <sup>308</sup>	60.47 <sup>109</sup>	24.650 <sup>341</sup>	65.13 <sup>147</sup>	2.018 <sup>338</sup>	15.76 <sup>127</sup>	48.215 <sup>325</sup>	32.26 <sup>123</sup>
	337	51	338	147	317	78	313	83
19.7	57.094	59.96	24.978	66.60	2.335	14.98	48.528	31.43
29.7	57.429 <sup>335</sup>	60.06 <sup>10</sup>	25.284 <sup>306</sup>	68.03 <sup>148</sup>	2.633 <sup>306</sup>	14.72 <sup>26</sup>	48.824 <sup>296</sup>	31.12 <sup>31</sup>
Mar. 10.7	57.733 <sup>304</sup>	60.75 <sup>69</sup>	25.567 <sup>283</sup>	69.42 <sup>139</sup>	2.905 <sup>273</sup>	14.98 <sup>76</sup>	49.096 <sup>273</sup>	31.29 <sup>17</sup>
20.6	58.004 <sup>271</sup>	61.97 <sup>123</sup>	25.822 <sup>255</sup>	70.71 <sup>139</sup>	3.149 <sup>244</sup>	15.73 <sup>75</sup>	49.339 <sup>243</sup>	31.94 <sup>65</sup>
30.6	58.236 <sup>232</sup>	63.66 <sup>109</sup>	26.049 <sup>237</sup>	71.92 <sup>121</sup>	3.360 <sup>211</sup>	16.90 <sup>117</sup>	49.551 <sup>212</sup>	33.02 <sup>108</sup>
	190	209	190	107	177	156	180	145
Apr. 9.6	58.426	65.75	26.248	72.99	3.537	18.46	49.731	34.47
19.5	58.573 <sup>147</sup>	68.13 <sup>288</sup>	26.413 <sup>185</sup>	73.93 <sup>94</sup>	3.879 <sup>142</sup>	20.31 <sup>185</sup>	49.875 <sup>144</sup>	36.22 <sup>175</sup>
29.5	58.677 <sup>104</sup>	70.72 <sup>259</sup>	26.550 <sup>137</sup>	74.77 <sup>84</sup>	3.786 <sup>107</sup>	22.37 <sup>206</sup>	49.987 <sup>112</sup>	38.18 <sup>196</sup>
May 9.5	58.736 <sup>59</sup>	73.42 <sup>270</sup>	26.654 <sup>104</sup>	75.46 <sup>99</sup>	3.857 <sup>71</sup>	24.55 <sup>218</sup>	50.063 <sup>76</sup>	40.29 <sup>211</sup>
19.5	58.755 <sup>19</sup>	76.14 <sup>272</sup>	26.726 <sup>72</sup>	76.04 <sup>58</sup>	3.895 <sup>28</sup>	26.79 <sup>294</sup>	50.107 <sup>44</sup>	42.44 <sup>215</sup>
	23	265	43	47	4	222	10	214
29.4	58.732	78.79	26.769	76.51	3.899	29.01	50.117	44.58
June 8.4	58.671 <sup>61</sup>	81.28 <sup>249</sup>	26.775 <sup>6</sup>	76.84 <sup>23</sup>	3.872 <sup>27</sup>	31.12 <sup>211</sup>	50.096 <sup>21</sup>	46.63 <sup>206</sup>
18.4	58.574 <sup>97</sup>	83.51 <sup>283</sup>	26.753 <sup>22</sup>	77.08 <sup>24</sup>	3.812 <sup>69</sup>	33.07 <sup>195</sup>	50.044 <sup>52</sup>	48.53 <sup>190</sup>
28.4	58.443 <sup>181</sup>	85.47 <sup>196</sup>	26.700 <sup>53</sup>	77.18 <sup>10</sup>	3.724 <sup>88</sup>	34.81 <sup>174</sup>	49.962 <sup>83</sup>	50.23 <sup>170</sup>
July 8.3	58.282 <sup>161</sup>	87.09 <sup>162</sup>	26.619 <sup>81</sup>	77.12 <sup>6</sup>	3.608 <sup>116</sup>	36.29 <sup>148</sup>	49.855 <sup>107</sup>	51.70 <sup>147</sup>
	186	128	111	14	138	120	132	118
18.3	58.096	88.32	26.508	76.98	3.470	37.49	49.723	52.88
28.3	57.887 <sup>269</sup>	89.14 <sup>82</sup>	26.376 <sup>123</sup>	76.67 <sup>21</sup>	3.312 <sup>158</sup>	38.36 <sup>87</sup>	49.571 <sup>152</sup>	53.76 <sup>88</sup>
Aug. 7.2	57.668 <sup>219</sup>	89.57 <sup>48</sup>	26.226 <sup>150</sup>	76.23 <sup>44</sup>	3.139 <sup>173</sup>	38.89 <sup>58</sup>	49.403 <sup>168</sup>	54.32 <sup>56</sup>
17.2	57.437 <sup>231</sup>	89.52 <sup>5</sup>	26.062 <sup>164</sup>	75.68 <sup>55</sup>	2.955 <sup>184</sup>	39.07 <sup>46</sup>	49.226 <sup>177</sup>	54.54 <sup>22</sup>
27.2	57.205 <sup>232</sup>	89.05 <sup>47</sup>	25.896 <sup>166</sup>	75.00 <sup>66</sup>	2.769 <sup>186</sup>	38.89 <sup>18</sup>	49.044 <sup>182</sup>	54.42 <sup>12</sup>
	226	92	164	76	133	83	179	48
Sept. 6.2	56.979	88.13	25.732	74.24	2.586	38.86	48.665	53.94
16.1	56.769 <sup>210</sup>	86.77 <sup>126</sup>	25.584 <sup>148</sup>	73.42 <sup>82</sup>	2.416 <sup>179</sup>	37.44 <sup>92</sup>	48.699 <sup>166</sup>	53.12 <sup>82</sup>
26.1	56.582 <sup>187</sup>	85.03 <sup>174</sup>	25.456 <sup>128</sup>	72.57 <sup>85</sup>	2.266 <sup>169</sup>	36.19 <sup>126</sup>	48.552 <sup>147</sup>	51.95 <sup>117</sup>
Oct. 6.1	56.430 <sup>152</sup>	82.90 <sup>213</sup>	25.362 <sup>94</sup>	71.75 <sup>82</sup>	2.146 <sup>139</sup>	34.58 <sup>161</sup>	48.434 <sup>118</sup>	50.44 <sup>151</sup>
16.1	56.320 <sup>110</sup>	80.42 <sup>248</sup>	25.307 <sup>55</sup>	70.97 <sup>78</sup>	2.063 <sup>83</sup>	32.66 <sup>192</sup>	48.352 <sup>82</sup>	48.62 <sup>182</sup>
	63	280	7	65	40	233	39	213
26.0	56.257 <sup>6</sup>	77.62	25.300	70.32	2.023	30.43	48.313	46.49
Nov. 5.0	56.251 <sup>58</sup>	74.56 <sup>306</sup>	25.343 <sup>43</sup>	69.82 <sup>50</sup>	2.033 <sup>19</sup>	27.94 <sup>249</sup>	48.322 <sup>9</sup>	44.10 <sup>239</sup>
15.0	56.304 <sup>114</sup>	71.32 <sup>324</sup>	25.442 <sup>99</sup>	69.55 <sup>27</sup>	2.095 <sup>62</sup>	25.24 <sup>270</sup>	48.383 <sup>61</sup>	41.49 <sup>261</sup>
24.9	56.418 <sup>174</sup>	68.01 <sup>331</sup>	25.597 <sup>155</sup>	69.49 <sup>6</sup>	2.210 <sup>115</sup>	22.39 <sup>265</sup>	48.497 <sup>114</sup>	38.74 <sup>275</sup>
Dec. 4.9	56.592 <sup>227</sup>	64.65 <sup>306</sup>	25.803 <sup>206</sup>	69.72 <sup>28</sup>	2.377 <sup>167</sup>	19.46 <sup>298</sup>	48.662 <sup>165</sup>	35.88 <sup>286</sup>
	227	339	251	47	216	293	213	286
14.9	56.819	61.35	26.064	70.19	2.593	16.53	48.675	33.02
24.9	57.096 <sup>277</sup>	58.24 <sup>311</sup>	26.343 <sup>289</sup>	70.94 <sup>75</sup>	2.849 <sup>296</sup>	13.69 <sup>284</sup>	49.129 <sup>254</sup>	30.22 <sup>289</sup>
34.8	57.411 <sup>315</sup>	55.40 <sup>284</sup>	26.660 <sup>317</sup>	71.89 <sup>96</sup>	3.189 <sup>300</sup>	11.04 <sup>288</sup>	49.415 <sup>286</sup>	27.60 <sup>293</sup>
Mean Place	55.962	79.60	25.029	65.99	1.046	31.84	47.230	47.72
Sec δ, Tan δ	1.319	+0.860	1.103	-0.466	1.125	+0.515	1.105	+0.470
D <sub>α</sub> , D <sub>α</sub> '	+0.045	+0.041	+0.070	-0.022	+0.051	+0.024	+0.052	+0.022
D <sub>δ</sub> , D <sub>δ</sub> '	-0.28	-0.70	-0.28	-0.71	-0.28	-0.71	-0.28	-0.72

APPARENT PLACES OF STARS, 1920.

FOR THE UPPER TRANSIT AT WASHINGTON.

Washington Mean Time.	♋ Lupi. Mag. 3.5		♌ Libras. Mag. 4.7		♍ Serpentis. Mag. 5.4		♎ Triang. Aust. Mag. 3.1	
	Right Ascension.	Declination.	Right Ascension.	Declination.	Right Ascension.	Declination.	Right Ascension.	Declination.
	h m 15 6	° ' " -51 47	h m 15 7	° ' " -19 29	h m 15 11	° ' " + 5 13	h m 15 11	° ' " -68 22
Jan. 0.9	31.987	31.73	39.623	19.17	12.615	65.88	24.99	52.66
10.8	32.390 <sup>458</sup>	31.75 <sup>2</sup>	39.940 <sup>317</sup>	19.17 <sup>129</sup>	12.906 <sup>201</sup>	63.86 <sup>302</sup>	25.69 <sup>70</sup>	52.02 <sup>64</sup>
20.8	32.864 <sup>474</sup>	32.17 <sup>43</sup>	40.271 <sup>331</sup>	21.73 <sup>133</sup>	13.213 <sup>307</sup>	61.96 <sup>190</sup>	26.49 <sup>74</sup>	51.87 <sup>15</sup>
30.8	33.346 <sup>482</sup>	32.95 <sup>78</sup>	40.606 <sup>335</sup>	23.14 <sup>141</sup>	13.525 <sup>312</sup>	60.26 <sup>170</sup>	27.19 <sup>76</sup>	52.22 <sup>35</sup>
Feb. 9.7	33.821 <sup>475</sup>	34.09 <sup>114</sup>	40.936 <sup>330</sup>	24.55 <sup>141</sup>	13.832 <sup>307</sup>	58.81 <sup>145</sup>	27.94 <sup>75</sup>	53.03 <sup>81</sup>
19.7	34.281 <sup>460</sup>	35.51 <sup>142</sup>	41.254 <sup>318</sup>	25.93 <sup>128</sup>	14.139 <sup>296</sup>	57.67 <sup>114</sup>	28.68 <sup>74</sup>	54.27 <sup>124</sup>
29.7	34.716 <sup>435</sup>	37.19 <sup>168</sup>	41.554 <sup>300</sup>	27.23 <sup>120</sup>	14.413 <sup>283</sup>	56.87 <sup>80</sup>	29.38 <sup>70</sup>	55.91 <sup>164</sup>
Mar. 10.7	35.122 <sup>406</sup>	39.07 <sup>198</sup>	41.831 <sup>277</sup>	28.41 <sup>118</sup>	14.672 <sup>269</sup>	56.40 <sup>47</sup>	30.03 <sup>65</sup>	57.88 <sup>197</sup>
20.6	35.490 <sup>395</sup>	41.10 <sup>203</sup>	42.083 <sup>262</sup>	29.47 <sup>106</sup>	14.999 <sup>237</sup>	56.29 <sup>11</sup>	30.64 <sup>61</sup>	60.15 <sup>227</sup>
30.6	35.820 <sup>330</sup>	43.25 <sup>215</sup>	42.308 <sup>226</sup>	30.38 <sup>91</sup>	15.118 <sup>200</sup>	56.51 <sup>22</sup>	31.17 <sup>58</sup>	62.64 <sup>249</sup>
Apr. 9.6	36.108 <sup>288</sup>	45.45 <sup>220</sup>	42.504 <sup>196</sup>	31.13 <sup>78</sup>	15.300 <sup>188</sup>	57.01 <sup>80</sup>	31.64 <sup>47</sup>	65.32 <sup>286</sup>
19.6	36.351 <sup>243</sup>	47.68 <sup>223</sup>	42.671 <sup>167</sup>	31.74 <sup>61</sup>	15.453 <sup>159</sup>	57.77 <sup>76</sup>	32.03 <sup>39</sup>	68.10 <sup>278</sup>
29.5	36.548 <sup>197</sup>	49.90 <sup>222</sup>	42.810 <sup>139</sup>	32.23 <sup>49</sup>	15.576 <sup>128</sup>	58.72 <sup>95</sup>	32.34 <sup>31</sup>	70.97 <sup>257</sup>
May 9.5	36.698 <sup>150</sup>	52.06 <sup>216</sup>	42.918 <sup>108</sup>	32.58 <sup>38</sup>	15.672 <sup>96</sup>	59.83 <sup>111</sup>	32.57 <sup>23</sup>	73.82 <sup>235</sup>
19.5	36.799 <sup>101</sup>	54.13 <sup>207</sup>	42.996 <sup>78</sup>	32.82 <sup>24</sup>	15.738 <sup>66</sup>	61.04 <sup>121</sup>	32.71 <sup>14</sup>	76.63 <sup>261</sup>
29.4	36.850 <sup>51</sup>	56.05 <sup>192</sup>	43.045 <sup>49</sup>	32.96 <sup>14</sup>	15.774 <sup>36</sup>	62.28 <sup>124</sup>	32.76 <sup>5</sup>	79.30 <sup>267</sup>
June 8.4	36.850 <sup>0</sup>	57.81 <sup>176</sup>	43.061 <sup>16</sup>	33.00 <sup>4</sup>	15.782 <sup>8</sup>	63.53 <sup>125</sup>	32.72 <sup>4</sup>	81.82 <sup>232</sup>
18.4	36.801 <sup>49</sup>	59.35 <sup>154</sup>	43.047 <sup>14</sup>	32.96 <sup>4</sup>	15.791 <sup>21</sup>	64.75 <sup>123</sup>	32.60 <sup>12</sup>	84.08 <sup>226</sup>
28.4	36.703 <sup>98</sup>	60.65 <sup>130</sup>	43.003 <sup>44</sup>	32.83 <sup>13</sup>	15.712 <sup>40</sup>	65.88 <sup>113</sup>	32.39 <sup>21</sup>	86.06 <sup>196</sup>
July 8.3	36.561 <sup>142</sup>	61.65 <sup>100</sup>	42.929 <sup>74</sup>	32.62 <sup>21</sup>	15.636 <sup>76</sup>	66.92 <sup>104</sup>	32.11 <sup>28</sup>	87.67 <sup>161</sup>
18.3	36.378 <sup>183</sup>	62.32 <sup>67</sup>	42.830 <sup>99</sup>	32.33 <sup>29</sup>	15.537 <sup>99</sup>	67.84 <sup>93</sup>	31.75 <sup>26</sup>	88.91 <sup>134</sup>
28.3	36.159 <sup>219</sup>	62.67 <sup>35</sup>	42.706 <sup>124</sup>	31.96 <sup>27</sup>	15.415 <sup>122</sup>	68.90 <sup>76</sup>	31.34 <sup>41</sup>	89.69 <sup>78</sup>
Aug. 7.3	35.914 <sup>245</sup>	62.65 <sup>2</sup>	42.564 <sup>142</sup>	31.51 <sup>45</sup>	15.277 <sup>138</sup>	69.22 <sup>45</sup>	30.89 <sup>45</sup>	90.02 <sup>33</sup>
17.2	35.652 <sup>262</sup>	62.28 <sup>39</sup>	42.409 <sup>155</sup>	30.99 <sup>52</sup>	15.126 <sup>151</sup>	69.87 <sup>43</sup>	30.40 <sup>49</sup>	89.87 <sup>15</sup>
27.2	35.384 <sup>268</sup>	61.51 <sup>75</sup>	42.248 <sup>161</sup>	30.42 <sup>57</sup>	14.970 <sup>156</sup>	69.92 <sup>26</sup>	29.92 <sup>43</sup>	89.23 <sup>64</sup>
Sept. 6.2	35.124 <sup>260</sup>	60.41 <sup>116</sup>	42.089 <sup>169</sup>	30.42 <sup>63</sup>	14.814 <sup>156</sup>	69.92 <sup>7</sup>	29.44 <sup>48</sup>	88.11 <sup>112</sup>
16.1	34.883 <sup>241</sup>	59.02 <sup>139</sup>	41.940 <sup>149</sup>	29.80 <sup>63</sup>	14.668 <sup>146</sup>	69.99 <sup>14</sup>	29.44 <sup>44</sup>	88.11 <sup>153</sup>
26.1	34.676 <sup>207</sup>	57.37 <sup>165</sup>	41.812 <sup>128</sup>	29.17 <sup>62</sup>	14.668 <sup>139</sup>	69.85 <sup>35</sup>	29.00 <sup>38</sup>	86.56 <sup>195</sup>
Oct. 6.1	34.515 <sup>161</sup>	55.49 <sup>188</sup>	41.713 <sup>99</sup>	28.55 <sup>56</sup>	14.539 <sup>168</sup>	69.50 <sup>59</sup>	28.62 <sup>30</sup>	84.61 <sup>226</sup>
16.1	34.415 <sup>100</sup>	53.52 <sup>197</sup>	41.652 <sup>61</sup>	27.99 <sup>48</sup>	14.436 <sup>168</sup>	68.91 <sup>83</sup>	28.32 <sup>22</sup>	82.35 <sup>251</sup>
26.0	34.381 <sup>34</sup>	51.50 <sup>202</sup>	41.635 <sup>17</sup>	27.51 <sup>34</sup>	14.368 <sup>28</sup>	68.09 <sup>107</sup>	28.10 <sup>9</sup>	79.84 <sup>264</sup>
Nov. 5.0	34.422 <sup>41</sup>	49.51 <sup>199</sup>	41.635 <sup>82</sup>	27.17 <sup>17</sup>	14.340 <sup>18</sup>	67.02 <sup>130</sup>	28.01 <sup>2</sup>	77.20 <sup>269</sup>
15.0	34.541 <sup>119</sup>	47.66 <sup>185</sup>	41.667 <sup>83</sup>	27.00 <sup>3</sup>	14.358 <sup>67</sup>	65.72 <sup>154</sup>	28.03 <sup>14</sup>	74.51 <sup>261</sup>
25.0	34.736 <sup>196</sup>	47.66 <sup>164</sup>	41.755 <sup>141</sup>	27.03 <sup>27</sup>	14.425 <sup>117</sup>	64.18 <sup>173</sup>	28.17 <sup>28</sup>	71.90 <sup>245</sup>
Dec. 4.9	34.736 <sup>269</sup>	46.02 <sup>135</sup>	41.896 <sup>191</sup>	27.90 <sup>49</sup>	14.542 <sup>165</sup>	62.45 <sup>199</sup>	28.45 <sup>39</sup>	69.45 <sup>217</sup>
14.9	35.005 <sup>334</sup>	44.67 <sup>102</sup>	42.067 <sup>234</sup>	27.79 <sup>74</sup>	14.707 <sup>209</sup>	60.55 <sup>268</sup>	28.84 <sup>49</sup>	67.28 <sup>182</sup>
24.9	35.339 <sup>398</sup>	43.65 <sup>62</sup>	42.321 <sup>273</sup>	28.53 <sup>95</sup>	14.916 <sup>246</sup>	58.53 <sup>266</sup>	29.33 <sup>59</sup>	65.46 <sup>141</sup>
34.8	35.727 <sup>431</sup>	43.03 <sup>28</sup>	42.594 <sup>303</sup>	29.48 <sup>113</sup>	15.162 <sup>276</sup>	56.45 <sup>268</sup>	29.92 <sup>66</sup>	64.05 <sup>94</sup>
34.8	36.158 <sup>431</sup>	42.80 <sup>28</sup>	42.897 <sup>303</sup>	30.61 <sup>113</sup>	15.437 <sup>276</sup>	54.37 <sup>268</sup>	30.58 <sup>66</sup>	63.11 <sup>94</sup>
Mean Place	31.699	44.15	39.437	23.85	18.648	67.96	25.034	67.68
Sec δ, Tan δ	1.617	-1.271	1.061	-0.354	1.004	+0.092	2.715	-2.524
D <sub>α</sub> , D <sub>ω</sub>	+0.086	-0.058	+0.068	-0.016	+0.059	+0.004	+0.111	-0.113
D <sub>δ</sub> , D <sub>ε</sub>	-0.27	-0.73	-0.27	-0.73	-0.27	-0.74	-0.27	-0.74



FOR THE UPPER TRANSIT AT WASHINGTON.

Washington Mean Time.	δ Boötis. Mag. 3.5		β Libras. Mag. 2.7		γ Urae Mīnoris. Mag. 3.1		μ Boötis pr. Mag. 4.5	
	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.
	h m	° ' "	h m	° ' "	h m	° ' "	h m	° ' "
	15 12	+33 36	15 12	- 9 5	15 20	+72 6	15 21	+37 39
	s	"	s	"	s	"	s	"
Jan. 0.9	16.138	35.81	42.000	17.02	46.96	53.05	27.407	16.00
10.8	16.448 <sup>810</sup>	33.19 <sup>262</sup>	42.360 <sup>300</sup>	18.69 <sup>158</sup>	47.57 <sup>61</sup>	50.39 <sup>265</sup>	27.717 <sup>810</sup>	13.30 <sup>270</sup>
20.8	16.780 <sup>532</sup>	30.96 <sup>228</sup>	42.675 <sup>315</sup>	20.18 <sup>108</sup>	48.25 <sup>68</sup>	48.25 <sup>214</sup>	28.053 <sup>836</sup>	10.99 <sup>281</sup>
30.8	17.122 <sup>343</sup>	29.15 <sup>181</sup>	42.994 <sup>319</sup>	21.69 <sup>151</sup>	48.99 <sup>74</sup>	46.73 <sup>152</sup>	28.404 <sup>351</sup>	9.14 <sup>185</sup>
Feb. 9.7	17.465 <sup>643</sup>	27.87 <sup>126</sup>	43.308 <sup>314</sup>	23.12 <sup>143</sup>	49.75 <sup>76</sup>	45.87 <sup>86</sup>	28.757 <sup>353</sup>	7.82 <sup>123</sup>
	17.465 <sup>333</sup>	27.87 <sup>74</sup>	43.308 <sup>306</sup>	23.12 <sup>127</sup>	49.75 <sup>77</sup>	45.87 <sup>19</sup>	28.757 <sup>346</sup>	7.82 <sup>74</sup>
19.7	17.798	27.18	43.618	24.39	50.52	45.68	29.103	7.08
29.7	18.114 <sup>516</sup>	26.96 <sup>17</sup>	43.902 <sup>269</sup>	25.48 <sup>109</sup>	51.26 <sup>74</sup>	46.18 <sup>50</sup>	29.435 <sup>333</sup>	6.93 <sup>15</sup>
Mar. 10.7	18.407 <sup>263</sup>	27.35 <sup>30</sup>	44.168 <sup>268</sup>	26.36 <sup>88</sup>	51.95 <sup>69</sup>	47.33 <sup>115</sup>	29.743 <sup>308</sup>	7.37 <sup>44</sup>
20.6	18.672 <sup>265</sup>	28.25 <sup>90</sup>	44.412 <sup>244</sup>	27.01 <sup>65</sup>	52.57 <sup>62</sup>	49.06 <sup>173</sup>	30.023 <sup>280</sup>	8.35 <sup>98</sup>
30.6	18.902 <sup>230</sup>	29.62 <sup>137</sup>	44.631 <sup>219</sup>	27.45 <sup>44</sup>	53.10 <sup>52</sup>	51.32 <sup>226</sup>	30.268 <sup>245</sup>	9.83 <sup>148</sup>
	19.4	179	189	21	43	268	209	189
Apr. 9.6	19.096	31.41	44.820	27.66	53.52	54.00	30.477	11.72
19.6	19.255 <sup>159</sup>	33.52 <sup>211</sup>	44.982 <sup>162</sup>	27.69 <sup>3</sup>	53.83 <sup>19</sup>	57.00 <sup>300</sup>	30.646 <sup>169</sup>	13.96 <sup>224</sup>
29.5	19.373 <sup>115</sup>	35.84 <sup>232</sup>	45.116 <sup>134</sup>	27.55 <sup>14</sup>	54.02 <sup>7</sup>	60.19 <sup>319</sup>	30.775 <sup>129</sup>	16.47 <sup>251</sup>
May 9.5	19.455 <sup>82</sup>	38.31 <sup>247</sup>	45.223 <sup>107</sup>	27.26 <sup>29</sup>	54.09 <sup>6</sup>	63.48 <sup>329</sup>	30.865 <sup>90</sup>	19.09 <sup>262</sup>
19.5	19.498 <sup>43</sup>	40.88 <sup>252</sup>	45.300 <sup>77</sup>	26.88 <sup>38</sup>	54.08 <sup>6</sup>	66.72 <sup>334</sup>	30.913 <sup>48</sup>	21.78 <sup>269</sup>
	4	249	47	47	16	313	8	266
29.4	19.502	43.32	45.347	26.41	53.87	69.85	30.921	24.44
June 8.4	19.474 <sup>26</sup>	45.69 <sup>237</sup>	45.364 <sup>17</sup>	25.89 <sup>52</sup>	53.59 <sup>28</sup>	72.76 <sup>291</sup>	30.890 <sup>31</sup>	26.97 <sup>253</sup>
18.4	19.409 <sup>65</sup>	47.87 <sup>218</sup>	45.352 <sup>12</sup>	25.33 <sup>56</sup>	53.22 <sup>37</sup>	75.36 <sup>260</sup>	30.822 <sup>168</sup>	29.34 <sup>237</sup>
28.4	19.313 <sup>96</sup>	49.81 <sup>184</sup>	46.311 <sup>41</sup>	24.77 <sup>56</sup>	52.75 <sup>47</sup>	77.60 <sup>224</sup>	30.719 <sup>108</sup>	31.42 <sup>208</sup>
July 8.3	19.186 <sup>127</sup>	51.49 <sup>168</sup>	45.241 <sup>70</sup>	24.18 <sup>59</sup>	52.21 <sup>54</sup>	79.40 <sup>180</sup>	30.584 <sup>135</sup>	33.23 <sup>181</sup>
	152	133	98	58	61	132	165	144
18.3	19.034	52.82	45.148	23.60	51.60	80.72	30.419	34.67
28.3	18.858 <sup>176</sup>	53.79 <sup>97</sup>	45.030 <sup>118</sup>	23.04 <sup>56</sup>	50.95 <sup>65</sup>	81.52 <sup>80</sup>	30.231 <sup>188</sup>	35.73 <sup>106</sup>
Aug. 7.3	18.667 <sup>191</sup>	54.40 <sup>61</sup>	44.894 <sup>136</sup>	22.51 <sup>53</sup>	50.27 <sup>68</sup>	81.81 <sup>29</sup>	30.022 <sup>209</sup>	36.38 <sup>65</sup>
17.2	18.461 <sup>206</sup>	54.58 <sup>18</sup>	44.745 <sup>149</sup>	22.00 <sup>51</sup>	49.56 <sup>71</sup>	81.59 <sup>22</sup>	29.800 <sup>222</sup>	36.62 <sup>24</sup>
27.2	18.253 <sup>206</sup>	54.35 <sup>23</sup>	44.591 <sup>154</sup>	21.55 <sup>45</sup>	48.86 <sup>70</sup>	80.83 <sup>76</sup>	29.573 <sup>227</sup>	36.43 <sup>19</sup>
	206	61	155	41	69	129	226	62
Sept. 6.2	18.048	59.74	44.436	21.14	48.17	79.54	29.347	35.81
16.1	17.851 <sup>197</sup>	52.71 <sup>108</sup>	44.292 <sup>144</sup>	20.84 <sup>30</sup>	47.52 <sup>65</sup>	77.78 <sup>176</sup>	29.133 <sup>214</sup>	34.76 <sup>105</sup>
26.1	17.677 <sup>174</sup>	51.31 <sup>140</sup>	44.167 <sup>125</sup>	20.62 <sup>23</sup>	46.92 <sup>60</sup>	75.55 <sup>223</sup>	28.937 <sup>196</sup>	33.30 <sup>146</sup>
Oct. 6.1	17.534 <sup>143</sup>	49.50 <sup>181</sup>	44.066 <sup>101</sup>	20.56 <sup>6</sup>	46.39 <sup>53</sup>	72.92 <sup>263</sup>	28.771 <sup>166</sup>	31.45 <sup>165</sup>
16.1	17.428 <sup>166</sup>	47.36 <sup>214</sup>	44.005 <sup>61</sup>	20.64 <sup>8</sup>	45.95 <sup>44</sup>	69.89 <sup>303</sup>	28.643 <sup>128</sup>	29.22 <sup>223</sup>
	64	242	24	24	34	331	82	256
26.0	17.364	44.94	43.981	20.88	45.61	66.58	28.561	26.66
Nov. 5.0	17.353 <sup>11</sup>	42.20 <sup>274</sup>	44.006 <sup>25</sup>	21.35 <sup>47</sup>	45.39 <sup>22</sup>	63.02 <sup>353</sup>	28.531 <sup>30</sup>	23.84 <sup>282</sup>
15.0	17.336 <sup>43</sup>	39.25 <sup>295</sup>	44.080 <sup>74</sup>	22.03 <sup>68</sup>	45.29 <sup>16</sup>	59.29 <sup>373</sup>	28.557 <sup>26</sup>	20.77 <sup>307</sup>
25.0	17.498 <sup>103</sup>	36.17 <sup>306</sup>	44.207 <sup>127</sup>	22.89 <sup>86</sup>	45.33 <sup>4</sup>	55.52 <sup>377</sup>	28.642 <sup>85</sup>	17.56 <sup>321</sup>
Dec. 4.9	17.653 <sup>156</sup>	33.60 <sup>317</sup>	44.382 <sup>173</sup>	24.01 <sup>112</sup>	45.50 <sup>17</sup>	51.79 <sup>373</sup>	28.787 <sup>145</sup>	14.28 <sup>328</sup>
	206	313	216	128	31	358	198	326
14.9	17.859	29.87	44.598	25.29	45.81	48.21	28.985	11.02
24.9	18.113 <sup>254</sup>	26.85 <sup>302</sup>	44.854 <sup>256</sup>	26.73 <sup>144</sup>	46.25 <sup>44</sup>	44.88 <sup>333</sup>	29.232 <sup>247</sup>	7.89 <sup>313</sup>
34.8	18.400 <sup>237</sup>	24.02 <sup>263</sup>	45.136 <sup>282</sup>	28.26 <sup>153</sup>	46.79 <sup>54</sup>	41.92 <sup>265</sup>	29.521 <sup>289</sup>	4.98 <sup>291</sup>
Mean Place	16.664	45.01	41.969	18.92	50.720	67.05	28.095	25.38
Sec δ, Tan δ	1.201	+0.665	1.013	-0.160	3.257	+3.999	1.263	+0.772
D <sub>1/2</sub> α, D <sub>1/2</sub> δ	+0.048	+0.030	+0.064	-0.007	-0.002	+0.132	+0.046	+0.033
D <sub>1/2</sub> β, D <sub>1/2</sub> γ	-0.27	-0.74	-0.27	-0.75	-0.25	-0.77	-0.25	-0.77

APPARENT PLACES OF STARS, 1920.

FOR THE UPPER TRANSIT AT WASHINGTON.

Washington Mean Time.	$\gamma^1$ Serpentis. Mag. 5.5		$\epsilon$ Draconis. Mag. 3.5		$\delta$ Libræ. Mag. 5.9		$\beta$ Coronæ Borealis. Mag. 3.7	
	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.
	h m	° '	h m	° '	h m	° '	h m	° '
	15 22	+15 42	15 23	+59 14	15 23	-16 26	15 24	+29 22
	s	"	s	"	s	"	s	"
Jan. 0.9	4.447	26.08	7.168	32.33	44.579	14.00	31.959	48.14
10.8	4.732 <sup>285</sup>	23.77 <sup>231</sup>	7.574 <sup>306</sup>	29.53 <sup>290</sup>	44.883 <sup>304</sup>	15.85 <sup>135</sup>	31.654 <sup>295</sup>	40.54 <sup>269</sup>
20.8	5.036 <sup>304</sup>	21.69 <sup>208</sup>	8.028 <sup>453</sup>	27.23 <sup>230</sup>	45.204 <sup>321</sup>	17.18 <sup>133</sup>	31.970 <sup>316</sup>	38.27 <sup>227</sup>
30.8	5.348 <sup>312</sup>	19.90 <sup>179</sup>	8.506 <sup>480</sup>	25.50 <sup>178</sup>	45.581 <sup>327</sup>	18.54 <sup>136</sup>	32.298 <sup>328</sup>	36.40 <sup>187</sup>
Feb. 9.8	5.660 <sup>312</sup>	18.45 <sup>145</sup>	9.001 <sup>495</sup>	24.41 <sup>109</sup>	45.857 <sup>328</sup>	19.88 <sup>124</sup>	32.629 <sup>331</sup>	35.91 <sup>139</sup>
	304	104	490		318	138	325	88
19.7	5.964	17.41	9.491	23.99	46.173	21.14	32.964	34.13
29.7	6.254 <sup>290</sup>	16.80 <sup>61</sup>	9.964 <sup>473</sup>	24.24 <sup>25</sup>	46.474 <sup>301</sup>	22.30 <sup>116</sup>	33.263 <sup>300</sup>	33.79 <sup>34</sup>
Mar. 10.7	6.524 <sup>270</sup>	16.64 <sup>16</sup>	10.405 <sup>441</sup>	25.15 <sup>91</sup>	46.756 <sup>283</sup>	23.81 <sup>101</sup>	33.552 <sup>289</sup>	33.98 <sup>19</sup>
20.6	6.769 <sup>245</sup>	16.90 <sup>28</sup>	10.803 <sup>398</sup>	26.64 <sup>149</sup>	47.014 <sup>288</sup>	24.19 <sup>88</sup>	33.815 <sup>283</sup>	34.69 <sup>71</sup>
30.6	6.987 <sup>218</sup>	17.55 <sup>65</sup>	11.147 <sup>344</sup>	28.69 <sup>205</sup>	47.248 <sup>284</sup>	24.89 <sup>70</sup>	34.048 <sup>253</sup>	35.88 <sup>119</sup>
	190	100	285	248	307	54	301	157
Apr. 9.6	7.177	18.55	11.432	31.17	47.455	25.43	34.249	37.45
19.6	7.338 <sup>161</sup>	19.85 <sup>130</sup>	11.652 <sup>220</sup>	34.00 <sup>283</sup>	47.634 <sup>179</sup>	25.80 <sup>37</sup>	34.415 <sup>164</sup>	39.37 <sup>192</sup>
29.5	7.469 <sup>131</sup>	21.37 <sup>182</sup>	11.803 <sup>151</sup>	37.05 <sup>305</sup>	47.786 <sup>153</sup>	26.06 <sup>26</sup>	34.546 <sup>131</sup>	41.54 <sup>217</sup>
May 9.5	7.569 <sup>100</sup>	23.06 <sup>169</sup>	11.884 <sup>81</sup>	40.23 <sup>318</sup>	47.909 <sup>128</sup>	26.18 <sup>12</sup>	34.643 <sup>97</sup>	43.86 <sup>232</sup>
19.5	7.637 <sup>68</sup>	24.84 <sup>178</sup>	11.898 <sup>14</sup>	43.41 <sup>318</sup>	48.001 <sup>92</sup>	26.21 <sup>3</sup>	34.703 <sup>60</sup>	46.25 <sup>239</sup>
	37	180	53	312	62	7	24	289
29.5	7.674	26.64	11.845	46.53	48.063	26.14	34.727	48.64
June 8.4	7.682 <sup>8</sup>	28.40 <sup>176</sup>	11.728 <sup>117</sup>	49.45 <sup>292</sup>	48.093 <sup>30</sup>	26.00 <sup>14</sup>	34.716 <sup>11</sup>	50.95 <sup>231</sup>
18.4	7.658 <sup>24</sup>	30.07 <sup>167</sup>	11.553 <sup>175</sup>	52.09 <sup>264</sup>	48.092 <sup>1</sup>	25.81 <sup>19</sup>	34.672 <sup>44</sup>	53.10 <sup>215</sup>
28.4	7.605 <sup>53</sup>	31.62 <sup>185</sup>	11.323 <sup>230</sup>	54.40 <sup>231</sup>	48.080 <sup>32</sup>	25.55 <sup>26</sup>	34.594 <sup>78</sup>	55.06 <sup>196</sup>
July 8.3	7.523 <sup>82</sup>	32.99 <sup>187</sup>	11.046 <sup>377</sup>	56.31 <sup>191</sup>	47.997 <sup>68</sup>	25.25 <sup>30</sup>	34.486 <sup>108</sup>	56.74 <sup>168</sup>
	108	116	318	147	91	36	135	149
18.3	7.415	34.15	10.728	57.78	47.966	24.89	34.351	58.14
28.3	7.286 <sup>129</sup>	35.09 <sup>94</sup>	10.376 <sup>363</sup>	58.77 <sup>99</sup>	47.790 <sup>116</sup>	24.51 <sup>36</sup>	34.191 <sup>160</sup>	59.21 <sup>107</sup>
Aug. 7.3	7.137 <sup>149</sup>	35.77 <sup>68</sup>	10.001 <sup>376</sup>	59.27 <sup>1</sup>	47.652 <sup>138</sup>	24.06 <sup>45</sup>	34.012 <sup>179</sup>	59.92 <sup>71</sup>
17.2	6.973 <sup>164</sup>	36.20 <sup>43</sup>	9.609 <sup>392</sup>	59.26 <sup>1</sup>	47.500 <sup>152</sup>	23.59 <sup>47</sup>	33.820 <sup>192</sup>	60.26 <sup>24</sup>
27.2	6.804 <sup>169</sup>	36.34 <sup>14</sup>	9.214 <sup>395</sup>	58.78 <sup>53</sup>	47.338 <sup>162</sup>	23.08 <sup>51</sup>	33.620 <sup>200</sup>	60.24 <sup>2</sup>
	170	14	390	104	161	50	199	42
Sept. 6.2	6.634	36.20	8.824	57.69	47.177	22.58	33.421	59.82
16.2	6.472 <sup>163</sup>	35.78 <sup>42</sup>	8.454 <sup>370</sup>	56.16 <sup>153</sup>	47.023 <sup>154</sup>	22.08 <sup>50</sup>	33.231 <sup>190</sup>	59.02 <sup>80</sup>
26.1	6.327 <sup>145</sup>	35.06 <sup>72</sup>	8.115 <sup>339</sup>	54.18 <sup>198</sup>	46.867 <sup>126</sup>	21.61 <sup>47</sup>	33.059 <sup>173</sup>	57.84 <sup>118</sup>
Oct. 6.1	6.206 <sup>121</sup>	34.05 <sup>101</sup>	7.817 <sup>308</sup>	51.76 <sup>242</sup>	46.778 <sup>109</sup>	21.21 <sup>40</sup>	32.912 <sup>147</sup>	56.30 <sup>154</sup>
16.1	6.119 <sup>87</sup>	32.74 <sup>131</sup>	7.574 <sup>243</sup>	48.96 <sup>290</sup>	46.704 <sup>74</sup>	20.90 <sup>31</sup>	32.801 <sup>111</sup>	54.41 <sup>139</sup>
	48	189	178	316	31	17	68	221
26.0	6.071	31.15	7.396	45.80	46.673	20.78	32.753	52.20
Nov. 5.0	6.070 <sup>1</sup>	29.31 <sup>184</sup>	7.291 <sup>105</sup>	42.39 <sup>341</sup>	46.690 <sup>17</sup>	20.78 <sup>0</sup>	32.713 <sup>20</sup>	49.70 <sup>250</sup>
15.0	6.119 <sup>49</sup>	27.22 <sup>209</sup>	7.269 <sup>22</sup>	38.78 <sup>361</sup>	46.758 <sup>68</sup>	20.92 <sup>19</sup>	32.746 <sup>33</sup>	46.98 <sup>272</sup>
25.0	6.219 <sup>100</sup>	24.95 <sup>227</sup>	7.330 <sup>61</sup>	35.08 <sup>370</sup>	46.878 <sup>120</sup>	21.32 <sup>40</sup>	32.884 <sup>88</sup>	44.09 <sup>289</sup>
Dec. 4.9	6.368 <sup>149</sup>	22.54 <sup>241</sup>	7.477 <sup>147</sup>	31.37 <sup>371</sup>	47.050 <sup>172</sup>	21.94 <sup>68</sup>	32.976 <sup>142</sup>	41.09 <sup>300</sup>
	195	249	329	361	217	84	192	301
14.9	6.563	20.05	7.706	27.76	47.267	22.78	33.168	38.08
24.9	6.798 <sup>225</sup>	17.56 <sup>249</sup>	8.012 <sup>306</sup>	24.37 <sup>339</sup>	47.522 <sup>265</sup>	23.80 <sup>102</sup>	33.493 <sup>235</sup>	35.14 <sup>294</sup>
34.9	7.066 <sup>263</sup>	15.15 <sup>241</sup>	8.383 <sup>371</sup>	21.31 <sup>306</sup>	47.810 <sup>288</sup>	24.98 <sup>118</sup>	33.678 <sup>275</sup>	32.37 <sup>277</sup>
Mean Place	4.664	30.43	8.994	44.98	44.491	18.74	31.844	50.58
Sec $\delta$ , Tan $\delta$	1.039	+0.231	1.956	+1.680	1.043	-0.295	1.148	+0.563
$D\phi_a, D\omega_a$	+0.056	+0.012	+0.027	+0.071	+0.067	-0.012	+0.050	+0.023
$D\phi_\delta, D\omega_\delta$	-0.25	-0.77	-0.25	-0.77	-0.25	-0.78	-0.25	-0.78

FOR THE UPPER TRANSIT AT WASHINGTON.

Washington Mean Time.	$\gamma^1$ Boötis. Mag. 5.2		$\gamma$ Lupi (mean). Mag. 3.0		$\gamma$ Librae. Mag. 4.0		$\alpha$ Coronae Borealis. Mag. 2.3	
	Right Ascension.	Declination.	Right Ascension.	Declination.	Right Ascension.	Declination.	Right Ascension.	Declination.
	h m	° ' "	h m	° ' "	h m	° ' "	h m	° ' "
	15 28	+41 5	15 29	-40 53	15 31	-14 31	15 31	+26 58
	s	"	s	"	s	"	s	"
Jan. 0.9	2.510	68.74	48.306	46.78	2.950	20.90	17.548	52.67
10.8	2.824 <sup>314</sup>	65.96 <sup>378</sup>	48.677 <sup>371</sup>	46.98 <sup>20</sup>	3.257 <sup>308</sup>	22.18 <sup>128</sup>	17.834 <sup>286</sup>	50.08 <sup>280</sup>
20.8	3.167 <sup>348</sup>	63.58 <sup>338</sup>	49.070 <sup>303</sup>	47.47 <sup>49</sup>	3.572 <sup>315</sup>	23.53 <sup>135</sup>	18.145 <sup>311</sup>	47.82 <sup>238</sup>
30.8	3.526 <sup>339</sup>	61.60 <sup>180</sup>	49.472 <sup>402</sup>	48.25 <sup>78</sup>	3.894 <sup>322</sup>	24.89 <sup>136</sup>	18.464 <sup>319</sup>	45.92 <sup>190</sup>
Feb. 9.8	3.891 <sup>365</sup>	60.25 <sup>134</sup>	49.874 <sup>402</sup>	49.24 <sup>99</sup>	4.216 <sup>328</sup>	26.20 <sup>131</sup>	18.790 <sup>326</sup>	44.46 <sup>146</sup>
19.7	4.252 <sup>361</sup>	59.60 <sup>78</sup>	50.287 <sup>398</sup>	50.42 <sup>118</sup>	4.530 <sup>314</sup>	27.43 <sup>128</sup>	19.111 <sup>321</sup>	43.51 <sup>96</sup>
29.7	4.598 <sup>346</sup>	59.46 <sup>14</sup>	50.643 <sup>376</sup>	51.77 <sup>125</sup>	4.832 <sup>303</sup>	28.52 <sup>109</sup>	19.418 <sup>307</sup>	43.09 <sup>42</sup>
Mar. 10.7	4.923 <sup>325</sup>	59.93 <sup>47</sup>	50.998 <sup>355</sup>	53.22 <sup>145</sup>	5.113 <sup>281</sup>	29.46 <sup>94</sup>	19.707 <sup>289</sup>	43.17 <sup>8</sup>
20.7	5.217 <sup>304</sup>	60.96 <sup>108</sup>	51.326 <sup>328</sup>	54.77 <sup>155</sup>	5.373 <sup>260</sup>	30.23 <sup>76</sup>	19.971 <sup>264</sup>	43.77 <sup>60</sup>
30.6	5.477 <sup>280</sup>	62.51 <sup>155</sup>	51.625 <sup>299</sup>	56.35 <sup>186</sup>	5.610 <sup>237</sup>	30.81 <sup>59</sup>	20.208 <sup>237</sup>	44.85 <sup>108</sup>
Apr. 9.6	5.699 <sup>228</sup>	64.50 <sup>199</sup>	51.893 <sup>268</sup>	56.35 <sup>169</sup>	5.821 <sup>211</sup>	31.23 <sup>42</sup>	20.411 <sup>208</sup>	46.31 <sup>146</sup>
19.6	5.881 <sup>183</sup>	66.83 <sup>223</sup>	52.125 <sup>232</sup>	59.54 <sup>159</sup>	6.006 <sup>185</sup>	31.48 <sup>25</sup>	20.585 <sup>174</sup>	48.10 <sup>179</sup>
29.5	6.020 <sup>139</sup>	69.43 <sup>290</sup>	52.324 <sup>199</sup>	61.11 <sup>187</sup>	6.162 <sup>156</sup>	31.59 <sup>11</sup>	20.723 <sup>138</sup>	50.15 <sup>205</sup>
May 9.5	6.116 <sup>93</sup>	72.18 <sup>376</sup>	52.484 <sup>169</sup>	62.62 <sup>151</sup>	6.290 <sup>128</sup>	31.58 <sup>1</sup>	20.723 <sup>107</sup>	52.37 <sup>222</sup>
19.5	6.168 <sup>59</sup>	74.99 <sup>381</sup>	52.605 <sup>131</sup>	64.06 <sup>144</sup>	6.390 <sup>100</sup>	31.48 <sup>10</sup>	20.830 <sup>67</sup>	54.68 <sup>231</sup>
29.5	6.178 <sup>10</sup>	77.78 <sup>379</sup>	52.686 <sup>81</sup>	65.41 <sup>128</sup>	6.457 <sup>67</sup>	31.29 <sup>19</sup>	20.897 <sup>35</sup>	54.68 <sup>232</sup>
June 8.4	6.146 <sup>33</sup>	80.45 <sup>367</sup>	52.726 <sup>40</sup>	66.63 <sup>122</sup>	6.493 <sup>36</sup>	31.03 <sup>26</sup>	20.932 <sup>1</sup>	57.00 <sup>224</sup>
18.4	6.073 <sup>78</sup>	82.91 <sup>246</sup>	52.723 <sup>3</sup>	67.71 <sup>108</sup>	6.499 <sup>6</sup>	31.03 <sup>31</sup>	20.932 <sup>35</sup>	59.24 <sup>214</sup>
28.4	5.963 <sup>119</sup>	85.11 <sup>230</sup>	52.679 <sup>44</sup>	68.61 <sup>90</sup>	6.472 <sup>27</sup>	30.72 <sup>34</sup>	20.898 <sup>65</sup>	61.38 <sup>192</sup>
July 8.4	5.819 <sup>144</sup>	87.01 <sup>190</sup>	52.594 <sup>85</sup>	69.32 <sup>71</sup>	6.414 <sup>58</sup>	30.00 <sup>38</sup>	20.833 <sup>98</sup>	63.30 <sup>170</sup>
18.3	5.643 <sup>176</sup>	88.53 <sup>162</sup>	52.473 <sup>121</sup>	69.81 <sup>49</sup>	6.414 <sup>86</sup>	30.00 <sup>40</sup>	20.735 <sup>126</sup>	65.00 <sup>140</sup>
28.3	5.440 <sup>308</sup>	89.66 <sup>112</sup>	52.473 <sup>157</sup>	70.06 <sup>25</sup>	6.328 <sup>113</sup>	29.60 <sup>43</sup>	20.600 <sup>149</sup>	66.40 <sup>110</sup>
Aug. 7.3	5.217 <sup>228</sup>	90.86 <sup>70</sup>	52.316 <sup>183</sup>	70.06 <sup>2</sup>	6.215 <sup>135</sup>	29.17 <sup>45</sup>	20.460 <sup>172</sup>	67.50 <sup>78</sup>
17.2	4.979 <sup>228</sup>	92.91 <sup>27</sup>	52.133 <sup>183</sup>	70.04 <sup>2</sup>	6.080 <sup>135</sup>	28.72 <sup>45</sup>	20.288 <sup>172</sup>	68.28 <sup>41</sup>
27.2	4.734 <sup>245</sup>	90.63 <sup>18</sup>	51.930 <sup>308</sup>	69.78 <sup>55</sup>	5.930 <sup>180</sup>	28.25 <sup>47</sup>	20.101 <sup>187</sup>	68.69 <sup>4</sup>
Sept. 6.2	4.734 <sup>244</sup>	90.45 <sup>63</sup>	51.716 <sup>314</sup>	69.23 <sup>79</sup>	5.769 <sup>161</sup>	27.79 <sup>46</sup>	20.101 <sup>185</sup>	68.73 <sup>80</sup>
16.2	4.490 <sup>294</sup>	89.82 <sup>108</sup>	51.501 <sup>304</sup>	68.44 <sup>101</sup>	5.606 <sup>156</sup>	27.33 <sup>44</sup>	19.906 <sup>194</sup>	68.43 <sup>70</sup>
26.1	4.256 <sup>313</sup>	88.74 <sup>150</sup>	51.297 <sup>283</sup>	67.43 <sup>123</sup>	5.450 <sup>139</sup>	26.89 <sup>39</sup>	19.712 <sup>181</sup>	67.73 <sup>104</sup>
Oct. 6.1	4.043 <sup>198</sup>	87.24 <sup>192</sup>	51.115 <sup>183</sup>	66.20 <sup>124</sup>	5.311 <sup>114</sup>	26.50 <sup>31</sup>	19.528 <sup>174</sup>	66.69 <sup>143</sup>
16.1	3.857 <sup>148</sup>	85.32 <sup>230</sup>	50.966 <sup>149</sup>	64.86 <sup>145</sup>	5.197 <sup>80</sup>	26.19 <sup>19</sup>	19.354 <sup>145</sup>	65.26 <sup>176</sup>
26.1	3.711 <sup>99</sup>	83.03 <sup>264</sup>	50.864 <sup>49</sup>	63.41 <sup>146</sup>	5.117 <sup>38</sup>	26.00 <sup>7</sup>	19.209 <sup>111</sup>	63.50 <sup>207</sup>
Nov. 5.0	3.612 <sup>44</sup>	80.39 <sup>293</sup>	50.815 <sup>11</sup>	61.95 <sup>141</sup>	5.079 <sup>9</sup>	25.93 <sup>10</sup>	19.027 <sup>23</sup>	61.43 <sup>238</sup>
15.0	3.568 <sup>12</sup>	77.46 <sup>315</sup>	50.826 <sup>76</sup>	60.54 <sup>130</sup>	5.068 <sup>60</sup>	26.03 <sup>30</sup>	19.004 <sup>28</sup>	59.05 <sup>261</sup>
25.0	3.580 <sup>75</sup>	74.31 <sup>322</sup>	50.902 <sup>141</sup>	59.24 <sup>113</sup>	5.148 <sup>113</sup>	26.33 <sup>60</sup>	19.032 <sup>83</sup>	56.44 <sup>276</sup>
Dec. 4.9	3.655 <sup>125</sup>	70.99 <sup>326</sup>	51.043 <sup>204</sup>	58.12 <sup>88</sup>	5.260 <sup>163</sup>	26.83 <sup>71</sup>	19.115 <sup>135</sup>	53.68 <sup>291</sup>
14.9	3.790 <sup>199</sup>	67.61 <sup>326</sup>	51.247 <sup>261</sup>	57.24 <sup>60</sup>	5.422 <sup>208</sup>	27.54 <sup>90</sup>	19.250 <sup>184</sup>	50.77 <sup>294</sup>
24.9	3.983 <sup>246</sup>	64.25 <sup>323</sup>	51.506 <sup>310</sup>	56.34 <sup>31</sup>	5.690 <sup>240</sup>	28.44 <sup>109</sup>	19.494 <sup>231</sup>	47.83 <sup>289</sup>
34.9	4.229 <sup>290</sup>	61.03 <sup>298</sup>	51.818 <sup>349</sup>	56.33 <sup>1</sup>	5.879 <sup>279</sup>	29.53 <sup>139</sup>	19.865 <sup>266</sup>	44.94 <sup>273</sup>
Mean Place	3.348	78.28	48.194	56.85	2.915	24.69	18.010	59.16
Sec $\delta$ , Tan $\delta$	1.327	+0.872	1.323	-0.866	1.083	-0.259	1.122	+0.509
$D_{\alpha}$ , $D_{\delta}$	+0.043	+0.036	+0.079	-0.035	+0.067	-0.010	+0.050	+0.021
$D_{\delta}$ , $D_{\alpha}$	-0.24	-0.79	-0.24	-0.79	-0.24	-0.30	-0.24	-0.30

FOR THE UPPER TRANSIT AT WASHINGTON.

Washington Mean Time.	γ Cor. Bor. seq. Mag. 5.1		α Serpentinis. Mag. 2.8		β Serpentinis. Mag. 3.7		κ Serpentinis. Mag. 4.3	
	Right Ascension.	Declination.	Right Ascension.	Declination.	Right Ascension.	Declination.	Right Ascension.	Declination.
	h m 15 36	° ' " +36 53	h m 15 46	° ' " + 6 40	h m 15 42	° ' " +15 40	h m 15 45	° ' " +18 23
Jan. 0.9	21.190	33.26	19.385	33.89	29.415	13.26	7.904	11.90
10.9	21.489 <sup>299</sup>	30.50 <sup>276</sup>	19.600 <sup>275</sup>	31.85 <sup>204</sup>	29.687 <sup>272</sup>	16.93 <sup>238</sup>	8.175 <sup>271</sup>	9.50 <sup>240</sup>
20.8	21.813 <sup>324</sup>	28.09 <sup>241</sup>	19.952 <sup>302</sup>	29.96 <sup>189</sup>	29.930 <sup>306</sup>	8.82 <sup>211</sup>	8.468 <sup>303</sup>	7.32 <sup>218</sup>
30.8	22.155 <sup>342</sup>	26.13 <sup>196</sup>	20.255 <sup>303</sup>	28.26 <sup>170</sup>	30.287 <sup>307</sup>	6.97 <sup>185</sup>	8.776 <sup>308</sup>	5.43 <sup>189</sup>
Feb. 9.8	22.503 <sup>348</sup>	24.69 <sup>144</sup>	20.562 <sup>307</sup>	26.82 <sup>144</sup>	30.597 <sup>310</sup>	5.47 <sup>150</sup>	9.087 <sup>311</sup>	3.92 <sup>151</sup>
	24.6	86	303	115	305	109	807	109
19.7	22.849	23.83	20.865	25.67	30.902	4.38	9.394	2.83
29.7	23.181 <sup>332</sup>	23.54 <sup>29</sup>	21.157 <sup>293</sup>	24.88 <sup>79</sup>	31.197 <sup>295</sup>	3.72 <sup>66</sup>	9.692 <sup>298</sup>	2.20 <sup>63</sup>
Mar. 10.7	23.494 <sup>313</sup>	23.54 <sup>30</sup>	21.430 <sup>273</sup>	24.45 <sup>43</sup>	31.476 <sup>279</sup>	3.50 <sup>22</sup>	9.973 <sup>281</sup>	2.03 <sup>17</sup>
20.7	23.783 <sup>290</sup>	24.70 <sup>86</sup>	21.684 <sup>284</sup>	24.39 <sup>6</sup>	31.732 <sup>286</sup>	3.71 <sup>21</sup>	10.234 <sup>261</sup>	2.32 <sup>29</sup>
30.6	24.039 <sup>256</sup>	26.07 <sup>137</sup>	21.913 <sup>239</sup>	24.67 <sup>28</sup>	31.967 <sup>235</sup>	4.38 <sup>62</sup>	10.471 <sup>237</sup>	3.03 <sup>71</sup>
	222	181	307	61	307	98	210	110
Apr. 9.6	24.261	27.88	22.120	25.28	32.174	5.31	10.681	4.13
19.6	24.446 <sup>185</sup>	30.06 <sup>218</sup>	22.298 <sup>178</sup>	26.14 <sup>86</sup>	32.354 <sup>180</sup>	6.61 <sup>130</sup>	10.864 <sup>183</sup>	5.54 <sup>141</sup>
29.6	24.592 <sup>146</sup>	32.50 <sup>244</sup>	22.450 <sup>152</sup>	27.22 <sup>168</sup>	32.504 <sup>159</sup>	8.14 <sup>163</sup>	11.016 <sup>152</sup>	7.21 <sup>167</sup>
May 9.5	24.699 <sup>107</sup>	35.12 <sup>262</sup>	22.571 <sup>121</sup>	28.43 <sup>126</sup>	32.624 <sup>120</sup>	9.86 <sup>172</sup>	11.137 <sup>121</sup>	9.06 <sup>185</sup>
19.5	24.765 <sup>66</sup>	37.81 <sup>269</sup>	22.663 <sup>92</sup>	29.82 <sup>134</sup>	32.718 <sup>89</sup>	11.63 <sup>183</sup>	11.237 <sup>90</sup>	11.01 <sup>195</sup>
	26	270	68	141	87	187	56	206
29.5	24.790	40.51	22.726	31.23	32.770	13.55	11.283	13.01
June 8.4	24.777 <sup>13</sup>	43.11 <sup>260</sup>	22.757 <sup>31</sup>	32.64 <sup>141</sup>	32.794 <sup>24</sup>	15.99 <sup>184</sup>	11.307 <sup>24</sup>	14.96 <sup>197</sup>
18.4	24.726 <sup>51</sup>	45.54 <sup>243</sup>	22.758 <sup>1</sup>	34.01 <sup>137</sup>	32.788 <sup>6</sup>	17.15 <sup>176</sup>	11.298 <sup>9</sup>	16.86 <sup>158</sup>
28.4	24.637 <sup>89</sup>	47.74 <sup>220</sup>	22.726 <sup>32</sup>	35.31 <sup>139</sup>	32.748 <sup>40</sup>	18.78 <sup>168</sup>	11.257 <sup>41</sup>	18.61 <sup>175</sup>
July 8.4	24.514 <sup>133</sup>	49.64 <sup>190</sup>	22.665 <sup>61</sup>	36.48 <sup>117</sup>	32.678 <sup>70</sup>	20.26 <sup>148</sup>	11.184 <sup>73</sup>	20.17 <sup>156</sup>
	154	188	88	106	98	127	101	124
18.3	24.360	51.22	22.577	37.54	32.580	21.53	11.063	21.51
28.3	24.179 <sup>181</sup>	52.42 <sup>120</sup>	22.462 <sup>115</sup>	38.42 <sup>88</sup>	32.455 <sup>125</sup>	22.57 <sup>164</sup>	10.955 <sup>128</sup>	22.61 <sup>110</sup>
Aug. 7.3	23.975 <sup>204</sup>	53.23 <sup>81</sup>	22.326 <sup>126</sup>	39.13 <sup>71</sup>	32.306 <sup>146</sup>	23.36 <sup>79</sup>	10.804 <sup>151</sup>	23.43 <sup>82</sup>
17.3	23.757 <sup>218</sup>	53.62 <sup>39</sup>	22.174 <sup>182</sup>	39.64 <sup>51</sup>	32.146 <sup>163</sup>	23.90 <sup>54</sup>	10.636 <sup>168</sup>	23.98 <sup>55</sup>
27.2	23.528 <sup>229</sup>	53.59 <sup>3</sup>	22.011 <sup>168</sup>	39.97 <sup>33</sup>	31.972 <sup>174</sup>	24.15 <sup>25</sup>	10.458 <sup>178</sup>	24.22 <sup>24</sup>
	228	48	165	12	176	3	182	6
Sept. 6.2	23.300	53.11	21.846	40.09	31.796	24.12	10.276	24.16
16.2	23.078 <sup>223</sup>	52.21 <sup>90</sup>	21.686 <sup>160</sup>	39.99 <sup>10</sup>	31.624 <sup>172</sup>	23.79 <sup>38</sup>	10.099 <sup>177</sup>	23.77 <sup>39</sup>
26.1	22.875 <sup>203</sup>	50.90 <sup>151</sup>	21.539 <sup>147</sup>	39.64 <sup>35</sup>	31.467 <sup>187</sup>	23.16 <sup>68</sup>	9.936 <sup>163</sup>	23.07 <sup>70</sup>
Oct. 6.1	22.698 <sup>177</sup>	49.19 <sup>171</sup>	21.415 <sup>124</sup>	39.06 <sup>58</sup>	31.331 <sup>186</sup>	22.24 <sup>92</sup>	9.794 <sup>142</sup>	22.05 <sup>102</sup>
16.1	22.557 <sup>141</sup>	47.09 <sup>210</sup>	21.323 <sup>92</sup>	38.26 <sup>80</sup>	31.227 <sup>104</sup>	21.01 <sup>128</sup>	9.684 <sup>110</sup>	20.72 <sup>133</sup>
	97	243	57	168	65	151	71	163
26.1	22.460	44.66	21.266	37.18	31.162	19.50	9.613	19.09
Nov. 5.0	22.413 <sup>47</sup>	41.91 <sup>275</sup>	21.256 <sup>10</sup>	35.86 <sup>132</sup>	31.141 <sup>21</sup>	17.72 <sup>178</sup>	9.586 <sup>27</sup>	17.19 <sup>190</sup>
15.0	22.422 <sup>9</sup>	38.93 <sup>298</sup>	21.292 <sup>36</sup>	34.33 <sup>153</sup>	31.169 <sup>28</sup>	15.70 <sup>202</sup>	9.609 <sup>32</sup>	15.03 <sup>216</sup>
25.0	22.490 <sup>68</sup>	35.78 <sup>315</sup>	21.381 <sup>89</sup>	32.58 <sup>175</sup>	31.247 <sup>78</sup>	13.47 <sup>223</sup>	9.682 <sup>73</sup>	12.68 <sup>235</sup>
Dec. 5.0	22.615 <sup>125</sup>	32.52 <sup>326</sup>	21.518 <sup>137</sup>	30.64 <sup>194</sup>	31.376 <sup>129</sup>	11.10 <sup>237</sup>	9.897 <sup>125</sup>	10.18 <sup>250</sup>
	181	325	181	204	176	247	172	280
14.9	22.796	29.27	21.699	28.60	31.552	8.63	9.979	7.58
24.9	23.028 <sup>292</sup>	26.11 <sup>316</sup>	21.922 <sup>223</sup>	26.53 <sup>297</sup>	31.771 <sup>219</sup>	6.15 <sup>248</sup>	10.194 <sup>215</sup>	5.00 <sup>268</sup>
34.9	23.392 <sup>274</sup>	23.15 <sup>296</sup>	22.177 <sup>255</sup>	24.43 <sup>210</sup>	32.024 <sup>263</sup>	3.73 <sup>248</sup>	10.446 <sup>252</sup>	2.49 <sup>251</sup>
Mean Place	21.931	41.41	19.562	35.18	29.720	16.54	8.263	13.66
Sec δ, Tan δ	1.250	+0.751	1.007	+0.117	1.089	+0.281	1.054	+0.332
D <sub>γ</sub> α, D <sub>γ</sub> α	+0.045	+0.029	+0.058	+0.004	+0.055	+0.611	+0.054	+0.012
D <sub>γ</sub> δ, D <sub>γ</sub> δ	-0.23	-0.81	-0.23	-0.82	-0.22	-0.83	-0.22	-0.83

# APPARENT PLACES OF STARS, 1920.

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## FOR THE UPPER TRANSIT AT WASHINGTON.

Washington Mean Time.	μ Serpentis. Mag. 3.6		13 H. Draconis. Mag. 5.1		ε Serpentis. Mag. 3.8		ζ Ursae Minoris. Mag. 4.3	
	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.
	h m 15 45	° ' " - 3 11	h m 15 45	° ' " +62 50	h m 15 46	° ' " + 4 42	h m 15 46	° ' " +78 2
	s	"	s	"	s	"	s	"
Jan. 0.9	26.495	9.46	24.20	86.15	49.409	63.49	46.57	16.61
10.9	26.771 <sup>276</sup>	11.14 <sup>108</sup>	24.63 <sup>43</sup>	83.20 <sup>293</sup>	49.679 <sup>270</sup>	61.54 <sup>195</sup>	47.32 <sup>75</sup>	13.80 <sup>281</sup>
20.8	27.066 <sup>295</sup>	12.77 <sup>163</sup>	25.09 <sup>46</sup>	80.71 <sup>249</sup>	49.970 <sup>291</sup>	59.68 <sup>186</sup>	48.21 <sup>89</sup>	11.46 <sup>234</sup>
30.8	27.372 <sup>306</sup>	14.30 <sup>193</sup>	25.60 <sup>51</sup>	28.77 <sup>194</sup>	50.271 <sup>301</sup>	58.00 <sup>168</sup>	49.21 <sup>100</sup>	9.73 <sup>173</sup>
Feb. 9.8	27.680 <sup>306</sup>	15.67 <sup>137</sup>	26.13 <sup>58</sup>	27.47 <sup>130</sup>	50.577 <sup>306</sup>	56.58 <sup>142</sup>	50.27 <sup>106</sup>	8.61 <sup>112</sup>
19.7	27.983 <sup>306</sup>	16.82 <sup>115</sup>	26.54 <sup>54</sup>	26.82 <sup>66</sup>	50.890 <sup>308</sup>	55.45 <sup>118</sup>	51.37 <sup>110</sup>	8.17 <sup>44</sup>
29.7	28.277 <sup>294</sup>	17.74 <sup>92</sup>	27.20 <sup>53</sup>	26.87 <sup>5</sup>	51.173 <sup>293</sup>	54.63 <sup>82</sup>	52.46 <sup>109</sup>	8.41 <sup>24</sup>
Mar. 10.7	28.554 <sup>277</sup>	18.38 <sup>84</sup>	27.70 <sup>50</sup>	27.57 <sup>70</sup>	51.448 <sup>275</sup>	54.18 <sup>45</sup>	53.49 <sup>103</sup>	9.29 <sup>88</sup>
20.7	28.812 <sup>268</sup>	18.75 <sup>67</sup>	28.16 <sup>46</sup>	28.91 <sup>134</sup>	51.705 <sup>257</sup>	54.06 <sup>13</sup>	54.44 <sup>95</sup>	10.81 <sup>152</sup>
30.6	29.048 <sup>236</sup>	18.84 <sup>9</sup>	28.57 <sup>41</sup>	30.82 <sup>191</sup>	51.939 <sup>284</sup>	54.26 <sup>21</sup>	55.28 <sup>84</sup>	12.87 <sup>206</sup>
Apr. 9.6	29.260 <sup>212</sup>	18.68 <sup>16</sup>	28.92 <sup>35</sup>	33.21 <sup>239</sup>	52.151 <sup>212</sup>	54.78 <sup>82</sup>	55.97 <sup>66</sup>	15.38 <sup>251</sup>
19.6	29.447 <sup>187</sup>	18.30 <sup>28</sup>	29.20 <sup>28</sup>	35.98 <sup>277</sup>	52.334 <sup>183</sup>	55.56 <sup>78</sup>	56.50 <sup>53</sup>	18.27 <sup>289</sup>
29.6	29.607 <sup>166</sup>	17.74 <sup>56</sup>	29.40 <sup>20</sup>	39.03 <sup>305</sup>	52.493 <sup>159</sup>	56.55 <sup>99</sup>	56.86 <sup>36</sup>	21.39 <sup>312</sup>
May 9.5	29.741 <sup>134</sup>	17.02 <sup>72</sup>	29.53 <sup>13</sup>	42.25 <sup>322</sup>	52.623 <sup>130</sup>	57.70 <sup>115</sup>	57.04 <sup>18</sup>	24.66 <sup>327</sup>
19.5	29.844 <sup>108</sup>	16.20 <sup>82</sup>	29.58 <sup>5</sup>	45.52 <sup>327</sup>	52.722 <sup>99</sup>	58.97 <sup>127</sup>	57.03 <sup>1</sup>	27.94 <sup>328</sup>
29.5	29.918 <sup>74</sup>	15.32 <sup>86</sup>	29.54 <sup>4</sup>	48.74 <sup>322</sup>	52.792 <sup>70</sup>	60.29 <sup>132</sup>	57.03 <sup>19</sup>	27.94 <sup>321</sup>
June 8.4	29.961 <sup>43</sup>	14.42 <sup>90</sup>	29.43 <sup>11</sup>	51.81 <sup>307</sup>	52.830 <sup>28</sup>	61.61 <sup>122</sup>	56.84 <sup>36</sup>	31.15 <sup>303</sup>
18.4	29.973 <sup>12</sup>	13.51 <sup>91</sup>	29.26 <sup>17</sup>	54.67 <sup>286</sup>	52.837 <sup>7</sup>	62.93 <sup>132</sup>	55.96 <sup>52</sup>	34.18 <sup>308</sup>
28.4	29.962 <sup>21</sup>	12.61 <sup>90</sup>	29.02 <sup>24</sup>	57.18 <sup>251</sup>	52.813 <sup>24</sup>	64.15 <sup>122</sup>	55.30 <sup>66</sup>	36.94 <sup>276</sup>
July 8.4	29.902 <sup>89</sup>	11.79 <sup>92</sup>	28.72 <sup>30</sup>	59.32 <sup>214</sup>	52.757 <sup>56</sup>	65.30 <sup>115</sup>	54.50 <sup>80</sup>	39.36 <sup>242</sup>
18.3	29.821 <sup>91</sup>	11.02 <sup>77</sup>	28.37 <sup>25</sup>	61.05 <sup>173</sup>	52.675 <sup>82</sup>	66.30 <sup>100</sup>	54.50 <sup>90</sup>	41.41 <sup>206</sup>
28.3	29.715 <sup>106</sup>	10.34 <sup>68</sup>	27.97 <sup>40</sup>	62.90 <sup>125</sup>	52.564 <sup>111</sup>	67.16 <sup>86</sup>	53.60 <sup>90</sup>	42.99 <sup>111</sup>
Aug. 7.3	29.584 <sup>131</sup>	9.73 <sup>61</sup>	27.55 <sup>42</sup>	63.06 <sup>78</sup>	52.431 <sup>133</sup>	67.88 <sup>72</sup>	52.61 <sup>99</sup>	44.10 <sup>59</sup>
17.3	29.437 <sup>147</sup>	9.23 <sup>50</sup>	27.10 <sup>45</sup>	63.90 <sup>24</sup>	52.290 <sup>151</sup>	68.41 <sup>53</sup>	51.56 <sup>105</sup>	44.69 <sup>8</sup>
27.2	29.277 <sup>160</sup>	8.84 <sup>39</sup>	26.63 <sup>47</sup>	63.90 <sup>27</sup>	52.290 <sup>162</sup>	68.41 <sup>58</sup>	50.48 <sup>108</sup>	44.77 <sup>46</sup>
Sept. 6.2	29.114 <sup>163</sup>	8.56 <sup>28</sup>	26.17 <sup>46</sup>	63.03 <sup>79</sup>	52.118 <sup>165</sup>	68.78 <sup>17</sup>	49.37 <sup>109</sup>	44.31 <sup>96</sup>
16.2	28.954 <sup>160</sup>	8.42 <sup>14</sup>	25.17 <sup>44</sup>	62.24 <sup>130</sup>	51.953 <sup>162</sup>	68.95 <sup>5</sup>	48.28 <sup>106</sup>	43.36 <sup>148</sup>
26.1	28.954 <sup>146</sup>	8.42 <sup>0</sup>	25.73 <sup>42</sup>	60.94 <sup>178</sup>	51.791 <sup>148</sup>	68.90 <sup>26</sup>	47.22 <sup>100</sup>	41.88 <sup>193</sup>
Oct. 6.1	28.685 <sup>124</sup>	8.59 <sup>17</sup>	25.31 <sup>38</sup>	59.16 <sup>294</sup>	51.643 <sup>129</sup>	68.64 <sup>48</sup>	46.22 <sup>90</sup>	39.95 <sup>239</sup>
16.1	28.594 <sup>91</sup>	8.94 <sup>35</sup>	24.93 <sup>32</sup>	56.92 <sup>266</sup>	51.514 <sup>96</sup>	68.16 <sup>70</sup>	45.32 <sup>79</sup>	37.56 <sup>273</sup>
26.1	28.594 <sup>55</sup>	8.94 <sup>55</sup>	24.61 <sup>36</sup>	54.26 <sup>308</sup>	51.418 <sup>61</sup>	67.46 <sup>96</sup>	44.53 <sup>65</sup>	34.81 <sup>313</sup>
Nov. 5.6	28.539 <sup>9</sup>	9.49 <sup>74</sup>	24.35 <sup>18</sup>	51.23 <sup>331</sup>	51.357 <sup>14</sup>	66.50 <sup>120</sup>	43.88 <sup>49</sup>	31.68 <sup>338</sup>
15.0	28.530 <sup>39</sup>	10.23 <sup>96</sup>	24.17 <sup>9</sup>	47.92 <sup>367</sup>	51.343 <sup>33</sup>	65.30 <sup>142</sup>	43.39 <sup>31</sup>	28.30 <sup>358</sup>
25.0	28.569 <sup>86</sup>	11.19 <sup>116</sup>	24.08 <sup>3</sup>	44.35 <sup>369</sup>	51.376 <sup>82</sup>	63.88 <sup>160</sup>	43.08 <sup>12</sup>	24.72 <sup>370</sup>
Dec. 5.0	28.657 <sup>138</sup>	12.35 <sup>124</sup>	24.10 <sup>10</sup>	40.66 <sup>374</sup>	51.458 <sup>138</sup>	62.28 <sup>194</sup>	42.96 <sup>8</sup>	21.02 <sup>360</sup>
14.9	28.795 <sup>194</sup>	13.69 <sup>150</sup>	24.20 <sup>19</sup>	36.92 <sup>368</sup>	51.591 <sup>175</sup>	60.49 <sup>194</sup>	43.04 <sup>28</sup>	17.33 <sup>361</sup>
24.9	28.979 <sup>236</sup>	15.19 <sup>163</sup>	24.39 <sup>26</sup>	33.24 <sup>380</sup>	51.766 <sup>219</sup>	58.55 <sup>196</sup>	43.32 <sup>48</sup>	13.72 <sup>339</sup>
34.9	29.205 <sup>256</sup>	16.81 <sup>168</sup>	24.67 <sup>36</sup>	29.74 <sup>390</sup>	51.985 <sup>260</sup>	56.57 <sup>200</sup>	43.80 <sup>65</sup>	10.33 <sup>306</sup>
34.9	29.461 <sup>256</sup>	18.49 <sup>168</sup>	25.06 <sup>36</sup>	26.54 <sup>320</sup>	52.285 <sup>280</sup>	54.57 <sup>200</sup>	44.45 <sup>65</sup>	7.25 <sup>306</sup>
Mean Place	26.592	10.79	26.592	47.14	49.590	64.64	53.101	23.37
Sec δ, Tan δ	1.002	-0.056	2.191	+1.950	1.003	+0.033	4.826	+4.721
D <sub>α</sub> , D <sub>β</sub>	+0.062	-0.002	+0.013	+0.072	+0.059	+0.003	-0.043	+0.173
D <sub>γ</sub> , D <sub>δ</sub>	-0.22	-0.63	-0.22	-0.33	-0.22	-0.84	-0.22	-0.84

APPARENT PLACES OF STARS, 1920.

FOR THE UPPER TRANSIT AT WASHINGTON.

Washington Mean Time.	$\beta$ Triang. Aust. Mag. 3.0			$\lambda$ Libese. Mag. 5.1			$\gamma$ Serpente. Mag. 3.9			$\pi$ Scorpini. Mag. 3.0		
	Right Ascension.		Declina- tion.	Right Ascension.		Declina- tion.	Right Ascension.		Declina- tion.	Right Ascension.		Declina- tion.
	h	m	° ' "	h	m	° ' "	h	m	° ' "	h	m	° ' "
	15	48	-63 10	15	48	-19 55	15	52	+15 55	15	54	-25 52
	s	"	"	s	"	"	s	"	"	s	"	"
Jan. 0.9	4.49	53.29	41.176	39.37	45.068	15.89	0.502	56.88				
10.9	5.04	52.37	41.472	40.32	45.334	13.52	0.907	59.53				
20.8	5.63	51.88	41.787	41.39	45.622	11.35	1.134	60.34				
30.8	6.25	51.81	42.114	42.52	45.926	9.44	1.473	61.27				
Feb. 9.8	6.88	52.17	42.443	43.66	46.234	7.89	1.815	62.27				
19.7	7.51	52.93	42.769	44.77	46.589	6.73	2.154	63.32				
29.7	8.12	54.06	43.082	45.82	46.836	6.01	2.482	64.36				
Mar. 10.7	8.70	55.51	43.380	46.77	47.119	5.73	2.795	65.37				
20.7	9.25	57.25	43.659	47.61	47.381	5.89	3.088	66.33				
30.6	9.75	59.22	43.915	48.32	47.622	6.47	3.360	67.22				
Apr. 9.6	10.21	61.40	44.148	48.89	47.837	7.41	3.607	68.03				
19.6	10.61	63.73	44.354	49.36	48.026	8.68	3.828	68.74				
29.6	10.95	66.17	44.533	49.71	48.186	10.19	4.021	69.39				
May 9.5	11.22	68.67	44.685	49.96	48.316	11.91	4.184	69.96				
19.5	11.43	71.17	44.805	50.12	48.415	13.73	4.316	70.46				
29.5	11.56	73.62	44.895	50.21	48.482	15.60	4.415	70.89				
June 8.4	11.62	75.97	44.950	50.24	48.516	17.46	4.478	71.26				
18.4	11.61	78.17	44.972	50.21	48.518	19.24	4.505	71.55				
28.4	11.52	80.14	44.957	50.12	48.486	20.99	4.496	71.76				
July 8.4	11.36	81.88	44.911	49.99	48.423	22.40	4.451	71.91				
18.3	11.12	83.27	44.832	49.80	48.331	23.70	4.371	71.95				
28.3	10.84	84.32	44.722	49.55	48.210	24.76	4.258	71.89				
Aug. 7.3	10.50	84.96	44.588	49.22	48.066	25.57	4.119	71.73				
17.3	10.12	85.17	44.434	48.85	47.903	26.12	3.957	71.44				
27.2	9.73	84.95	44.266	48.43	47.729	26.39	3.782	71.04				
Sept. 6.2	9.33	84.27	44.094	47.95	47.550	26.37	3.600	70.54				
16.2	8.95	83.17	43.926	47.45	47.374	26.05	3.422	69.95				
26.1	8.60	81.67	43.772	46.94	47.211	25.43	3.259	69.29				
Oct. 6.1	8.30	79.84	43.643	46.44	47.068	24.52	3.113	68.59				
16.1	8.07	77.71	43.546	45.99	46.956	23.29	3.013	67.89				
26.1	7.93	75.39	43.492	45.65	46.881	21.78	2.951	67.23				
Nov. 5.0	7.88	72.98	43.485	45.42	46.850	20.00	2.908	66.66				
15.0	7.93	70.56	43.528	45.36	46.867	17.96	2.979	66.21				
25.0	8.09	68.23	43.627	45.48	46.935	15.72	3.077	65.95				
Dec. 5.0	8.35	66.08	43.777	45.79	47.055	13.32	3.229	65.87				
14.9	8.70	64.19	43.977	46.30	47.221	10.82	3.422	65.99				
24.9	9.14	62.64	44.218	47.01	47.431	8.30	3.679	66.34				
34.9	9.65	61.47	44.494	47.88	47.677	5.84	3.963	66.89				
Mean Place	4.786	66.91	41.184	44.77	45.416	18.67	0.515	65.68				
Sec $\delta$ , Tan $\delta$	2.217	-1.978	1.064	-0.363	1.940	+0.285	1.111	-0.485				
$D_{\mu\alpha}$ , $D_{\omega\alpha}$	+0.105	-0.072	+0.069	-0.013	+0.055	+0.010	+0.072	-0.017				
$D_{\mu\delta}$ , $D_{\omega\delta}$	-0.22	-0.84	-0.22	-0.84	-0.21	-0.85	-0.21	-0.85				



APPARENT PLACES OF STARS, 1920.

FOR THE UPPER TRANSIT AT WASHINGTON.

Washington Mean Time.	κ Hercules. Mag. 5.3		Groombridge 2890. Mag. 5.4		φ Hercules. Mag. 4.3		δ <sup>1</sup> Apodis. Mag. 4.8	
	Right Ascension.	Declination.	Right Ascension.	Declination.	Right Ascension.	Declination.	Right Ascension.	Declination.
	h m	° ' "	h m	° ' "	h m	° ' "	h m	° ' "
	16 4	+17 15	16 6	+68 0	16 6	+45 8	16 8	-78 29
	s	"	s	"	s	"	s	"
Jan. 0.9	27.338 <sup>6</sup>	29.88	2.62	65.08	13.749	31.48	18.33	34.25
10.9	27.595 <sup>257</sup>	27.50 <sup>238</sup>	3.05 <sup>43</sup>	62.00 <sup>968</sup>	14.035 <sup>296</sup>	28.48 <sup>300</sup>	19.40 <sup>107</sup>	32.51 <sup>174</sup>
20.8	27.877 <sup>283</sup>	25.30 <sup>220</sup>	3.55 <sup>50</sup>	59.37 <sup>263</sup>	14.360 <sup>836</sup>	25.83 <sup>265</sup>	20.59 <sup>119</sup>	31.24 <sup>127</sup>
30.8	28.175 <sup>296</sup>	23.40 <sup>190</sup>	4.12 <sup>57</sup>	57.26 <sup>211</sup>	14.714 <sup>354</sup>	23.64 <sup>210</sup>	21.87 <sup>128</sup>	30.48 <sup>76</sup>
Feb. 9.8	28.480 <sup>308</sup>	21.84 <sup>158</sup>	4.74 <sup>62</sup>	55.78 <sup>148</sup>	15.084 <sup>370</sup>	21.99 <sup>165</sup>	23.20 <sup>133</sup>	30.21 <sup>27</sup>
19.8	28.786 <sup>306</sup>	20.69 <sup>115</sup>	5.37 <sup>68</sup>	54.96 <sup>83</sup>	15.460 <sup>376</sup>	20.98 <sup>166</sup>	23.20 <sup>135</sup>	30.21 <sup>21</sup>
29.7	29.086 <sup>300</sup>	19.98 <sup>71</sup>	6.01 <sup>64</sup>	54.81 <sup>15</sup>	15.831 <sup>371</sup>	20.52 <sup>41</sup>	25.89 <sup>124</sup>	31.11 <sup>69</sup>
Mar. 10.7	29.371 <sup>285</sup>	19.73 <sup>25</sup>	6.62 <sup>61</sup>	55.35 <sup>54</sup>	16.188 <sup>357</sup>	20.72 <sup>30</sup>	27.19 <sup>120</sup>	32.25 <sup>114</sup>
20.7	29.640 <sup>269</sup>	19.93 <sup>20</sup>	7.19 <sup>57</sup>	56.54 <sup>119</sup>	16.523 <sup>335</sup>	21.54 <sup>82</sup>	28.42 <sup>128</sup>	33.80 <sup>155</sup>
30.6	29.888 <sup>248</sup>	20.57 <sup>64</sup>	7.71 <sup>53</sup>	58.31 <sup>177</sup>	16.829 <sup>306</sup>	22.95 <sup>141</sup>	29.57 <sup>115</sup>	35.71 <sup>191</sup>
Apr. 9.6	30.113 <sup>225</sup>	21.59 <sup>102</sup>	8.18 <sup>45</sup>	58.31 <sup>290</sup>	17.100 <sup>270</sup>	22.95 <sup>189</sup>	29.57 <sup>105</sup>	35.71 <sup>224</sup>
19.6	30.311 <sup>198</sup>	22.94 <sup>135</sup>	8.53 <sup>37</sup>	60.61 <sup>271</sup>	17.009 <sup>233</sup>	24.84 <sup>231</sup>	30.62 <sup>92</sup>	37.95 <sup>249</sup>
29.6	30.481 <sup>170</sup>	22.94 <sup>162</sup>	8.53 <sup>27</sup>	63.32 <sup>302</sup>	17.332 <sup>188</sup>	27.15 <sup>231</sup>	31.54 <sup>92</sup>	40.44 <sup>249</sup>
May 9.5	30.621 <sup>140</sup>	24.56 <sup>182</sup>	8.80 <sup>18</sup>	66.34 <sup>302</sup>	17.520 <sup>168</sup>	29.79 <sup>284</sup>	32.33 <sup>79</sup>	43.17 <sup>273</sup>
19.5	30.821 <sup>110</sup>	26.38 <sup>185</sup>	8.98 <sup>9</sup>	69.58 <sup>334</sup>	17.664 <sup>144</sup>	32.65 <sup>286</sup>	32.97 <sup>64</sup>	46.05 <sup>288</sup>
29.5	30.731 <sup>76</sup>	28.33 <sup>199</sup>	9.07 <sup>2</sup>	72.90 <sup>332</sup>	17.760 <sup>96</sup>	35.64 <sup>289</sup>	33.45 <sup>46</sup>	49.01 <sup>296</sup>
June 8.5	30.807 <sup>43</sup>	30.32 <sup>200</sup>	9.05 <sup>10</sup>	76.22 <sup>320</sup>	17.810 <sup>1</sup>	38.66 <sup>296</sup>	33.75 <sup>13</sup>	52.00 <sup>298</sup>
18.4	30.856 <sup>3</sup>	34.23 <sup>191</sup>	8.95 <sup>20</sup>	79.42 <sup>320</sup>	17.811 <sup>45</sup>	41.62 <sup>296</sup>	33.88 <sup>5</sup>	54.95 <sup>295</sup>
28.4	30.834 <sup>24</sup>	34.23 <sup>181</sup>	8.75 <sup>20</sup>	82.41 <sup>299</sup>	17.766 <sup>45</sup>	44.43 <sup>281</sup>	33.83 <sup>5</sup>	57.76 <sup>281</sup>
July 8.4	30.776 <sup>58</sup>	36.04 <sup>163</sup>	8.46 <sup>29</sup>	85.12 <sup>271</sup>	17.675 <sup>91</sup>	46.99 <sup>288</sup>	33.60 <sup>28</sup>	60.40 <sup>264</sup>
18.3	30.686 <sup>90</sup>	37.67 <sup>142</sup>	8.10 <sup>36</sup>	87.49 <sup>237</sup>	17.541 <sup>134</sup>	49.28 <sup>289</sup>	33.20 <sup>40</sup>	62.76 <sup>236</sup>
28.3	30.567 <sup>119</sup>	39.09 <sup>119</sup>	7.67 <sup>43</sup>	89.43 <sup>164</sup>	17.368 <sup>173</sup>	51.22 <sup>194</sup>	32.64 <sup>56</sup>	64.80 <sup>204</sup>
Aug. 7.3	30.424 <sup>143</sup>	40.28 <sup>119</sup>	7.18 <sup>49</sup>	89.43 <sup>148</sup>	17.368 <sup>208</sup>	51.22 <sup>154</sup>	32.64 <sup>70</sup>	64.80 <sup>164</sup>
17.3	30.259 <sup>165</sup>	41.21 <sup>98</sup>	7.18 <sup>49</sup>	90.91 <sup>101</sup>	17.160 <sup>208</sup>	52.76 <sup>111</sup>	31.94 <sup>81</sup>	66.44 <sup>120</sup>
27.2	30.081 <sup>178</sup>	41.21 <sup>65</sup>	6.65 <sup>58</sup>	91.92 <sup>48</sup>	16.923 <sup>287</sup>	53.87 <sup>67</sup>	31.13 <sup>81</sup>	67.64 <sup>71</sup>
Sept. 6.2	30.259 <sup>184</sup>	41.86 <sup>37</sup>	6.08 <sup>58</sup>	92.40 <sup>1</sup>	16.662 <sup>261</sup>	54.54 <sup>19</sup>	30.23 <sup>96</sup>	68.35 <sup>17</sup>
16.2	30.081 <sup>184</sup>	42.23 <sup>8</sup>	5.50 <sup>69</sup>	92.39 <sup>56</sup>	16.367 <sup>275</sup>	54.73 <sup>87</sup>	29.27 <sup>98</sup>	68.52 <sup>39</sup>
26.2	29.897 <sup>182</sup>	42.29 <sup>26</sup>	4.90 <sup>58</sup>	91.83 <sup>169</sup>	16.166 <sup>279</sup>	54.46 <sup>75</sup>	28.29 <sup>95</sup>	68.13 <sup>89</sup>
Oct. 6.1	29.715 <sup>173</sup>	42.04 <sup>56</sup>	4.32 <sup>55</sup>	90.74 <sup>187</sup>	15.827 <sup>293</sup>	53.71 <sup>122</sup>	27.34 <sup>89</sup>	67.24 <sup>142</sup>
16.1	29.542 <sup>153</sup>	41.48 <sup>88</sup>	3.77 <sup>51</sup>	89.17 <sup>206</sup>	15.564 <sup>240</sup>	52.49 <sup>166</sup>	26.45 <sup>79</sup>	65.82 <sup>190</sup>
26.1	29.389 <sup>124</sup>	40.60 <sup>119</sup>	3.26 <sup>45</sup>	87.12 <sup>249</sup>	15.324 <sup>204</sup>	50.83 <sup>208</sup>	25.66 <sup>65</sup>	63.92 <sup>231</sup>
Nov. 5.0	29.265 <sup>96</sup>	39.41 <sup>148</sup>	2.81 <sup>37</sup>	84.63 <sup>288</sup>	15.120 <sup>160</sup>	48.74 <sup>248</sup>	25.01 <sup>47</sup>	61.61 <sup>262</sup>
15.0	29.179 <sup>46</sup>	37.93 <sup>177</sup>	2.44 <sup>28</sup>	81.75 <sup>323</sup>	14.960 <sup>108</sup>	46.26 <sup>282</sup>	24.54 <sup>27</sup>	58.99 <sup>265</sup>
25.0	29.133 <sup>5</sup>	36.16 <sup>208</sup>	2.16 <sup>19</sup>	78.52 <sup>348</sup>	14.852 <sup>47</sup>	43.44 <sup>311</sup>	24.27 <sup>6</sup>	56.14 <sup>297</sup>
Dec. 5.0	29.188 <sup>54</sup>	34.13 <sup>224</sup>	1.97 <sup>7</sup>	75.04 <sup>364</sup>	14.805 <sup>15</sup>	40.33 <sup>331</sup>	24.21 <sup>17</sup>	53.17 <sup>299</sup>
14.9	29.192 <sup>106</sup>	31.89 <sup>241</sup>	1.90 <sup>4</sup>	71.40 <sup>373</sup>	14.820 <sup>81</sup>	37.02 <sup>344</sup>	24.38 <sup>39</sup>	50.18 <sup>267</sup>
24.9	29.298 <sup>154</sup>	29.48 <sup>251</sup>	1.94 <sup>16</sup>	67.67 <sup>371</sup>	14.991 <sup>145</sup>	33.58 <sup>348</sup>	24.77 <sup>61</sup>	47.31 <sup>268</sup>
34.9	29.452 <sup>197</sup>	26.97 <sup>283</sup>	2.10 <sup>27</sup>	63.96 <sup>355</sup>	15.048 <sup>304</sup>	30.10 <sup>339</sup>	25.38 <sup>80</sup>	44.65 <sup>288</sup>
	29.649 <sup>235</sup>	24.44 <sup>248</sup>	2.37 <sup>37</sup>	60.41 <sup>332</sup>	15.250 <sup>368</sup>	26.71 <sup>321</sup>	26.18 <sup>97</sup>	42.27 <sup>197</sup>
	29.884 <sup>235</sup>	21.96 <sup>248</sup>	2.74 <sup>37</sup>	57.09 <sup>332</sup>	15.508 <sup>368</sup>	23.50 <sup>321</sup>	27.15 <sup>97</sup>	40.30 <sup>197</sup>
Mean Place	27.753	32.31	5.934	74.43	14.934	38.58	29.317	45.79
Sec δ, Tan δ	1.047	+0.311	2.672	+2.478	1.418	+1.095	5.615	-4.914
D <sub>α</sub> , D <sub>ω</sub>	+0.054	+0.010	+0.003	+0.079	+0.083	+0.032	+0.176	-0.153
D <sub>δ</sub> , D <sub>ε</sub>	-0.19	-0.88	-0.19	-0.88	-0.19	-0.88	-0.19	-0.88



# APPARENT PLACES OF STARS, 1920.

445

FOR THE UPPER TRANSIT AT WASHINGTON.

Washington Mean Time.	δ Ophiuchi. Mag. 3.0		σ Cor. Bor. seq. Mag. 5.8		19 Ursae Minoris. Mag. 5.5		γ <sup>2</sup> Normae. Mag. 4.1	
	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.
	h m 16 10	° ' " - 3 29	h m 16 11	° ' " +34 3	h m 16 12	° ' " +76 4	h m 16 13	° ' " -49 57
	s	"	s	"	s	"	s	"
Jan. 0.9	8.891	19.26	40.119	33.73	59.86	37.04	50.387	27.21
10.9	9.152 <sup>261</sup>	20.83 <sup>157</sup>	40.379 <sup>260</sup>	30.89 <sup>284</sup>	59.94 <sup>58</sup>	34.00 <sup>304</sup>	50.773 <sup>386</sup>	26.56 <sup>65</sup>
20.8	9.433 <sup>261</sup>	22.37 <sup>154</sup>	40.672 <sup>268</sup>	28.35 <sup>254</sup>	60.65	31.39	51.194	26.22 <sup>34</sup>
30.8	9.730 <sup>267</sup>	23.83 <sup>146</sup>	40.988 <sup>316</sup>	26.17 <sup>218</sup>	61.47 <sup>82</sup>	29.31 <sup>206</sup>	51.637 <sup>443</sup>	26.22 <sup>0</sup>
Feb. 9.8	10.033 <sup>308</sup>	25.14 <sup>191</sup>	41.318 <sup>320</sup>	24.48 <sup>169</sup>	62.36 <sup>89</sup>	27.83 <sup>148</sup>	52.093 <sup>456</sup>	26.50 <sup>28</sup>
19.8	10.337 <sup>304</sup>	26.24 <sup>110</sup>	41.651 <sup>333</sup>	23.32 <sup>116</sup>	63.30 <sup>54</sup>	27.01 <sup>82</sup>	52.550 <sup>457</sup>	27.05 <sup>55</sup>
29.7	10.634 <sup>297</sup>	27.10 <sup>86</sup>	41.980 <sup>329</sup>	22.76 <sup>56</sup>	64.25 <sup>96</sup>	26.86 <sup>15</sup>	52.999 <sup>449</sup>	27.87 <sup>82</sup>
Mar. 10.7	10.918 <sup>284</sup>	27.69 <sup>59</sup>	42.297 <sup>317</sup>	22.76 <sup>0</sup>	65.18 <sup>98</sup>	27.89 <sup>53</sup>	53.435 <sup>436</sup>	28.89 <sup>102</sup>
20.7	11.190 <sup>273</sup>	28.02 <sup>33</sup>	42.596 <sup>299</sup>	23.30 <sup>64</sup>	66.06 <sup>88</sup>	28.56 <sup>117</sup>	53.849 <sup>414</sup>	30.11 <sup>122</sup>
30.7	11.440 <sup>250</sup>	28.07 <sup>5</sup>	42.871 <sup>275</sup>	24.39 <sup>109</sup>	66.85 <sup>79</sup>	30.33 <sup>177</sup>	54.238 <sup>389</sup>	31.49 <sup>138</sup>
Apr. 9.6	11.671 <sup>231</sup>	27.87 <sup>20</sup>	43.118 <sup>247</sup>	25.95 <sup>156</sup>	67.53 <sup>68</sup>	32.61 <sup>298</sup>	54.597 <sup>359</sup>	33.01 <sup>152</sup>
19.6	11.879 <sup>208</sup>	27.45 <sup>42</sup>	43.334 <sup>216</sup>	27.93 <sup>198</sup>	68.08 <sup>55</sup>	35.32 <sup>371</sup>	54.921 <sup>321</sup>	34.63 <sup>162</sup>
29.6	12.069 <sup>180</sup>	26.84 <sup>61</sup>	43.518 <sup>184</sup>	30.20 <sup>227</sup>	68.49 <sup>41</sup>	38.33 <sup>301</sup>	55.208 <sup>287</sup>	36.32 <sup>169</sup>
May 9.5	12.217 <sup>158</sup>	26.09 <sup>75</sup>	43.662 <sup>144</sup>	32.72 <sup>252</sup>	68.75 <sup>10</sup>	41.55 <sup>332</sup>	55.453 <sup>245</sup>	38.07 <sup>175</sup>
19.5	12.344 <sup>127</sup>	25.23 <sup>86</sup>	43.770 <sup>108</sup>	35.87 <sup>265</sup>	68.85 <sup>26</sup>	44.86 <sup>381</sup>	55.653 <sup>300</sup>	39.83 <sup>176</sup>
29.5	12.442 <sup>98</sup>	24.31 <sup>92</sup>	43.839 <sup>69</sup>	38.08 <sup>271</sup>	68.85 <sup>5</sup>	48.17 <sup>381</sup>	55.804 <sup>151</sup>	39.83 <sup>175</sup>
June 8.5	12.507 <sup>65</sup>	23.36 <sup>96</sup>	43.866 <sup>27</sup>	40.76 <sup>268</sup>	68.80 <sup>20</sup>	48.17 <sup>319</sup>	55.804 <sup>100</sup>	41.58 <sup>169</sup>
18.4	12.539 <sup>32</sup>	22.41 <sup>95</sup>	43.857 <sup>9</sup>	40.76 <sup>256</sup>	68.60 <sup>34</sup>	51.36 <sup>371</sup>	55.904 <sup>46</sup>	43.27 <sup>160</sup>
28.4	12.537 <sup>2</sup>	22.41 <sup>94</sup>	43.857 <sup>53</sup>	43.32 <sup>283</sup>	68.26 <sup>49</sup>	54.35 <sup>390</sup>	55.950 <sup>9</sup>	44.87 <sup>148</sup>
July 8.4	12.502 <sup>35</sup>	21.50 <sup>88</sup>	43.804 <sup>88</sup>	45.70 <sup>214</sup>	67.77 <sup>61</sup>	57.06 <sup>396</sup>	55.941 <sup>61</sup>	46.35 <sup>128</sup>
18.4	12.435 <sup>67</sup>	20.62 <sup>79</sup>	43.716 <sup>125</sup>	47.84 <sup>183</sup>	67.16 <sup>71</sup>	59.42 <sup>195</sup>	55.880 <sup>114</sup>	47.63 <sup>110</sup>
28.3	12.339 <sup>96</sup>	19.83 <sup>70</sup>	43.591 <sup>159</sup>	49.67 <sup>151</sup>	66.45 <sup>80</sup>	61.37 <sup>150</sup>	55.766 <sup>182</sup>	48.73 <sup>84</sup>
Aug. 7.3	12.215 <sup>124</sup>	19.13 <sup>63</sup>	43.432 <sup>183</sup>	51.18 <sup>115</sup>	65.65 <sup>87</sup>	62.87 <sup>101</sup>	55.604 <sup>204</sup>	49.57 <sup>56</sup>
17.3	12.070 <sup>145</sup>	18.50 <sup>51</sup>	43.249 <sup>206</sup>	52.33 <sup>74</sup>	64.78 <sup>93</sup>	63.88 <sup>50</sup>	55.400 <sup>235</sup>	50.13 <sup>23</sup>
27.2	11.910 <sup>160</sup>	17.99 <sup>41</sup>	43.043 <sup>223</sup>	53.07 <sup>32</sup>	63.85 <sup>96</sup>	64.38 <sup>3</sup>	55.165 <sup>261</sup>	50.36 <sup>8</sup>
Sept. 6.2	11.743 <sup>167</sup>	17.58 <sup>27</sup>	42.820 <sup>280</sup>	53.39 <sup>7</sup>	62.89 <sup>96</sup>	64.35 <sup>54</sup>	54.904 <sup>270</sup>	50.28 <sup>42</sup>
16.2	11.576 <sup>167</sup>	17.81 <sup>16</sup>	42.590 <sup>226</sup>	53.32 <sup>52</sup>	61.93 <sup>94</sup>	63.81 <sup>105</sup>	54.634 <sup>271</sup>	49.86 <sup>74</sup>
26.2	11.418 <sup>158</sup>	17.15 <sup>1</sup>	42.364 <sup>218</sup>	52.80 <sup>93</sup>	60.99 <sup>90</sup>	62.76 <sup>155</sup>	54.363 <sup>252</sup>	49.12 <sup>106</sup>
Oct. 6.1	11.281 <sup>137</sup>	17.14 <sup>14</sup>	42.146 <sup>197</sup>	51.87 <sup>135</sup>	60.09 <sup>85</sup>	61.21 <sup>202</sup>	54.111 <sup>223</sup>	48.06 <sup>133</sup>
16.1	11.169 <sup>112</sup>	17.28 <sup>31</sup>	41.949 <sup>167</sup>	50.52 <sup>174</sup>	59.24 <sup>75</sup>	59.19 <sup>245</sup>	53.888 <sup>178</sup>	46.73 <sup>154</sup>
26.1	11.096 <sup>73</sup>	17.59 <sup>51</sup>	41.782 <sup>137</sup>	48.78 <sup>210</sup>	58.49 <sup>65</sup>	56.74 <sup>284</sup>	53.710 <sup>122</sup>	45.19 <sup>171</sup>
Nov. 5.1	11.096 <sup>31</sup>	18.10 <sup>68</sup>	41.655 <sup>82</sup>	46.68 <sup>245</sup>	57.84 <sup>50</sup>	53.90 <sup>317</sup>	53.588 <sup>57</sup>	43.48 <sup>177</sup>
15.0	11.065 <sup>14</sup>	18.78 <sup>89</sup>	41.573 <sup>26</sup>	44.23 <sup>272</sup>	57.34 <sup>37</sup>	50.73 <sup>344</sup>	53.531 <sup>17</sup>	41.71 <sup>180</sup>
25.0	11.079 <sup>66</sup>	19.67 <sup>110</sup>	41.545 <sup>29</sup>	41.51 <sup>296</sup>	56.97 <sup>20</sup>	47.29 <sup>380</sup>	53.548 <sup>91</sup>	39.91 <sup>172</sup>
Dec. 5.0	11.145 <sup>112</sup>	20.77 <sup>124</sup>	41.574 <sup>33</sup>	38.55 <sup>310</sup>	56.77 <sup>2</sup>	43.69 <sup>369</sup>	53.639 <sup>165</sup>	38.19 <sup>159</sup>
14.9	11.257 <sup>163</sup>	22.01 <sup>141</sup>	41.657 <sup>138</sup>	35.45 <sup>317</sup>	56.75 <sup>15</sup>	40.00 <sup>367</sup>	53.804 <sup>237</sup>	36.60 <sup>139</sup>
24.9	11.420 <sup>203</sup>	23.42 <sup>154</sup>	41.795 <sup>190</sup>	32.28 <sup>312</sup>	56.90 <sup>82</sup>	36.33 <sup>363</sup>	54.041 <sup>300</sup>	35.21 <sup>112</sup>
34.9	11.623 <sup>240</sup>	24.95 <sup>158</sup>	41.985 <sup>287</sup>	29.15 <sup>300</sup>	57.22 <sup>49</sup>	32.80 <sup>327</sup>	54.341 <sup>353</sup>	34.09 <sup>84</sup>
34.9	11.863	26.53	42.222	26.15	57.71	29.53	54.694	33.25
Mean Place	9.061	21.89	40.926	38.79	65.186	46.07	50.614	38.36
Sec δ, Tan δ	1.002	-0.061	1.207	+0.676	4.157	+4.034	1.554	-1.190
D <sub>δa</sub> , D <sub>ωa</sub>	+0.063	-0.002	+0.045	+0.021	-0.034	+0.121	+0.089	-0.035
D <sub>δδ</sub> , D <sub>ωδ</sub>	-0.18	-0.89	-0.18	-0.89	-0.18	-0.89	-0.18	-0.89

FOR THE UPPER TRANSIT AT WASHINGTON.

Washington Mean Time.	ε Ophiuchi. Mag. 3.3		σ Scorpi. Mag. 3.1		τ Herculis. Mag. 3.9		γ Herculis. Mag. 3.8	
	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.
	h m 16 14	° ' " - 4 29	h m 16 16	° ' " -25 24	h m 16 17	° ' " +46 29	h m 16 18	° ' " +19 20
	s	"	s	"	s	"	s	"
Jan. 0.9	4.991	52.06	19.235	0.46	18.868	65.18	22.915	22.12
10.9	5.250 <sup>259</sup>	53.59 <sup>183</sup>	19.523 <sup>288</sup>	0.97 <sup>51</sup>	19.146 <sup>278</sup>	62.05 <sup>308</sup>	23.162 <sup>247</sup>	19.66 <sup>246</sup>
20.8	5.531 <sup>281</sup>	55.08 <sup>149</sup>	19.836 <sup>313</sup>	1.64 <sup>67</sup>	19.466 <sup>320</sup>	59.32 <sup>273</sup>	23.436 <sup>274</sup>	17.40 <sup>226</sup>
30.8	5.827 <sup>296</sup>	56.51 <sup>143</sup>	20.165 <sup>329</sup>	2.41 <sup>77</sup>	19.818 <sup>352</sup>	57.04 <sup>236</sup>	23.728 <sup>293</sup>	15.41 <sup>199</sup>
Feb. 9.8	6.131 <sup>304</sup>	57.78 <sup>127</sup>	20.501 <sup>336</sup>	3.24 <sup>83</sup>	20.190 <sup>372</sup>	55.30 <sup>174</sup>	24.031 <sup>308</sup>	13.81 <sup>160</sup>
	304	108	337	87	381	115	306	120
19.8	6.435	58.86	20.838	4.11	20.571	54.15	24.337	12.61
29.7	6.733 <sup>298</sup>	59.72 <sup>86</sup>	21.169 <sup>331</sup>	4.98 <sup>87</sup>	20.950 <sup>379</sup>	53.64 <sup>51</sup>	24.640 <sup>368</sup>	11.86 <sup>75</sup>
Mar. 10.7	7.019 <sup>286</sup>	60.31 <sup>59</sup>	21.488 <sup>319</sup>	5.81 <sup>83</sup>	21.318 <sup>368</sup>	53.77 <sup>13</sup>	24.931 <sup>291</sup>	11.00 <sup>28</sup>
20.7	7.291 <sup>272</sup>	60.65 <sup>34</sup>	21.791 <sup>308</sup>	6.59 <sup>78</sup>	21.666 <sup>348</sup>	54.52 <sup>75</sup>	25.208 <sup>277</sup>	11.81 <sup>21</sup>
30.7	7.546 <sup>255</sup>	60.71 <sup>6</sup>	22.076 <sup>285</sup>	7.30 <sup>71</sup>	21.966 <sup>320</sup>	55.85 <sup>123</sup>	25.466 <sup>256</sup>	12.47 <sup>66</sup>
	284	17	268	64	287	186	235	108
Apr. 9.6	7.780	60.54	22.339	7.94	22.273	57.71	25.701	13.55
19.6	7.991 <sup>211</sup>	60.16 <sup>38</sup>	22.579 <sup>240</sup>	8.51 <sup>57</sup>	22.520 <sup>247</sup>	60.01 <sup>280</sup>	25.911 <sup>219</sup>	14.97 <sup>142</sup>
29.6	8.177 <sup>186</sup>	59.58 <sup>58</sup>	22.792 <sup>213</sup>	9.02 <sup>51</sup>	22.725 <sup>205</sup>	62.66 <sup>265</sup>	26.093 <sup>182</sup>	16.69 <sup>172</sup>
May 9.5	8.337 <sup>160</sup>	58.87 <sup>71</sup>	22.977 <sup>185</sup>	9.46 <sup>44</sup>	22.884 <sup>189</sup>	65.54 <sup>289</sup>	26.247 <sup>154</sup>	18.61 <sup>192</sup>
19.5	8.470 <sup>133</sup>	58.04 <sup>83</sup>	23.131 <sup>154</sup>	9.85 <sup>39</sup>	22.995 <sup>111</sup>	68.58 <sup>304</sup>	26.367 <sup>120</sup>	20.69 <sup>208</sup>
	101	87	121	34	62	306	90	213
29.5	8.571 <sup>70</sup>	57.17 <sup>91</sup>	23.252 <sup>88</sup>	10.19 <sup>30</sup>	23.057 <sup>12</sup>	71.66 <sup>302</sup>	26.457 <sup>52</sup>	22.82 <sup>213</sup>
June 8.5	8.641 <sup>38</sup>	56.26 <sup>91</sup>	23.338 <sup>50</sup>	10.49 <sup>25</sup>	23.069 <sup>37</sup>	74.68 <sup>290</sup>	26.509 <sup>20</sup>	24.95 <sup>207</sup>
18.4	8.679 <sup>2</sup>	55.35 <sup>89</sup>	23.388 <sup>10</sup>	10.74 <sup>20</sup>	23.032 <sup>64</sup>	77.58 <sup>268</sup>	26.529 <sup>17</sup>	27.02 <sup>194</sup>
28.4	8.681 <sup>30</sup>	54.46 <sup>83</sup>	23.398 <sup>27</sup>	10.94 <sup>15</sup>	22.948 <sup>180</sup>	80.26 <sup>240</sup>	26.512 <sup>51</sup>	28.96 <sup>178</sup>
July 8.4	8.651 <sup>64</sup>	53.63 <sup>76</sup>	23.371 <sup>65</sup>	11.09 <sup>8</sup>	22.818 <sup>172</sup>	82.66 <sup>205</sup>	26.461 <sup>86</sup>	30.74 <sup>156</sup>
18.4	8.587 <sup>94</sup>	52.87 <sup>68</sup>	23.306 <sup>99</sup>	11.17 <sup>0</sup>	22.646 <sup>211</sup>	84.71 <sup>166</sup>	26.375 <sup>115</sup>	32.30 <sup>131</sup>
28.3	8.493 <sup>121</sup>	52.19 <sup>60</sup>	23.207 <sup>131</sup>	11.17 <sup>8</sup>	22.435 <sup>241</sup>	86.37 <sup>125</sup>	26.260 <sup>144</sup>	33.61 <sup>104</sup>
Aug. 7.3	8.372 <sup>145</sup>	51.59 <sup>52</sup>	23.076 <sup>156</sup>	11.69 <sup>20</sup>	22.194 <sup>268</sup>	87.62 <sup>79</sup>	26.116 <sup>165</sup>	34.65 <sup>75</sup>
17.3	8.227 <sup>160</sup>	51.07 <sup>41</sup>	22.920 <sup>174</sup>	10.89 <sup>28</sup>	21.926 <sup>285</sup>	88.41 <sup>32</sup>	25.951 <sup>181</sup>	35.40 <sup>44</sup>
27.2	8.067 <sup>167</sup>	50.66 <sup>29</sup>	22.746 <sup>184</sup>	10.61 <sup>39</sup>	21.641 <sup>298</sup>	88.73 <sup>16</sup>	25.770 <sup>191</sup>	35.84 <sup>14</sup>
Sept. 6.2	7.900 <sup>169</sup>	50.37 <sup>18</sup>	22.562 <sup>184</sup>	10.22 <sup>47</sup>	21.348 <sup>292</sup>	88.57 <sup>64</sup>	25.579 <sup>191</sup>	35.98 <sup>21</sup>
16.2	7.731 <sup>160</sup>	50.19 <sup>4</sup>	22.378 <sup>175</sup>	9.75 <sup>55</sup>	21.056 <sup>280</sup>	87.93 <sup>112</sup>	25.368 <sup>182</sup>	35.77 <sup>55</sup>
26.2	7.571 <sup>140</sup>	50.15 <sup>8</sup>	22.203 <sup>153</sup>	9.20 <sup>60</sup>	20.776 <sup>256</sup>	86.81 <sup>158</sup>	25.206 <sup>165</sup>	35.22 <sup>86</sup>
Oct. 6.1	7.431 <sup>112</sup>	50.23 <sup>26</sup>	22.050 <sup>123</sup>	8.60 <sup>62</sup>	20.520 <sup>222</sup>	85.23 <sup>202</sup>	25.041 <sup>137</sup>	34.36 <sup>120</sup>
16.1	7.319 <sup>78</sup>	50.49 <sup>43</sup>	21.927 <sup>89</sup>	7.98 <sup>59</sup>	20.298 <sup>179</sup>	83.21 <sup>242</sup>	24.904 <sup>102</sup>	33.16 <sup>136</sup>
26.1	7.241 <sup>35</sup>	50.92 <sup>63</sup>	21.844 <sup>34</sup>	7.39 <sup>53</sup>	20.119 <sup>127</sup>	80.79 <sup>278</sup>	24.802 <sup>60</sup>	31.66 <sup>180</sup>
Nov. 5.1	7.208 <sup>13</sup>	51.55 <sup>81</sup>	21.810 <sup>17</sup>	6.86 <sup>43</sup>	19.992 <sup>67</sup>	78.01 <sup>306</sup>	24.742 <sup>13</sup>	29.86 <sup>208</sup>
15.0	7.219 <sup>62</sup>	52.36 <sup>101</sup>	21.827 <sup>78</sup>	6.43 <sup>28</sup>	19.925 <sup>3</sup>	74.93 <sup>381</sup>	24.729 <sup>30</sup>	27.78 <sup>230</sup>
25.0	7.281 <sup>112</sup>	53.37 <sup>118</sup>	21.900 <sup>128</sup>	6.15 <sup>18</sup>	19.922 <sup>68</sup>	71.62 <sup>345</sup>	24.768 <sup>89</sup>	25.48 <sup>247</sup>
Dec. 5.0	7.393 <sup>160</sup>	54.55 <sup>132</sup>	22.028 <sup>180</sup>	6.02 <sup>6</sup>	19.985 <sup>128</sup>	68.17 <sup>380</sup>	24.857 <sup>139</sup>	23.01 <sup>236</sup>
14.9	7.553	55.87	22.208	6.08	20.113	64.67	24.906	20.43
24.9	7.755 <sup>202</sup>	57.33 <sup>146</sup>	22.434 <sup>226</sup>	6.33 <sup>25</sup>	20.305 <sup>192</sup>	61.28 <sup>344</sup>	25.181 <sup>185</sup>	17.83 <sup>260</sup>
34.9	7.992 <sup>237</sup>	58.85 <sup>182</sup>	22.699 <sup>265</sup>	6.76 <sup>43</sup>	20.552 <sup>247</sup>	57.96 <sup>337</sup>	25.408 <sup>223</sup>	15.27 <sup>256</sup>
Mean Place	5.187	54.55	19.347	7.25	20.166	71.48	23.413	24.17
Sec δ, Tan δ	1.003	-0.079	1.107	-0.475	1.453	+1.054	1.060	+0.351
D <sub>α</sub> , D <sub>αα</sub>	+0.063	-0.002	+0.073	-0.014	+0.086	+0.030	+0.063	+0.010
D <sub>β</sub> , D <sub>ββ</sub>	-0.18	-0.90	-0.17	-0.90	-0.17	-0.90	-0.17	-0.90

FOR THE UPPER TRANSIT AT WASHINGTON.

Washington Mean Time.	γ Ursæ Minoris. Mag. 5.0		γ Apodis. Mag. 3.9		ω Herculis. Mag. 4.5		η Draconis. Mag. 2.9	
	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.
	h m	° '	h m	° '	h m	° '	h m	° '
	16 19	+75 56	16 21	-78 42	16 21	+14 12	16 22	+61 41
	s	"	s	"	s	"	s	"
Jan. 0.9	43.56	16.57	5.64	58.81	42.708	58.66	51.84	34.60
10.9	44.11 55	13.50 207	6.69 108	56.92 189	42.951 243	56.38 228	52.17 33	31.40 320
20.9	44.80 60	10.83 267	7.87 118	55.47 145	43.220 260	54.27 211	52.58 41	28.60 280
30.8	45.59 79	8.68 215	9.15 128	54.49 98	43.509 280	52.38 189	53.03 45	26.27 233
Feb. 9.8	46.46 87	7.12 156	10.49 184	54.00 2	43.807 298	50.82 156	53.52 49	24.55 172
19.8	47.39 93	6.22 90	11.86 137	54.02 48	44.108 301	49.63 119	54.03 51	23.44 111
29.7	48.33 94	5.98 24	13.23 137	54.50 48	44.406 288	48.85 78	54.55 52	23.01 43
Mar. 10.7	49.25 92	6.42 44	14.57 124	55.43 93	44.694 288	48.50 25	55.05 50	23.28 27
20.7	50.12 87	7.51 109	15.86 120	56.78 135	44.968 274	48.58 8	55.53 48	24.20 92
30.7	50.92 80	9.20 169	17.07 121	58.52 174	45.223 265	49.08 50	55.97 44	25.73 153
Apr. 9.6	51.61 58	11.42 265	18.17 109	60.59 236	45.457 211	49.96 122	56.36 33	27.81 251
19.6	52.19 42	14.07 209	19.17 86	62.95 200	45.668 186	51.18 148	56.69 27	30.32 290
29.6	52.61 28	17.06 320	20.03 70	65.55 278	45.854 166	52.66 170	56.96 19	33.22 313
May 9.6	52.89 14	20.26 332	20.73 54	68.33 289	46.010 127	54.36 182	57.15 13	36.35 330
19.5	53.03 4	23.58 333	21.27 38	71.22 295	46.137 95	56.18 191	57.28 4	39.65 332
29.5	52.99 17	26.91 324	21.65 18	74.17 295	46.232 62	58.09 190	57.32 3	42.97 324
June 8.5	52.82 32	30.15 304	21.83 1	77.12 285	46.294 27	59.99 186	57.29 10	46.21 311
18.4	52.50 47	33.19 278	21.84 19	79.97 269	46.321 7	61.85 176	57.19 17	49.32 288
28.4	52.03 58	35.97 244	21.65 36	82.66 245	46.314 41	63.61 162	57.02 24	52.20 256
July 8.4	51.45 66	38.41 203	21.29 52	85.11 215	46.273 75	65.23 143	56.78 30	54.76 217
18.4	50.77 78	40.44 160	20.77 68	87.26 177	46.198 106	66.66 121	56.48 35	56.93 174
28.3	49.99 87	42.04 111	20.09 80	89.03 134	46.092 134	67.87 98	56.13 39	58.67 127
Aug. 7.3	49.12 91	43.15 61	19.29 80	90.37 86	45.958 157	68.85 72	55.74 43	59.94 79
17.3	48.21 95	43.76 9	18.39 97	91.23 35	45.801 172	69.57 46	55.31 45	60.73 30
27.3	47.26 95	43.85 43	17.42 100	91.58 20	45.629 182	70.03 18	54.86 46	61.03 24
Sept. 6.2	46.31 95	43.43 95	16.42 99	91.38 74	45.447 184	70.21 12	54.40 46	60.79 77
16.2	45.36 90	42.48 144	15.43 94	90.64 127	45.263 176	70.09 39	53.94 44	60.02 128
26.2	44.46 85	41.04 193	14.49 84	89.37 175	45.087 169	69.70 70	53.50 41	58.74 176
Oct. 6.1	43.61 77	39.11 294	13.65 70	87.62 219	44.928 182	69.00 98	53.09 36	56.98 219
16.1	42.84 66	36.77 276	12.95 54	85.43 264	44.796 99	68.02 128	52.73 31	54.79 267
26.1	42.18 53	34.01 310	12.41 35	82.89 279	44.697 56	66.74 156	52.42 24	52.12 303
Nov. 5.1	41.65 38	30.91 337	12.06 11	80.10 295	44.641 10	65.18 181	52.18 15	49.09 332
15.0	41.27 23	27.54 358	11.95 19	77.15 300	44.631 40	63.37 204	52.03 7	45.77 355
25.0	41.04 5	23.96 366	12.05 24	74.15 303	44.671 89	61.33 220	51.96 2	42.22 368
Dec. 5.0	40.99 13	20.30 366	12.39 56	71.22 276	44.760 139	59.13 233	51.98 12	38.54 369
14.9	41.12 20	16.64 354	12.95 77	68.46 248	44.899 183	56.80 228	52.10 20	34.85 361
24.9	41.41 46	13.10 330	13.72 92	65.98 213	45.062 222	54.42 296	52.30 29	31.24 340
34.9	41.87	9.80	14.65	63.85	45.304	52.06	52.59	27.84 340
Mean Place	49.382	24.86	7.965	72.88	43.181	59.58	54.316	41.91
Sec δ, Tan δ	4.116	+3.993	5.112	-5.014	1.032	+0.253	2.109	+1.857
D <sub>α</sub> , D <sub>β</sub>	-0.035	+0.113	+0.182	-0.140	+0.055	+0.007	+0.016	+0.051
D <sub>γ</sub> , D <sub>δ</sub>	-0.17	-0.91	-0.17	-0.91	-0.17	-0.91	-0.16	-0.91

FOR THE UPPER TRANSIT AT WASHINGTON.

Washington Mean Time.	$\alpha$ Scorpii. (Antares.) Mag. 1.2		$\beta$ Herculis. Mag. 2.8		$\lambda$ Ophiuchi. Mag. 3.8		$\Delta$ Draconis. Mag. 5.0	
	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.
	h m 16 24	° ' " -26 15	h m 16 26	° ' " +21 39	h m 16 26	° ' " + 2 9	h m 16 28	° ' " +68 56
Jan. 0.9	29.799	13.24	46.198	44.65	52.333	30.50	4.29	21.29
10.9	30.084 <sup>285</sup>	13.66 <sup>42</sup>	46.437 <sup>280</sup>	42.12 <sup>263</sup>	52.576 <sup>243</sup>	28.72 <sup>178</sup>	4.68 <sup>39</sup>	18.08 <sup>321</sup>
20.9	30.394 <sup>310</sup>	14.21 <sup>55</sup>	46.706 <sup>280</sup>	39.78 <sup>264</sup>	52.846 <sup>270</sup>	27.00 <sup>172</sup>	5.16 <sup>48</sup>	15.26 <sup>232</sup>
30.8	30.719 <sup>325</sup>	14.90 <sup>69</sup>	46.998 <sup>282</sup>	37.74 <sup>264</sup>	53.132 <sup>286</sup>	25.43 <sup>167</sup>	5.71 <sup>55</sup>	12.94 <sup>232</sup>
Feb. 9.8	31.056 <sup>337</sup>	15.65 <sup>75</sup>	47.300 <sup>282</sup>	36.06 <sup>168</sup>	53.428 <sup>286</sup>	24.06 <sup>137</sup>	6.32 <sup>61</sup>	11.20 <sup>174</sup>
19.8	31.395 <sup>339</sup>	16.44 <sup>79</sup>	47.607 <sup>287</sup>	34.82 <sup>124</sup>	53.727 <sup>280</sup>	22.94 <sup>112</sup>	6.97 <sup>65</sup>	10.09 <sup>111</sup>
29.7	31.730 <sup>335</sup>	17.23 <sup>79</sup>	47.912 <sup>305</sup>	34.06 <sup>76</sup>	54.022 <sup>285</sup>	22.12 <sup>82</sup>	7.63 <sup>66</sup>	9.68 <sup>41</sup>
Mar. 10.7	32.054 <sup>334</sup>	18.01 <sup>78</sup>	48.208 <sup>286</sup>	33.80 <sup>26</sup>	54.306 <sup>286</sup>	21.62 <sup>50</sup>	8.27 <sup>64</sup>	9.94 <sup>26</sup>
20.7	32.363 <sup>309</sup>	18.74 <sup>73</sup>	48.490 <sup>282</sup>	34.03 <sup>33</sup>	54.581 <sup>272</sup>	21.45 <sup>17</sup>	8.89 <sup>62</sup>	10.88 <sup>94</sup>
30.7	32.656 <sup>293</sup>	19.42 <sup>68</sup>	48.754 <sup>284</sup>	34.74 <sup>71</sup>	54.837 <sup>266</sup>	21.60 <sup>15</sup>	9.46 <sup>57</sup>	12.43 <sup>155</sup>
Apr. 9.6	32.927 <sup>271</sup>	20.03 <sup>61</sup>	48.996 <sup>242</sup>	35.85 <sup>111</sup>	55.075 <sup>288</sup>	22.04 <sup>44</sup>	9.97 <sup>51</sup>	14.53 <sup>210</sup>
19.6	33.176 <sup>249</sup>	20.59 <sup>58</sup>	49.214 <sup>218</sup>	37.35 <sup>160</sup>	55.291 <sup>246</sup>	22.76 <sup>72</sup>	10.39 <sup>42</sup>	17.09 <sup>256</sup>
29.6	33.397 <sup>221</sup>	21.09 <sup>50</sup>	49.405 <sup>191</sup>	39.16 <sup>181</sup>	55.484 <sup>198</sup>	23.69 <sup>93</sup>	10.79 <sup>34</sup>	20.01 <sup>292</sup>
May 9.6	33.593 <sup>106</sup>	21.54 <sup>45</sup>	49.564 <sup>159</sup>	41.18 <sup>262</sup>	55.650 <sup>166</sup>	24.78 <sup>109</sup>	10.96 <sup>23</sup>	23.18 <sup>317</sup>
19.5	33.756 <sup>163</sup>	21.96 <sup>42</sup>	49.694 <sup>130</sup>	43.36 <sup>218</sup>	55.790 <sup>140</sup>	26.01 <sup>128</sup>	11.10 <sup>14</sup>	26.50 <sup>332</sup>
29.5	33.886 <sup>130</sup>	22.34 <sup>38</sup>	49.788 <sup>94</sup>	45.62 <sup>226</sup>	55.898 <sup>108</sup>	27.30 <sup>129</sup>	11.14 <sup>4</sup>	29.86 <sup>336</sup>
June 8.5	33.980 <sup>94</sup>	22.87 <sup>33</sup>	49.850 <sup>62</sup>	47.87 <sup>225</sup>	55.974 <sup>76</sup>	28.61 <sup>131</sup>	11.08 <sup>6</sup>	33.16 <sup>330</sup>
18.4	34.038 <sup>58</sup>	22.96 <sup>29</sup>	49.872 <sup>22</sup>	50.08 <sup>221</sup>	56.018 <sup>44</sup>	29.90 <sup>130</sup>	10.92 <sup>16</sup>	36.29 <sup>313</sup>
28.4	34.066 <sup>23</sup>	23.21 <sup>25</sup>	49.857 <sup>15</sup>	52.14 <sup>206</sup>	56.027 <sup>26</sup>	31.14 <sup>124</sup>	10.66 <sup>26</sup>	39.20 <sup>291</sup>
July 8.4	34.033 <sup>60</sup>	23.39 <sup>12</sup>	49.809 <sup>84</sup>	54.93 <sup>189</sup>	56.001 <sup>60</sup>	32.29 <sup>115</sup>	10.32 <sup>34</sup>	41.77 <sup>257</sup>
18.4	33.973 <sup>97</sup>	23.51 <sup>8</sup>	49.725 <sup>118</sup>	55.71 <sup>144</sup>	55.941 <sup>96</sup>	33.33 <sup>91</sup>	9.90 <sup>42</sup>	43.97 <sup>177</sup>
28.3	33.876 <sup>126</sup>	23.59 <sup>5</sup>	49.607 <sup>143</sup>	57.15 <sup>112</sup>	55.851 <sup>120</sup>	34.24 <sup>75</sup>	9.41 <sup>49</sup>	45.74 <sup>130</sup>
Aug. 7.3	33.750 <sup>166</sup>	23.54 <sup>13</sup>	49.464 <sup>168</sup>	58.27 <sup>80</sup>	55.731 <sup>143</sup>	34.99 <sup>61</sup>	8.87 <sup>54</sup>	47.04 <sup>81</sup>
17.3	33.594 <sup>174</sup>	23.41 <sup>24</sup>	49.296 <sup>188</sup>	59.07 <sup>52</sup>	55.588 <sup>161</sup>	35.60 <sup>44</sup>	8.28 <sup>62</sup>	47.85 <sup>29</sup>
27.3	33.420 <sup>186</sup>	23.17 <sup>25</sup>	49.108 <sup>195</sup>	59.59 <sup>15</sup>	55.427 <sup>171</sup>	36.04 <sup>26</sup>	7.66 <sup>62</sup>	48.14 <sup>24</sup>
Sept. 6.2	33.234 <sup>188</sup>	22.82 <sup>46</sup>	48.913 <sup>198</sup>	59.74 <sup>21</sup>	55.256 <sup>174</sup>	36.80 <sup>9</sup>	7.04 <sup>63</sup>	47.90 <sup>76</sup>
16.2	33.046 <sup>179</sup>	22.36 <sup>53</sup>	48.715 <sup>190</sup>	59.53 <sup>63</sup>	55.082 <sup>168</sup>	36.89 <sup>10</sup>	6.41 <sup>61</sup>	47.14 <sup>127</sup>
26.2	32.867 <sup>168</sup>	21.83 <sup>69</sup>	48.525 <sup>178</sup>	59.00 <sup>88</sup>	54.916 <sup>161</sup>	36.29 <sup>31</sup>	5.80 <sup>57</sup>	45.87 <sup>176</sup>
Oct. 6.1	32.709 <sup>131</sup>	21.23 <sup>60</sup>	48.350 <sup>146</sup>	58.12 <sup>123</sup>	54.765 <sup>185</sup>	35.98 <sup>50</sup>	5.23 <sup>51</sup>	44.11 <sup>223</sup>
16.1	32.578 <sup>88</sup>	20.63 <sup>61</sup>	48.202 <sup>112</sup>	56.89 <sup>155</sup>	54.640 <sup>92</sup>	35.48 <sup>74</sup>	4.72 <sup>44</sup>	41.88 <sup>266</sup>
26.1	32.490 <sup>44</sup>	20.02 <sup>50</sup>	48.090 <sup>72</sup>	55.84 <sup>187</sup>	54.548 <sup>50</sup>	34.74 <sup>94</sup>	4.28 <sup>36</sup>	39.22 <sup>302</sup>
Nov. 5.1	32.446 <sup>10</sup>	19.43 <sup>45</sup>	48.018 <sup>28</sup>	53.47 <sup>217</sup>	54.498 <sup>4</sup>	33.80 <sup>116</sup>	3.92 <sup>24</sup>	36.20 <sup>332</sup>
15.0	32.456 <sup>65</sup>	18.98 <sup>36</sup>	47.995 <sup>27</sup>	51.30 <sup>238</sup>	54.494 <sup>45</sup>	32.64 <sup>136</sup>	3.68 <sup>14</sup>	32.88 <sup>356</sup>
25.0	32.521 <sup>120</sup>	18.62 <sup>5</sup>	48.022 <sup>78</sup>	48.92 <sup>264</sup>	54.539 <sup>154</sup>	31.28 <sup>169</sup>	3.54 <sup>3</sup>	29.32 <sup>268</sup>
Dec. 5.0	32.641 <sup>173</sup>	18.43 <sup>5</sup>	48.100 <sup>120</sup>	46.38 <sup>267</sup>	54.633 <sup>142</sup>	29.74 <sup>180</sup>	3.51 <sup>10</sup>	25.64 <sup>371</sup>
15.0	32.814 <sup>218</sup>	18.38 <sup>17</sup>	48.230 <sup>173</sup>	43.71 <sup>270</sup>	54.775 <sup>186</sup>	28.05 <sup>177</sup>	3.61 <sup>22</sup>	21.93 <sup>363</sup>
24.9	33.032 <sup>260</sup>	18.55 <sup>33</sup>	48.403 <sup>218</sup>	41.01 <sup>265</sup>	54.960 <sup>238</sup>	26.28 <sup>181</sup>	3.83 <sup>33</sup>	18.30 <sup>341</sup>
34.9	33.292	18.88	48.621	38.36	55.183	24.47	4.16	14.89
Mean Place	29.947	20.21	46.764	46.62	52.627	28.92	7.940	28.48
Sec $\delta$ , Tan $\delta$	1.115	-0.493	1.076	+0.397	1.001	+0.088	2.783	+2.597
$D_{\alpha}$ , $D_{\alpha\alpha}$	+0.073	-0.013	+0.051	+0.010	+0.060	+0.001	-0.002	+0.068
$D_{\delta}$ , $D_{\delta\delta}$	-0.16	-0.91	-0.16	-0.92	-0.16	-0.92	-0.16	-0.92

# APPARENT PLACES OF STARS, 1920.

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FOR THE UPPER TRANSIT AT WASHINGTON.

Washington Mean Time.	τ Scorpil. Mag. 2.9		σ Heronlis. Mag. 4.2		ζ Ophiuchi. Mag. 2.7		24 Scorpil. Mag. 5.0	
	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.
	h m 16 30	° ' " -28 2	h m 16 31	° ' " +42 35	h m 16 32	° ' " -10 24	h m 16 36	° ' " -17 35
	s	"	s	"	s	"	s	"
Jan. 0.9	53.761 <sup>262</sup>	57.27	30.244	59.57	44.877	17.88	56.416	12.70
10.9	54.043 <sup>262</sup>	57.56	30.497 <sup>268</sup>	58.49	45.128 <sup>261</sup>	19.04 <sup>118</sup>	56.673 <sup>257</sup>	13.49
20.9	54.354 <sup>311</sup>	57.99	30.792 <sup>295</sup>	58.71	45.405 <sup>277</sup>	20.25 <sup>122</sup>	56.957 <sup>284</sup>	14.35
30.8	54.683 <sup>330</sup>	58.55	31.118 <sup>326</sup>	51.36	45.697 <sup>293</sup>	21.41 <sup>116</sup>	57.260 <sup>303</sup>	15.24
Feb. 9.8	55.022 <sup>339</sup>	59.20	31.466 <sup>348</sup>	49.51	46.001 <sup>304</sup>	22.49 <sup>108</sup>	57.573 <sup>313</sup>	16.12
19.8	55.364 <sup>342</sup>	59.92	31.824	48.22	46.309 <sup>308</sup>	23.45 <sup>98</sup>	57.889 <sup>316</sup>	16.96
29.7	55.703 <sup>339</sup>	60.66	32.183 <sup>350</sup>	47.54	46.613 <sup>304</sup>	24.23 <sup>78</sup>	58.204 <sup>315</sup>	17.69
Mar. 10.7	56.033 <sup>330</sup>	61.39	32.535 <sup>352</sup>	47.50	46.909 <sup>296</sup>	24.82 <sup>59</sup>	58.510 <sup>306</sup>	18.32
20.7	56.350 <sup>317</sup>	62.09	32.872 <sup>337</sup>	48.06	47.192 <sup>283</sup>	25.21 <sup>39</sup>	58.805 <sup>295</sup>	18.82
30.7	56.649 <sup>299</sup>	62.77	33.185 <sup>313</sup>	49.21	47.463 <sup>271</sup>	25.41 <sup>20</sup>	59.085 <sup>280</sup>	19.19
Apr. 9.6	56.929 <sup>290</sup>	63.41	33.470	50.89	47.713	25.41	59.348	19.41
19.6	57.185 <sup>268</sup>	64.00	33.722 <sup>282</sup>	58.02	47.944 <sup>281</sup>	25.24	59.589 <sup>243</sup>	19.52
29.6	57.418 <sup>238</sup>	64.55	33.936 <sup>214</sup>	55.52	48.150 <sup>206</sup>	24.90	59.807 <sup>218</sup>	19.52
May 9.6	57.621 <sup>208</sup>	65.06	34.109 <sup>178</sup>	58.28	48.332 <sup>182</sup>	24.45	60.001 <sup>194</sup>	19.44
19.5	57.794 <sup>178</sup>	65.55	34.238 <sup>129</sup>	61.21	48.486 <sup>154</sup>	23.91	60.165 <sup>164</sup>	19.30
29.5	57.984 <sup>140</sup>	66.00	34.322 <sup>84</sup>	64.21	48.610 <sup>126</sup>	23.32	60.300 <sup>135</sup>	19.11
June 8.5	58.037 <sup>103</sup>	66.42	34.360 <sup>38</sup>	67.20	48.700 <sup>90</sup>	22.70	60.400 <sup>100</sup>	19.11
18.4	58.101 <sup>64</sup>	66.81	34.351 <sup>9</sup>	70.10	48.757 <sup>57</sup>	22.06	60.465 <sup>65</sup>	18.90
28.4	58.125 <sup>24</sup>	67.16	34.295 <sup>56</sup>	72.81	48.778 <sup>21</sup>	21.45	60.493 <sup>28</sup>	18.67
July 8.4	58.108 <sup>17</sup>	67.45	34.195 <sup>100</sup>	75.26	48.762 <sup>16</sup>	20.85	60.483 <sup>10</sup>	18.43
18.4	58.052 <sup>56</sup>	67.66	34.054 <sup>141</sup>	77.40	48.713 <sup>49</sup>	20.80	60.438 <sup>45</sup>	18.19
28.3	57.960 <sup>99</sup>	67.81	33.874 <sup>180</sup>	79.18	48.628 <sup>85</sup>	19.80	60.355 <sup>83</sup>	17.96
Aug. 7.3	57.832 <sup>128</sup>	67.85	33.660 <sup>214</sup>	80.56	48.512 <sup>116</sup>	19.84	60.240 <sup>115</sup>	17.72
17.3	57.676 <sup>156</sup>	67.78	33.420 <sup>240</sup>	81.63	48.373 <sup>139</sup>	18.93	60.099 <sup>141</sup>	17.47
27.3	57.499 <sup>177</sup>	67.59	33.158 <sup>262</sup>	82.03	48.216 <sup>167</sup>	18.56	60.009 <sup>163</sup>	17.21
Sept. 6.2	57.310 <sup>189</sup>	67.28	32.887 <sup>271</sup>	82.08	48.045 <sup>5</sup>	18.56	59.936 <sup>175</sup>	16.93
16.2	57.117 <sup>198</sup>	66.85	32.614 <sup>273</sup>	81.65	47.870 <sup>175</sup>	18.26	59.761 <sup>179</sup>	16.63
26.2	56.932 <sup>185</sup>	66.32	32.350 <sup>294</sup>	81.65	47.870 <sup>166</sup>	18.01	59.582 <sup>19</sup>	16.32
Oct. 6.1	56.766 <sup>166</sup>	65.71	32.104 <sup>246</sup>	80.76	47.704 <sup>106</sup>	17.82	59.408 <sup>174</sup>	16.01
16.1	56.629 <sup>137</sup>	65.04	32.004 <sup>215</sup>	79.41	47.553 <sup>151</sup>	17.75	59.252 <sup>156</sup>	15.72
26.1	56.581 <sup>98</sup>	64.36	31.889 <sup>176</sup>	77.62	47.429 <sup>124</sup>	17.76	59.121 <sup>131</sup>	15.47
Nov. 5.1	56.481 <sup>50</sup>	63.71	31.713 <sup>129</sup>	75.42	47.338 <sup>91</sup>	17.89	59.024 <sup>97</sup>	15.28
15.0	56.484 <sup>3</sup>	63.12	31.584 <sup>73</sup>	72.84	47.290 <sup>48</sup>	18.17	58.871 <sup>53</sup>	15.18
25.0	56.543 <sup>59</sup>	62.64	31.511 <sup>13</sup>	69.96	47.284 <sup>6</sup>	18.62	58.967 <sup>4</sup>	15.19
Dec. 5.0	56.658 <sup>115</sup>	62.31	31.498 <sup>50</sup>	66.81	47.334 <sup>60</sup>	19.23	59.015 <sup>48</sup>	15.34
15.0	56.826 <sup>168</sup>	62.15	31.548 <sup>111</sup>	63.60	47.451 <sup>97</sup>	20.01	59.115 <sup>100</sup>	15.66
24.9	57.043 <sup>217</sup>	62.16	31.659 <sup>170</sup>	60.11	47.579 <sup>148</sup>	20.92	59.264 <sup>149</sup>	16.12
34.9	57.301 <sup>268</sup>	62.36	31.829 <sup>238</sup>	56.73	47.767 <sup>188</sup>	21.96	59.460 <sup>196</sup>	16.73
			32.052 <sup>288</sup>	53.49	47.998 <sup>281</sup>	23.12	59.694 <sup>234</sup>	17.48
Mean Place	58.932	64.56	31.416	64.28	45.098	21.97	56.620	18.16
Sec δ, Tan δ	1.183	-0.533	1.359	+0.920	1.017	-0.184	1.049	-0.317
D <sub>ψ</sub> a, D <sub>ω</sub> a	+0.074	-0.013	+0.039	+0.023	+0.066	-0.005	+0.069	-0.007
D <sub>ψ</sub> δ, D <sub>ω</sub> δ	-0.15	-0.93	-0.15	-0.93	-0.15	-0.98	-0.14	-0.94

FOR THE UPPER TRANSIT AT WASHINGTON.

Washington Mean Time.	ζ Herculis. Mag. 3.0		η Herculis. Mag. 3.6		α Triang. Aust. Mag. 1.9		Groombridge 2377. Mag. 4.9	
	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.
	h m 16 38 s	° ' " +31 44 "	h m 16 40 s	° ' " +39 4 "	h m 16 40 s	° ' " -68 52 "	h m 16 43 s	° ' " +56 55 "
Jan. 0.9	15.375	46.30	8.091	21.41	9.59	45.60	44.679	23.15
10.9	15.609 <sup>284</sup>	43.45 <sup>285</sup>	8.332 <sup>241</sup>	18.37 <sup>304</sup>	10.17 <sup>58</sup>	43.85 <sup>178</sup>	44.955 <sup>276</sup>	19.85 <sup>330</sup>
20.9	15.877 <sup>268</sup>	40.86 <sup>259</sup>	8.608 <sup>276</sup>	15.61 <sup>276</sup>	10.82 <sup>65</sup>	42.47 <sup>188</sup>	45.291 <sup>336</sup>	16.89 <sup>296</sup>
30.8	16.171 <sup>294</sup>	38.61 <sup>225</sup>	8.917 <sup>309</sup>	13.25 <sup>286</sup>	11.53 <sup>71</sup>	41.49 <sup>96</sup>	45.677 <sup>386</sup>	14.33 <sup>251</sup>
Feb. 9.8	16.484 <sup>313</sup>	36.79 <sup>182</sup>	9.248 <sup>331</sup>	11.34 <sup>191</sup>	12.28 <sup>75</sup>	40.92 <sup>57</sup>	46.100 <sup>428</sup>	12.41 <sup>197</sup>
19.8	16.805 <sup>321</sup>	35.48 <sup>78</sup>	9.590 <sup>347</sup>	9.98 <sup>78</sup>	13.04 <sup>76</sup>	40.79 <sup>18</sup>	46.546 <sup>446</sup>	11.05 <sup>136</sup>
29.8	17.126 <sup>321</sup>	34.70 <sup>20</sup>	9.937 <sup>347</sup>	9.20 <sup>78</sup>	13.82 <sup>78</sup>	41.08 <sup>29</sup>	47.001 <sup>455</sup>	10.34 <sup>71</sup>
Mar. 10.7	17.441 <sup>315</sup>	34.50 <sup>20</sup>	10.275 <sup>338</sup>	9.05 <sup>15</sup>	14.58 <sup>76</sup>	41.71 <sup>63</sup>	47.453 <sup>452</sup>	10.31 <sup>3</sup>
20.7	17.745 <sup>304</sup>	34.85 <sup>35</sup>	10.602 <sup>327</sup>	9.48 <sup>43</sup>	15.32 <sup>74</sup>	42.74 <sup>108</sup>	47.888 <sup>485</sup>	10.93 <sup>62</sup>
30.7	18.030 <sup>285</sup>	35.75 <sup>90</sup>	10.907 <sup>305</sup>	10.50 <sup>102</sup>	16.02 <sup>70</sup>	44.10 <sup>186</sup>	48.296 <sup>408</sup>	12.19 <sup>126</sup>
Apr. 9.6	18.292 <sup>262</sup>	37.14 <sup>180</sup>	11.188 <sup>281</sup>	12.04 <sup>184</sup>	16.68 <sup>66</sup>	45.76 <sup>136</sup>	48.667 <sup>371</sup>	14.02 <sup>183</sup>
19.6	18.528 <sup>236</sup>	38.94 <sup>190</sup>	11.439 <sup>251</sup>	14.04 <sup>200</sup>	17.28 <sup>60</sup>	47.69 <sup>198</sup>	48.994 <sup>327</sup>	16.34 <sup>232</sup>
29.6	18.733 <sup>205</sup>	41.11 <sup>217</sup>	11.659 <sup>230</sup>	16.40 <sup>286</sup>	17.81 <sup>53</sup>	49.81 <sup>213</sup>	49.267 <sup>273</sup>	19.07 <sup>273</sup>
May 9.6	18.905 <sup>172</sup>	43.54 <sup>243</sup>	11.838 <sup>179</sup>	19.03 <sup>263</sup>	18.27 <sup>46</sup>	52.14 <sup>232</sup>	49.483 <sup>216</sup>	22.10 <sup>303</sup>
19.5	19.042 <sup>137</sup>	46.16 <sup>262</sup>	11.976 <sup>138</sup>	21.87 <sup>284</sup>	18.64 <sup>37</sup>	54.58 <sup>244</sup>	49.637 <sup>184</sup>	25.31 <sup>321</sup>
29.5	19.140 <sup>96</sup>	48.84 <sup>268</sup>	11.976 <sup>96</sup>	21.87 <sup>292</sup>	18.64 <sup>29</sup>	54.58 <sup>258</sup>	49.637 <sup>89</sup>	25.31 <sup>331</sup>
June 8.5	19.200 <sup>60</sup>	51.55 <sup>271</sup>	12.074 <sup>53</sup>	24.79 <sup>263</sup>	18.93 <sup>19</sup>	57.11 <sup>255</sup>	49.726 <sup>25</sup>	28.62 <sup>329</sup>
18.5	19.220 <sup>20</sup>	54.17 <sup>262</sup>	12.126 <sup>8</sup>	27.72 <sup>263</sup>	19.12 <sup>9</sup>	59.66 <sup>248</sup>	49.751 <sup>41</sup>	31.91 <sup>319</sup>
28.4	19.199 <sup>21</sup>	56.66 <sup>249</sup>	12.134 <sup>35</sup>	30.55 <sup>268</sup>	19.21 <sup>1</sup>	62.14 <sup>237</sup>	49.710 <sup>104</sup>	35.10 <sup>299</sup>
July 8.4	19.137 <sup>62</sup>	58.92 <sup>226</sup>	12.020 <sup>79</sup>	35.70 <sup>247</sup>	19.09 <sup>11</sup>	64.51 <sup>221</sup>	49.606 <sup>165</sup>	38.09 <sup>273</sup>
18.4	19.037 <sup>100</sup>	60.93 <sup>201</sup>	12.020 <sup>119</sup>	35.70 <sup>216</sup>	19.09 <sup>21</sup>	66.72 <sup>197</sup>	49.441 <sup>221</sup>	40.82 <sup>239</sup>
28.3	18.902 <sup>135</sup>	62.64 <sup>171</sup>	11.901 <sup>159</sup>	37.86 <sup>180</sup>	18.88 <sup>30</sup>	68.69 <sup>165</sup>	49.220 <sup>273</sup>	43.21 <sup>199</sup>
Aug. 7.3	18.734 <sup>168</sup>	64.00 <sup>186</sup>	11.742 <sup>169</sup>	39.66 <sup>147</sup>	18.58 <sup>30</sup>	70.34 <sup>180</sup>	48.947 <sup>316</sup>	45.20 <sup>157</sup>
17.3	18.541 <sup>198</sup>	64.99 <sup>99</sup>	11.548 <sup>194</sup>	41.13 <sup>147</sup>	18.20 <sup>38</sup>	71.64 <sup>92</sup>	48.631 <sup>316</sup>	46.77 <sup>109</sup>
27.3	18.541 <sup>214</sup>	64.99 <sup>99</sup>	11.325 <sup>223</sup>	42.15 <sup>102</sup>	17.76 <sup>44</sup>	72.56 <sup>92</sup>	48.278 <sup>353</sup>	47.86 <sup>109</sup>
27.3	18.327 <sup>226</sup>	66.60 <sup>61</sup>	11.086 <sup>239</sup>	42.78 <sup>61</sup>	17.27 <sup>52</sup>	73.00 <sup>4</sup>	48.006 <sup>378</sup>	48.46 <sup>60</sup>
Sept. 6.2	18.102 <sup>226</sup>	65.79 <sup>21</sup>	11.086 <sup>253</sup>	42.78 <sup>17</sup>	17.27 <sup>52</sup>	73.00 <sup>4</sup>	47.900 <sup>393</sup>	48.46 <sup>10</sup>
16.2	17.873 <sup>229</sup>	65.58 <sup>21</sup>	10.833 <sup>268</sup>	42.93 <sup>80</sup>	16.75 <sup>53</sup>	72.96 <sup>49</sup>	47.507 <sup>397</sup>	48.56 <sup>42</sup>
26.2	17.873 <sup>222</sup>	65.58 <sup>63</sup>	10.575 <sup>261</sup>	42.63 <sup>76</sup>	16.22 <sup>50</sup>	72.47 <sup>96</sup>	47.110 <sup>359</sup>	48.14 <sup>94</sup>
Oct. 6.2	17.651 <sup>206</sup>	64.95 <sup>105</sup>	10.324 <sup>233</sup>	41.87 <sup>118</sup>	15.72 <sup>46</sup>	71.49 <sup>144</sup>	46.721 <sup>366</sup>	47.20 <sup>144</sup>
16.1	17.265 <sup>180</sup>	63.90 <sup>144</sup>	10.091 <sup>209</sup>	40.69 <sup>163</sup>	15.28 <sup>40</sup>	70.05 <sup>181</sup>	46.355 <sup>331</sup>	45.76 <sup>191</sup>
26.1	17.265 <sup>147</sup>	62.46 <sup>183</sup>	9.832 <sup>170</sup>	39.06 <sup>206</sup>	14.86 <sup>30</sup>	68.24 <sup>218</sup>	46.024 <sup>284</sup>	43.85 <sup>235</sup>
Nov. 5.1	17.118 <sup>103</sup>	60.63 <sup>217</sup>	9.712 <sup>194</sup>	37.01 <sup>241</sup>	14.56 <sup>20</sup>	66.06 <sup>240</sup>	45.740 <sup>226</sup>	41.50 <sup>277</sup>
15.0	17.015 <sup>62</sup>	58.46 <sup>250</sup>	9.588 <sup>72</sup>	34.60 <sup>274</sup>	14.36 <sup>9</sup>	63.66 <sup>267</sup>	45.614 <sup>157</sup>	38.73 <sup>311</sup>
25.0	16.963 <sup>1</sup>	56.96 <sup>273</sup>	9.516 <sup>15</sup>	31.86 <sup>301</sup>	14.27 <sup>5</sup>	61.09 <sup>264</sup>	45.357 <sup>82</sup>	35.62 <sup>337</sup>
Dec. 5.0	16.962 <sup>85</sup>	53.23 <sup>294</sup>	9.501 <sup>43</sup>	28.85 <sup>316</sup>	14.32 <sup>17</sup>	58.45 <sup>259</sup>	45.275 <sup>2</sup>	32.25 <sup>336</sup>
15.0	17.017 <sup>110</sup>	50.29 <sup>308</sup>	9.544 <sup>103</sup>	25.69 <sup>330</sup>	14.49 <sup>29</sup>	55.86 <sup>298</sup>	45.273 <sup>79</sup>	28.69 <sup>364</sup>
24.9	17.127 <sup>160</sup>	47.26 <sup>306</sup>	9.647 <sup>158</sup>	22.39 <sup>239</sup>	14.78 <sup>42</sup>	53.38 <sup>234</sup>	45.352 <sup>159</sup>	25.05 <sup>361</sup>
34.9	17.287 <sup>207</sup>	44.20 <sup>298</sup>	9.805 <sup>210</sup>	19.10 <sup>318</sup>	15.20 <sup>51</sup>	51.14 <sup>195</sup>	45.511 <sup>233</sup>	21.44 <sup>361</sup>
34.9	17.494 <sup>207</sup>	41.22 <sup>298</sup>	10.015 <sup>210</sup>	15.92 <sup>318</sup>	15.71 <sup>51</sup>	49.19 <sup>195</sup>	45.744 <sup>233</sup>	17.98 <sup>364</sup>
Mean Place	16.202	49.05	9.152	24.95	10.736	58.18	46.759	28.05
Sec δ, Tan δ	1.176	+0.619	1.288	+0.812	2.776	-2.589	1.832	+1.535
D <sub>α</sub> , D <sub>α</sub>	+0.046	+0.014	+0.041	+0.018	+0.126	-0.059	+0.023	+0.033
D <sub>δ</sub> , D <sub>δ</sub>	-0.14	-0.94	-0.14	-0.94	-0.14	-0.94	-0.13	-0.95

# APPARENT PLACES OF STARS, 1920.

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FOR THE UPPER TRANSIT AT WASHINGTON.

Washington Mean Time.	ε Scorpil. Mag. 2.4		49 Herculis. Mag. 6.4		ε <sup>1</sup> Arse. Mag. 4.2		κ Ophiuchi. Mag. 3.4	
	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.
	h m 16 44	° ' " -34 8	h m 16 48	° ' " +15 6	h m 16 53	° ' " -53 2	h m 16 53	° ' " + 9 29
	s	"	s	"	s	"	s	"
Jan. 0.9	58.422	49.69	25.760	26.88	11.544	10.81	52.379	55.66
10.9	58.706 <sup>284</sup>	49.55	25.982 <sup>222</sup>	24.57 <sup>231</sup>	11.905 <sup>361</sup>	9.64 <sup>117</sup>	52.596 <sup>217</sup>	53.59 <sup>307</sup>
20.9	59.023 <sup>317</sup>	49.60	26.235 <sup>238</sup>	22.42 <sup>215</sup>	12.313 <sup>408</sup>	8.73 <sup>91</sup>	52.844 <sup>248</sup>	51.65 <sup>194</sup>
30.8	59.363 <sup>340</sup>	49.81	26.508 <sup>273</sup>	20.49 <sup>193</sup>	12.755 <sup>442</sup>	8.13 <sup>60</sup>	53.114 <sup>270</sup>	49.88 <sup>177</sup>
Feb. 9.8	59.717 <sup>354</sup>	50.14	26.796 <sup>288</sup>	18.87 <sup>162</sup>	13.220 <sup>465</sup>	7.82 <sup>31</sup>	53.399 <sup>285</sup>	48.36 <sup>153</sup>
19.8	60.076 <sup>389</sup>	50.64	27.092 <sup>296</sup>	17.61 <sup>126</sup>	13.698 <sup>478</sup>	7.80 <sup>2</sup>	53.692 <sup>298</sup>	47.18 <sup>118</sup>
29.8	60.435 <sup>359</sup>	51.20	27.390 <sup>298</sup>	16.77 <sup>84</sup>	14.180 <sup>482</sup>	8.06 <sup>26</sup>	53.988 <sup>291</sup>	46.34 <sup>84</sup>
Mar. 10.7	60.785 <sup>350</sup>	51.84	27.682 <sup>292</sup>	16.37 <sup>40</sup>	14.654 <sup>474</sup>	8.56 <sup>80</sup>	54.272 <sup>289</sup>	45.90 <sup>44</sup>
20.7	61.127 <sup>342</sup>	52.51	27.965 <sup>283</sup>	16.42 <sup>5</sup>	15.117 <sup>463</sup>	9.32 <sup>76</sup>	54.554 <sup>283</sup>	45.86 <sup>4</sup>
30.7	61.452 <sup>325</sup>	53.21	28.234 <sup>269</sup>	16.89 <sup>47</sup>	15.561 <sup>444</sup>	10.27 <sup>95</sup>	54.822 <sup>268</sup>	46.22 <sup>36</sup>
Apr. 9.7	61.758 <sup>306</sup>	53.94	28.485 <sup>251</sup>	17.76 <sup>87</sup>	15.981 <sup>430</sup>	11.43 <sup>116</sup>	55.075 <sup>253</sup>	46.92 <sup>70</sup>
19.6	62.042 <sup>284</sup>	54.68	28.717 <sup>232</sup>	19.00 <sup>124</sup>	16.371 <sup>390</sup>	12.75 <sup>132</sup>	55.307 <sup>239</sup>	47.94 <sup>102</sup>
29.6	62.301 <sup>259</sup>	55.42	28.923 <sup>206</sup>	20.53 <sup>153</sup>	16.725 <sup>354</sup>	14.21 <sup>146</sup>	55.520 <sup>213</sup>	49.23 <sup>129</sup>
May 9.6	62.530 <sup>229</sup>	56.19	29.105 <sup>182</sup>	22.28 <sup>175</sup>	17.039 <sup>314</sup>	15.80 <sup>159</sup>	55.704 <sup>194</sup>	50.74 <sup>151</sup>
19.5	62.728 <sup>198</sup>	56.94	29.256 <sup>151</sup>	24.19 <sup>191</sup>	17.308 <sup>269</sup>	17.48 <sup>168</sup>	55.864 <sup>160</sup>	52.41 <sup>167</sup>
29.5	62.889 <sup>161</sup>	57.71	29.376 <sup>120</sup>	26.19 <sup>206</sup>	17.527 <sup>219</sup>	19.21 <sup>173</sup>	55.990 <sup>126</sup>	54.73 <sup>172</sup>
June 8.5	63.012 <sup>128</sup>	58.46	29.462 <sup>88</sup>	28.23 <sup>204</sup>	17.691 <sup>164</sup>	20.97 <sup>176</sup>	56.084 <sup>94</sup>	55.90 <sup>177</sup>
18.5	63.092 <sup>80</sup>	59.20	29.513 <sup>51</sup>	30.23 <sup>200</sup>	17.796 <sup>105</sup>	22.72 <sup>175</sup>	56.146 <sup>62</sup>	57.66 <sup>176</sup>
28.4	63.129 <sup>37</sup>	59.89	29.527 <sup>14</sup>	32.13 <sup>190</sup>	17.841 <sup>45</sup>	24.40 <sup>168</sup>	56.170 <sup>24</sup>	59.33 <sup>167</sup>
July 8.4	63.122 <sup>7</sup>	60.51	29.504 <sup>23</sup>	33.89 <sup>176</sup>	17.823 <sup>18</sup>	25.98 <sup>158</sup>	56.157 <sup>13</sup>	60.89 <sup>156</sup>
18.4	63.071 <sup>51</sup>	61.06	29.445 <sup>59</sup>	35.48 <sup>169</sup>	17.745 <sup>78</sup>	27.40 <sup>143</sup>	56.108 <sup>49</sup>	62.30 <sup>141</sup>
28.4	62.977 <sup>94</sup>	61.49	29.353 <sup>92</sup>	36.86 <sup>138</sup>	17.608 <sup>137</sup>	28.60 <sup>120</sup>	56.023 <sup>85</sup>	63.52 <sup>122</sup>
Aug. 7.3	62.845 <sup>132</sup>	61.79	29.228 <sup>126</sup>	38.00 <sup>114</sup>	17.419 <sup>189</sup>	29.57 <sup>97</sup>	55.909 <sup>114</sup>	64.57 <sup>105</sup>
17.3	62.682 <sup>168</sup>	61.98	29.078 <sup>150</sup>	38.88 <sup>88</sup>	17.184 <sup>235</sup>	30.24 <sup>67</sup>	55.787 <sup>142</sup>	65.37 <sup>80</sup>
27.3	62.492 <sup>190</sup>	61.91	28.906 <sup>173</sup>	39.48 <sup>60</sup>	16.915 <sup>269</sup>	30.58 <sup>84</sup>	55.603 <sup>164</sup>	65.95 <sup>58</sup>
Sept. 6.2	62.287 <sup>205</sup>	61.71	28.721 <sup>185</sup>	39.79 <sup>31</sup>	16.623 <sup>293</sup>	30.59 <sup>1</sup>	55.426 <sup>177</sup>	66.28 <sup>33</sup>
16.2	62.077 <sup>210</sup>	61.34	28.530 <sup>191</sup>	39.80 <sup>1</sup>	16.322 <sup>301</sup>	30.23 <sup>36</sup>	55.242 <sup>184</sup>	66.39 <sup>11</sup>
26.2	61.871 <sup>206</sup>	60.79	28.344 <sup>186</sup>	39.51 <sup>29</sup>	16.027 <sup>295</sup>	29.52 <sup>71</sup>	55.059 <sup>183</sup>	66.23 <sup>16</sup>
Oct. 6.2	61.684 <sup>187</sup>	60.10	28.171 <sup>173</sup>	38.92 <sup>59</sup>	15.756 <sup>271</sup>	28.47 <sup>106</sup>	54.892 <sup>167</sup>	65.80 <sup>43</sup>
16.1	61.526 <sup>168</sup>	59.30	28.020 <sup>151</sup>	38.03 <sup>89</sup>	15.522 <sup>294</sup>	27.14 <sup>183</sup>	54.742 <sup>150</sup>	65.09 <sup>71</sup>
26.1	61.409 <sup>117</sup>	58.39	27.901 <sup>119</sup>	36.84 <sup>119</sup>	15.359 <sup>186</sup>	25.56 <sup>158</sup>	54.626 <sup>116</sup>	64.13 <sup>96</sup>
Nov. 5.1	61.338 <sup>71</sup>	57.48	27.821 <sup>80</sup>	35.86 <sup>148</sup>	15.220 <sup>119</sup>	23.80 <sup>176</sup>	54.547 <sup>79</sup>	62.94 <sup>119</sup>
15.1	61.323 <sup>15</sup>	56.56	27.785 <sup>86</sup>	33.61 <sup>175</sup>	15.174 <sup>46</sup>	21.94 <sup>186</sup>	54.512 <sup>35</sup>	61.46 <sup>148</sup>
25.0	61.367 <sup>44</sup>	55.72	27.797 <sup>12</sup>	31.63 <sup>198</sup>	15.206 <sup>82</sup>	20.04 <sup>190</sup>	54.525 <sup>13</sup>	59.77 <sup>169</sup>
Dec. 5.0	61.470 <sup>108</sup>	54.98	27.860 <sup>68</sup>	29.45 <sup>218</sup>	15.317 <sup>111</sup>	18.18 <sup>186</sup>	54.586 <sup>61</sup>	57.91 <sup>186</sup>
15.0	61.631 <sup>161</sup>	54.39	27.971 <sup>111</sup>	27.14 <sup>231</sup>	15.506 <sup>189</sup>	16.44 <sup>174</sup>	54.696 <sup>110</sup>	55.91 <sup>200</sup>
24.9	61.843 <sup>212</sup>	53.97	28.128 <sup>157</sup>	24.76 <sup>238</sup>	15.766 <sup>260</sup>	14.89 <sup>155</sup>	54.849 <sup>153</sup>	53.82 <sup>209</sup>
34.9	62.101 <sup>268</sup>	53.74	28.326 <sup>198</sup>	22.39 <sup>237</sup>	16.090 <sup>324</sup>	13.55 <sup>134</sup>	55.044 <sup>195</sup>	51.70 <sup>212</sup>
Mean Place	58.669	57.86	26.274	26.56	12.065	21.32	52.830	54.24
Sec δ, Tan δ	1.268	-0.678	1.036	+0.270	1.663	-1.329	1.014	+0.167
D <sub>α</sub> , D <sub>α</sub> <sup>2</sup>	+0.973	-0.015	+0.054	+0.006	+0.095	-0.025	+0.057	+0.003
D <sub>δ</sub> , D <sub>δ</sub> <sup>2</sup>	-0.18	-0.95	-0.12	-0.95	-0.11	-0.96	-0.11	-0.96

APPARENT PLACES OF STARS, 1920.

FOR THE UPPER TRANSIT AT WASHINGTON.

Washington Mean Time.	30 Ophiuchi. Mag. 5.0		ε Herculia. Mag. 3.9		δ Herculia. Mag. 5.3		γ Ophiuchi. Mag. 2.6	
	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.
	h m 16 56	° ' " - 4 6	h m 16 57	° ' " +31 2	h m 16 58	° ' " +33 40	h m 17 5	° ' " -15 37
Jan. 0.9	50.158	9.61	12.835	34.84	38.122	58.09	46.962	31.69
10.9	50.384 <sup>226</sup>	11.01 140	13.051 <sup>216</sup>	31.98 <sup>286</sup>	38.337 <sup>285</sup>	55.14 <sup>295</sup>	47.193 <sup>231</sup>	32.42 <sup>72</sup>
20.9	50.638 <sup>254</sup>	12.40 130	13.303 <sup>252</sup>	29.31 <sup>267</sup>	38.590 <sup>263</sup>	52.42 <sup>273</sup>	47.455 <sup>262</sup>	33.23 <sup>81</sup>
30.8	50.911 <sup>273</sup>	13.69 120	13.584 <sup>281</sup>	27.00 <sup>281</sup>	38.874 <sup>284</sup>	50.04 <sup>298</sup>	47.737 <sup>282</sup>	34.03 <sup>80</sup>
Feb. 9.8	51.200 <sup>289</sup>	14.86 117	13.884 <sup>300</sup>	25.07 <sup>193</sup>	39.180 <sup>306</sup>	48.07 <sup>197</sup>	48.083 <sup>296</sup>	34.79 <sup>76</sup>
	51.495 <sup>295</sup>	15.83 97	14.199 <sup>315</sup>	23.68 <sup>144</sup>	39.499 <sup>319</sup>	46.61 <sup>146</sup>	48.340 <sup>307</sup>	35.47 <sup>63</sup>
19.8	51.792 <sup>297</sup>	16.57 74	14.517 <sup>318</sup>	22.72 <sup>91</sup>	39.825 <sup>326</sup>	45.69 <sup>92</sup>	48.648 <sup>308</sup>	36.06 <sup>59</sup>
29.8	52.084 <sup>292</sup>	17.05 48	14.833 <sup>316</sup>	22.38 <sup>34</sup>	40.149 <sup>324</sup>	45.35 <sup>34</sup>	48.954 <sup>306</sup>	36.51 <sup>45</sup>
Mar. 10.7	52.368 <sup>284</sup>	17.28 23	15.140 <sup>307</sup>	22.60 <sup>22</sup>	40.463 <sup>314</sup>	45.58 <sup>23</sup>	49.255 <sup>301</sup>	36.82 <sup>31</sup>
20.7	52.641 <sup>273</sup>	17.23 5	15.434 <sup>294</sup>	23.37 <sup>77</sup>	40.763 <sup>300</sup>	46.38 <sup>80</sup>	49.544 <sup>289</sup>	36.97 <sup>15</sup>
30.7	52.900 <sup>259</sup>	16.94 29	15.708 <sup>274</sup>	24.63 <sup>126</sup>	41.043 <sup>289</sup>	47.69 <sup>181</sup>	49.820 <sup>276</sup>	37.00 <sup>3</sup>
Apr. 9.7	53.140 <sup>240</sup>	16.41 53	15.958 <sup>250</sup>	26.33 <sup>170</sup>	41.298 <sup>255</sup>	49.46 <sup>177</sup>	50.078 <sup>258</sup>	37.00 <sup>12</sup>
19.6	53.360 <sup>220</sup>	15.71 70	16.182 <sup>234</sup>	28.41 <sup>208</sup>	41.527 <sup>239</sup>	51.62 <sup>216</sup>	50.317 <sup>239</sup>	36.88 <sup>25</sup>
29.6	53.557 <sup>197</sup>	14.85 86	16.373 <sup>191</sup>	30.78 <sup>227</sup>	41.722 <sup>195</sup>	54.07 <sup>245</sup>	50.533 <sup>216</sup>	36.63 <sup>32</sup>
May 9.6	53.727 <sup>170</sup>	13.88 97	16.531 <sup>158</sup>	33.37 <sup>269</sup>	41.881 <sup>169</sup>	56.73 <sup>266</sup>	50.722 <sup>189</sup>	36.31 <sup>36</sup>
19.5	53.867 <sup>140</sup>	12.86 102	16.651 <sup>130</sup>	36.05 <sup>268</sup>	42.001 <sup>139</sup>	59.51 <sup>278</sup>	50.881 <sup>159</sup>	35.95 <sup>40</sup>
29.5	53.976 <sup>109</sup>	11.81 105	16.732 <sup>81</sup>	38.77 <sup>273</sup>	42.080 <sup>79</sup>	62.32 <sup>261</sup>	51.007 <sup>126</sup>	35.55 <sup>41</sup>
June 8.5	54.051 <sup>75</sup>	10.78 103	16.773 <sup>41</sup>	41.44 <sup>267</sup>	42.118 <sup>38</sup>	65.08 <sup>276</sup>	51.096 <sup>89</sup>	35.14 <sup>41</sup>
18.5	54.089 <sup>38</sup>	9.78 100	16.773 <sup>0</sup>	43.99 <sup>255</sup>	42.115 <sup>3</sup>	67.72 <sup>264</sup>	51.149 <sup>53</sup>	34.73 <sup>37</sup>
28.4	54.091 <sup>2</sup>	8.85 93	16.730 <sup>43</sup>	46.35 <sup>226</sup>	42.066 <sup>49</sup>	70.16 <sup>244</sup>	51.162 <sup>13</sup>	34.35 <sup>33</sup>
July 8.4	54.055 <sup>72</sup>	8.00 75	16.647 <sup>130</sup>	48.48 <sup>183</sup>	41.979 <sup>127</sup>	72.35 <sup>192</sup>	51.138 <sup>65</sup>	33.98 <sup>14</sup>
18.4	53.983 <sup>103</sup>	7.25 66	16.527 <sup>155</sup>	50.31 <sup>150</sup>	41.852 <sup>143</sup>	74.27 <sup>155</sup>	51.073 <sup>99</sup>	33.65 <sup>30</sup>
28.4	53.880 <sup>132</sup>	6.59 54	16.372 <sup>185</sup>	51.81 <sup>113</sup>	41.689 <sup>194</sup>	75.82 <sup>117</sup>	51.073 <sup>131</sup>	33.35 <sup>28</sup>
Aug. 7.3	53.748 <sup>154</sup>	6.05 43	16.187 <sup>207</sup>	52.94 <sup>77</sup>	41.495 <sup>214</sup>	76.99 <sup>79</sup>	50.974 <sup>154</sup>	33.07 <sup>25</sup>
17.3	53.594 <sup>170</sup>	5.62 30	15.980 <sup>221</sup>	53.71 <sup>27</sup>	41.281 <sup>221</sup>	77.78 <sup>29</sup>	50.843 <sup>173</sup>	32.82 <sup>25</sup>
27.3	53.424 <sup>177</sup>	5.32 19	15.759 <sup>229</sup>	54.08 <sup>5</sup>	41.050 <sup>228</sup>	78.17 <sup>6</sup>	50.689 <sup>177</sup>	32.57 <sup>24</sup>
Sept. 6.2	53.247 <sup>174</sup>	5.13 5	15.530 <sup>227</sup>	54.03 <sup>47</sup>	40.812 <sup>226</sup>	78.11 <sup>49</sup>	50.516 <sup>182</sup>	32.33 <sup>21</sup>
16.2	53.073 <sup>161</sup>	5.08 9	15.308 <sup>213</sup>	53.56 <sup>88</sup>	40.576 <sup>223</sup>	77.62 <sup>92</sup>	50.339 <sup>167</sup>	32.12 <sup>21</sup>
26.2	52.912 <sup>141</sup>	5.17 26	15.091 <sup>192</sup>	52.68 <sup>167</sup>	40.353 <sup>167</sup>	76.70 <sup>123</sup>	50.157 <sup>144</sup>	31.91 <sup>19</sup>
Oct. 6.2	52.771 <sup>109</sup>	5.42 40	14.899 <sup>156</sup>	51.41 <sup>127</sup>	40.153 <sup>107</sup>	75.37 <sup>173</sup>	49.990 <sup>114</sup>	31.72 <sup>14</sup>
16.1	52.662 <sup>70</sup>	5.82 56	14.743 <sup>118</sup>	49.74 <sup>206</sup>	40.066 <sup>125</sup>	73.44 <sup>213</sup>	49.844 <sup>78</sup>	31.58 <sup>6</sup>
26.1	52.592 <sup>27</sup>	6.40 75	14.625 <sup>71</sup>	47.69 <sup>286</sup>	39.986 <sup>79</sup>	71.52 <sup>245</sup>	49.730 <sup>29</sup>	31.52 <sup>1</sup>
Nov. 5.1	52.565 <sup>20</sup>	7.15 92	14.554 <sup>19</sup>	45.33 <sup>263</sup>	39.861 <sup>26</sup>	69.07 <sup>271</sup>	49.652 <sup>17</sup>	31.53 <sup>13</sup>
15.1	52.585 <sup>69</sup>	8.07 109	14.535 <sup>90</sup>	42.70 <sup>297</sup>	39.782 <sup>84</sup>	66.36 <sup>294</sup>	49.623 <sup>71</sup>	31.66 <sup>21</sup>
25.0	52.654 <sup>119</sup>	9.16 123	14.570 <sup>90</sup>	39.85 <sup>297</sup>	39.756 <sup>84</sup>	63.42 <sup>307</sup>	49.640 <sup>117</sup>	31.87 <sup>37</sup>
Dec. 5.0	52.773 <sup>161</sup>	10.39 135	14.660 <sup>139</sup>	36.88 <sup>303</sup>	39.787 <sup>185</sup>	60.35 <sup>313</sup>	49.711 <sup>165</sup>	32.24 <sup>48</sup>
15.0	52.934 <sup>203</sup>	11.74 139	14.789 <sup>189</sup>	33.85 <sup>298</sup>	39.871 <sup>128</sup>	60.35 <sup>313</sup>	49.828 <sup>208</sup>	32.72 <sup>62</sup>
24.9	53.137 <sup>203</sup>	13.13 139	14.988 <sup>189</sup>	30.87 <sup>298</sup>	40.009 <sup>185</sup>	57.23 <sup>306</sup>	49.993 <sup>208</sup>	33.34 <sup>72</sup>
34.9					40.194	54.17	50.201	34.06
Mean Place	50.489	13.18	13.689	36.10	39.053	59.54	47.263	37.08
Sec δ, Tan δ	1.003	-0.072	1.167	+0.602	1.202	+0.667	1.038	-0.280
D <sub>ψα</sub> , D <sub>ωα</sub>	+0.063	-0.001	+0.046	+0.011	+0.044	+0.012	+0.063	-0.004
D <sub>ψδ</sub> , D <sub>ωδ</sub>	-0.11	-0.96	-0.11	-0.96	-0.11	-0.96	-0.09	-0.97



APPARENT PLACES OF STARS, 1920.

FOR THE UPPER TRANSIT AT WASHINGTON.

Washington Mean Time.	γ Scorpii. Mag. 3.4		ζ Draconis. Mag. 3.2		α Herculis. Var. 3.1-3.9		δ Herculis. Mag. 3.2	
	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.
	h m 17 8	° ' " -43 7	h m 17 8	° ' " +65 48	h m 17 10	° ' " +14 28	h m 17 11	° ' " +24 55
Jan. 0.9	24.788	58.04	29.92	44.09	59.381	51.31	48.949	57.96
10.9	25.061	57.27	30.19	40.68	59.583	49.05	44.149	55.29
20.9	25.416	56.70	30.56	37.55	59.815	46.92	44.384	52.78
30.9	25.781	56.34	30.99	34.85	60.074	44.99	44.648	50.54
Feb. 9.8	26.166	56.20	31.50	32.66	60.353	43.37	44.931	48.66
19.8	26.563	56.24	32.04	31.06	60.643	42.08	45.228	47.22
29.8	26.965	56.47	32.61	30.11	60.936	41.19	45.532	46.23
Mar. 10.7	27.363	56.85	33.19	29.83	61.228	40.72	45.837	45.78
20.7	27.754	57.37	33.76	30.25	61.515	40.71	46.138	45.86
30.7	28.132	58.03	34.31	31.31	61.792	41.13	46.423	46.44
Apr. 9.7	28.491	58.79	34.81	32.98	62.054	41.97	46.696	47.49
19.6	28.830	59.65	35.26	35.17	62.299	43.15	46.948	48.98
29.6	29.141	60.61	35.64	37.82	62.524	44.64	47.177	50.82
May 9.6	29.423	61.65	35.94	40.80	62.723	46.38	47.380	52.95
19.6	29.668	62.77	36.17	44.05	62.895	48.30	47.552	55.30
29.5	29.874	63.94	36.30	47.42	63.038	50.32	47.690	57.76
June 8.5	30.035	65.13	36.35	50.83	63.144	52.38	47.790	60.28
18.5	30.149	66.33	36.31	54.18	63.215	54.41	47.853	62.77
28.4	30.213	67.51	36.18	57.36	63.251	56.38	47.876	65.16
July 8.4	30.224	68.63	35.96	60.31	63.247	58.23	47.859	67.41
18.4	30.184	69.66	35.67	62.96	63.205	59.89	47.800	69.45
28.4	30.094	70.55	35.30	65.24	63.129	61.35	47.705	71.23
Aug. 7.3	29.956	71.28	34.88	67.10	63.012	62.60	47.574	72.71
17.3	29.779	71.81	34.40	68.49	62.872	63.60	47.413	73.89
27.3	29.569	72.10	33.88	69.40	62.707	64.31	47.226	74.72
Sept. 6.3	29.337	72.15	33.33	69.81	62.524	64.74	47.024	75.20
16.2	29.094	71.92	32.77	69.69	62.332	64.86	46.811	75.30
26.2	28.852	71.44	32.22	69.03	62.142	64.74	46.600	75.02
Oct. 6.2	28.626	70.70	31.68	67.87	61.961	64.27	46.397	74.38
16.1	28.429	69.75	31.19	66.19	61.798	63.50	46.215	73.35
26.1	28.272	68.61	30.74	64.04	61.665	62.44	46.062	71.95
Nov. 5.1	28.167	67.35	30.37	61.46	61.568	61.10	45.946	70.22
15.1	28.122	66.01	30.07	58.48	61.511	59.46	45.874	68.16
25.0	28.140	64.65	29.87	55.19	61.504	57.58	45.852	65.83
Dec. 5.0	28.224	63.34	29.77	51.66	61.545	55.52	45.878	63.29
15.0	28.374	62.13	29.77	48.05	61.634	53.32	45.957	60.58
25.0	28.583	61.07	29.88	44.38	61.769	51.02	46.086	57.82
34.9	28.846	60.18	30.10	40.82	61.945	48.71	46.258	55.05
Mean Place	25.198	67.02	33.152	46.94	59.934	49.77	44.686	57.55
Sec δ, Tan δ	1.370	-0.937	2.441	+2.227	1.083	+0.258	1.103	+0.463
D <sub>γ</sub> α, D <sub>α</sub> α	+0.085	-0.014	+0.004	+0.033	+0.065	+0.004	+0.049	+0.006
D <sub>γ</sub> δ, D <sub>α</sub> δ	-0.09	-0.97	-0.09	-0.97	-0.08	-0.98	-0.08	-0.98

APPARENT PLACES OF STARS, 1920.

FOR THE UPPER TRANSIT AT WASHINGTON.

Washington Mean Time.	α Herculis. Mag. 3.4		θ Ophiuchi. Mag. 3.4		ω Herculis. Mag. 5.4		β Aris. Mag. 2.8	
	Right Ascension.	Declination.	Right Ascension.	Declination.	Right Ascension.	Declination.	Right Ascension.	Declination.
	h m	° '	h m	° '	h m	° '	h m	° '
	17 12	+36 53	17 17	-24 55	17 17	+32 33	17 18	-55 27
	s	"	s	"	s	"	s	"
Jan. 0.9	14.524	53.97	5.337	8.86	38.062	71.17	38.028	10.87
10.9	14.728 <sup>204</sup>	50.92 <sup>306</sup>	5.572 <sup>235</sup>	9.01 <sup>15</sup>	39.157 <sup>195</sup>	68.20 <sup>207</sup>	38.371 <sup>343</sup>	9.35 <sup>152</sup>
20.9	14.970 <sup>242</sup>	48.10 <sup>282</sup>	5.840 <sup>268</sup>	9.27 <sup>28</sup>	39.393 <sup>230</sup>	65.44 <sup>278</sup>	38.769 <sup>398</sup>	8.07 <sup>128</sup>
30.9	15.249 <sup>279</sup>	45.60 <sup>260</sup>	6.132 <sup>292</sup>	9.60 <sup>33</sup>	39.660 <sup>267</sup>	62.97 <sup>247</sup>	39.208 <sup>439</sup>	7.07 <sup>100</sup>
Feb. 9.8	15.554 <sup>305</sup>	43.49 <sup>211</sup>	6.445 <sup>313</sup>	9.98 <sup>38</sup>	39.952 <sup>292</sup>	60.00 <sup>207</sup>	39.681 <sup>478</sup>	6.36 <sup>71</sup>
19.8	15.875	41.93	6.766	10.39	40.261	59.30	40.178	5.95
29.8	16.207 <sup>332</sup>	40.91 <sup>102</sup>	7.092 <sup>336</sup>	10.76 <sup>37</sup>	40.579 <sup>318</sup>	58.23 <sup>107</sup>	40.674 <sup>501</sup>	5.82 <sup>13</sup>
Mar. 10.8	16.540 <sup>333</sup>	40.49 <sup>42</sup>	7.417 <sup>336</sup>	11.11 <sup>35</sup>	40.899 <sup>330</sup>	57.72 <sup>51</sup>	41.178 <sup>504</sup>	5.96 <sup>14</sup>
20.7	16.868 <sup>328</sup>	40.65 <sup>16</sup>	7.738 <sup>321</sup>	11.39 <sup>28</sup>	41.214 <sup>315</sup>	57.80 <sup>6</sup>	41.675 <sup>497</sup>	6.36 <sup>40</sup>
30.7	17.181 <sup>313</sup>	41.40 <sup>75</sup>	8.048 <sup>310</sup>	11.65 <sup>26</sup>	41.519 <sup>305</sup>	58.43 <sup>8</sup>	42.159 <sup>484</sup>	7.02 <sup>66</sup>
Apr. 9.7	17.478	42.68	8.347	11.84	41.806	59.59	42.624	7.90
19.6	17.749 <sup>271</sup>	44.46 <sup>178</sup>	8.631 <sup>284</sup>	11.99 <sup>15</sup>	42.976 <sup>288</sup>	61.21 <sup>162</sup>	43.060 <sup>436</sup>	9.00 <sup>110</sup>
29.6	17.994 <sup>245</sup>	46.66 <sup>220</sup>	8.894 <sup>263</sup>	12.09 <sup>10</sup>	42.318 <sup>242</sup>	63.23 <sup>202</sup>	43.465 <sup>405</sup>	10.30 <sup>130</sup>
May 9.6	18.205 <sup>211</sup>	49.18 <sup>282</sup>	9.134 <sup>240</sup>	12.19 <sup>10</sup>	42.581 <sup>213</sup>	65.57 <sup>204</sup>	43.830 <sup>365</sup>	11.76 <sup>146</sup>
19.6	18.380 <sup>175</sup>	51.90 <sup>272</sup>	9.346 <sup>212</sup>	12.28 <sup>9</sup>	42.710 <sup>179</sup>	68.15 <sup>268</sup>	44.150 <sup>330</sup>	13.35 <sup>159</sup>
29.5	18.516	54.79	9.528	12.37	42.851	70.89	44.417	15.07
June 8.5	18.607 <sup>91</sup>	57.76 <sup>297</sup>	9.872 <sup>144</sup>	12.47 <sup>10</sup>	42.953 <sup>102</sup>	73.68 <sup>379</sup>	44.628 <sup>311</sup>	16.86 <sup>179</sup>
18.5	18.656 <sup>49</sup>	60.68 <sup>292</sup>	9.782 <sup>110</sup>	12.60 <sup>13</sup>	43.014 <sup>61</sup>	76.43 <sup>375</sup>	44.776 <sup>148</sup>	18.68 <sup>182</sup>
28.5	18.660 <sup>4</sup>	63.46 <sup>378</sup>	9.849 <sup>67</sup>	12.71 <sup>11</sup>	43.081 <sup>17</sup>	79.10 <sup>287</sup>	44.858 <sup>82</sup>	20.50 <sup>182</sup>
July 8.4	18.616 <sup>44</sup>	66.07 <sup>261</sup>	9.875 <sup>26</sup>	12.86 <sup>15</sup>	43.005 <sup>26</sup>	81.59 <sup>289</sup>	44.873 <sup>15</sup>	22.24 <sup>174</sup>
18.4	18.531	68.43	9.859	12.99	42.936	83.87	44.821	23.86
28.4	18.401 <sup>130</sup>	70.50 <sup>207</sup>	9.799 <sup>60</sup>	13.12 <sup>13</sup>	42.826 <sup>110</sup>	86.85 <sup>196</sup>	44.702 <sup>119</sup>	25.33 <sup>147</sup>
Aug. 7.8	18.235 <sup>166</sup>	72.24 <sup>174</sup>	9.703 <sup>96</sup>	13.21 <sup>9</sup>	42.678 <sup>148</sup>	87.52 <sup>187</sup>	44.524 <sup>178</sup>	26.55 <sup>122</sup>
17.3	18.037 <sup>196</sup>	73.58 <sup>186</sup>	9.569 <sup>134</sup>	13.26 <sup>5</sup>	42.498 <sup>180</sup>	88.82 <sup>180</sup>	44.291 <sup>333</sup>	27.51 <sup>96</sup>
27.3	17.812 <sup>235</sup>	74.52 <sup>94</sup>	9.409 <sup>160</sup>	13.23 <sup>3</sup>	42.292 <sup>208</sup>	89.76 <sup>194</sup>	44.016 <sup>275</sup>	28.14 <sup>63</sup>
Sept. 6.3	17.568	75.03	9.229	13.13	42.068	90.29	43.710	28.43
16.2	17.315 <sup>283</sup>	75.08 <sup>5</sup>	9.037 <sup>192</sup>	12.96 <sup>17</sup>	41.882 <sup>236</sup>	90.39 <sup>10</sup>	43.386 <sup>334</sup>	28.36 <sup>7</sup>
26.2	17.063 <sup>252</sup>	74.70 <sup>38</sup>	8.845 <sup>192</sup>	12.70 <sup>26</sup>	41.596 <sup>230</sup>	90.07 <sup>32</sup>	43.064 <sup>322</sup>	27.90 <sup>46</sup>
Oct. 6.2	16.823 <sup>240</sup>	73.89 <sup>81</sup>	8.663 <sup>182</sup>	12.37 <sup>38</sup>	41.369 <sup>227</sup>	89.83 <sup>74</sup>	42.756 <sup>308</sup>	27.07 <sup>83</sup>
16.2	16.604 <sup>219</sup>	72.60 <sup>129</sup>	8.502 <sup>161</sup>	11.98 <sup>39</sup>	41.162 <sup>207</sup>	88.15 <sup>118</sup>	42.483 <sup>273</sup>	25.91 <sup>116</sup>
26.1	16.415 <sup>189</sup>	70.91	8.373	11.60	40.966	86.58	42.257	24.45
Nov. 5.1	16.267 <sup>148</sup>	68.81 <sup>210</sup>	8.286 <sup>87</sup>	11.18 <sup>42</sup>	40.846 <sup>140</sup>	84.63 <sup>195</sup>	42.093 <sup>164</sup>	22.75 <sup>170</sup>
15.1	16.164 <sup>103</sup>	66.36 <sup>245</sup>	8.243 <sup>43</sup>	10.80 <sup>36</sup>	40.752 <sup>94</sup>	82.31 <sup>232</sup>	42.003 <sup>90</sup>	20.86 <sup>139</sup>
25.0	16.117 <sup>47</sup>	63.59 <sup>277</sup>	8.251 <sup>8</sup>	10.49 <sup>31</sup>	40.708 <sup>44</sup>	79.70 <sup>261</sup>	41.990 <sup>13</sup>	18.89 <sup>197</sup>
Dec. 5.0	16.124 <sup>7</sup>	60.62 <sup>297</sup>	8.316 <sup>65</sup>	10.25 <sup>24</sup>	40.719 <sup>11</sup>	76.86 <sup>284</sup>	42.061 <sup>71</sup>	16.89 <sup>209</sup>
15.0	16.189	57.47	8.430	10.13	40.784	73.86	42.215	14.93
25.0	16.309 <sup>120</sup>	54.27 <sup>320</sup>	8.566 <sup>198</sup>	10.14 <sup>1</sup>	40.900 <sup>116</sup>	70.79 <sup>307</sup>	42.446 <sup>231</sup>	13.10 <sup>183</sup>
34.9	16.480 <sup>171</sup>	51.12 <sup>315</sup>	8.802 <sup>206</sup>	10.25 <sup>11</sup>	41.066 <sup>166</sup>	67.73 <sup>306</sup>	42.746 <sup>300</sup>	11.47 <sup>163</sup>
Mean Place	15.581	54.69	5.667	15.46	39.895	71.08	38.769	20.69
Sec δ, Tan δ	1.250	+0.751	1.103	-0.465	1.187	+0.639	1.763	-1.453
D <sub>α</sub> , D <sub>ω</sub>	+0.042	+0.010	+0.073	-0.006	+0.044	+0.008	+0.099	-0.017
D <sub>θ</sub> , D <sub>β</sub>	-0.08	-0.98	-0.07	-0.98	-0.07	-0.98	-0.07	-0.98

FOR THE UPPER TRANSIT AT WASHINGTON.

Washington Mean Time.	δ Ophiuchi. Mag. 4.3		σ Ophiuchi. Mag. 4.4		δ Arse. Mag. 3.3		α Arse. Mag. 3.0	
	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.
	h m 17 21	° ' " -24 6	h m 17 22	° ' " + 4 12	h m 17 25	° ' " - 0 36	h m 17 25	° ' " -49 48
Jan. 0.9	28.592	4.70	32.227	35.35	51.27	58.37	33.653	42.43
10.9	28.821 <sup>200</sup>	4.87 <sup>17</sup>	32.424 <sup>107</sup>	33.58 <sup>177</sup>	51.65 <sup>28</sup>	57.06 <sup>153</sup>	38.955 <sup>302</sup>	41.13 <sup>130</sup>
20.9	29.063 <sup>202</sup>	5.15 <sup>28</sup>	32.652 <sup>228</sup>	31.90 <sup>108</sup>	52.09 <sup>44</sup>	55.50 <sup>155</sup>	39.303 <sup>348</sup>	40.06 <sup>107</sup>
30.9	29.370 <sup>207</sup>	5.49 <sup>34</sup>	32.905 <sup>253</sup>	30.36 <sup>154</sup>	52.59 <sup>80</sup>	54.24 <sup>128</sup>	39.691 <sup>385</sup>	39.21 <sup>85</sup>
Feb. 9.8	29.677 <sup>207</sup>	5.98 <sup>39</sup>	33.176 <sup>271</sup>	29.01 <sup>135</sup>	53.11 <sup>69</sup>	53.30 <sup>94</sup>	40.196 <sup>415</sup>	38.61 <sup>60</sup>
19.8	29.995 <sup>218</sup>	6.26 <sup>38</sup>	33.459 <sup>283</sup>	27.92 <sup>109</sup>	53.67 <sup>56</sup>	52.69 <sup>61</sup>	40.540 <sup>434</sup>	38.24 <sup>37</sup>
29.8	30.316 <sup>331</sup>	6.60 <sup>34</sup>	33.747 <sup>283</sup>	27.92 <sup>79</sup>	53.67 <sup>57</sup>	52.69 <sup>39</sup>	40.540 <sup>444</sup>	38.24 <sup>13</sup>
Mar. 10.8	30.639 <sup>326</sup>	6.92 <sup>32</sup>	34.037 <sup>290</sup>	27.13 <sup>45</sup>	54.24 <sup>66</sup>	52.40 <sup>3</sup>	40.984 <sup>446</sup>	38.11 <sup>9</sup>
20.7	30.959 <sup>329</sup>	7.18 <sup>26</sup>	34.321 <sup>294</sup>	26.68 <sup>10</sup>	54.82 <sup>57</sup>	52.43 <sup>34</sup>	41.430 <sup>443</sup>	38.20 <sup>29</sup>
30.7	31.269 <sup>310</sup>	7.40 <sup>22</sup>	34.599 <sup>278</sup>	26.58 <sup>24</sup>	55.39 <sup>55</sup>	52.77 <sup>63</sup>	41.873 <sup>433</sup>	38.49 <sup>50</sup>
Apr. 9.7	31.568 <sup>290</sup>	7.53 <sup>15</sup>	34.865 <sup>266</sup>	26.32 <sup>57</sup>	55.94 <sup>54</sup>	53.40 <sup>92</sup>	42.306 <sup>416</sup>	38.99 <sup>68</sup>
19.6	31.853 <sup>295</sup>	7.62 <sup>9</sup>	34.965 <sup>251</sup>	27.39 <sup>87</sup>	56.48 <sup>60</sup>	54.32 <sup>118</sup>	42.722 <sup>394</sup>	39.67 <sup>86</sup>
29.6	32.118 <sup>295</sup>	7.67 <sup>5</sup>	35.116 <sup>234</sup>	28.26 <sup>111</sup>	56.98 <sup>46</sup>	55.50 <sup>140</sup>	43.116 <sup>367</sup>	40.53 <sup>108</sup>
May 9.6	32.359 <sup>241</sup>	7.67 <sup>4</sup>	35.350 <sup>211</sup>	29.37 <sup>180</sup>	57.44 <sup>43</sup>	56.90 <sup>161</sup>	43.483 <sup>335</sup>	41.56 <sup>117</sup>
19.6	32.572 <sup>213</sup>	7.71 <sup>2</sup>	35.561 <sup>187</sup>	30.67 <sup>146</sup>	57.86 <sup>87</sup>	58.51 <sup>178</sup>	43.818 <sup>295</sup>	42.73 <sup>129</sup>
29.5	32.756 <sup>184</sup>	7.73 <sup>3</sup>	35.748 <sup>157</sup>	32.13 <sup>154</sup>	58.23 <sup>31</sup>	60.29 <sup>192</sup>	44.113 <sup>252</sup>	44.02 <sup>139</sup>
June 8.5	32.756 <sup>160</sup>	7.76 <sup>3</sup>	35.905 <sup>136</sup>	33.67 <sup>168</sup>	58.54 <sup>28</sup>	62.21 <sup>201</sup>	44.385 <sup>202</sup>	45.41 <sup>149</sup>
18.5	32.906 <sup>112</sup>	7.79 <sup>7</sup>	36.031 <sup>92</sup>	35.26 <sup>156</sup>	58.79 <sup>17</sup>	64.22 <sup>207</sup>	44.567 <sup>145</sup>	46.90 <sup>151</sup>
28.5	33.019 <sup>73</sup>	7.86 <sup>6</sup>	36.123 <sup>55</sup>	36.90 <sup>151</sup>	58.96 <sup>9</sup>	66.28 <sup>206</sup>	44.715 <sup>90</sup>	48.41 <sup>152</sup>
July 8.4	33.091 <sup>29</sup>	7.92 <sup>10</sup>	36.178 <sup>16</sup>	38.31 <sup>141</sup>	59.05 <sup>1</sup>	68.35 <sup>199</sup>	44.805 <sup>81</sup>	49.93 <sup>148</sup>
18.4	33.120 <sup>11</sup>	8.02 <sup>10</sup>	36.194 <sup>23</sup>	39.72 <sup>130</sup>	59.06 <sup>7</sup>	70.34 <sup>188</sup>	44.836 <sup>81</sup>	51.41 <sup>140</sup>
28.4	33.109 <sup>56</sup>	8.12 <sup>9</sup>	36.172 <sup>60</sup>	41.02 <sup>114</sup>	58.99 <sup>13</sup>	72.22 <sup>168</sup>	44.805 <sup>88</sup>	52.81 <sup>127</sup>
Aug. 7.3	33.063 <sup>94</sup>	8.21 <sup>8</sup>	36.112 <sup>94</sup>	42.16 <sup>97</sup>	58.86 <sup>21</sup>	73.90 <sup>145</sup>	44.717 <sup>145</sup>	54.08 <sup>106</sup>
17.3	32.959 <sup>130</sup>	8.29 <sup>5</sup>	36.018 <sup>94</sup>	43.13 <sup>79</sup>	58.65 <sup>27</sup>	75.35 <sup>114</sup>	44.572 <sup>192</sup>	55.14 <sup>87</sup>
27.3	32.829 <sup>156</sup>	8.34 <sup>4</sup>	35.892 <sup>151</sup>	43.92 <sup>61</sup>	58.38 <sup>28</sup>	76.49 <sup>79</sup>	44.380 <sup>233</sup>	56.01 <sup>57</sup>
Sept. 6.3	32.671 <sup>178</sup>	8.30 <sup>7</sup>	35.741 <sup>179</sup>	44.53 <sup>40</sup>	58.06 <sup>36</sup>	77.28 <sup>42</sup>	44.147 <sup>261</sup>	56.58 <sup>29</sup>
16.2	32.493 <sup>191</sup>	8.23 <sup>14</sup>	35.571 <sup>181</sup>	44.93 <sup>20</sup>	57.70 <sup>38</sup>	77.70 <sup>1</sup>	43.886 <sup>280</sup>	56.87 <sup>2</sup>
26.2	32.302 <sup>192</sup>	8.09 <sup>24</sup>	35.390 <sup>183</sup>	45.13 <sup>2</sup>	57.32 <sup>38</sup>	77.71 <sup>43</sup>	43.606 <sup>281</sup>	56.85 <sup>36</sup>
Oct. 6.2	32.110 <sup>182</sup>	7.85 <sup>30</sup>	35.208 <sup>175</sup>	45.11 <sup>21</sup>	56.94 <sup>36</sup>	77.28 <sup>83</sup>	43.325 <sup>299</sup>	56.49 <sup>69</sup>
16.2	31.928 <sup>162</sup>	7.55 <sup>34</sup>	35.033 <sup>156</sup>	44.90 <sup>45</sup>	56.58 <sup>38</sup>	76.45 <sup>131</sup>	43.056 <sup>300</sup>	55.89 <sup>96</sup>
26.1	31.766 <sup>129</sup>	7.21 <sup>34</sup>	34.877 <sup>130</sup>	44.45 <sup>67</sup>	56.25 <sup>38</sup>	75.24 <sup>156</sup>	42.814 <sup>302</sup>	54.84 <sup>123</sup>
Nov. 5.1	31.637 <sup>91</sup>	6.87 <sup>37</sup>	34.747 <sup>94</sup>	43.78 <sup>89</sup>	55.97 <sup>21</sup>	78.63 <sup>185</sup>	42.614 <sup>148</sup>	53.61 <sup>145</sup>
15.1	31.546 <sup>48</sup>	6.50 <sup>32</sup>	34.651 <sup>54</sup>	42.89 <sup>110</sup>	55.76 <sup>13</sup>	71.85 <sup>207</sup>	42.468 <sup>83</sup>	52.16 <sup>159</sup>
25.0	31.498 <sup>4</sup>	6.18 <sup>29</sup>	34.597 <sup>5</sup>	41.79 <sup>132</sup>	55.64 <sup>3</sup>	69.78 <sup>230</sup>	42.385 <sup>15</sup>	50.57 <sup>170</sup>
Dec. 5.0	31.502 <sup>59</sup>	5.93 <sup>19</sup>	34.569 <sup>40</sup>	40.47 <sup>149</sup>	55.61 <sup>6</sup>	67.56 <sup>228</sup>	42.370 <sup>60</sup>	48.87 <sup>170</sup>
15.0	31.561 <sup>110</sup>	5.74 <sup>9</sup>	34.629 <sup>89</sup>	38.98 <sup>163</sup>	55.67 <sup>15</sup>	65.30 <sup>228</sup>	42.430 <sup>132</sup>	47.17 <sup>165</sup>
25.0	31.671 <sup>189</sup>	5.65 <sup>2</sup>	34.715 <sup>131</sup>	37.36 <sup>174</sup>	55.82 <sup>25</sup>	63.08 <sup>211</sup>	42.582 <sup>200</sup>	45.52 <sup>154</sup>
34.9	31.830 <sup>304</sup>	5.67 <sup>17</sup>	34.846 <sup>173</sup>	35.62 <sup>178</sup>	56.07 <sup>33</sup>	60.97 <sup>194</sup>	42.762 <sup>263</sup>	43.98 <sup>139</sup>
34.9	32.034 <sup>304</sup>	5.84 <sup>17</sup>	35.018 <sup>173</sup>	33.84 <sup>178</sup>	56.39 <sup>33</sup>	59.06 <sup>194</sup>	43.025 <sup>263</sup>	42.59 <sup>139</sup>
Mean Place	28.931	11.18	32.680	32.11	52.258	63.39	39.273	51.47
Sec δ, Tan δ	1.096	-0.447	1.093	+0.074	2.038	-1.776	1.550	-1.184
D <sub>ψα</sub> , D <sub>μα</sub>	+0.073	-0.005	+0.059	+0.001	+0.108	-0.019	+0.092	-0.012
D <sub>ψδ</sub> , D <sub>μδ</sub>	-0.07	-0.99	-0.06	-0.99	-0.06	-0.99	-0.06	-0.99

APPARENT PLACES OF STARS, 1920.

FOR THE UPPER TRANSIT AT WASHINGTON.

Washington Mean Time.	λ Hercules. Mag. 4.5		λ Scorpil. Mag. 1.7		β Draconis. Mag. 3.0		α Ophiuchi. Mag. 2.1	
	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.
	h m 17 27	° ' " +26 10	h m 17 28	° ' " -37 2	h m 17 28	° ' " +52 21	h m 17 31	° ' " +12 36
Jan. 1.0	29.506	13.63	10.017	40.27	35.639	35.99	12.646	64.00
10.9	29.691 <sup>185</sup>	10.90 <sup>278</sup>	10.267 <sup>250</sup>	39.67 <sup>60</sup>	35.834 <sup>193</sup>	32.59 <sup>340</sup>	12.832 <sup>196</sup>	62.45 <sup>215</sup>
20.9	29.913 <sup>228</sup>	8.34 <sup>256</sup>	10.558 <sup>291</sup>	39.20 <sup>47</sup>	36.089 <sup>255</sup>	29.43 <sup>316</sup>	13.049 <sup>217</sup>	60.40 <sup>205</sup>
30.9	30.165 <sup>262</sup>	6.04 <sup>290</sup>	10.878 <sup>330</sup>	38.91 <sup>20</sup>	36.397 <sup>306</sup>	26.63 <sup>280</sup>	13.295 <sup>246</sup>	58.53 <sup>187</sup>
Feb. 9.8	30.441 <sup>276</sup>	4.09 <sup>195</sup>	11.221 <sup>345</sup>	38.73 <sup>18</sup>	36.746 <sup>349</sup>	24.29 <sup>294</sup>	13.562 <sup>267</sup>	56.93 <sup>160</sup>
19.8	30.734 <sup>298</sup>	2.55 <sup>154</sup>	11.579 <sup>368</sup>	38.69 <sup>4</sup>	37.124 <sup>378</sup>	22.47 <sup>183</sup>	13.841 <sup>270</sup>	55.64 <sup>129</sup>
29.8	31.036 <sup>302</sup>	1.50 <sup>165</sup>	11.942 <sup>383</sup>	38.75 <sup>6</sup>	37.524 <sup>400</sup>	21.26 <sup>131</sup>	14.129 <sup>238</sup>	54.73 <sup>91</sup>
Mar. 10.8	31.340 <sup>304</sup>	0.97 <sup>53</sup>	12.309 <sup>387</sup>	38.82 <sup>17</sup>	37.953 <sup>411</sup>	20.71 <sup>55</sup>	14.419 <sup>290</sup>	54.24 <sup>49</sup>
20.7	31.643 <sup>308</sup>	0.98 <sup>1</sup>	12.673 <sup>364</sup>	39.15 <sup>28</sup>	38.343 <sup>408</sup>	20.81 <sup>70</sup>	14.708 <sup>289</sup>	54.15 <sup>9</sup>
30.7	31.938 <sup>295</sup>	1.51 <sup>58</sup>	13.027 <sup>354</sup>	39.47 <sup>83</sup>	38.740 <sup>397</sup>	21.57 <sup>76</sup>	14.990 <sup>232</sup>	54.50 <sup>35</sup>
Apr. 9.7	32.220 <sup>282</sup>	2.53 <sup>102</sup>	13.371 <sup>344</sup>	39.86 <sup>89</sup>	39.114 <sup>374</sup>	22.94 <sup>187</sup>	15.261 <sup>271</sup>	55.25 <sup>73</sup>
19.7	32.484 <sup>264</sup>	3.99 <sup>146</sup>	13.697 <sup>326</sup>	40.31 <sup>45</sup>	39.458 <sup>344</sup>	24.85 <sup>191</sup>	15.516 <sup>255</sup>	56.35 <sup>110</sup>
29.6	32.727 <sup>243</sup>	5.84 <sup>185</sup>	14.003 <sup>306</sup>	40.82 <sup>51</sup>	39.767 <sup>300</sup>	27.22 <sup>267</sup>	15.754 <sup>236</sup>	57.75 <sup>140</sup>
May 9.6	32.943 <sup>216</sup>	7.99 <sup>219</sup>	14.282 <sup>279</sup>	41.42 <sup>60</sup>	40.030 <sup>283</sup>	29.98 <sup>276</sup>	15.971 <sup>217</sup>	59.40 <sup>165</sup>
19.6	33.129 <sup>185</sup>	10.38 <sup>250</sup>	14.532 <sup>250</sup>	42.07 <sup>65</sup>	40.244 <sup>214</sup>	33.02 <sup>304</sup>	16.160 <sup>189</sup>	61.26 <sup>186</sup>
29.5	33.282 <sup>153</sup>	12.93 <sup>255</sup>	14.748 <sup>216</sup>	42.77 <sup>70</sup>	40.404 <sup>101</sup>	36.27 <sup>326</sup>	16.322 <sup>163</sup>	63.21 <sup>195</sup>
June 8.5	33.399 <sup>117</sup>	15.52 <sup>269</sup>	14.924 <sup>176</sup>	43.53 <sup>76</sup>	40.595 <sup>41</sup>	39.59 <sup>332</sup>	16.449 <sup>127</sup>	65.22 <sup>201</sup>
18.5	33.475 <sup>76</sup>	18.11 <sup>269</sup>	15.057 <sup>133</sup>	44.33 <sup>80</sup>	40.546 <sup>16</sup>	42.89 <sup>330</sup>	16.541 <sup>92</sup>	67.23 <sup>201</sup>
28.5	33.511 <sup>26</sup>	20.61 <sup>260</sup>	15.142 <sup>85</sup>	45.15 <sup>82</sup>	40.530 <sup>16</sup>	46.09 <sup>320</sup>	16.596 <sup>55</sup>	69.18 <sup>195</sup>
July 8.4	33.506 <sup>5</sup>	22.99 <sup>288</sup>	15.180 <sup>38</sup>	45.95 <sup>80</sup>	40.454 <sup>76</sup>	49.12 <sup>308</sup>	16.612 <sup>16</sup>	71.02 <sup>184</sup>
18.4	33.459 <sup>47</sup>	25.16 <sup>217</sup>	15.169 <sup>11</sup>	46.72 <sup>77</sup>	40.318 <sup>186</sup>	51.38 <sup>276</sup>	16.590 <sup>22</sup>	72.67 <sup>165</sup>
28.4	33.373 <sup>86</sup>	27.07 <sup>191</sup>	15.109 <sup>69</sup>	47.44 <sup>72</sup>	40.128 <sup>190</sup>	54.32 <sup>244</sup>	16.526 <sup>64</sup>	74.17 <sup>150</sup>
Aug. 7.4	33.248 <sup>126</sup>	28.72 <sup>185</sup>	15.092 <sup>107</sup>	48.08 <sup>59</sup>	39.891 <sup>237</sup>	56.40 <sup>268</sup>	16.428 <sup>98</sup>	75.46 <sup>129</sup>
17.3	33.091 <sup>157</sup>	30.93 <sup>181</sup>	14.856 <sup>166</sup>	48.51 <sup>48</sup>	39.611 <sup>280</sup>	58.05 <sup>165</sup>	16.298 <sup>130</sup>	76.49 <sup>103</sup>
27.3	32.907 <sup>184</sup>	31.01 <sup>96</sup>	14.675 <sup>181</sup>	48.82 <sup>31</sup>	39.296 <sup>315</sup>	59.26 <sup>191</sup>	16.142 <sup>156</sup>	77.27 <sup>78</sup>
Sept. 6.3	32.708 <sup>204</sup>	31.62 <sup>61</sup>	14.471 <sup>204</sup>	49.05 <sup>13</sup>	38.956 <sup>340</sup>	59.96 <sup>70</sup>	15.966 <sup>176</sup>	77.79 <sup>52</sup>
16.2	32.488 <sup>215</sup>	31.55 <sup>28</sup>	14.250 <sup>271</sup>	48.88 <sup>7</sup>	38.603 <sup>353</sup>	60.18 <sup>23</sup>	15.777 <sup>180</sup>	78.04 <sup>25</sup>
26.2	32.270 <sup>218</sup>	31.69 <sup>16</sup>	14.027 <sup>223</sup>	48.60 <sup>26</sup>	38.245 <sup>358</sup>	59.89 <sup>29</sup>	15.586 <sup>191</sup>	77.98 <sup>6</sup>
Oct. 6.2	32.060 <sup>210</sup>	31.15 <sup>94</sup>	13.816 <sup>211</sup>	48.14 <sup>46</sup>	37.900 <sup>345</sup>	59.08 <sup>81</sup>	15.402 <sup>184</sup>	77.65 <sup>33</sup>
16.2	31.867 <sup>193</sup>	30.22 <sup>58</sup>	13.624 <sup>193</sup>	47.50 <sup>64</sup>	37.575 <sup>335</sup>	57.76 <sup>133</sup>	15.234 <sup>168</sup>	77.01 <sup>64</sup>
26.1	31.701 <sup>166</sup>	28.91 <sup>181</sup>	13.467 <sup>157</sup>	46.70 <sup>80</sup>	37.286 <sup>299</sup>	57.00 <sup>177</sup>	15.080 <sup>145</sup>	76.09 <sup>92</sup>
Nov. 5.1	31.571 <sup>130</sup>	28.91 <sup>167</sup>	13.467 <sup>115</sup>	46.70 <sup>92</sup>	37.286 <sup>245</sup>	55.99 <sup>235</sup>	15.080 <sup>106</sup>	76.09 <sup>119</sup>
15.1	31.458 <sup>88</sup>	27.24 <sup>200</sup>	13.352 <sup>60</sup>	45.78 <sup>97</sup>	37.041 <sup>189</sup>	53.74 <sup>267</sup>	14.981 <sup>68</sup>	74.90 <sup>148</sup>
25.1	31.441 <sup>42</sup>	25.24 <sup>228</sup>	13.292 <sup>7</sup>	44.81 <sup>101</sup>	36.852 <sup>129</sup>	51.07 <sup>302</sup>	14.913 <sup>27</sup>	73.42 <sup>170</sup>
Dec. 5.0	31.452 <sup>11</sup>	22.96 <sup>264</sup>	13.285 <sup>56</sup>	43.80 <sup>96</sup>	36.723 <sup>57</sup>	48.05 <sup>328</sup>	14.886 <sup>24</sup>	71.72 <sup>191</sup>
15.0	31.452 <sup>62</sup>	20.42 <sup>270</sup>	13.341 <sup>414</sup>	42.84 <sup>93</sup>	36.666 <sup>14</sup>	44.77 <sup>344</sup>	14.910 <sup>71</sup>	69.81 <sup>204</sup>
25.0	31.514 <sup>199</sup>	17.72 <sup>278</sup>	13.455 <sup>170</sup>	41.92 <sup>78</sup>	36.680 <sup>82</sup>	41.83 <sup>353</sup>	14.981 <sup>116</sup>	67.77 <sup>218</sup>
34.9	31.779 <sup>156</sup>	14.94 <sup>280</sup>	13.625 <sup>321</sup>	41.13 <sup>68</sup>	36.762 <sup>156</sup>	37.81 <sup>356</sup>	15.097 <sup>161</sup>	65.59 <sup>219</sup>
34.9	31.779 <sup>156</sup>	12.14 <sup>280</sup>	13.846 <sup>321</sup>	40.45 <sup>68</sup>	36.918 <sup>156</sup>	34.81 <sup>356</sup>	15.258 <sup>161</sup>	63.40 <sup>219</sup>
Mean Place	30.294	12.80	10.446	48.04	37.456	36.27	13.269	61.88
Sec δ, Tan δ	1.114	+0.491	1.253	-0.755	1.638	+1.297	1.025	+0.224
D <sub>α</sub> , D <sub>β</sub>	+0.048	+0.005	+0.081	-0.007	+0.027	+0.012	+0.055	+0.002
D <sub>γ</sub> , D <sub>δ</sub>	-0.06	-0.99	-0.06	-0.99	-0.05	-0.99	-0.05	-0.99

# APPARENT PLACES OF STARS, 1920.

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## FOR THE UPPER TRANSIT AT WASHINGTON.

Washington Mean Time.	ξ Serpentis. Mag. 3.6		ι Herculis. Mag. 3.8		α Draconis. Mag. 4.9		γ Pavonis. Mag. 3.6	
	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.
	h m 17 32	° ' " -15 20	h m 17 37	° ' " +46 2	h m 17 37	° ' " +68 47	h m 17 37	° ' " -64 40
Jan. 1.0	59.874	51.72	10.952	54.63	21.23	42.22	51.24	65.51
10.9	60.080 <sup>208</sup>	52.36 <sup>64</sup>	11.129 <sup>177</sup>	51.83 <sup>308</sup>	21.45 <sup>23</sup>	38.74 <sup>948</sup>	51.63 <sup>39</sup>	63.40 <sup>211</sup>
20.9	60.318 <sup>208</sup>	53.03 <sup>67</sup>	11.359 <sup>230</sup>	48.24 <sup>308</sup>	21.79 <sup>34</sup>	35.48 <sup>388</sup>	52.10 <sup>47</sup>	61.53 <sup>187</sup>
30.9	60.582 <sup>204</sup>	53.71 <sup>68</sup>	11.634 <sup>275</sup>	45.46 <sup>278</sup>	22.21 <sup>43</sup>	32.57 <sup>301</sup>	52.64 <sup>54</sup>	59.95 <sup>158</sup>
Feb. 9.8	60.865 <sup>208</sup>	54.34 <sup>68</sup>	11.947 <sup>313</sup>	43.11 <sup>238</sup>	22.72 <sup>51</sup>	30.12 <sup>246</sup>	53.22 <sup>58</sup>	58.69 <sup>126</sup>
19.8	61.160 <sup>206</sup>	54.89 <sup>55</sup>	12.286 <sup>339</sup>	41.26 <sup>188</sup>	23.29 <sup>67</sup>	28.22 <sup>190</sup>	53.84 <sup>62</sup>	57.78 <sup>91</sup>
29.8	61.462 <sup>308</sup>	55.34 <sup>46</sup>	12.645 <sup>350</sup>	39.99 <sup>127</sup>	23.90 <sup>61</sup>	26.94 <sup>188</sup>	54.48 <sup>64</sup>	57.22 <sup>56</sup>
Mar. 10.8	61.766 <sup>304</sup>	55.83 <sup>26</sup>	13.013 <sup>368</sup>	39.35 <sup>64</sup>	24.54 <sup>64</sup>	26.82 <sup>68</sup>	55.13 <sup>65</sup>	57.00 <sup>22</sup>
20.7	62.068 <sup>302</sup>	55.79 <sup>36</sup>	13.381 <sup>368</sup>	39.55 <sup>0</sup>	25.19 <sup>65</sup>	26.39 <sup>7</sup>	55.78 <sup>65</sup>	57.13 <sup>13</sup>
30.7	62.364 <sup>286</sup>	55.80 <sup>1</sup>	13.741 <sup>340</sup>	39.98 <sup>68</sup>	25.82 <sup>63</sup>	27.12 <sup>78</sup>	56.42 <sup>64</sup>	57.59 <sup>46</sup>
Apr. 9.7	62.650 <sup>286</sup>	55.86 <sup>14</sup>	14.084 <sup>343</sup>	41.21 <sup>128</sup>	26.41 <sup>60</sup>	28.49 <sup>187</sup>	57.03 <sup>61</sup>	58.37 <sup>78</sup>
19.7	62.924 <sup>374</sup>	55.88 <sup>28</sup>	14.404 <sup>330</sup>	42.98 <sup>177</sup>	26.96 <sup>55</sup>	30.42 <sup>198</sup>	57.62 <sup>59</sup>	59.43 <sup>106</sup>
29.6	63.180 <sup>304</sup>	55.01 <sup>97</sup>	14.694 <sup>200</sup>	45.22 <sup>234</sup>	27.44 <sup>48</sup>	32.85 <sup>245</sup>	58.17 <sup>55</sup>	60.79 <sup>136</sup>
May 9.6	63.416 <sup>238</sup>	54.56 <sup>45</sup>	14.948 <sup>284</sup>	47.85 <sup>268</sup>	27.94 <sup>40</sup>	35.68 <sup>288</sup>	58.66 <sup>49</sup>	62.89 <sup>160</sup>
19.6	63.628 <sup>212</sup>	54.06 <sup>60</sup>	15.181 <sup>213</sup>	50.76 <sup>291</sup>	28.14 <sup>30</sup>	38.82 <sup>314</sup>	59.10 <sup>44</sup>	64.23 <sup>184</sup>
29.5	63.812 <sup>184</sup>	53.53 <sup>28</sup>	15.327 <sup>186</sup>	53.88 <sup>312</sup>	28.35 <sup>21</sup>	42.16 <sup>324</sup>	59.47 <sup>37</sup>	66.21 <sup>198</sup>
June 8.5	63.963 <sup>164</sup>	53.02 <sup>51</sup>	15.445 <sup>128</sup>	57.09 <sup>321</sup>	28.47 <sup>13</sup>	45.00 <sup>344</sup>	59.77 <sup>30</sup>	68.34 <sup>218</sup>
18.5	64.079 <sup>136</sup>	52.52 <sup>30</sup>	15.510 <sup>65</sup>	60.90 <sup>321</sup>	28.48 <sup>1</sup>	49.04 <sup>344</sup>	59.98 <sup>21</sup>	70.56 <sup>228</sup>
28.5	64.157 <sup>78</sup>	52.07 <sup>45</sup>	15.523 <sup>13</sup>	63.44 <sup>314</sup>	28.89 <sup>9</sup>	52.40 <sup>336</sup>	60.11 <sup>13</sup>	72.78 <sup>222</sup>
July 8.4	64.194 <sup>3</sup>	51.68 <sup>41</sup>	15.481 <sup>297</sup>	66.41 <sup>297</sup>	29.18 <sup>21</sup>	55.57 <sup>317</sup>	60.14 <sup>3</sup>	74.97 <sup>219</sup>
18.4	64.191 <sup>3</sup>	51.31 <sup>35</sup>	15.387 <sup>94</sup>	69.15 <sup>274</sup>	29.18 <sup>28</sup>	55.57 <sup>302</sup>	60.14 <sup>6</sup>	74.97 <sup>210</sup>
28.4	64.147 <sup>44</sup>	51.01 <sup>30</sup>	15.243 <sup>144</sup>	71.69 <sup>244</sup>	27.52 <sup>38</sup>	61.08 <sup>380</sup>	59.94 <sup>14</sup>	78.99 <sup>192</sup>
Aug. 7.4	64.084 <sup>83</sup>	50.75 <sup>26</sup>	15.055 <sup>188</sup>	73.83 <sup>269</sup>	27.52 <sup>45</sup>	63.30 <sup>322</sup>	59.94 <sup>14</sup>	78.99 <sup>192</sup>
17.3	63.947 <sup>117</sup>	50.54 <sup>31</sup>	14.826 <sup>239</sup>	75.38 <sup>179</sup>	27.07 <sup>52</sup>	65.09 <sup>179</sup>	59.71 <sup>23</sup>	80.67 <sup>168</sup>
27.3	63.802 <sup>144</sup>	50.35 <sup>16</sup>	14.563 <sup>283</sup>	76.64 <sup>126</sup>	26.55 <sup>68</sup>	65.09 <sup>182</sup>	59.41 <sup>26</sup>	82.03 <sup>136</sup>
Sept. 6.3	63.634 <sup>188</sup>	50.19 <sup>16</sup>	14.277 <sup>286</sup>	76.64 <sup>81</sup>	25.97 <sup>63</sup>	66.41 <sup>83</sup>	59.05 <sup>41</sup>	83.06 <sup>103</sup>
16.2	63.453 <sup>181</sup>	50.04 <sup>15</sup>	13.975 <sup>302</sup>	77.45 <sup>29</sup>	25.94 <sup>64</sup>	67.24 <sup>81</sup>	58.84 <sup>44</sup>	83.69 <sup>19</sup>
26.2	63.269 <sup>184</sup>	49.92 <sup>12</sup>	13.778 <sup>307</sup>	77.78 <sup>16</sup>	24.90 <sup>65</sup>	67.55 <sup>21</sup>	58.20 <sup>44</sup>	83.88 <sup>26</sup>
Oct. 6.2	63.092 <sup>177</sup>	49.82 <sup>18</sup>	13.668 <sup>360</sup>	77.62 <sup>64</sup>	24.05 <sup>63</sup>	67.34 <sup>75</sup>	57.75 <sup>43</sup>	83.62 <sup>72</sup>
16.2	62.933 <sup>150</sup>	49.75 <sup>7</sup>	13.487 <sup>381</sup>	79.98 <sup>114</sup>	23.42 <sup>69</sup>	66.59 <sup>126</sup>	57.82 <sup>40</sup>	82.90 <sup>114</sup>
26.1	62.800 <sup>133</sup>	49.75 <sup>2</sup>	13.287 <sup>281</sup>	75.84 <sup>161</sup>	22.83 <sup>56</sup>	65.33 <sup>177</sup>	56.92 <sup>34</sup>	81.76 <sup>155</sup>
Nov. 5.1	62.800 <sup>96</sup>	49.73 <sup>4</sup>	12.933 <sup>212</sup>	74.23 <sup>212</sup>	22.27 <sup>40</sup>	63.56 <sup>224</sup>	56.58 <sup>27</sup>	80.21 <sup>186</sup>
15.1	62.702 <sup>84</sup>	49.77 <sup>12</sup>	12.624 <sup>168</sup>	72.17 <sup>206</sup>	21.78 <sup>41</sup>	61.32 <sup>267</sup>	56.31 <sup>17</sup>	78.85 <sup>215</sup>
25.1	62.648 <sup>7</sup>	49.89 <sup>23</sup>	12.461 <sup>107</sup>	69.70 <sup>247</sup>	21.37 <sup>51</sup>	58.85 <sup>305</sup>	56.14 <sup>8</sup>	76.20 <sup>233</sup>
Dec. 5.0	62.641 <sup>41</sup>	50.12 <sup>34</sup>	12.254 <sup>45</sup>	66.89 <sup>310</sup>	21.05 <sup>50</sup>	55.60 <sup>322</sup>	56.06 <sup>2</sup>	73.87 <sup>244</sup>
15.0	62.682 <sup>92</sup>	50.46 <sup>48</sup>	12.009 <sup>16</sup>	63.79 <sup>380</sup>	20.95 <sup>8</sup>	52.28 <sup>323</sup>	56.08 <sup>14</sup>	71.43 <sup>244</sup>
25.0	62.774 <sup>138</sup>	50.89 <sup>58</sup>	12.325 <sup>80</sup>	60.49 <sup>340</sup>	20.77 <sup>3</sup>	48.75 <sup>361</sup>	56.22 <sup>24</sup>	68.99 <sup>237</sup>
34.9	62.912 <sup>180</sup>	51.42 <sup>62</sup>	12.405 <sup>142</sup>	57.09 <sup>339</sup>	20.80 <sup>14</sup>	45.14 <sup>360</sup>	56.46 <sup>33</sup>	66.62 <sup>232</sup>
34.9	63.092 <sup>180</sup>	52.04 <sup>62</sup>	12.547 <sup>142</sup>	53.70 <sup>339</sup>	20.94 <sup>14</sup>	41.54 <sup>360</sup>	56.79 <sup>33</sup>	64.40 <sup>237</sup>
Mean Place	60.241	57.27	12.407	53.84	25.078	42.06	52.565	75.14
Sec δ, Tan δ	1.037	-0.274	1.441	+1.087	2.765	+2.578	2.339	-2.114
D <sub>1</sub> α, D <sub>2</sub> α	+0.068	-0.002	+0.034	+0.007	-0.007	+0.017	+0.117	-0.014
D <sub>1</sub> δ, D <sub>2</sub> δ	-0.06	-0.99	-0.04	-1.00	-0.04	-1.00	-0.04	-1.00

FOR THE UPPER TRANSIT AT WASHINGTON.

Washington Mean Time.	$\beta$ Ophiuchi. Mag. 2.9			$\epsilon^1$ Scorp. Mag. 3.1			$\mu$ Hercules. Mag. 3.5			$\psi$ Draconis. Mag. 4.9		
	Right Ascension.		Declina- tion.	Right Ascension.		Declina- tion.	Right Ascension.		Declina- tion.	Right Ascension.		Declina- tion.
	h	m	° ' "	h	m	° ' "	h	m	° ' "	h	m	° ' "
	17	39	+ 4 35	17	41	-40 5	17	43	+27 45	17	43	+72 11
	s	"	"	s	"	"	s	"	"	s	"	"
Jan. 1.0	30.719	62.67	58.831	42.80	18.774	62.05	16.71	19.31				
10.9	30.901 <sup>183</sup>	60.95 <sup>172</sup>	59.075 <sup>244</sup>	41.93 <sup>87</sup>	18.942 <sup>168</sup>	59.24 <sup>263</sup>	16.93 <sup>22</sup>	15.82 <sup>349</sup>				
20.9	31.115 <sup>214</sup>	59.27 <sup>168</sup>	59.361 <sup>286</sup>	41.22 <sup>71</sup>	19.149 <sup>207</sup>	56.60 <sup>264</sup>	17.28 <sup>35</sup>	12.53 <sup>329</sup>				
30.9	31.356 <sup>241</sup>	57.75 <sup>162</sup>	59.680 <sup>319</sup>	40.64 <sup>58</sup>	19.388 <sup>239</sup>	54.20 <sup>267</sup>	17.75 <sup>47</sup>	9.58 <sup>298</sup>				
Feb. 9.9	31.616 <sup>260</sup>	56.41 <sup>134</sup>	60.027 <sup>347</sup>	40.22 <sup>42</sup>	19.655 <sup>267</sup>	52.13 <sup>267</sup>	18.32 <sup>57</sup>	7.07 <sup>251</sup>				
	275	190	364	37	287	168	68	197				
19.8	31.891	55.32	60.391	39.95	19.942	50.47	18.98	5.10				
29.8	32.175 <sup>284</sup>	54.54 <sup>78</sup>	60.765 <sup>374</sup>	39.81 <sup>14</sup>	20.241 <sup>290</sup>	49.32 <sup>115</sup>	19.68 <sup>70</sup>	3.75 <sup>125</sup>				
Mar. 10.8	32.462 <sup>287</sup>	54.09 <sup>45</sup>	61.144 <sup>379</sup>	39.78 <sup>3</sup>	20.545 <sup>304</sup>	48.68 <sup>64</sup>	20.43 <sup>75</sup>	3.05 <sup>70</sup>				
20.7	32.747 <sup>285</sup>	54.01 <sup>8</sup>	61.522 <sup>373</sup>	39.87 <sup>9</sup>	20.852 <sup>307</sup>	48.57 <sup>11</sup>	21.18 <sup>75</sup>	3.03 <sup>2</sup>				
30.7	33.028 <sup>281</sup>	54.27 <sup>26</sup>	61.895 <sup>373</sup>	40.08 <sup>21</sup>	21.153 <sup>301</sup>	49.02 <sup>45</sup>	21.92 <sup>74</sup>	3.67 <sup>64</sup>				
	373	59	363	30	290	92	70	126				
Apr. 9.7	33.301	54.86	62.257	40.38	21.443	49.94	22.62	4.95				
19.7	33.562 <sup>261</sup>	55.76 <sup>90</sup>	62.604 <sup>347</sup>	40.78 <sup>40</sup>	21.718 <sup>275</sup>	51.36 <sup>143</sup>	23.25 <sup>68</sup>	6.80 <sup>155</sup>				
29.6	33.805 <sup>248</sup>	56.90 <sup>114</sup>	62.932 <sup>388</sup>	41.28 <sup>50</sup>	21.972 <sup>284</sup>	53.17 <sup>181</sup>	23.82 <sup>57</sup>	9.16 <sup>236</sup>				
May 9.6	34.029 <sup>224</sup>	58.26 <sup>126</sup>	63.234 <sup>368</sup>	41.89 <sup>61</sup>	22.202 <sup>290</sup>	55.34 <sup>217</sup>	24.29 <sup>47</sup>	11.93 <sup>277</sup>				
19.6	34.229 <sup>260</sup>	59.76 <sup>150</sup>	63.508 <sup>374</sup>	42.60 <sup>71</sup>	22.402 <sup>200</sup>	57.74 <sup>240</sup>	24.65 <sup>36</sup>	15.02 <sup>308</sup>				
	172	162	238	78	166	268	25	339				
29.6	34.401	61.38	63.746	43.38	22.568	60.32	24.90	18.32				
June 8.5	34.542 <sup>141</sup>	63.02 <sup>164</sup>	63.943 <sup>197</sup>	44.24 <sup>36</sup>	22.700 <sup>122</sup>	62.97 <sup>265</sup>	25.03 <sup>13</sup>	21.73 <sup>341</sup>				
18.5	34.648 <sup>106</sup>	64.65 <sup>163</sup>	64.096 <sup>158</sup>	45.17 <sup>98</sup>	22.790 <sup>90</sup>	65.65 <sup>268</sup>	25.03 <sup>0</sup>	25.16 <sup>343</sup>				
28.5	34.719 <sup>71</sup>	66.24 <sup>159</sup>	64.201 <sup>166</sup>	46.13 <sup>96</sup>	22.842 <sup>52</sup>	68.27 <sup>262</sup>	24.92 <sup>11</sup>	28.51 <sup>335</sup>				
July 8.4	34.748 <sup>29</sup>	67.73 <sup>149</sup>	64.254 <sup>58</sup>	47.11 <sup>96</sup>	22.847 <sup>5</sup>	70.74 <sup>247</sup>	24.68 <sup>24</sup>	31.69 <sup>318</sup>				
	9	187	0	95	39	220	34	294				
18.4	34.739	69.10	64.254	48.06	22.808	73.03	24.34	34.63				
28.4	34.692 <sup>47</sup>	70.30 <sup>120</sup>	64.203 <sup>51</sup>	48.95 <sup>39</sup>	22.730 <sup>78</sup>	75.09 <sup>266</sup>	23.89 <sup>45</sup>	37.25 <sup>262</sup>				
Aug. 7.4	34.607 <sup>85</sup>	71.34 <sup>104</sup>	64.104 <sup>99</sup>	49.74 <sup>79</sup>	22.612 <sup>118</sup>	76.84 <sup>175</sup>	23.35 <sup>54</sup>	39.51 <sup>226</sup>				
17.3	34.489 <sup>118</sup>	72.21 <sup>87</sup>	63.960 <sup>144</sup>	50.39 <sup>66</sup>	22.458 <sup>184</sup>	78.28 <sup>144</sup>	22.72 <sup>63</sup>	41.34 <sup>183</sup>				
27.3	34.343 <sup>146</sup>	72.87 <sup>66</sup>	63.777 <sup>183</sup>	50.88 <sup>49</sup>	22.278 <sup>180</sup>	79.41 <sup>113</sup>	22.03 <sup>69</sup>	42.73 <sup>139</sup>				
	167	46	211	38	206	73	78	89				
Sept. 6.3	34.176	73.33	63.666	51.16	22.072	80.13	21.30	43.62				
16.3	33.995 <sup>181</sup>	73.58 <sup>25</sup>	63.837 <sup>229</sup>	51.22 <sup>6</sup>	21.853 <sup>219</sup>	80.47 <sup>34</sup>	20.53 <sup>77</sup>	44.00 <sup>38</sup>				
26.2	33.811 <sup>184</sup>	73.61 <sup>3</sup>	63.102 <sup>235</sup>	51.04 <sup>18</sup>	21.629 <sup>224</sup>	80.43 <sup>4</sup>	19.76 <sup>77</sup>	43.86 <sup>14</sup>				
Oct. 6.2	33.631 <sup>180</sup>	73.42 <sup>19</sup>	62.874 <sup>226</sup>	50.65 <sup>29</sup>	21.409 <sup>230</sup>	79.97 <sup>46</sup>	18.99 <sup>77</sup>	43.19 <sup>67</sup>				
16.2	33.467 <sup>164</sup>	73.02 <sup>40</sup>	62.666 <sup>208</sup>	50.02 <sup>68</sup>	21.203 <sup>206</sup>	79.11 <sup>89</sup>	18.26 <sup>73</sup>	41.99 <sup>120</sup>				
	138	63	176	81	179	123	68	170				
26.1	33.329	72.39	62.490	49.21	21.024	77.88	17.58	40.29				
Nov. 5.1	33.221 <sup>108</sup>	71.54 <sup>85</sup>	62.357 <sup>123</sup>	48.24 <sup>97</sup>	20.878 <sup>146</sup>	76.24 <sup>104</sup>	16.97 <sup>61</sup>	38.11 <sup>218</sup>				
15.1	33.159 <sup>68</sup>	70.46 <sup>108</sup>	62.276 <sup>81</sup>	47.16 <sup>108</sup>	20.774 <sup>104</sup>	74.28 <sup>196</sup>	16.46 <sup>51</sup>	35.50 <sup>261</sup>				
25.1	33.130 <sup>23</sup>	69.19 <sup>127</sup>	62.252 <sup>24</sup>	46.01 <sup>115</sup>	20.712 <sup>62</sup>	71.99 <sup>229</sup>	16.05 <sup>41</sup>	32.51 <sup>299</sup>				
Dec. 5.0	33.153 <sup>23</sup>	67.74 <sup>145</sup>	62.291 <sup>39</sup>	44.86 <sup>115</sup>	20.703 <sup>0</sup>	69.48 <sup>251</sup>	15.78 <sup>37</sup>	29.23 <sup>328</sup>				
	68	159	100	113	42	274	15	361				
15.0	33.221	66.15	62.391	43.78	20.745	66.74	15.63	25.72				
25.0	33.337 <sup>116</sup>	64.44 <sup>171</sup>	62.549 <sup>168</sup>	42.69 <sup>104</sup>	20.836 <sup>91</sup>	63.90 <sup>264</sup>	15.63 <sup>0</sup>	22.12 <sup>360</sup>				
35.0	33.493 <sup>156</sup>	62.69 <sup>175</sup>	62.761 <sup>212</sup>	41.76 <sup>98</sup>	20.974 <sup>128</sup>	61.04 <sup>286</sup>	15.76 <sup>13</sup>	18.53 <sup>359</sup>				
Mean Place	31.202	58.89	59.337	50.50	19.614	59.79	21.438	18.52				
Sec $\delta$ , Tan $\delta$	1.003	+0.080	1.307	-0.842	1.180	+0.527	3.269	+3.113				
$D\psi_a, D_{\omega a}$	+0.059	0.000	+0.083	-0.004	+0.047	+0.003	-0.021	+0.015				
$D\psi_s, D_{\omega s}$	-0.04	-1.00	-0.03	-1.00	-0.03	-1.00	-0.03	-1.00				

FOR THE UPPER TRANSIT AT WASHINGTON.

Washington Mean Time.	γ Ophiuchi. Mag. 3.7		ξ Draconis. Mag. 3.9		89 Herculis. Mag. 5.5		25 Draconis. Mag. 5.0	
	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.
	h m 17 43	° ' " + 2 44	h m 17 52	° ' " +56 52	h m 17 52	° ' " +26 3	h m 17 52	° ' " +76 58
Jan. 1.0	52.365 179	15.01	6.625 188	67.96 347	10.767 160	45.62 270	54.96 22	29.51 346
10.9	52.544 212	13.40 161	6.787 204	63.79 330	10.926 196	42.92 267	55.20 40	26.05 328
20.9	52.756 266	11.83 146	7.021 207	60.49 268	11.124 233	40.35 234	55.60 56	22.77 266
30.9	52.994 300	10.37 127	7.318 260	57.51 266	11.357 269	38.00 168	56.16 83	19.81 265
Feb. 9.9	53.254 373	9.30 104	7.668 306	54.95 206	11.616 278	35.97 208	56.88 83	17.26 203
19.8	53.526 263	8.06 75	8.061 424	52.90 145	11.894 204	34.84 117	57.71 93	15.23 144
29.8	53.809 286	7.31 44	8.485 443	51.45 61	12.168 300	33.17 65	58.64 97	13.79 80
Mar. 10.8	54.095 286	6.87 10	8.928 449	50.64 15	12.488 302	32.52 13	59.61 100	12.99 14
20.7	54.381 262	6.77 26	9.377 448	50.49 53	12.790 300	32.39 29	60.61 99	12.85 54
30.7	54.663 274	7.02 53	9.820 437	51.02 116	13.090 291	32.78 91	61.60 95	13.39 116
Apr. 9.7	54.987 261	7.55 84	10.247 366	52.18 174	13.381 278	33.69 186	62.55 86	14.55 175
19.7	55.198 247	8.39 100	10.645 361	53.92 225	13.659 260	35.05 173	63.41 78	16.30 226
29.6	55.445 228	9.48 126	11.006 315	56.17 269	13.918 296	36.83 209	64.17 64	18.56 268
May 9.6	55.673 203	10.76 152	11.321 268	56.86 301	14.154 268	38.92 267	64.81 50	21.24 302
19.6	55.876 178	12.18 152	11.583 308	61.87 385	14.362 176	41.29 264	65.31 24	24.26 325
29.6	56.052 147	13.70 186	11.786 138	65.12 398	14.540 141	43.83 263	65.65 17	27.51 338
June 8.5	56.199 112	15.26 164	11.924 73	68.50 342	14.681 103	46.46 265	65.82 1	30.89 342
18.5	56.311 75	16.80 180	11.997 3	71.92 387	14.784 60	49.11 260	65.83 16	34.31 336
28.5	56.386 35	18.80 141	12.000 68	75.29 322	14.844 19	51.71 240	65.67 22	37.67 323
July 8.4	56.421 3	19.71 129	11.987 181	78.51 299	14.963 25	54.19 248	65.35 47	40.90 299
18.4	56.418 48	21.00 113	11.806 196	81.50 270	14.838 67	56.49 207	64.88 61	43.89 270
28.4	56.375 80	22.18 96	11.611 262	84.20 267	14.771 108	58.56 180	64.27 75	46.59 226
Aug. 7.4	56.295 114	23.11 80	11.359 303	86.57 196	14.663 142	60.36 148	63.52 85	48.95 195
17.3	56.181 143	23.91 61	11.056 346	88.53 151	14.521 174	61.84 117	62.67 94	50.90 182
27.3	56.038 164	24.52 44	10.710 378	90.04 106	14.347 197	63.01 81	61.73 102	52.42 103
Sept. 6.3	55.874 170	24.96 34	10.332 400	91.07 53	14.150 214	63.82 42	60.71 105	53.45 54
16.3	55.695 184	25.20 5	9.932 408	91.60 2	13.986 219	64.24 5	59.66 107	53.99 1
26.2	55.511 179	25.25 16	9.524 403	91.62 51	13.717 216	64.29 24	58.59 107	54.00 50
Oct. 6.2	55.332 164	25.09 26	9.121 386	91.11 103	13.501 208	63.95 76	57.52 103	53.50 108
16.2	55.168 141	24.73 56	8.735 354	90.08 154	13.298 178	63.20 111	56.49 97	52.47 153
26.1	55.027 100	24.17 78	8.381 311	88.54 202	13.120 148	62.09 140	55.52 87	50.94 201
Nov. 5.1	54.918 69	23.39 97	8.070 265	86.52 243	12.972 110	60.60 184	54.65 75	48.93 246
15.1	54.849 26	22.42 117	7.815 190	84.06 286	12.862 63	58.76 214	53.90 62	46.47 284
25.1	54.823 20	21.25 134	7.625 118	81.21 218	12.799 15	56.62 241	53.28 46	43.63 316
Dec. 5.0	54.843 67	19.91 140	7.507 41	78.03 341	12.784 35	54.21 260	52.82 27	40.47 339
15.0	54.910 113	18.42 159	7.466 88	74.62 354	12.819 85	51.61 272	52.55 9	37.08 358
25.0	55.023 163	16.83 166	7.504 115	71.08 355	12.904 181	48.89 275	52.46 10	33.55 353
35.0	55.176 163	15.18 166	7.619 115	67.58 355	13.095 181	46.14 275	52.56 10	30.02 353
Mean Place	52.835	10.92	8.796	65.40	11.572	42.70	61.730	27.63
Sec δ, Tan δ	1.001	+0.048	1.831	+1.533	1.113	+0.489	4.437	+4.323
D <sub>ψα</sub> , D <sub>ωα</sub>	+0.060	0.000	+0.021	+0.004	+0.048	+0.001	-0.053	+0.009
D <sub>ψδ</sub> , D <sub>ωδ</sub>	-0.08	-1.00	-0.01	-1.00	-0.01	-1.00	-0.01	-1.00

APPARENT PLACES OF STARS, 1920.

FOR THE UPPER TRANSIT AT WASHINGTON.

Washington Mean Time.	θ Herculis. Mag. 4.0		ν Ophiuchi. Mag. 3.5		ξ Herculis. Mag. 3.8		γ Draconis. Mag. 2.4	
	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.
	h m 17 53	° ' " +37 15	h m 17 54	° ' " - 9 45	h m 17 54	° ' " +29 15	h m 17 54	° ' " +51 29
	s "	"	s "	"	s "	"	s "	"
Jan. 1.0	29.445	39.74	36.884	48.48	38.497	23.99	43.130	54.12
10.9	29.600 <sup>155</sup>	36.66 <sup>308</sup>	37.064 <sup>190</sup>	49.36 <sup>88</sup>	38.654 <sup>157</sup>	20.57 <sup>262</sup>	43.286 <sup>156</sup>	50.70 <sup>342</sup>
20.9	29.802 <sup>202</sup>	33.72 <sup>294</sup>	37.278 <sup>214</sup>	50.26 <sup>69</sup>	38.850 <sup>196</sup>	17.88 <sup>269</sup>	43.501 <sup>215</sup>	47.47 <sup>223</sup>
30.9	30.043 <sup>241</sup>	31.05 <sup>267</sup>	37.518 <sup>240</sup>	51.09 <sup>64</sup>	39.062 <sup>232</sup>	15.43 <sup>245</sup>	43.773 <sup>272</sup>	44.53 <sup>294</sup>
Feb. 9.9	30.316 <sup>273</sup>	28.75 <sup>230</sup>	37.780 <sup>268</sup>	51.84 <sup>73</sup>	39.342 <sup>260</sup>	13.81 <sup>212</sup>	44.069 <sup>316</sup>	41.98 <sup>256</sup>
	300	185	277	61	263	170	355	202
19.8	30.616	26.90 <sup>132</sup>	38.057 <sup>257</sup>	52.45 <sup>46</sup>	39.624 <sup>296</sup>	11.61 <sup>128</sup>	44.444 <sup>370</sup>	39.96 <sup>145</sup>
29.8	30.932 <sup>316</sup>	25.56 <sup>76</sup>	38.344 <sup>287</sup>	52.91 <sup>27</sup>	39.920 <sup>306</sup>	10.38 <sup>71</sup>	44.823 <sup>370</sup>	38.51 <sup>83</sup>
Mar. 10.8	31.259 <sup>327</sup>	24.82 <sup>16</sup>	38.637 <sup>293</sup>	53.18 <sup>5</sup>	40.227 <sup>307</sup>	9.67 <sup>15</sup>	45.219 <sup>392</sup>	37.68 <sup>19</sup>
20.8	31.560 <sup>331</sup>	24.67 <sup>45</sup>	38.932 <sup>295</sup>	53.23 <sup>15</sup>	40.535 <sup>308</sup>	9.52 <sup>59</sup>	45.621 <sup>398</sup>	37.49 <sup>48</sup>
30.7	31.917 <sup>327</sup>	25.12 <sup>104</sup>	39.224 <sup>292</sup>	53.68 <sup>36</sup>	40.841 <sup>306</sup>	9.91 <sup>93</sup>	46.019 <sup>398</sup>	37.97 <sup>111</sup>
Apr. 9.7	32.234	26.13	39.509	52.72	41.138	10.64	46.403	39.08
19.7	32.534 <sup>300</sup>	27.67 <sup>154</sup>	39.785 <sup>276</sup>	52.19 <sup>58</sup>	41.422 <sup>264</sup>	12.24 <sup>140</sup>	46.764 <sup>361</sup>	40.76 <sup>165</sup>
29.6	32.813 <sup>279</sup>	29.67 <sup>200</sup>	40.046 <sup>261</sup>	51.51 <sup>68</sup>	41.686 <sup>264</sup>	14.07 <sup>183</sup>	47.094 <sup>330</sup>	42.96 <sup>220</sup>
May 9.6	33.064 <sup>251</sup>	32.05 <sup>268</sup>	40.291 <sup>245</sup>	50.71 <sup>80</sup>	41.927 <sup>241</sup>	16.26 <sup>219</sup>	47.386 <sup>292</sup>	45.54 <sup>256</sup>
19.6	33.282 <sup>190</sup>	34.73 <sup>268</sup>	40.512 <sup>221</sup>	49.84 <sup>67</sup>	42.139 <sup>212</sup>	18.71 <sup>245</sup>	47.632 <sup>246</sup>	48.50 <sup>296</sup>
		288	196	90	181	265	196	317
29.6	33.462	37.61	40.710	48.94	42.320	21.36	47.828	51.67
June 8.5	33.603 <sup>141</sup>	40.61 <sup>300</sup>	40.875 <sup>185</sup>	48.68 <sup>91</sup>	42.462 <sup>142</sup>	24.11 <sup>275</sup>	47.970 <sup>142</sup>	54.97 <sup>330</sup>
18.5	33.698 <sup>95</sup>	43.64 <sup>303</sup>	41.007 <sup>132</sup>	47.14 <sup>80</sup>	42.565 <sup>103</sup>	26.88 <sup>277</sup>	48.052 <sup>82</sup>	58.32 <sup>335</sup>
28.5	33.746 <sup>48</sup>	46.63 <sup>299</sup>	41.100 <sup>96</sup>	46.32 <sup>82</sup>	42.625 <sup>60</sup>	29.61 <sup>273</sup>	48.074 <sup>22</sup>	61.63 <sup>331</sup>
July 8.4	33.747 <sup>49</sup>	49.49 <sup>286</sup>	41.154 <sup>54</sup>	45.56 <sup>76</sup>	42.642 <sup>17</sup>	32.22 <sup>261</sup>	48.038 <sup>36</sup>	64.80 <sup>317</sup>
		265	13	68	26	242	98	295
18.4	33.698	52.14	41.167	44.88	42.614	34.64	47.940	67.75
28.4	33.607 <sup>61</sup>	54.54 <sup>240</sup>	41.139 <sup>26</sup>	44.31 <sup>57</sup>	42.543 <sup>71</sup>	36.82 <sup>218</sup>	47.786 <sup>154</sup>	70.42 <sup>267</sup>
Aug. 7.4	33.467 <sup>170</sup>	56.62 <sup>268</sup>	41.071 <sup>68</sup>	43.83 <sup>48</sup>	42.430 <sup>118</sup>	38.73 <sup>191</sup>	47.581 <sup>295</sup>	72.76 <sup>234</sup>
17.3	33.291 <sup>146</sup>	58.36 <sup>174</sup>	40.966 <sup>105</sup>	43.43 <sup>40</sup>	42.290 <sup>150</sup>	40.81 <sup>158</sup>	47.329 <sup>262</sup>	74.69 <sup>193</sup>
27.3	33.062 <sup>209</sup>	59.71 <sup>135</sup>	40.831 <sup>135</sup>	43.13 <sup>30</sup>	42.100 <sup>180</sup>	41.54 <sup>123</sup>	47.035 <sup>294</sup>	76.22 <sup>153</sup>
	235	94	159	22	205	85	322	104
Sept. 6.3	32.847	60.65	40.672	42.91	41.895	42.39	46.713	77.26
16.3	32.596 <sup>251</sup>	61.15 <sup>50</sup>	40.497 <sup>175</sup>	42.76 <sup>15</sup>	41.673 <sup>222</sup>	42.87 <sup>43</sup>	46.371 <sup>342</sup>	77.81 <sup>55</sup>
26.2	32.337 <sup>259</sup>	61.19 <sup>4</sup>	40.316 <sup>181</sup>	42.69 <sup>7</sup>	41.445 <sup>228</sup>	42.93 <sup>6</sup>	46.021 <sup>360</sup>	77.87 <sup>6</sup>
Oct. 6.2	32.082 <sup>255</sup>	60.78 <sup>41</sup>	40.135 <sup>181</sup>	42.71 <sup>2</sup>	41.219 <sup>296</sup>	42.58 <sup>85</sup>	45.676 <sup>345</sup>	77.41 <sup>46</sup>
16.2	31.841 <sup>241</sup>	59.92 <sup>86</sup>	39.970 <sup>165</sup>	42.79 <sup>3</sup>	41.007 <sup>212</sup>	41.82 <sup>76</sup>	45.345 <sup>331</sup>	76.45 <sup>96</sup>
	217	131	142	19	190	116	303	149
26.1	31.624	58.61	39.828	42.98	40.817	40.66	45.042	74.96
Nov. 5.1	31.440 <sup>184</sup>	56.87 <sup>174</sup>	39.717 <sup>111</sup>	43.26 <sup>26</sup>	40.658 <sup>159</sup>	39.11 <sup>155</sup>	44.779 <sup>263</sup>	73.02 <sup>194</sup>
15.1	31.299 <sup>141</sup>	54.73 <sup>214</sup>	39.646 <sup>71</sup>	43.66 <sup>40</sup>	40.542 <sup>116</sup>	37.20 <sup>191</sup>	44.563 <sup>216</sup>	70.63 <sup>239</sup>
25.1	31.208 <sup>91</sup>	52.24 <sup>249</sup>	39.617 <sup>29</sup>	44.16 <sup>80</sup>	40.470 <sup>72</sup>	34.96 <sup>224</sup>	44.408 <sup>155</sup>	67.90 <sup>273</sup>
Dec. 5.0	31.167 <sup>16</sup>	49.47 <sup>277</sup>	39.637 <sup>20</sup>	44.78 <sup>62</sup>	40.447 <sup>28</sup>	32.45 <sup>261</sup>	44.316 <sup>92</sup>	64.78 <sup>312</sup>
		300	66	72	26	271	23	333
15.0	31.183	46.47	39.703	45.50	40.475	29.74	44.293	61.43
25.0	31.253 <sup>70</sup>	43.35 <sup>312</sup>	39.815 <sup>112</sup>	46.32 <sup>83</sup>	40.553 <sup>78</sup>	26.90 <sup>294</sup>	44.336 <sup>48</sup>	58.00 <sup>343</sup>
35.0	31.376 <sup>123</sup>	40.20 <sup>315</sup>	39.968 <sup>153</sup>	47.21 <sup>89</sup>	40.680 <sup>137</sup>	24.02 <sup>288</sup>	44.451 <sup>115</sup>	54.51 <sup>349</sup>
Mean Place	30.548	37.21	37.300	53.72	39.372	20.43	44.895	51.90
Sec δ, Tan δ	1.257	+0.761	1.015	-0.172	1.146	+0.560	1.606	+1.257
D <sub>φ</sub> α, D <sub>α</sub> α	+0.041	+0.001	+0.066	0.000	+0.046	+0.001	+0.028	+0.002
D <sub>φ</sub> δ, D <sub>α</sub> δ	-0.01	-1.00	-0.01	-1.00	-0.01	-1.00	-0.91	-1.00



# APPARENT PLACES OF STARS, 1920.

461

## FOR THE UPPER TRANSIT AT WASHINGTON.

Washington Mean Time.	67 Ophiuchi. Mag. 3.9		θ Aras. Mag. 3.9		γ Sagittarii. Mag. 3.1		70 Ophiuchi. Mag. 4.1	
	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.
	h m	° '	h m	° '	h m	° '	h m	° '
	17 56	+ 2 56	18 0	-50 5	18 0	-80 25	18 1	+ 2 30
	s	"	s	"	s	"	s	"
Jan. 1.0	37.828	8.17	23.909	47.15	39.574	28.46	24.165	65.47
10.9	37.995 <sup>167</sup>	6.58 <sup>150</sup>	23.663 <sup>254</sup>	45.61 <sup>154</sup>	39.776 <sup>208</sup>	28.04 <sup>42</sup>	24.329 <sup>164</sup>	63.88 <sup>150</sup>
20.9	38.196 <sup>201</sup>	5.02 <sup>156</sup>	23.970 <sup>307</sup>	44.21 <sup>140</sup>	40.015 <sup>280</sup>	27.74 <sup>30</sup>	24.525 <sup>196</sup>	62.34 <sup>154</sup>
30.9	38.424 <sup>236</sup>	3.58 <sup>144</sup>	24.330 <sup>360</sup>	43.02 <sup>119</sup>	40.286 <sup>271</sup>	27.53 <sup>21</sup>	24.751 <sup>226</sup>	60.89 <sup>145</sup>
Feb. 9.9	38.675 <sup>261</sup>	2.33 <sup>126</sup>	24.707 <sup>387</sup>	42.01 <sup>101</sup>	40.584 <sup>293</sup>	27.32 <sup>21</sup>	24.999 <sup>245</sup>	59.63 <sup>126</sup>
19.8	38.942 <sup>267</sup>	1.30 <sup>103</sup>	25.120 <sup>413</sup>	41.21 <sup>80</sup>	40.899 <sup>315</sup>	27.17 <sup>15</sup>	25.265 <sup>266</sup>	58.60 <sup>108</sup>
29.8	39.220 <sup>278</sup>	0.57 <sup>73</sup>	25.560 <sup>430</sup>	40.62 <sup>59</sup>	41.226 <sup>327</sup>	27.08 <sup>9</sup>	25.541 <sup>276</sup>	57.85 <sup>75</sup>
Mar. 10.8	39.504 <sup>284</sup>	0.14 <sup>43</sup>	25.991 <sup>441</sup>	40.25 <sup>37</sup>	41.562 <sup>336</sup>	27.00 <sup>5</sup>	25.825 <sup>284</sup>	57.40 <sup>45</sup>
20.8	39.790 <sup>286</sup>	0.05 <sup>35</sup>	26.436 <sup>445</sup>	40.09 <sup>16</sup>	41.900 <sup>338</sup>	26.94 <sup>6</sup>	26.111 <sup>286</sup>	57.29 <sup>11</sup>
30.7	40.074 <sup>284</sup>	0.30 <sup>35</sup>	26.878 <sup>443</sup>	40.13 <sup>4</sup>	42.235 <sup>335</sup>	26.88 <sup>6</sup>	26.396 <sup>285</sup>	57.51 <sup>22</sup>
Apr. 9.7	40.352 <sup>278</sup>	0.86 <sup>58</sup>	27.312 <sup>494</sup>	40.38 <sup>26</sup>	42.563 <sup>328</sup>	26.84 <sup>4</sup>	26.677 <sup>281</sup>	58.95 <sup>54</sup>
19.7	40.620 <sup>266</sup>	1.73 <sup>85</sup>	27.782 <sup>420</sup>	40.88 <sup>45</sup>	42.885 <sup>323</sup>	26.81 <sup>3</sup>	26.946 <sup>260</sup>	58.87 <sup>82</sup>
29.6	40.874 <sup>254</sup>	2.84 <sup>111</sup>	28.190 <sup>396</sup>	41.48 <sup>65</sup>	43.190 <sup>305</sup>	26.80 <sup>1</sup>	27.204 <sup>258</sup>	59.94 <sup>107</sup>
May 9.6	41.111 <sup>287</sup>	4.15 <sup>191</sup>	28.501 <sup>371</sup>	42.32 <sup>84</sup>	43.475 <sup>285</sup>	26.85 <sup>5</sup>	27.444 <sup>240</sup>	61.22 <sup>128</sup>
19.6	41.324 <sup>213</sup>	5.61 <sup>146</sup>	28.838 <sup>337</sup>	43.33 <sup>101</sup>	43.786 <sup>261</sup>	26.97 <sup>12</sup>	27.663 <sup>219</sup>	62.65 <sup>143</sup>
29.6	41.512 <sup>168</sup>	7.17 <sup>156</sup>	29.135 <sup>297</sup>	44.49 <sup>116</sup>	43.999 <sup>238</sup>	27.13 <sup>16</sup>	27.854 <sup>191</sup>	64.16 <sup>151</sup>
June 8.5	41.669 <sup>157</sup>	8.78 <sup>161</sup>	29.384 <sup>249</sup>	45.80 <sup>131</sup>	44.166 <sup>197</sup>	27.36 <sup>23</sup>	28.016 <sup>162</sup>	65.73 <sup>157</sup>
18.5	41.792 <sup>123</sup>	10.37 <sup>150</sup>	29.580 <sup>196</sup>	47.20 <sup>140</sup>	44.325 <sup>159</sup>	27.68 <sup>32</sup>	28.145 <sup>129</sup>	67.28 <sup>155</sup>
28.5	41.877 <sup>85</sup>	11.91 <sup>154</sup>	29.720 <sup>140</sup>	48.68 <sup>148</sup>	44.440 <sup>115</sup>	28.05 <sup>37</sup>	28.236 <sup>91</sup>	68.79 <sup>151</sup>
July 8.5	41.925 <sup>48</sup>	13.36 <sup>145</sup>	29.798 <sup>78</sup>	50.19 <sup>151</sup>	44.511 <sup>71</sup>	28.47 <sup>42</sup>	28.287 <sup>51</sup>	70.20 <sup>141</sup>
18.4	41.961 <sup>6</sup>	14.70 <sup>134</sup>	29.812 <sup>14</sup>	51.67 <sup>148</sup>	44.584 <sup>23</sup>	28.92 <sup>45</sup>	28.299 <sup>12</sup>	71.50 <sup>130</sup>
28.4	41.898 <sup>33</sup>	15.88 <sup>118</sup>	29.764 <sup>48</sup>	53.06 <sup>141</sup>	44.508 <sup>26</sup>	29.37 <sup>45</sup>	28.270 <sup>29</sup>	72.65 <sup>115</sup>
Aug. 7.4	41.825 <sup>73</sup>	16.90 <sup>100</sup>	29.656 <sup>108</sup>	54.37 <sup>129</sup>	44.438 <sup>70</sup>	29.84 <sup>47</sup>	28.202 <sup>68</sup>	73.63 <sup>98</sup>
17.3	41.719 <sup>106</sup>	17.75 <sup>85</sup>	29.492 <sup>164</sup>	55.48 <sup>111</sup>	44.323 <sup>115</sup>	30.23 <sup>30</sup>	28.097 <sup>105</sup>	74.45 <sup>82</sup>
27.3	41.582 <sup>137</sup>	18.41 <sup>66</sup>	29.281 <sup>211</sup>	56.37 <sup>89</sup>	44.176 <sup>147</sup>	30.55 <sup>32</sup>	27.963 <sup>134</sup>	75.07 <sup>62</sup>
Sept. 6.3	41.420 <sup>162</sup>	18.88 <sup>47</sup>	29.032 <sup>240</sup>	56.90 <sup>62</sup>	44.176 <sup>178</sup>	30.55 <sup>21</sup>	27.963 <sup>158</sup>	75.07 <sup>45</sup>
16.3	41.243 <sup>177</sup>	19.16 <sup>27</sup>	28.757 <sup>275</sup>	57.31 <sup>32</sup>	43.998 <sup>198</sup>	30.76 <sup>13</sup>	27.805 <sup>176</sup>	75.52 <sup>25</sup>
26.2	41.060 <sup>183</sup>	19.28 <sup>8</sup>	28.471 <sup>286</sup>	57.31 <sup>0</sup>	43.800 <sup>207</sup>	30.89 <sup>5</sup>	27.629 <sup>182</sup>	75.77 <sup>5</sup>
Oct. 6.2	40.878 <sup>182</sup>	19.09 <sup>14</sup>	28.188 <sup>283</sup>	56.98 <sup>23</sup>	43.593 <sup>204</sup>	30.84 <sup>14</sup>	27.447 <sup>181</sup>	75.82 <sup>15</sup>
16.2	40.710 <sup>168</sup>	18.76 <sup>33</sup>	27.924 <sup>264</sup>	56.81 <sup>67</sup>	43.389 <sup>199</sup>	30.70 <sup>30</sup>	27.266 <sup>160</sup>	75.87 <sup>34</sup>
26.2	40.563 <sup>147</sup>	18.28 <sup>53</sup>	27.693 <sup>231</sup>	55.86 <sup>96</sup>	43.199 <sup>163</sup>	30.40 <sup>41</sup>	27.097 <sup>149</sup>	75.33 <sup>54</sup>
Nov. 5.1	40.563 <sup>117</sup>	18.28 <sup>78</sup>	27.693 <sup>185</sup>	55.86 <sup>122</sup>	43.086 <sup>130</sup>	29.99 <sup>51</sup>	26.948 <sup>119</sup>	74.79 <sup>75</sup>
15.1	40.446 <sup>78</sup>	17.47 <sup>94</sup>	27.506 <sup>127</sup>	54.14 <sup>143</sup>	42.906 <sup>84</sup>	29.48 <sup>53</sup>	26.829 <sup>82</sup>	74.04 <sup>95</sup>
25.1	40.368 <sup>37</sup>	16.63 <sup>115</sup>	27.381 <sup>63</sup>	52.71 <sup>160</sup>	42.822 <sup>36</sup>	28.95 <sup>60</sup>	26.747 <sup>39</sup>	73.09 <sup>114</sup>
Dec. 5.0	40.331 <sup>9</sup>	15.38 <sup>131</sup>	27.318 <sup>8</sup>	51.11 <sup>160</sup>	42.786 <sup>16</sup>	28.35 <sup>58</sup>	26.708 <sup>5</sup>	71.95 <sup>131</sup>
15.0	40.340 <sup>55</sup>	14.07 <sup>146</sup>	27.326 <sup>80</sup>	49.42 <sup>172</sup>	42.892 <sup>70</sup>	27.77 <sup>55</sup>	26.713 <sup>52</sup>	70.64 <sup>145</sup>
25.0	40.395 <sup>100</sup>	12.61 <sup>150</sup>	27.496 <sup>140</sup>	47.70 <sup>163</sup>	42.872 <sup>125</sup>	27.22 <sup>51</sup>	26.765 <sup>96</sup>	69.19 <sup>156</sup>
35.0	40.495 <sup>141</sup>	11.05 <sup>163</sup>	27.555 <sup>214</sup>	46.02 <sup>160</sup>	42.997 <sup>171</sup>	26.71 <sup>43</sup>	26.861 <sup>138</sup>	67.63 <sup>161</sup>
	40.636 <sup>141</sup>	9.43 <sup>163</sup>	27.769 <sup>214</sup>	44.42 <sup>160</sup>	43.168 <sup>171</sup>	26.29 <sup>43</sup>	26.999 <sup>138</sup>	66.02 <sup>161</sup>
Mean Place	38.316	3.71	24.176	54.96	40.088	85.00	24.654	60.86
Sec δ. Tan δ	1.001	+0.051	1.559	-1.196	1.160	-0.567	1.001	+0.044
D <sub>γ</sub> α, D <sub>α</sub> α	+0.060	0.000	+0.093	0.000	+0.077	0.000	+0.060	0.000
D <sub>γ</sub> δ, D <sub>δ</sub> δ	-0.01	-1.00	0.00	-1.00	0.00	-1.00	0.00	-1.00

APPARENT PLACES OF STARS, 1920.

FOR THE UPPER TRANSIT AT WASHINGTON.

Washington Mean Time.	72 Ophiuchi. Mag. 3.7		o Herculis. Mag. 3.8		μ Sagittarii. Mag. 4.0		γ Sagittarii. Mag. 3.2	
	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.
	h m 18 3	° ' " + 9 33	h m 18 4	° ' " +28 44	h m 18 8	° ' " -21 4	h m 18 12	° ' " -36 47
	"	"	"	"	"	"	"	"
Jan. 1.0	32.823	9.93	24.410	65.73	58.270	45.61	12.330	5.82
11.0	32.978 <sup>155</sup>	8.00 <sup>198</sup>	24.556 <sup>146</sup>	62.93 <sup>290</sup>	58.448 <sup>178</sup>	45.75 <sup>14</sup>	12.531 <sup>201</sup>	4.98 <sup>84</sup>
20.9	33.170 <sup>192</sup>	6.14 <sup>186</sup>	24.742 <sup>186</sup>	60.25 <sup>298</sup>	58.661 <sup>218</sup>	45.92 <sup>17</sup>	12.774 <sup>243</sup>	4.23 <sup>75</sup>
30.9	33.389 <sup>219</sup>	4.41 <sup>178</sup>	24.965 <sup>238</sup>	57.80 <sup>245</sup>	58.908 <sup>247</sup>	46.11 <sup>19</sup>	13.052 <sup>278</sup>	3.50 <sup>64</sup>
Feb. 9.9	33.684 <sup>245</sup>	2.91 <sup>150</sup>	25.217 <sup>282</sup>	55.66 <sup>214</sup>	59.176 <sup>298</sup>	46.28 <sup>17</sup>	13.360 <sup>308</sup>	3.03 <sup>56</sup>
	33.684 <sup>262</sup>	2.91 <sup>122</sup>	25.217 <sup>274</sup>	55.66 <sup>174</sup>	59.176 <sup>298</sup>	46.28 <sup>18</sup>	13.360 <sup>320</sup>	3.03 <sup>47</sup>
19.8	33.896	1.69	25.491	53.92	59.464	46.41	13.689	2.56
29.8	34.170 <sup>274</sup>	0.81 <sup>88</sup>	25.783 <sup>292</sup>	52.65 <sup>127</sup>	59.764 <sup>300</sup>	46.51 <sup>10</sup>	14.034 <sup>345</sup>	2.18 <sup>33</sup>
Mar. 10.8	34.453 <sup>283</sup>	0.30 <sup>51</sup>	26.066 <sup>303</sup>	51.90 <sup>78</sup>	60.072 <sup>308</sup>	46.49 <sup>2</sup>	14.389 <sup>355</sup>	1.88 <sup>30</sup>
20.8	34.739 <sup>298</sup>	0.19 <sup>11</sup>	26.393 <sup>307</sup>	51.69 <sup>21</sup>	60.384 <sup>312</sup>	46.41 <sup>8</sup>	14.748 <sup>389</sup>	1.67 <sup>21</sup>
30.7	35.024 <sup>285</sup>	0.47 <sup>28</sup>	26.698 <sup>305</sup>	52.03 <sup>34</sup>	60.695 <sup>311</sup>	46.23 <sup>18</sup>	15.108 <sup>390</sup>	1.52 <sup>15</sup>
	35.024 <sup>280</sup>	0.47 <sup>67</sup>	26.698 <sup>300</sup>	52.03 <sup>87</sup>	60.695 <sup>307</sup>	46.23 <sup>26</sup>	15.108 <sup>355</sup>	1.52 <sup>7</sup>
Apr. 9.7	35.304	1.14	26.998	52.90	61.002	45.97	15.463	1.45
19.7	35.574 <sup>270</sup>	2.15 <sup>101</sup>	27.286 <sup>268</sup>	54.25 <sup>185</sup>	61.301 <sup>299</sup>	45.65 <sup>32</sup>	15.809 <sup>346</sup>	1.47 <sup>2</sup>
29.7	35.831 <sup>267</sup>	3.47 <sup>132</sup>	27.557 <sup>271</sup>	56.03 <sup>178</sup>	61.587 <sup>286</sup>	45.27 <sup>38</sup>	16.142 <sup>333</sup>	1.57 <sup>10</sup>
May 9.6	36.069 <sup>288</sup>	5.04 <sup>157</sup>	27.805 <sup>248</sup>	58.18 <sup>215</sup>	61.858 <sup>271</sup>	44.89 <sup>36</sup>	16.454 <sup>312</sup>	1.78 <sup>21</sup>
19.6	36.286 <sup>217</sup>	6.79 <sup>175</sup>	28.025 <sup>220</sup>	60.60 <sup>242</sup>	62.106 <sup>248</sup>	44.47 <sup>43</sup>	16.743 <sup>299</sup>	2.10 <sup>33</sup>
	36.286 <sup>190</sup>	6.79 <sup>189</sup>	28.025 <sup>190</sup>	60.60 <sup>268</sup>	62.106 <sup>222</sup>	44.47 <sup>38</sup>	16.743 <sup>268</sup>	2.10 <sup>42</sup>
29.6	36.476	8.68	28.215	63.23	62.328	44.09	17.001	2.52
June 8.5	36.634 <sup>158</sup>	10.63 <sup>196</sup>	28.367 <sup>152</sup>	65.97 <sup>274</sup>	62.519 <sup>191</sup>	43.77 <sup>32</sup>	17.223 <sup>222</sup>	3.04 <sup>52</sup>
18.5	36.759 <sup>125</sup>	12.58 <sup>195</sup>	28.490 <sup>118</sup>	68.74 <sup>277</sup>	62.675 <sup>186</sup>	43.50 <sup>27</sup>	17.405 <sup>182</sup>	3.67 <sup>63</sup>
28.5	36.846 <sup>87</sup>	14.47 <sup>180</sup>	28.551 <sup>71</sup>	71.48 <sup>274</sup>	62.790 <sup>115</sup>	43.31 <sup>19</sup>	17.540 <sup>136</sup>	4.38 <sup>71</sup>
July 8.5	36.894 <sup>48</sup>	16.29 <sup>182</sup>	28.577 <sup>26</sup>	74.11 <sup>268</sup>	62.862 <sup>78</sup>	43.13 <sup>18</sup>	17.627 <sup>87</sup>	5.15 <sup>77</sup>
	36.894 <sup>6</sup>	16.29 <sup>167</sup>	28.577 <sup>19</sup>	74.11 <sup>246</sup>	62.862 <sup>26</sup>	43.13 <sup>7</sup>	17.627 <sup>84</sup>	5.15 <sup>89</sup>
18.4	36.900	17.96	28.558	76.57	62.990	43.06	17.661	5.95
28.4	36.866 <sup>34</sup>	19.47 <sup>151</sup>	28.496 <sup>62</sup>	78.81 <sup>224</sup>	62.877 <sup>13</sup>	43.05 <sup>1</sup>	17.644 <sup>17</sup>	6.75 <sup>90</sup>
Aug. 7.4	36.792 <sup>74</sup>	20.77 <sup>130</sup>	28.392 <sup>104</sup>	80.78 <sup>196</sup>	62.817 <sup>69</sup>	43.07 <sup>2</sup>	17.577 <sup>67</sup>	7.52 <sup>77</sup>
17.4	36.683 <sup>109</sup>	21.86 <sup>109</sup>	28.250 <sup>142</sup>	82.40 <sup>164</sup>	62.721 <sup>96</sup>	43.15 <sup>8</sup>	17.468 <sup>114</sup>	8.20 <sup>68</sup>
27.3	36.544 <sup>189</sup>	22.71 <sup>85</sup>	28.075 <sup>175</sup>	83.71 <sup>131</sup>	62.586 <sup>185</sup>	43.19 <sup>4</sup>	17.307 <sup>166</sup>	8.78 <sup>58</sup>
	36.544 <sup>166</sup>	22.71 <sup>62</sup>	28.075 <sup>209</sup>	83.71 <sup>94</sup>	62.586 <sup>161</sup>	43.19 <sup>4</sup>	17.307 <sup>188</sup>	8.78 <sup>44</sup>
Sept. 6.3	36.378	23.33	27.875	84.65	62.425	43.23	17.119	9.22
16.3	36.197 <sup>181</sup>	23.69 <sup>36</sup>	27.656 <sup>219</sup>	85.20 <sup>55</sup>	62.245 <sup>180</sup>	43.25 <sup>2</sup>	16.907 <sup>212</sup>	9.48 <sup>26</sup>
26.2	36.008 <sup>189</sup>	23.79 <sup>10</sup>	27.430 <sup>226</sup>	85.35 <sup>15</sup>	62.054 <sup>191</sup>	43.23 <sup>2</sup>	16.683 <sup>224</sup>	9.56 <sup>8</sup>
Oct. 6.2	35.821 <sup>187</sup>	23.65 <sup>14</sup>	27.204 <sup>228</sup>	85.69 <sup>26</sup>	61.866 <sup>188</sup>	43.18 <sup>5</sup>	16.459 <sup>224</sup>	9.43 <sup>13</sup>
16.2	35.644 <sup>177</sup>	23.23 <sup>42</sup>	26.991 <sup>213</sup>	84.42 <sup>67</sup>	61.688 <sup>178</sup>	43.09 <sup>9</sup>	16.249 <sup>210</sup>	9.10 <sup>33</sup>
	35.644 <sup>155</sup>	23.23 <sup>69</sup>	26.991 <sup>198</sup>	84.42 <sup>108</sup>	61.688 <sup>155</sup>	43.09 <sup>12</sup>	16.249 <sup>187</sup>	9.10 <sup>51</sup>
26.2	35.489	22.54	26.798	83.34	61.533	42.97	16.062	8.50
Nov. 5.1	35.362 <sup>127</sup>	21.60 <sup>94</sup>	26.636 <sup>162</sup>	81.88 <sup>146</sup>	61.411 <sup>122</sup>	42.85 <sup>12</sup>	15.913 <sup>149</sup>	7.91 <sup>66</sup>
15.1	35.272 <sup>90</sup>	20.41 <sup>119</sup>	26.512 <sup>124</sup>	80.06 <sup>182</sup>	61.324 <sup>87</sup>	42.78 <sup>12</sup>	15.807 <sup>106</sup>	7.10 <sup>81</sup>
25.1	35.224 <sup>48</sup>	18.99 <sup>142</sup>	26.432 <sup>80</sup>	77.89 <sup>217</sup>	61.286 <sup>38</sup>	42.65 <sup>8</sup>	15.755 <sup>52</sup>	6.21 <sup>89</sup>
Dec. 5.1	35.220 <sup>4</sup>	17.37 <sup>162</sup>	26.400 <sup>82</sup>	75.46 <sup>243</sup>	61.294 <sup>8</sup>	42.60 <sup>5</sup>	15.759 <sup>4</sup>	5.27 <sup>94</sup>
	35.220 <sup>48</sup>	17.37 <sup>180</sup>	26.400 <sup>18</sup>	75.46 <sup>266</sup>	61.294 <sup>60</sup>	42.60 <sup>1</sup>	15.759 <sup>60</sup>	5.27 <sup>96</sup>
15.0	35.263	15.57	26.418	72.80	61.354	42.61	15.819	4.31
25.0	35.350 <sup>87</sup>	13.68 <sup>189</sup>	26.486 <sup>68</sup>	70.01 <sup>279</sup>	61.460 <sup>106</sup>	42.66 <sup>5</sup>	15.935 <sup>116</sup>	3.39 <sup>92</sup>
35.0	35.479 <sup>129</sup>	11.73 <sup>195</sup>	26.602 <sup>116</sup>	67.17 <sup>284</sup>	61.612 <sup>152</sup>	42.80 <sup>14</sup>	16.103 <sup>198</sup>	2.53 <sup>86</sup>
Mean Place	33.378	5.59	25.277	62.10	58.704	51.52	12.875	12.42
Sec δ, Tan δ	1.014	+0.168	1.141	+0.549	1.072	-0.385	1.249	-0.748
D <sub>α</sub> , D <sub>β</sub>	+0.057	0.000	+0.047	-0.001	+0.071	+0.001	+0.061	+0.003
D <sub>γ</sub> , D <sub>δ</sub>	+0.01	-1.00	+0.01	-1.00	+0.62	-1.00	+0.02	-1.00

# APPARENT PLACES OF STARS, 1920.

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## FOR THE UPPER TRANSIT AT WASHINGTON.

Washington Mean Time.	Groombridge 2633. Mag. 5.4		36 Draconis. Mag. 5.0		δ Sagittarii. Mag. 2.8		γ Serpentis. Mag. 3.4	
	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.
	h m 18 13	° ' " +42 7	h m 18 13	° ' " +64 21	h m 18 15	° ' " -29 51	h m 18 17	° ' " - 2 54
	s	"	s	"	s	"	s	"
Jan. 1.0	8.176	56.97	23.20	75.88	51.868	42.08	9.692	68.84
11.0	8.308 <sup>132</sup>	53.76 <sup>321</sup>	23.32 <sup>12</sup>	72.36 <sup>352</sup>	52.043 <sup>185</sup>	41.65 <sup>43</sup>	9.841 <sup>149</sup>	70.06 <sup>122</sup>
20.9	8.487 <sup>179</sup>	50.68 <sup>308</sup>	23.54 <sup>23</sup>	68.97 <sup>339</sup>	52.267 <sup>224</sup>	41.27 <sup>38</sup>	10.027 <sup>186</sup>	71.27 <sup>121</sup>
30.9	8.714 <sup>227</sup>	47.83 <sup>285</sup>	23.85 <sup>31</sup>	65.84 <sup>313</sup>	52.524 <sup>257</sup>	40.95 <sup>33</sup>	10.241 <sup>214</sup>	72.37 <sup>110</sup>
Feb. 9.9	8.980 <sup>268</sup>	45.34 <sup>249</sup>	24.24 <sup>39</sup>	63.08 <sup>276</sup>	52.806 <sup>282</sup>	40.68 <sup>27</sup>	10.481 <sup>240</sup>	73.87 <sup>100</sup>
19.8	9.278 <sup>268</sup>	43.29 <sup>265</sup>	24.68 <sup>44</sup>	60.81 <sup>227</sup>	53.111 <sup>305</sup>	40.45 <sup>28</sup>	10.739 <sup>258</sup>	74.15 <sup>78</sup>
29.8	9.599 <sup>321</sup>	41.76 <sup>158</sup>	25.17 <sup>49</sup>	59.11 <sup>170</sup>	53.429 <sup>318</sup>	40.23 <sup>22</sup>	11.008 <sup>269</sup>	74.73 <sup>58</sup>
Mar. 10.8	9.937 <sup>338</sup>	40.82 <sup>94</sup>	25.70 <sup>58</sup>	58.03 <sup>108</sup>	53.757 <sup>328</sup>	40.02 <sup>21</sup>	11.288 <sup>280</sup>	75.04 <sup>31</sup>
20.8	10.283 <sup>346</sup>	40.49 <sup>33</sup>	26.25 <sup>65</sup>	57.63 <sup>40</sup>	54.090 <sup>333</sup>	39.81 <sup>21</sup>	11.574 <sup>286</sup>	75.07 <sup>3</sup>
30.7	10.630 <sup>347</sup>	40.77 <sup>28</sup>	26.80 <sup>55</sup>	57.90 <sup>27</sup>	54.424 <sup>334</sup>	39.61 <sup>20</sup>	11.861 <sup>287</sup>	74.84 <sup>28</sup>
Apr. 9.7	10.971 <sup>341</sup>	41.66 <sup>89</sup>	27.33 <sup>53</sup>	58.83 <sup>93</sup>	54.754 <sup>380</sup>	39.41 <sup>20</sup>	12.144 <sup>283</sup>	74.84 <sup>50</sup>
19.7	11.298 <sup>327</sup>	43.12 <sup>146</sup>	27.84 <sup>51</sup>	60.36 <sup>153</sup>	55.078 <sup>324</sup>	39.23 <sup>18</sup>	12.423 <sup>279</sup>	73.60 <sup>74</sup>
29.7	11.604 <sup>306</sup>	45.07 <sup>195</sup>	28.30 <sup>46</sup>	62.44 <sup>208</sup>	55.368 <sup>310</sup>	39.09 <sup>14</sup>	12.689 <sup>266</sup>	72.64 <sup>96</sup>
May 9.6	11.883 <sup>279</sup>	47.43 <sup>235</sup>	28.71 <sup>41</sup>	65.00 <sup>286</sup>	55.683 <sup>295</sup>	38.99 <sup>10</sup>	12.941 <sup>252</sup>	71.51 <sup>113</sup>
19.6	12.128 <sup>245</sup>	50.15 <sup>272</sup>	29.06 <sup>35</sup>	67.94 <sup>294</sup>	55.955 <sup>272</sup>	38.95 <sup>4</sup>	13.178 <sup>232</sup>	70.26 <sup>128</sup>
29.6	12.334 <sup>163</sup>	53.12 <sup>297</sup>	29.32 <sup>26</sup>	71.15 <sup>321</sup>	56.199 <sup>244</sup>	38.99 <sup>4</sup>	13.378 <sup>205</sup>	68.96 <sup>130</sup>
June 8.5	12.497 <sup>115</sup>	56.25 <sup>313</sup>	29.51 <sup>19</sup>	74.55 <sup>340</sup>	56.411 <sup>212</sup>	39.11 <sup>12</sup>	13.556 <sup>178</sup>	67.63 <sup>138</sup>
18.5	12.612 <sup>65</sup>	59.44 <sup>319</sup>	29.82 <sup>11</sup>	78.03 <sup>343</sup>	56.584 <sup>178</sup>	39.32 <sup>21</sup>	13.702 <sup>146</sup>	66.31 <sup>132</sup>
28.5	12.677 <sup>13</sup>	62.61 <sup>317</sup>	29.64 <sup>2</sup>	81.51 <sup>348</sup>	56.716 <sup>182</sup>	39.61 <sup>29</sup>	13.808 <sup>106</sup>	65.05 <sup>126</sup>
July 8.5	12.690 <sup>39</sup>	65.68 <sup>307</sup>	29.57 <sup>7</sup>	84.88 <sup>337</sup>	56.802 <sup>86</sup>	39.98 <sup>37</sup>	13.877 <sup>69</sup>	63.86 <sup>119</sup>
18.4	12.651 <sup>90</sup>	68.58 <sup>290</sup>	29.42 <sup>15</sup>	88.08 <sup>320</sup>	56.841 <sup>39</sup>	40.39 <sup>41</sup>	13.904 <sup>27</sup>	62.79 <sup>107</sup>
28.4	12.561 <sup>183</sup>	71.23 <sup>265</sup>	29.17 <sup>26</sup>	91.01 <sup>293</sup>	56.881 <sup>10</sup>	40.84 <sup>45</sup>	13.889 <sup>15</sup>	61.86 <sup>98</sup>
Aug. 7.4	12.423 <sup>183</sup>	73.58 <sup>285</sup>	28.86 <sup>31</sup>	93.62 <sup>261</sup>	56.774 <sup>87</sup>	41.29 <sup>45</sup>	13.834 <sup>55</sup>	61.06 <sup>80</sup>
17.4	12.241 <sup>182</sup>	75.58 <sup>290</sup>	28.49 <sup>37</sup>	95.86 <sup>224</sup>	56.673 <sup>101</sup>	41.71 <sup>42</sup>	13.740 <sup>94</sup>	60.40 <sup>66</sup>
27.3	12.021 <sup>230</sup>	77.19 <sup>161</sup>	28.05 <sup>44</sup>	97.66 <sup>180</sup>	56.585 <sup>138</sup>	42.09 <sup>28</sup>	13.615 <sup>125</sup>	59.89 <sup>51</sup>
Sept. 6.3	11.772 <sup>249</sup>	78.38 <sup>119</sup>	28.05 <sup>47</sup>	97.66 <sup>134</sup>	56.585 <sup>171</sup>	42.09 <sup>29</sup>	13.615 <sup>180</sup>	59.89 <sup>36</sup>
16.3	11.501 <sup>271</sup>	79.12 <sup>74</sup>	27.58 <sup>51</sup>	99.00 <sup>85</sup>	56.364 <sup>196</sup>	42.38 <sup>18</sup>	13.465 <sup>171</sup>	59.53 <sup>22</sup>
26.2	11.219 <sup>282</sup>	79.12 <sup>27</sup>	27.97 <sup>53</sup>	99.85 <sup>94</sup>	56.171 <sup>204</sup>	42.56 <sup>6</sup>	13.294 <sup>181</sup>	59.31 <sup>5</sup>
Oct. 6.2	10.937 <sup>282</sup>	79.39 <sup>21</sup>	26.54 <sup>56</sup>	100.19 <sup>30</sup>	55.967 <sup>206</sup>	42.62 <sup>7</sup>	13.113 <sup>182</sup>	59.26 <sup>8</sup>
16.2	10.685 <sup>272</sup>	78.50 <sup>68</sup>	26.01 <sup>52</sup>	99.99 <sup>74</sup>	55.761 <sup>194</sup>	42.55 <sup>29</sup>	12.931 <sup>173</sup>	59.34 <sup>22</sup>
26.2	10.415 <sup>260</sup>	77.88 <sup>117</sup>	25.49 <sup>46</sup>	99.25 <sup>126</sup>	55.567 <sup>172</sup>	42.85 <sup>31</sup>	12.758 <sup>164</sup>	59.56 <sup>38</sup>
Nov. 5.1	10.197 <sup>218</sup>	77.88 <sup>163</sup>	25.01 <sup>44</sup>	97.99 <sup>178</sup>	55.895 <sup>139</sup>	42.04 <sup>42</sup>	12.604 <sup>127</sup>	59.94 <sup>51</sup>
15.1	10.020 <sup>177</sup>	75.70 <sup>205</sup>	24.57 <sup>38</sup>	96.21 <sup>226</sup>	55.256 <sup>97</sup>	41.62 <sup>49</sup>	12.477 <sup>90</sup>	60.45 <sup>69</sup>
25.1	9.890 <sup>130</sup>	73.65 <sup>245</sup>	24.19 <sup>31</sup>	93.95 <sup>268</sup>	55.159 <sup>50</sup>	41.13 <sup>64</sup>	12.387 <sup>49</sup>	61.14 <sup>83</sup>
Dec. 5.1	9.814 <sup>76</sup>	71.20 <sup>277</sup>	23.88 <sup>21</sup>	91.27 <sup>306</sup>	55.109 <sup>4</sup>	40.59 <sup>55</sup>	12.338 <sup>38</sup>	61.97 <sup>98</sup>
15.0	9.814 <sup>20</sup>	68.43 <sup>308</sup>	23.67 <sup>13</sup>	89.21 <sup>332</sup>	55.113 <sup>55</sup>	40.04 <sup>54</sup>	12.330 <sup>39</sup>	62.95 <sup>109</sup>
25.0	9.794 <sup>39</sup>	65.40 <sup>319</sup>	23.54 <sup>4</sup>	84.89 <sup>362</sup>	55.168 <sup>106</sup>	39.50 <sup>51</sup>	12.309 <sup>81</sup>	64.04 <sup>120</sup>
35.0	9.833 <sup>96</sup>	62.21 <sup>326</sup>	23.50 <sup>7</sup>	81.37 <sup>382</sup>	55.274 <sup>164</sup>	38.99 <sup>51</sup>	12.450 <sup>81</sup>	65.24 <sup>122</sup>
35.0	9.929 <sup>96</sup>	58.95 <sup>326</sup>	23.57 <sup>7</sup>	77.79 <sup>388</sup>	55.428 <sup>184</sup>	38.54 <sup>44</sup>	12.577 <sup>127</sup>	66.46 <sup>122</sup>
Mean Place	9.445	52.96	26.188	71.90	52.344	43.30	10.156	74.04
Sec δ, Tan δ	1.348	+0.905	2.312	+2.064	1.153	-0.574	1.001	-0.051
D <sub>α</sub> , D <sub>ω</sub>	+0.037	-0.003	+0.006	-0.008	+0.076	+0.003	+0.062	0.000
D <sub>γ</sub> δ, D <sub>ω</sub> δ	+0.02	-1.00	+0.02	-1.00	+0.08	-1.00	+0.03	-1.00

APPARENT PLACES OF STARS, 1920.

FOR THE UPPER TRANSIT AT WASHINGTON.

Washington Mean Time.	ε Sagittarii. Mag. 2.0		109 Heroulis. Mag. 3.9		α Telescopi. Mag. 3.8		χ Draconis. Mag. 3.7	
	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.
	h m 18 18	° ' " -34 25	h m 18 20	° ' " +21 43	h m 18 21	° ' " -46 0	h m 18 22	° ' " +72 41
Jan. 1.0	51.164	18.69	16.585	60.84	1.787	43.74	25.34	59.21
11.0	51.353 <sup>180</sup>	17.97 <sup>72</sup>	16.718 <sup>132</sup>	58.35 <sup>240</sup>	2.000 <sup>213</sup>	42.32 <sup>142</sup>	25.44 <sup>10</sup>	55.69 <sup>352</sup>
20.9	51.584 <sup>281</sup>	17.31 <sup>66</sup>	16.890 <sup>173</sup>	55.94 <sup>241</sup>	2.262 <sup>262</sup>	40.99 <sup>138</sup>	25.68 <sup>24</sup>	52.27 <sup>342</sup>
30.9	51.848 <sup>284</sup>	16.73 <sup>58</sup>	17.096 <sup>208</sup>	53.71 <sup>228</sup>	2.565 <sup>308</sup>	39.80 <sup>119</sup>	26.06 <sup>28</sup>	49.08 <sup>319</sup>
Feb. 9.9	52.142 <sup>284</sup>	16.23 <sup>50</sup>	17.330 <sup>234</sup>	51.76 <sup>196</sup>	2.906 <sup>341</sup>	38.74 <sup>106</sup>	26.55 <sup>49</sup>	46.24 <sup>284</sup>
19.9	52.458 <sup>316</sup>	15.78 <sup>45</sup>	17.587 <sup>287</sup>	50.18 <sup>188</sup>	3.274 <sup>308</sup>	37.85 <sup>89</sup>	27.14 <sup>59</sup>	43.87 <sup>237</sup>
29.8	52.789 <sup>331</sup>	15.40 <sup>38</sup>	17.862 <sup>278</sup>	48.98 <sup>120</sup>	3.661 <sup>367</sup>	37.13 <sup>72</sup>	27.82 <sup>68</sup>	42.07 <sup>180</sup>
Mar. 10.8	53.133 <sup>344</sup>	15.08 <sup>32</sup>	18.148 <sup>298</sup>	48.19 <sup>74</sup>	4.063 <sup>402</sup>	36.56 <sup>57</sup>	28.55 <sup>73</sup>	40.86 <sup>121</sup>
20.8	53.482 <sup>340</sup>	14.80 <sup>28</sup>	18.442 <sup>304</sup>	47.93 <sup>28</sup>	4.472 <sup>409</sup>	36.15 <sup>41</sup>	29.32 <sup>77</sup>	40.33 <sup>53</sup>
30.7	53.833 <sup>351</sup>	14.58 <sup>22</sup>	18.737 <sup>295</sup>	48.18 <sup>28</sup>	4.883 <sup>411</sup>	35.91 <sup>34</sup>	30.09 <sup>77</sup>	40.45 <sup>12</sup>
Apr. 9.7	54.180 <sup>347</sup>	14.40 <sup>18</sup>	19.030 <sup>286</sup>	48.91 <sup>73</sup>	5.292 <sup>409</sup>	35.86 <sup>5</sup>	30.85 <sup>76</sup>	41.23 <sup>73</sup>
19.7	54.520 <sup>340</sup>	14.30 <sup>10</sup>	19.315 <sup>285</sup>	50.09 <sup>118</sup>	5.690 <sup>382</sup>	35.97 <sup>11</sup>	31.57 <sup>72</sup>	42.65 <sup>142</sup>
29.7	54.848 <sup>336</sup>	14.28 <sup>2</sup>	19.587 <sup>273</sup>	51.67 <sup>188</sup>	6.075 <sup>388</sup>	36.26 <sup>29</sup>	32.22 <sup>65</sup>	44.61 <sup>196</sup>
May 9.6	55.158 <sup>310</sup>	14.94 <sup>6</sup>	19.840 <sup>262</sup>	53.67 <sup>199</sup>	6.437 <sup>382</sup>	36.74 <sup>48</sup>	32.80 <sup>88</sup>	47.05 <sup>244</sup>
19.6	55.446 <sup>288</sup>	14.50 <sup>16</sup>	20.071 <sup>281</sup>	55.75 <sup>216</sup>	6.772 <sup>335</sup>	37.39 <sup>65</sup>	33.28 <sup>48</sup>	49.89 <sup>284</sup>
29.6	55.704 <sup>288</sup>	14.75 <sup>26</sup>	20.273 <sup>292</sup>	58.12 <sup>227</sup>	7.073 <sup>301</sup>	38.19 <sup>80</sup>	33.65 <sup>37</sup>	53.04 <sup>315</sup>
June 8.6	55.928 <sup>294</sup>	15.11 <sup>36</sup>	20.443 <sup>176</sup>	60.61 <sup>249</sup>	7.332 <sup>269</sup>	39.16 <sup>97</sup>	33.90 <sup>26</sup>	56.88 <sup>234</sup>
18.5	56.112 <sup>184</sup>	15.87 <sup>46</sup>	20.575 <sup>123</sup>	63.14 <sup>263</sup>	7.544 <sup>212</sup>	40.25 <sup>109</sup>	34.03 <sup>18</sup>	59.84 <sup>345</sup>
28.5	56.252 <sup>140</sup>	16.12 <sup>55</sup>	20.670 <sup>96</sup>	65.64 <sup>260</sup>	7.704 <sup>160</sup>	41.45 <sup>120</sup>	34.03 <sup>0</sup>	63.31 <sup>347</sup>
July 8.5	56.343 <sup>91</sup>	16.75 <sup>63</sup>	20.721 <sup>51</sup>	68.05 <sup>241</sup>	7.897 <sup>108</sup>	42.71 <sup>136</sup>	33.91 <sup>12</sup>	66.70 <sup>239</sup>
18.4	56.385 <sup>42</sup>	17.42 <sup>67</sup>	20.729 <sup>8</sup>	70.32 <sup>227</sup>	7.850 <sup>48</sup>	44.01 <sup>130</sup>	33.66 <sup>26</sup>	69.94 <sup>234</sup>
28.4	56.376 <sup>9</sup>	18.11 <sup>69</sup>	20.698 <sup>26</sup>	72.38 <sup>206</sup>	7.836 <sup>14</sup>	45.29 <sup>128</sup>	33.30 <sup>36</sup>	72.93 <sup>290</sup>
Aug. 7.4	56.316 <sup>60</sup>	18.78 <sup>67</sup>	20.616 <sup>77</sup>	74.21 <sup>183</sup>	7.759 <sup>77</sup>	46.51 <sup>129</sup>	32.83 <sup>47</sup>	75.63 <sup>270</sup>
17.4	56.212 <sup>104</sup>	19.40 <sup>68</sup>	20.590 <sup>116</sup>	75.76 <sup>155</sup>	7.629 <sup>139</sup>	47.59 <sup>106</sup>	32.25 <sup>58</sup>	77.97 <sup>224</sup>
27.3	56.067 <sup>145</sup>	19.93 <sup>83</sup>	20.351 <sup>149</sup>	77.01 <sup>126</sup>	7.453 <sup>178</sup>	48.51 <sup>92</sup>	31.61 <sup>64</sup>	79.89 <sup>192</sup>
Sept. 6.3	55.887 <sup>180</sup>	20.36 <sup>43</sup>	20.174 <sup>177</sup>	77.95 <sup>94</sup>	7.237 <sup>216</sup>	49.23 <sup>72</sup>	30.89 <sup>72</sup>	81.36 <sup>147</sup>
16.3	55.685 <sup>202</sup>	20.63 <sup>27</sup>	19.979 <sup>195</sup>	78.53 <sup>58</sup>	6.992 <sup>245</sup>	49.69 <sup>66</sup>	30.89 <sup>76</sup>	81.36 <sup>98</sup>
26.3	55.468 <sup>217</sup>	20.74 <sup>11</sup>	19.772 <sup>207</sup>	78.77 <sup>24</sup>	6.731 <sup>261</sup>	49.88 <sup>19</sup>	29.34 <sup>79</sup>	82.80 <sup>46</sup>
Oct. 6.2	55.252 <sup>216</sup>	20.68 <sup>6</sup>	19.564 <sup>206</sup>	78.65 <sup>12</sup>	6.469 <sup>282</sup>	49.78 <sup>10</sup>	28.54 <sup>80</sup>	82.75 <sup>5</sup>
16.2	55.045 <sup>207</sup>	20.43 <sup>25</sup>	19.364 <sup>200</sup>	78.17 <sup>48</sup>	6.219 <sup>289</sup>	49.38 <sup>40</sup>	27.76 <sup>78</sup>	82.16 <sup>89</sup>
26.2	54.863 <sup>182</sup>	20.01 <sup>43</sup>	19.183 <sup>181</sup>	77.32 <sup>86</sup>	5.995 <sup>224</sup>	48.70 <sup>68</sup>	27.01 <sup>75</sup>	81.03 <sup>113</sup>
Nov. 5.1	54.713 <sup>180</sup>	19.46 <sup>55</sup>	19.029 <sup>144</sup>	76.13 <sup>119</sup>	5.809 <sup>186</sup>	47.77 <sup>98</sup>	26.32 <sup>69</sup>	79.39 <sup>164</sup>
15.1	54.607 <sup>106</sup>	18.79 <sup>67</sup>	18.910 <sup>119</sup>	74.60 <sup>183</sup>	5.672 <sup>137</sup>	46.63 <sup>114</sup>	25.72 <sup>60</sup>	77.26 <sup>213</sup>
25.1	54.551 <sup>86</sup>	18.02 <sup>77</sup>	18.832 <sup>78</sup>	72.77 <sup>183</sup>	5.594 <sup>178</sup>	45.31 <sup>139</sup>	25.21 <sup>51</sup>	74.68 <sup>288</sup>
Dec. 5.1	54.548 <sup>3</sup>	17.22 <sup>80</sup>	18.798 <sup>24</sup>	70.67 <sup>280</sup>	5.580 <sup>14</sup>	43.88 <sup>143</sup>	24.80 <sup>41</sup>	71.72 <sup>286</sup>
15.0	54.601 <sup>83</sup>	16.40 <sup>82</sup>	18.811 <sup>13</sup>	68.87 <sup>290</sup>	5.629 <sup>49</sup>	42.38 <sup>180</sup>	24.54 <sup>26</sup>	68.47 <sup>235</sup>
25.0	54.707 <sup>106</sup>	15.62 <sup>78</sup>	18.870 <sup>89</sup>	65.92 <sup>245</sup>	5.743 <sup>114</sup>	40.89 <sup>149</sup>	24.42 <sup>12</sup>	65.00 <sup>247</sup>
35.0	54.863 <sup>106</sup>	14.87 <sup>75</sup>	18.975 <sup>106</sup>	63.41 <sup>261</sup>	5.916 <sup>173</sup>	39.44 <sup>145</sup>	24.43 <sup>1</sup>	61.44 <sup>266</sup>
Mean Place	51.699	25.00	17.309	56.08	2.515	50.40	30.116	54.19
Sec δ, Tan δ	1.212	-0.665	1.077	+0.399	1.440	-1.086	3.368	+3.211
D <sub>12</sub> , D <sub>12</sub>	+0.079	+0.004	+0.051	-0.062	+0.089	+0.066	-0.024	-0.021
D <sub>12</sub> , D <sub>12</sub>	+0.08	-1.00	+0.04	-1.00	+0.04	-1.00	+0.04	-1.00

# APPARENT PLACES OF STARS, 1920.

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FOR THE UPPER TRANSIT AT WASHINGTON.

Washington Mean Time.	λ Sagittarii. Mag. 2.9		γ Serpentis. Mag. 5.4.		ι Aquilae. Mag. 4.1		ζ Favis. Mag. 4.1	
	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.
	h m 18 23	° ' " -25 27	h m 18 25	° ' " - 2 2	h m 18 30	° ' " - 8 17	h m 18 33	° ' " -71 29
	s	"	s	"	s	"	s	"
Jan. 1.0	1.551	56.30	30.684	11.87	50.750	58.42	39.01	49.22
11.0	1.721 <sup>170</sup>	56.11 <sup>10</sup>	30.628 <sup>144</sup>	12.10 <sup>123</sup>	50.902 <sup>143</sup>	59.23 <sup>86</sup>	39.35 <sup>34</sup>	46.45 <sup>277</sup>
20.9	1.930 <sup>300</sup>	55.95 <sup>16</sup>	31.007 <sup>179</sup>	14.31 <sup>121</sup>	51.082 <sup>180</sup>	60.12 <sup>84</sup>	39.80 <sup>45</sup>	43.83 <sup>262</sup>
30.9	2.170 <sup>340</sup>	55.82 <sup>12</sup>	31.215 <sup>208</sup>	15.43 <sup>112</sup>	51.291 <sup>200</sup>	60.91 <sup>79</sup>	40.36 <sup>56</sup>	41.41 <sup>242</sup>
Feb. 9.9	2.437 <sup>367</sup>	55.72 <sup>11</sup>	31.448 <sup>233</sup>	16.41 <sup>98</sup>	51.525 <sup>234</sup>	61.58 <sup>67</sup>	41.01 <sup>65</sup>	39.26 <sup>215</sup>
19.9	2.724 <sup>367</sup>	55.60 <sup>12</sup>	31.700 <sup>252</sup>	17.21 <sup>86</sup>	51.779 <sup>254</sup>	62.13 <sup>55</sup>	41.73 <sup>72</sup>	37.40 <sup>186</sup>
29.8	3.027 <sup>308</sup>	55.46 <sup>14</sup>	31.969 <sup>309</sup>	17.77 <sup>56</sup>	52.049 <sup>370</sup>	62.49 <sup>38</sup>	42.50 <sup>77</sup>	35.90 <sup>150</sup>
Mar. 10.8	3.339 <sup>312</sup>	55.28 <sup>18</sup>	32.246 <sup>377</sup>	18.07 <sup>30</sup>	52.330 <sup>281</sup>	62.62 <sup>12</sup>	43.32 <sup>83</sup>	34.75 <sup>115</sup>
20.8	3.658 <sup>319</sup>	55.05 <sup>23</sup>	32.530 <sup>384</sup>	18.08 <sup>1</sup>	52.619 <sup>299</sup>	62.56 <sup>6</sup>	44.16 <sup>84</sup>	33.99 <sup>76</sup>
30.7	3.979 <sup>321</sup>	54.78 <sup>27</sup>	32.817 <sup>387</sup>	17.82 <sup>20</sup>	52.911 <sup>302</sup>	62.26 <sup>30</sup>	45.01 <sup>85</sup>	33.60 <sup>39</sup>
Apr. 9.7	4.296 <sup>319</sup>	54.48 <sup>30</sup>	33.103 <sup>396</sup>	17.56 <sup>56</sup>	53.202 <sup>291</sup>	61.75 <sup>51</sup>	45.01 <sup>85</sup>	33.60 <sup>0</sup>
19.7	4.611 <sup>313</sup>	54.15 <sup>33</sup>	33.384 <sup>381</sup>	17.26 <sup>80</sup>	53.202 <sup>288</sup>	61.75 <sup>71</sup>	45.01 <sup>89</sup>	33.60 <sup>39</sup>
29.7	4.912 <sup>301</sup>	53.82 <sup>32</sup>	33.654 <sup>370</sup>	16.46 <sup>103</sup>	53.490 <sup>376</sup>	61.04 <sup>85</sup>	46.69 <sup>79</sup>	33.99 <sup>77</sup>
May 9.6	5.200 <sup>298</sup>	53.51 <sup>31</sup>	33.911 <sup>357</sup>	15.44 <sup>119</sup>	53.766 <sup>304</sup>	60.19 <sup>98</sup>	47.48 <sup>75</sup>	34.76 <sup>113</sup>
19.6	5.467 <sup>267</sup>	53.23 <sup>26</sup>	34.148 <sup>337</sup>	14.25 <sup>131</sup>	54.030 <sup>247</sup>	59.21 <sup>105</sup>	48.23 <sup>69</sup>	35.89 <sup>143</sup>
29.6	5.766 <sup>290</sup>	53.01 <sup>22</sup>	34.362 <sup>314</sup>	12.94 <sup>141</sup>	54.277 <sup>222</sup>	58.16 <sup>111</sup>	48.92 <sup>59</sup>	37.32 <sup>176</sup>
June 8.6	5.918 <sup>212</sup>	53.01 <sup>15</sup>	34.567 <sup>186</sup>	11.53 <sup>141</sup>	54.499 <sup>197</sup>	57.05 <sup>112</sup>	49.51 <sup>51</sup>	39.08 <sup>202</sup>
18.5	6.093 <sup>175</sup>	52.86 <sup>8</sup>	34.700 <sup>153</sup>	10.12 <sup>142</sup>	54.696 <sup>161</sup>	55.93 <sup>107</sup>	50.02 <sup>41</sup>	41.10 <sup>222</sup>
28.5	6.227 <sup>134</sup>	52.79 <sup>1</sup>	34.815 <sup>115</sup>	8.70 <sup>136</sup>	54.857 <sup>126</sup>	54.86 <sup>101</sup>	50.43 <sup>30</sup>	43.32 <sup>238</sup>
July 8.5	6.318 <sup>91</sup>	52.89 <sup>10</sup>	34.892 <sup>77</sup>	7.35 <sup>127</sup>	54.983 <sup>86</sup>	53.85 <sup>91</sup>	50.73 <sup>17</sup>	45.70 <sup>245</sup>
18.4	6.362 <sup>44</sup>	52.89 <sup>16</sup>	34.892 <sup>35</sup>	6.08 <sup>115</sup>	55.068 <sup>44</sup>	52.94 <sup>81</sup>	50.90 <sup>5</sup>	48.15 <sup>248</sup>
28.4	6.359 <sup>3</sup>	53.05 <sup>23</sup>	34.927 <sup>7</sup>	4.98 <sup>102</sup>	55.112 <sup>0</sup>	52.13 <sup>70</sup>	50.95 <sup>3</sup>	50.63 <sup>240</sup>
Aug. 7.4	6.312 <sup>47</sup>	53.28 <sup>26</sup>	34.920 <sup>48</sup>	3.91 <sup>88</sup>	55.112 <sup>0</sup>	51.43 <sup>59</sup>	50.87 <sup>8</sup>	53.03 <sup>240</sup>
17.4	6.221 <sup>91</sup>	53.54 <sup>26</sup>	34.872 <sup>48</sup>	3.03 <sup>88</sup>	55.069 <sup>43</sup>	50.84 <sup>59</sup>	50.68 <sup>19</sup>	55.29 <sup>226</sup>
27.3	6.091 <sup>130</sup>	53.81 <sup>27</sup>	34.785 <sup>87</sup>	2.31 <sup>73</sup>	54.999 <sup>30</sup>	50.37 <sup>47</sup>	50.35 <sup>33</sup>	57.32 <sup>203</sup>
Sept. 6.3	6.091 <sup>160</sup>	54.06 <sup>26</sup>	34.666 <sup>119</sup>	1.74 <sup>57</sup>	54.872 <sup>117</sup>	50.02 <sup>35</sup>	50.35 <sup>43</sup>	57.32 <sup>173</sup>
16.3	5.931 <sup>183</sup>	54.06 <sup>21</sup>	34.666 <sup>140</sup>	1.41 <sup>41</sup>	54.872 <sup>144</sup>	50.02 <sup>23</sup>	49.93 <sup>50</sup>	59.05 <sup>136</sup>
26.3	5.748 <sup>196</sup>	54.27 <sup>16</sup>	34.517 <sup>160</sup>	1.33 <sup>26</sup>	54.728 <sup>163</sup>	49.79 <sup>14</sup>	49.43 <sup>57</sup>	60.41 <sup>94</sup>
Oct. 6.2	5.552 <sup>197</sup>	54.43 <sup>8</sup>	34.348 <sup>179</sup>	1.08 <sup>10</sup>	54.560 <sup>178</sup>	49.65 <sup>2</sup>	48.86 <sup>61</sup>	61.35 <sup>45</sup>
16.2	5.355 <sup>197</sup>	54.51 <sup>0</sup>	34.169 <sup>181</sup>	0.98 <sup>6</sup>	54.382 <sup>184</sup>	49.63 <sup>5</sup>	48.25 <sup>62</sup>	61.80 <sup>5</sup>
26.2	5.166 <sup>189</sup>	54.42 <sup>9</sup>	33.988 <sup>174</sup>	1.04 <sup>31</sup>	54.198 <sup>172</sup>	49.68 <sup>16</sup>	47.63 <sup>60</sup>	61.75 <sup>56</sup>
Nov. 5.1	4.989 <sup>167</sup>	54.25 <sup>17</sup>	33.814 <sup>156</sup>	1.25 <sup>37</sup>	54.026 <sup>158</sup>	49.84 <sup>23</sup>	47.03 <sup>57</sup>	61.19 <sup>105</sup>
15.1	4.861 <sup>138</sup>	54.01 <sup>24</sup>	33.658 <sup>129</sup>	1.62 <sup>53</sup>	53.868 <sup>130</sup>	50.07 <sup>36</sup>	46.46 <sup>49</sup>	60.14 <sup>263</sup>
25.1	4.763 <sup>98</sup>	54.01 <sup>27</sup>	33.529 <sup>96</sup>	2.15 <sup>63</sup>	53.738 <sup>99</sup>	50.43 <sup>45</sup>	45.97 <sup>40</sup>	58.61 <sup>194</sup>
Dec. 5.1	4.710 <sup>53</sup>	53.44 <sup>30</sup>	33.433 <sup>56</sup>	2.83 <sup>84</sup>	53.639 <sup>57</sup>	50.88 <sup>53</sup>	45.87 <sup>27</sup>	56.87 <sup>238</sup>
15.0	4.706 <sup>4</sup>	53.44 <sup>30</sup>	33.377 <sup>13</sup>	3.67 <sup>97</sup>	53.582 <sup>14</sup>	51.41 <sup>64</sup>	45.90 <sup>16</sup>	54.39 <sup>265</sup>
25.0	4.706 <sup>45</sup>	53.14 <sup>26</sup>	33.364 <sup>32</sup>	4.64 <sup>111</sup>	53.568 <sup>32</sup>	52.05 <sup>75</sup>	45.14 <sup>2</sup>	51.84 <sup>372</sup>
35.0	4.751 <sup>96</sup>	52.86 <sup>28</sup>	33.306 <sup>76</sup>	5.75 <sup>118</sup>	53.600 <sup>78</sup>	52.80 <sup>82</sup>	45.12 <sup>12</sup>	49.12 <sup>280</sup>
	4.847 <sup>142</sup>	52.63 <sup>19</sup>	33.472 <sup>117</sup>	6.93 <sup>125</sup>	53.673 <sup>118</sup>	53.62 <sup>85</sup>	45.24 <sup>28</sup>	46.32 <sup>379</sup>
	4.989 <sup>142</sup>	52.44 <sup>19</sup>	33.589 <sup>117</sup>	8.18 <sup>125</sup>	53.791 <sup>118</sup>	54.47 <sup>85</sup>	45.49 <sup>28</sup>	43.53 <sup>379</sup>
Mean Place	2.019	62.22	31.159	17.22	51.214	63.95	41.489	55.93
Sec δ, Tan δ	1.108	-0.476	1.001	-0.036	1.011	-0.146	3.151	-2.988
D <sub>α</sub> α, D <sub>α</sub> α	+0.074	+0.003	+0.062	0.000	+0.065	+0.001	+0.140	+0.030
D <sub>δ</sub> δ, D <sub>δ</sub> δ	+0.04	-0.99	+0.04	-0.99	+0.05	-0.99	+0.06	-0.99

APPARENT PLACES OF STARS, 1920.

FOR THE UPPER TRANSIT AT WASHINGTON.

Washington Mean Time.	α Lyrae. (Vega.) Mag. 0.1		β Aquilae. Mag. 4.7		φ Sagittarii. Mag. 3.3		110 Herculis. Mag. 4.3	
	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.
	h m 18 34	° ' " +38 42	h m 18 37	° ' " - 9 7	h m 18 40	° ' " -27 4	h m 18 42	° ' " +20 28
Jan. 1.0	12.666	36.08	53.222	43.23	39.010	21.61	12.373	13.41
11.0	12.775 <sup>107</sup>	32.96 <sup>308</sup>	53.360 <sup>138</sup>	44.00 <sup>77</sup>	39.163 <sup>153</sup>	21.25 <sup>36</sup>	12.484 <sup>111</sup>	11.02 <sup>239</sup>
20.9	12.929 <sup>156</sup>	29.94 <sup>301</sup>	53.534 <sup>174</sup>	44.76 <sup>76</sup>	39.355 <sup>192</sup>	20.91 <sup>34</sup>	12.634 <sup>150</sup>	8.69 <sup>233</sup>
30.9	13.130 <sup>301</sup>	27.15 <sup>279</sup>	53.737 <sup>303</sup>	45.45 <sup>69</sup>	39.582 <sup>327</sup>	20.59 <sup>23</sup>	12.818 <sup>184</sup>	6.51 <sup>218</sup>
Feb. 9.9	13.366 <sup>236</sup>	24.65 <sup>250</sup>	53.968 <sup>331</sup>	46.05 <sup>60</sup>	39.838 <sup>356</sup>	20.28 <sup>31</sup>	13.033 <sup>215</sup>	4.56 <sup>195</sup>
19.9	13.639 <sup>373</sup>	22.53 <sup>212</sup>	54.218 <sup>360</sup>	46.52 <sup>47</sup>	39.838 <sup>378</sup>	20.28 <sup>32</sup>	13.033 <sup>340</sup>	4.56 <sup>163</sup>
29.8	13.937 <sup>308</sup>	20.94 <sup>150</sup>	54.485 <sup>367</sup>	46.82 <sup>30</sup>	40.116 <sup>398</sup>	19.96 <sup>34</sup>	13.273 <sup>362</sup>	2.93 <sup>123</sup>
Mar. 10.8	14.253 <sup>316</sup>	19.89 <sup>105</sup>	54.763 <sup>378</sup>	46.82 <sup>10</sup>	40.412 <sup>311</sup>	19.62 <sup>36</sup>	13.535 <sup>376</sup>	1.70 <sup>80</sup>
20.8	14.585 <sup>332</sup>	19.89 <sup>48</sup>	54.763 <sup>388</sup>	46.92 <sup>11</sup>	40.723 <sup>318</sup>	19.28 <sup>38</sup>	13.811 <sup>387</sup>	0.90 <sup>33</sup>
30.8	14.919 <sup>333</sup>	19.41 <sup>11</sup>	55.051 <sup>392</sup>	46.81 <sup>33</sup>	41.041 <sup>325</sup>	18.88 <sup>42</sup>	14.098 <sup>392</sup>	0.57 <sup>16</sup>
Apr. 9.7	15.252 <sup>333</sup>	19.52 <sup>78</sup>	55.343 <sup>392</sup>	46.48 <sup>54</sup>	41.366 <sup>328</sup>	18.46 <sup>44</sup>	14.390 <sup>394</sup>	0.73 <sup>63</sup>
19.7	15.578 <sup>336</sup>	20.25 <sup>127</sup>	55.635 <sup>399</sup>	45.94 <sup>72</sup>	41.692 <sup>322</sup>	18.02 <sup>44</sup>	14.684 <sup>390</sup>	1.36 <sup>109</sup>
29.7	15.887 <sup>309</sup>	21.52 <sup>178</sup>	55.924 <sup>390</sup>	45.22 <sup>88</sup>	42.014 <sup>315</sup>	17.58 <sup>43</sup>	14.974 <sup>381</sup>	2.45 <sup>149</sup>
May 9.6	16.174 <sup>387</sup>	23.30 <sup>223</sup>	56.204 <sup>370</sup>	44.34 <sup>99</sup>	42.329 <sup>301</sup>	17.15 <sup>40</sup>	15.255 <sup>365</sup>	3.94 <sup>182</sup>
19.6	16.435 <sup>361</sup>	25.58 <sup>254</sup>	56.474 <sup>361</sup>	43.35 <sup>107</sup>	42.630 <sup>294</sup>	16.75 <sup>33</sup>	15.520 <sup>346</sup>	5.76 <sup>211</sup>
29.6	16.435 <sup>325</sup>	28.07 <sup>296</sup>	56.725 <sup>330</sup>	42.28 <sup>110</sup>	42.914 <sup>259</sup>	16.42 <sup>26</sup>	15.766 <sup>219</sup>	7.87 <sup>231</sup>
June 8.6	16.660 <sup>185</sup>	30.93 <sup>304</sup>	56.955 <sup>301</sup>	41.38 <sup>109</sup>	43.173 <sup>228</sup>	16.17 <sup>17</sup>	15.985 <sup>191</sup>	10.18 <sup>244</sup>
18.5	16.845 <sup>143</sup>	33.97 <sup>316</sup>	57.156 <sup>171</sup>	40.09 <sup>107</sup>	43.401 <sup>194</sup>	16.00 <sup>5</sup>	16.176 <sup>154</sup>	12.62 <sup>251</sup>
28.5	16.988 <sup>93</sup>	37.12 <sup>313</sup>	57.327 <sup>133</sup>	39.02 <sup>99</sup>	43.595 <sup>154</sup>	15.95 <sup>8</sup>	16.330 <sup>115</sup>	15.13 <sup>250</sup>
July 8.5	17.081 <sup>43</sup>	40.25 <sup>307</sup>	57.480 <sup>98</sup>	38.03 <sup>90</sup>	43.749 <sup>109</sup>	15.98 <sup>14</sup>	16.445 <sup>74</sup>	17.63 <sup>242</sup>
18.5	17.124 <sup>5</sup>	43.32 <sup>298</sup>	57.553 <sup>49</sup>	37.13 <sup>80</sup>	43.858 <sup>62</sup>	16.12 <sup>28</sup>	16.519 <sup>29</sup>	20.05 <sup>230</sup>
28.4	17.119 <sup>57</sup>	46.25 <sup>271</sup>	57.602 <sup>7</sup>	36.33 <sup>66</sup>	43.920 <sup>14</sup>	16.35 <sup>31</sup>	16.548 <sup>14</sup>	22.35 <sup>211</sup>
Aug. 7.4	17.062 <sup>103</sup>	48.96 <sup>246</sup>	57.609 <sup>35</sup>	35.65 <sup>56</sup>	43.934 <sup>36</sup>	16.66 <sup>36</sup>	16.534 <sup>58</sup>	24.46 <sup>190</sup>
17.4	16.959 <sup>159</sup>	51.42 <sup>212</sup>	57.574 <sup>76</sup>	35.10 <sup>43</sup>	43.899 <sup>78</sup>	17.01 <sup>38</sup>	16.476 <sup>97</sup>	26.36 <sup>163</sup>
27.3	16.809 <sup>190</sup>	53.54 <sup>176</sup>	57.498 <sup>113</sup>	34.67 <sup>32</sup>	43.821 <sup>120</sup>	17.39 <sup>36</sup>	16.379 <sup>134</sup>	27.99 <sup>136</sup>
37.0	16.619 <sup>220</sup>	55.30 <sup>136</sup>	57.386 <sup>142</sup>	34.35 <sup>21</sup>	43.701 <sup>153</sup>	17.75 <sup>32</sup>	16.245 <sup>165</sup>	29.35 <sup>103</sup>
Sept. 6.3	16.399 <sup>246</sup>	56.66 <sup>96</sup>	57.244 <sup>164</sup>	34.14 <sup>13</sup>	43.548 <sup>190</sup>	18.07 <sup>26</sup>	16.080 <sup>187</sup>	30.88 <sup>71</sup>
16.3	16.153 <sup>259</sup>	57.62 <sup>48</sup>	57.080 <sup>178</sup>	34.01 <sup>2</sup>	43.368 <sup>196</sup>	18.35 <sup>18</sup>	15.893 <sup>300</sup>	31.09 <sup>37</sup>
26.3	15.894 <sup>264</sup>	58.10 <sup>5</sup>	56.902 <sup>183</sup>	33.99 <sup>5</sup>	43.172 <sup>200</sup>	18.53 <sup>0</sup>	15.693 <sup>306</sup>	31.46 <sup>4</sup>
Oct. 6.2	15.630 <sup>257</sup>	58.15 <sup>44</sup>	56.720 <sup>176</sup>	34.04 <sup>15</sup>	42.972 <sup>198</sup>	18.62 <sup>3</sup>	15.487 <sup>196</sup>	31.50 <sup>33</sup>
16.2	15.373 <sup>241</sup>	57.71 <sup>91</sup>	56.544 <sup>159</sup>	34.19 <sup>22</sup>	42.779 <sup>177</sup>	18.59 <sup>12</sup>	15.287 <sup>186</sup>	31.17 <sup>66</sup>
26.2	15.132 <sup>216</sup>	56.80 <sup>135</sup>	56.385 <sup>135</sup>	34.41 <sup>31</sup>	42.602 <sup>149</sup>	18.47 <sup>29</sup>	15.101 <sup>162</sup>	30.48 <sup>102</sup>
Nov. 5.2	14.916 <sup>175</sup>	55.45 <sup>181</sup>	56.250 <sup>101</sup>	34.72 <sup>40</sup>	42.453 <sup>112</sup>	18.25 <sup>36</sup>	14.939 <sup>130</sup>	29.46 <sup>135</sup>
15.1	14.741 <sup>135</sup>	53.64 <sup>218</sup>	56.149 <sup>62</sup>	35.12 <sup>48</sup>	42.341 <sup>69</sup>	17.96 <sup>29</sup>	14.809 <sup>94</sup>	28.11 <sup>167</sup>
25.1	14.606 <sup>86</sup>	51.46 <sup>252</sup>	56.087 <sup>19</sup>	35.60 <sup>59</sup>	42.272 <sup>22</sup>	17.61 <sup>37</sup>	14.715 <sup>51</sup>	26.44 <sup>193</sup>
Dec. 5.1	14.520 <sup>32</sup>	48.94 <sup>282</sup>	56.068 <sup>25</sup>	36.19 <sup>67</sup>	42.250 <sup>28</sup>	17.24 <sup>38</sup>	14.664 <sup>7</sup>	24.51 <sup>216</sup>
15.0	14.487 <sup>18</sup>	46.12 <sup>300</sup>	56.093 <sup>70</sup>	36.86 <sup>73</sup>	42.278 <sup>78</sup>	16.86 <sup>39</sup>	14.657 <sup>39</sup>	22.35 <sup>231</sup>
25.0	14.505 <sup>73</sup>	43.12 <sup>311</sup>	56.163 <sup>110</sup>	37.58 <sup>79</sup>	42.356 <sup>124</sup>	16.47 <sup>35</sup>	14.696 <sup>83</sup>	20.04 <sup>240</sup>
35.0	14.578	40.01	56.273	38.37	42.480	16.12	14.779	17.64
Mean Place	13.789	30.38	53.677	48.80	39.510	27.23	13.062	7.49
Sec δ, Tan δ	1.282	+0.802	1.013	-0.161	1.123	-0.511	1.067	+0.373
D <sub>α</sub> , D <sub>ωα</sub>	+0.040	-0.008	+0.065	+0.002	+0.075	+0.006	+0.052	-0.005
D <sub>δ</sub> , D <sub>ωδ</sub>	+0.06	-0.99	+0.07	-0.99	+0.07	-0.98	+0.07	-0.98

# APPARENT PLACES OF STARS, 1920.

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FOR THE UPPER TRANSIT AT WASHINGTON.

Washington Mean Time.	♄ Aquila. Mag. 4.5		λ Pavonis. Mag. 4.4		β Lyrae. Var. 3.4-4.1		50 Draconis. Mag. 5.4	
	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.
	h m	° ' "	h m	° ' "	h m	° ' "	h m	° ' "
	18 42	- 4 49	18 44	-62 16	18 47	+33 15	18 48	+75 20
	s	"	s	"	s	"	s	"
Jan. 1.0	55.314	58.83	46.90	45.62	6.621	74.84	52.33	31.90
11.0	55.443 <sup>129</sup>	59.84 <sup>101</sup>	47.22 <sup>28</sup>	45.22 <sup>240</sup>	6.717 <sup>96</sup>	71.94 <sup>260</sup>	52.23 <sup>0</sup>	28.44 <sup>346</sup>
21.0	55.600 <sup>168</sup>	60.83 <sup>99</sup>	47.58 <sup>21</sup>	46.91 <sup>231</sup>	6.857 <sup>140</sup>	69.12 <sup>222</sup>	52.40 <sup>17</sup>	24.99 <sup>345</sup>
30.9	55.803 <sup>194</sup>	61.77 <sup>94</sup>	47.91 <sup>28</sup>	38.76 <sup>215</sup>	7.041 <sup>184</sup>	66.45 <sup>267</sup>	52.72 <sup>32</sup>	21.70 <sup>329</sup>
Feb. 9.9	56.025 <sup>222</sup>	62.57 <sup>89</sup>	48.36 <sup>45</sup>	36.80 <sup>196</sup>	7.257 <sup>236</sup>	64.06 <sup>299</sup>	53.30 <sup>48</sup>	18.73 <sup>297</sup>
19.9	56.268 <sup>242</sup>	63.20 <sup>82</sup>	48.85 <sup>49</sup>	35.07 <sup>173</sup>	7.507 <sup>269</sup>	62.04 <sup>268</sup>	53.31 <sup>61</sup>	16.15 <sup>258</sup>
29.8	56.529 <sup>261</sup>	63.62 <sup>42</sup>	49.38 <sup>53</sup>	33.61 <sup>146</sup>	7.783 <sup>276</sup>	60.44 <sup>169</sup>	54.53 <sup>72</sup>	14.06 <sup>209</sup>
Mar. 10.8	56.801 <sup>272</sup>	63.83 <sup>21</sup>	49.94 <sup>56</sup>	32.44 <sup>117</sup>	8.079 <sup>266</sup>	59.39 <sup>105</sup>	55.34 <sup>81</sup>	12.55 <sup>151</sup>
20.8	57.084 <sup>283</sup>	63.76 <sup>7</sup>	50.52 <sup>55</sup>	31.57 <sup>87</sup>	8.368 <sup>309</sup>	58.26 <sup>53</sup>	56.21 <sup>87</sup>	11.68 <sup>87</sup>
30.8	57.371 <sup>287</sup>	63.44 <sup>32</sup>	51.11 <sup>59</sup>	31.01 <sup>56</sup>	8.706 <sup>318</sup>	58.93 <sup>7</sup>	57.10 <sup>89</sup>	11.45 <sup>28</sup>
Apr. 9.7	57.660 <sup>289</sup>	62.88 <sup>58</sup>	51.71 <sup>60</sup>	30.77 <sup>24</sup>	9.024 <sup>318</sup>	59.53 <sup>60</sup>	57.99 <sup>89</sup>	11.90 <sup>45</sup>
19.7	57.946 <sup>295</sup>	62.06 <sup>80</sup>	52.29 <sup>55</sup>	30.86 <sup>9</sup>	9.336 <sup>312</sup>	60.68 <sup>114</sup>	58.25 <sup>86</sup>	12.96 <sup>106</sup>
29.7	58.236 <sup>280</sup>	61.07 <sup>90</sup>	52.86 <sup>57</sup>	31.25 <sup>39</sup>	9.638 <sup>302</sup>	62.32 <sup>164</sup>	58.55 <sup>80</sup>	14.61 <sup>165</sup>
May 9.7	58.492 <sup>286</sup>	59.92 <sup>115</sup>	53.40 <sup>54</sup>	31.95 <sup>73</sup>	9.923 <sup>285</sup>	64.38 <sup>206</sup>	60.37 <sup>72</sup>	16.81 <sup>220</sup>
19.6	58.743 <sup>251</sup>	58.66 <sup>126</sup>	53.90 <sup>50</sup>	32.99 <sup>101</sup>	10.165 <sup>269</sup>	66.79 <sup>241</sup>	60.99 <sup>62</sup>	19.44 <sup>263</sup>
29.6	58.971 <sup>228</sup>	57.34 <sup>122</sup>	54.35 <sup>45</sup>	34.28 <sup>129</sup>	10.415 <sup>290</sup>	69.48 <sup>209</sup>	61.49 <sup>50</sup>	22.41 <sup>297</sup>
June 8.6	59.173 <sup>202</sup>	56.61 <sup>128</sup>	54.74 <sup>39</sup>	35.83 <sup>155</sup>	10.610 <sup>195</sup>	72.35 <sup>287</sup>	61.86 <sup>37</sup>	25.66 <sup>325</sup>
18.5	59.344 <sup>171</sup>	54.69 <sup>122</sup>	55.07 <sup>32</sup>	37.60 <sup>177</sup>	10.768 <sup>158</sup>	75.31 <sup>296</sup>	62.08 <sup>22</sup>	29.09 <sup>343</sup>
28.5	59.478 <sup>124</sup>	53.44 <sup>125</sup>	55.31 <sup>24</sup>	39.53 <sup>198</sup>	10.880 <sup>112</sup>	78.30 <sup>299</sup>	62.16 <sup>8</sup>	32.58 <sup>349</sup>
July 8.5	59.572 <sup>94</sup>	52.29 <sup>115</sup>	55.48 <sup>17</sup>	41.57 <sup>204</sup>	10.945 <sup>65</sup>	81.24 <sup>294</sup>	62.09 <sup>7</sup>	36.06 <sup>348</sup>
18.5	59.623 <sup>51</sup>	51.24 <sup>105</sup>	55.56 <sup>8</sup>	43.65 <sup>206</sup>	11.062 <sup>17</sup>	84.05 <sup>281</sup>	61.87 <sup>22</sup>	39.46 <sup>340</sup>
28.4	59.632 <sup>9</sup>	50.32 <sup>92</sup>	55.55 <sup>1</sup>	45.72 <sup>207</sup>	10.931 <sup>31</sup>	86.67 <sup>262</sup>	61.51 <sup>36</sup>	42.66 <sup>320</sup>
Aug. 7.4	59.600 <sup>32</sup>	49.55 <sup>77</sup>	55.45 <sup>10</sup>	47.71 <sup>199</sup>	10.854 <sup>77</sup>	89.05 <sup>238</sup>	61.02 <sup>49</sup>	45.90 <sup>294</sup>
17.4	59.526 <sup>74</sup>	48.92 <sup>62</sup>	55.27 <sup>18</sup>	49.53 <sup>190</sup>	10.733 <sup>121</sup>	91.14 <sup>209</sup>	60.40 <sup>62</sup>	48.25 <sup>265</sup>
27.4	59.417 <sup>109</sup>	48.44 <sup>48</sup>	55.61 <sup>26</sup>	51.12 <sup>159</sup>	10.573 <sup>190</sup>	92.87 <sup>173</sup>	59.68 <sup>72</sup>	50.54 <sup>229</sup>
Sept. 6.3	59.277 <sup>140</sup>	48.09 <sup>35</sup>	54.70 <sup>31</sup>	52.42 <sup>130</sup>	10.378 <sup>195</sup>	94.25 <sup>133</sup>	59.88 <sup>80</sup>	52.88 <sup>184</sup>
16.3	59.115 <sup>162</sup>	47.88 <sup>21</sup>	54.33 <sup>37</sup>	53.95 <sup>93</sup>	10.160 <sup>218</sup>	95.25 <sup>100</sup>	59.60 <sup>88</sup>	53.80 <sup>142</sup>
26.3	58.989 <sup>176</sup>	47.81 <sup>7</sup>	53.98 <sup>46</sup>	53.91 <sup>56</sup>	9.926 <sup>234</sup>	95.81 <sup>56</sup>	57.06 <sup>92</sup>	54.70 <sup>90</sup>
Oct. 6.2	58.758 <sup>181</sup>	47.86 <sup>5</sup>	53.52 <sup>41</sup>	54.01 <sup>10</sup>	9.684 <sup>242</sup>	95.96 <sup>15</sup>	56.14 <sup>94</sup>	55.11 <sup>41</sup>
16.2	58.582 <sup>176</sup>	48.03 <sup>17</sup>	53.12 <sup>40</sup>	53.68 <sup>32</sup>	9.448 <sup>236</sup>	95.65 <sup>21</sup>	55.20 <sup>94</sup>	54.95 <sup>16</sup>
26.2	58.421 <sup>161</sup>	48.33 <sup>30</sup>	52.74 <sup>38</sup>	52.91 <sup>77</sup>	9.226 <sup>222</sup>	95.76 <sup>76</sup>	55.09 <sup>92</sup>	54.69 <sup>69</sup>
Nov. 5.2	58.421 <sup>135</sup>	48.33 <sup>44</sup>	52.74 <sup>33</sup>	52.91 <sup>119</sup>	9.226 <sup>197</sup>	94.89 <sup>117</sup>	54.23 <sup>86</sup>	54.26 <sup>124</sup>
15.1	58.285 <sup>106</sup>	48.77 <sup>55</sup>	52.41 <sup>27</sup>	51.72 <sup>156</sup>	9.029 <sup>167</sup>	93.72 <sup>160</sup>	53.49 <sup>79</sup>	53.02 <sup>174</sup>
25.1	58.179 <sup>66</sup>	49.32 <sup>69</sup>	52.14 <sup>18</sup>	50.16 <sup>198</sup>	8.862 <sup>129</sup>	92.12 <sup>200</sup>	52.68 <sup>69</sup>	51.28 <sup>223</sup>
Dec. 5.1	58.113 <sup>26</sup>	50.01 <sup>79</sup>	51.96 <sup>10</sup>	48.28 <sup>212</sup>	8.733 <sup>82</sup>	90.15 <sup>197</sup>	51.94 <sup>67</sup>	49.05 <sup>265</sup>
15.1	58.087 <sup>18</sup>	50.80 <sup>90</sup>	51.86 <sup>2</sup>	46.16 <sup>230</sup>	8.651 <sup>33</sup>	87.85 <sup>208</sup>	51.37 <sup>42</sup>	46.40 <sup>302</sup>
25.0	58.105 <sup>60</sup>	51.70 <sup>97</sup>	51.84 <sup>9</sup>	43.86 <sup>239</sup>	8.618 <sup>13</sup>	85.27 <sup>277</sup>	50.95 <sup>27</sup>	43.38 <sup>329</sup>
35.0	58.165 <sup>108</sup>	52.67 <sup>103</sup>	51.93 <sup>17</sup>	41.47 <sup>241</sup>	8.631 <sup>66</sup>	82.50 <sup>291</sup>	50.68 <sup>11</sup>	40.09 <sup>345</sup>
35.0	58.268 <sup>108</sup>	53.70 <sup>103</sup>	52.10 <sup>17</sup>	39.06 <sup>241</sup>	8.697 <sup>66</sup>	79.59 <sup>291</sup>	50.57 <sup>11</sup>	36.64 <sup>345</sup>
Mean Place	55.790	64.46	48.482	51.46	7.563	68.36	57.318	24.02
Sec δ, Tan δ	1.004	-0.065	2.150	-1.903	1.196	+0.956	3.952	+3.823
D <sub>ψ</sub> α, D <sub>ω</sub> α	+0.063	+0.001	+0.111	+0.025	+0.044	-0.009	-0.038	-0.054
D <sub>ψ</sub> δ, D <sub>ω</sub> δ	+0.07	-0.98	+0.06	-0.98	+0.08	-0.98	+0.06	-0.98

# APPARENT PLACES OF STARS, 1920.

FOR THE UPPER TRANSIT AT WASHINGTON.

Washington Mean Time.	α Draconis. Mag. 4.8		σ Sagittarii. Mag. 2.1		θ Serpentis pr. Mag. 4.5		R Lyrae. Var. 4.0-4.7	
	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.
	h m	° '	h m	° '	h m	° '	h m	° '
	18 49	+59 17	18 50	-26 23	18 52	+ 4 5	18 52	+43 50
	s	" "	s	" "	s	" "	s	" "
Jan. 1.0	59.133	32.34	17.770	45.37	14.020	69.37	52.792	31.41
11.0	59.191 <sup>58</sup>	28.87 <sup>347</sup>	17.912 <sup>142</sup>	45.03 <sup>34</sup>	14.134 <sup>114</sup>	56.86 <sup>181</sup>	52.870 <sup>78</sup>	28.22 <sup>319</sup>
21.0	59.330 <sup>139</sup>	25.45 <sup>343</sup>	18.093 <sup>151</sup>	44.69 <sup>34</sup>	14.283 <sup>149</sup>	57.39 <sup>147</sup>	53.002 <sup>133</sup>	25.07 <sup>315</sup>
30.9	59.542 <sup>212</sup>	22.19 <sup>338</sup>	18.308 <sup>215</sup>	44.37 <sup>33</sup>	14.464 <sup>181</sup>	56.01 <sup>136</sup>	53.164 <sup>183</sup>	22.09 <sup>286</sup>
Feb. 9.9	59.825 <sup>283</sup>	19.24 <sup>305</sup>	18.555 <sup>247</sup>	44.01 <sup>36</sup>	14.673 <sup>209</sup>	54.86 <sup>121</sup>	53.411 <sup>227</sup>	19.39 <sup>270</sup>
19.9	60.167 <sup>342</sup>	16.70 <sup>264</sup>	18.823 <sup>263</sup>	43.66 <sup>25</sup>	14.904 <sup>281</sup>	53.89 <sup>109</sup>	53.673 <sup>267</sup>	17.08 <sup>231</sup>
29.8	60.560 <sup>393</sup>	14.67 <sup>298</sup>	19.113 <sup>300</sup>	43.28 <sup>36</sup>	15.155 <sup>261</sup>	53.08 <sup>73</sup>	53.978 <sup>300</sup>	15.24 <sup>194</sup>
Mar. 10.8	60.992 <sup>432</sup>	13.22 <sup>145</sup>	19.418 <sup>305</sup>	42.86 <sup>43</sup>	15.420 <sup>275</sup>	52.67 <sup>41</sup>	54.393 <sup>325</sup>	13.95 <sup>139</sup>
20.8	61.450 <sup>458</sup>	12.40 <sup>83</sup>	19.731 <sup>313</sup>	42.41 <sup>45</sup>	15.696 <sup>276</sup>	52.00 <sup>7</sup>	54.646 <sup>343</sup>	13.25 <sup>70</sup>
30.8	61.923 <sup>473</sup>	12.25 <sup>15</sup>	20.051 <sup>320</sup>	41.90 <sup>51</sup>	15.978 <sup>293</sup>	52.88 <sup>26</sup>	55.001 <sup>355</sup>	13.18 <sup>7</sup>
Apr. 9.7	62.397 <sup>474</sup>	12.76 <sup>51</sup>	20.376 <sup>325</sup>	41.40 <sup>59</sup>	16.264 <sup>296</sup>	53.49 <sup>61</sup>	55.357 <sup>356</sup>	13.73 <sup>35</sup>
19.7	62.860 <sup>463</sup>	13.90 <sup>114</sup>	20.698 <sup>323</sup>	40.86 <sup>54</sup>	16.549 <sup>295</sup>	54.41 <sup>99</sup>	55.708 <sup>351</sup>	14.86 <sup>113</sup>
29.7	63.299 <sup>439</sup>	15.63 <sup>173</sup>	21.015 <sup>317</sup>	40.36 <sup>59</sup>	16.827 <sup>275</sup>	55.61 <sup>129</sup>	56.046 <sup>338</sup>	16.54 <sup>168</sup>
May 9.7	63.702 <sup>403</sup>	17.87 <sup>234</sup>	21.320 <sup>305</sup>	39.87 <sup>49</sup>	17.095 <sup>268</sup>	57.03 <sup>142</sup>	56.362 <sup>316</sup>	18.70 <sup>216</sup>
19.6	64.060 <sup>358</sup>	20.55 <sup>298</sup>	21.607 <sup>287</sup>	39.46 <sup>41</sup>	17.346 <sup>251</sup>	58.64 <sup>161</sup>	56.651 <sup>239</sup>	21.26 <sup>266</sup>
29.6	64.383 <sup>303</sup>	23.59 <sup>304</sup>	21.873 <sup>268</sup>	39.10 <sup>36</sup>	17.576 <sup>280</sup>	60.36 <sup>173</sup>	56.903 <sup>252</sup>	24.13 <sup>287</sup>
June 8.6	64.604 <sup>241</sup>	26.37 <sup>328</sup>	22.107 <sup>234</sup>	38.85 <sup>25</sup>	17.779 <sup>208</sup>	62.15 <sup>179</sup>	57.114 <sup>211</sup>	27.23 <sup>310</sup>
18.5	64.778 <sup>174</sup>	30.32 <sup>345</sup>	22.309 <sup>292</sup>	38.70 <sup>15</sup>	17.950 <sup>171</sup>	63.95 <sup>130</sup>	57.279 <sup>165</sup>	30.47 <sup>324</sup>
28.5	64.877 <sup>99</sup>	33.84 <sup>383</sup>	22.469 <sup>160</sup>	38.70 <sup>0</sup>	18.086 <sup>136</sup>	65.70 <sup>175</sup>	57.393 <sup>114</sup>	33.76 <sup>329</sup>
July 8.5	64.993 <sup>25</sup>	37.32 <sup>348</sup>	22.588 <sup>119</sup>	38.77 <sup>7</sup>	18.182 <sup>96</sup>	67.37 <sup>167</sup>	57.452 <sup>59</sup>	37.02 <sup>326</sup>
18.5	64.852 <sup>51</sup>	40.70 <sup>338</sup>	22.658 <sup>70</sup>	38.96 <sup>19</sup>	18.236 <sup>54</sup>	68.93 <sup>156</sup>	57.457 <sup>5</sup>	40.16 <sup>314</sup>
28.4	64.728 <sup>124</sup>	43.90 <sup>320</sup>	22.682 <sup>34</sup>	39.22 <sup>26</sup>	18.247 <sup>11</sup>	70.34 <sup>141</sup>	57.406 <sup>51</sup>	43.11 <sup>295</sup>
Aug. 7.4	64.533 <sup>195</sup>	46.83 <sup>298</sup>	22.654 <sup>28</sup>	39.55 <sup>33</sup>	18.216 <sup>31</sup>	71.56 <sup>123</sup>	57.393 <sup>108</sup>	45.80 <sup>289</sup>
17.4	64.274 <sup>259</sup>	49.43 <sup>269</sup>	22.585 <sup>69</sup>	39.92 <sup>37</sup>	18.145 <sup>71</sup>	72.61 <sup>105</sup>	57.150 <sup>153</sup>	48.21 <sup>241</sup>
27.4	63.958 <sup>316</sup>	51.66 <sup>293</sup>	22.471 <sup>114</sup>	40.28 <sup>36</sup>	18.037 <sup>168</sup>	73.45 <sup>84</sup>	56.963 <sup>197</sup>	50.24 <sup>203</sup>
Sept. 6.3	63.593 <sup>365</sup>	53.46 <sup>180</sup>	22.471 <sup>144</sup>	40.28 <sup>34</sup>	18.037 <sup>133</sup>	73.45 <sup>63</sup>	56.963 <sup>233</sup>	50.24 <sup>164</sup>
16.3	63.191 <sup>402</sup>	54.80 <sup>134</sup>	22.327 <sup>176</sup>	40.62 <sup>30</sup>	17.899 <sup>163</sup>	74.08 <sup>43</sup>	56.720 <sup>263</sup>	51.86 <sup>130</sup>
26.3	62.766 <sup>425</sup>	55.64 <sup>84</sup>	22.151 <sup>193</sup>	40.92 <sup>23</sup>	17.736 <sup>177</sup>	74.51 <sup>29</sup>	56.457 <sup>281</sup>	53.08 <sup>74</sup>
Oct. 6.2	62.328 <sup>438</sup>	56.96 <sup>32</sup>	21.958 <sup>198</sup>	41.15 <sup>13</sup>	17.559 <sup>183</sup>	74.71 <sup>1</sup>	56.176 <sup>290</sup>	53.82 <sup>27</sup>
16.2	61.893 <sup>435</sup>	55.75 <sup>21</sup>	21.760 <sup>193</sup>	41.28 <sup>5</sup>	17.376 <sup>180</sup>	74.72 <sup>23</sup>	55.886 <sup>238</sup>	54.09 <sup>27</sup>
26.2	61.474 <sup>419</sup>	55.00 <sup>75</sup>	21.567 <sup>173</sup>	41.33 <sup>5</sup>	17.196 <sup>166</sup>	74.59 <sup>42</sup>	55.598 <sup>274</sup>	53.86 <sup>72</sup>
Nov. 5.2	61.474 <sup>387</sup>	55.00 <sup>129</sup>	21.389 <sup>153</sup>	41.25 <sup>12</sup>	17.080 <sup>145</sup>	74.08 <sup>64</sup>	55.324 <sup>249</sup>	53.14 <sup>121</sup>
15.1	61.087 <sup>345</sup>	53.71 <sup>180</sup>	21.237 <sup>120</sup>	41.13 <sup>24</sup>	16.885 <sup>114</sup>	73.44 <sup>83</sup>	55.075 <sup>215</sup>	51.93 <sup>166</sup>
25.1	60.742 <sup>289</sup>	51.91 <sup>227</sup>	21.117 <sup>75</sup>	40.89 <sup>29</sup>	16.771 <sup>78</sup>	72.61 <sup>102</sup>	54.860 <sup>173</sup>	50.25 <sup>211</sup>
Dec. 5.1	60.453 <sup>224</sup>	49.64 <sup>270</sup>	21.042 <sup>31</sup>	40.60 <sup>33</sup>	16.693 <sup>31</sup>	71.59 <sup>120</sup>	54.687 <sup>125</sup>	48.14 <sup>260</sup>
15.1	60.229 <sup>151</sup>	46.94 <sup>305</sup>	21.011 <sup>18</sup>	40.28 <sup>35</sup>	16.654 <sup>3</sup>	70.39 <sup>135</sup>	54.562 <sup>71</sup>	45.64 <sup>231</sup>
25.0	60.078 <sup>75</sup>	43.89 <sup>330</sup>	21.029 <sup>65</sup>	39.93 <sup>35</sup>	16.657 <sup>45</sup>	69.04 <sup>146</sup>	54.491 <sup>16</sup>	42.83 <sup>306</sup>
35.0	60.003 <sup>7</sup>	40.59 <sup>346</sup>	21.094 <sup>112</sup>	39.58 <sup>34</sup>	16.702 <sup>87</sup>	67.58 <sup>151</sup>	54.475 <sup>42</sup>	39.77 <sup>319</sup>
35.0	60.010	37.13	21.206	39.24	16.789	66.07	54.517	36.58
Mean Place	61.394	24.83	18.274	50.81	14.528	54.42	54.066	24.18
Sec δ, Tan δ	1.958	+1.684	1.116	-0.496	1.003	+0.072	1.387	+0.960
D <sub>α</sub> , D <sub>ω</sub>	+0.018	-0.024	+0.074	+0.007	+0.059	-0.001	+0.036	-0.015
D <sub>β</sub> , D <sub>δ</sub>	+0.09	-0.98	+0.09	-0.96	+0.09	-0.97	+0.09	-0.97



FOR THE UPPER TRANSIT AT WASHINGTON.

Washington Mean Time.	γ Lyrae. Mag. 3.3		ε Aquilae. Mag. 4.2		ζ Sagittarii. Mag. 2.7		ζ Aquilae. Mag. 3.0	
	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.
	h m 18 55	° ' " +32 34	h m 18 55	° ' " +14 57	h m 18 57	° ' " -29 59	h m 19 1	° ' " +13 44
	"	"	"	"	"	"	"	"
Jan. 1.0	56.120	51.28	58.869	37.43	30.801	40.19	43.385	43.37
11.0	56.207 <sup>87</sup>	48.43 <sup>285</sup>	58.971 <sup>108</sup>	35.35 <sup>208</sup>	30.839 <sup>188</sup>	39.59 <sup>60</sup>	43.483 <sup>98</sup>	41.37 <sup>200</sup>
21.0	56.396 <sup>130</sup>	45.63 <sup>280</sup>	59.169 <sup>188</sup>	33.32 <sup>208</sup>	31.118 <sup>170</sup>	38.99 <sup>60</sup>	43.615 <sup>132</sup>	39.41 <sup>196</sup>
30.9	56.510 <sup>174</sup>	42.98 <sup>265</sup>	59.282 <sup>178</sup>	31.40 <sup>183</sup>	31.334 <sup>216</sup>	38.41 <sup>58</sup>	43.783 <sup>168</sup>	37.55 <sup>186</sup>
Feb. 9.9	56.718 <sup>208</sup>	40.59 <sup>230</sup>	59.485 <sup>208</sup>	29.69 <sup>171</sup>	31.581 <sup>247</sup>	37.84 <sup>67</sup>	43.981 <sup>198</sup>	35.90 <sup>165</sup>
19.9	56.959 <sup>241</sup>	38.55 <sup>204</sup>	59.712 <sup>237</sup>	28.24 <sup>145</sup>	31.852 <sup>271</sup>	37.27 <sup>57</sup>	44.204 <sup>223</sup>	34.50 <sup>140</sup>
29.8	57.223 <sup>280</sup>	36.93 <sup>162</sup>	59.961 <sup>249</sup>	27.15 <sup>100</sup>	32.144 <sup>292</sup>	36.70 <sup>57</sup>	44.449 <sup>245</sup>	33.44 <sup>106</sup>
Mar. 10.8	57.518 <sup>300</sup>	35.84 <sup>100</sup>	60.226 <sup>265</sup>	26.45 <sup>70</sup>	32.454 <sup>310</sup>	36.13 <sup>57</sup>	44.712 <sup>263</sup>	32.78 <sup>68</sup>
20.8	57.820 <sup>302</sup>	35.27 <sup>57</sup>	60.504 <sup>278</sup>	26.18 <sup>27</sup>	32.776 <sup>321</sup>	35.54 <sup>58</sup>	44.989 <sup>277</sup>	32.51 <sup>25</sup>
30.8	58.134 <sup>314</sup>	35.28 <sup>1</sup>	60.788 <sup>284</sup>	26.34 <sup>16</sup>	33.106 <sup>330</sup>	34.96 <sup>59</sup>	45.272 <sup>283</sup>	32.67 <sup>16</sup>
Apr. 9.7	58.451 <sup>317</sup>	35.83 <sup>86</sup>	61.077 <sup>289</sup>	26.94 <sup>60</sup>	33.438 <sup>333</sup>	34.40 <sup>55</sup>	45.561 <sup>289</sup>	33.25 <sup>58</sup>
19.7	58.765 <sup>314</sup>	36.92 <sup>109</sup>	61.364 <sup>287</sup>	27.94 <sup>100</sup>	33.771 <sup>333</sup>	33.86 <sup>54</sup>	45.849 <sup>288</sup>	33.25 <sup>98</sup>
29.7	59.070 <sup>305</sup>	38.50 <sup>106</sup>	61.646 <sup>282</sup>	29.31 <sup>187</sup>	34.100 <sup>330</sup>	33.37 <sup>49</sup>	46.132 <sup>283</sup>	34.23 <sup>134</sup>
May 9.7	59.368 <sup>298</sup>	40.51 <sup>201</sup>	61.916 <sup>270</sup>	29.31 <sup>189</sup>	34.417 <sup>327</sup>	32.94 <sup>43</sup>	46.405 <sup>273</sup>	35.57 <sup>164</sup>
19.6	59.626 <sup>286</sup>	42.88 <sup>237</sup>	62.167 <sup>251</sup>	32.93 <sup>186</sup>	34.717 <sup>300</sup>	32.60 <sup>34</sup>	46.660 <sup>255</sup>	37.21 <sup>191</sup>
29.6	59.864 <sup>288</sup>	45.52 <sup>204</sup>	62.397 <sup>230</sup>	32.93 <sup>214</sup>	34.717 <sup>270</sup>	32.60 <sup>23</sup>	46.660 <sup>285</sup>	39.12 <sup>200</sup>
June 8.6	60.069 <sup>205</sup>	48.37 <sup>285</sup>	62.599 <sup>203</sup>	35.07 <sup>235</sup>	34.996 <sup>285</sup>	32.38 <sup>11</sup>	46.895 <sup>205</sup>	41.21 <sup>222</sup>
18.5	60.294 <sup>185</sup>	48.37 <sup>285</sup>	62.599 <sup>189</sup>	37.32 <sup>235</sup>	35.244 <sup>285</sup>	32.27 <sup>1</sup>	47.100 <sup>174</sup>	43.43 <sup>225</sup>
28.5	60.567 <sup>138</sup>	51.31 <sup>294</sup>	62.768 <sup>133</sup>	39.62 <sup>280</sup>	35.458 <sup>234</sup>	32.28 <sup>1</sup>	47.274 <sup>130</sup>	45.68 <sup>225</sup>
July 8.5	60.831 <sup>74</sup>	54.29 <sup>286</sup>	62.906 <sup>92</sup>	41.91 <sup>290</sup>	35.631 <sup>173</sup>	32.42 <sup>14</sup>	47.413 <sup>97</sup>	47.93 <sup>225</sup>
18.5	60.462 <sup>21</sup>	57.23 <sup>283</sup>	62.992 <sup>49</sup>	44.15 <sup>294</sup>	35.760 <sup>120</sup>	32.70 <sup>38</sup>	47.510 <sup>56</sup>	50.11 <sup>208</sup>
28.4	60.440 <sup>23</sup>	59.06 <sup>203</sup>	63.041 <sup>5</sup>	46.24 <sup>194</sup>	35.841 <sup>30</sup>	33.08 <sup>46</sup>	47.566 <sup>10</sup>	52.16 <sup>192</sup>
Aug. 7.4	60.874 <sup>66</sup>	62.69 <sup>203</sup>	63.046 <sup>39</sup>	48.18 <sup>104</sup>	35.871 <sup>30</sup>	33.54 <sup>46</sup>	47.576 <sup>33</sup>	54.08 <sup>170</sup>
17.4	60.874 <sup>113</sup>	65.12 <sup>243</sup>	63.907 <sup>80</sup>	49.91 <sup>173</sup>	35.852 <sup>19</sup>	34.06 <sup>52</sup>	47.543 <sup>73</sup>	55.78 <sup>149</sup>
27.4	60.261 <sup>146</sup>	67.25 <sup>218</sup>	62.927 <sup>80</sup>	51.42 <sup>151</sup>	35.738 <sup>67</sup>	34.61 <sup>54</sup>	47.470 <sup>111</sup>	57.27 <sup>132</sup>
Sept. 6.3	60.103 <sup>185</sup>	69.04 <sup>145</sup>	62.811 <sup>147</sup>	52.66 <sup>98</sup>	35.674 <sup>147</sup>	35.15 <sup>80</sup>	47.350 <sup>141</sup>	58.49 <sup>98</sup>
16.3	59.923 <sup>212</sup>	70.49 <sup>105</sup>	62.664 <sup>172</sup>	53.64 <sup>65</sup>	35.527 <sup>178</sup>	35.65 <sup>42</sup>	47.213 <sup>168</sup>	59.47 <sup>68</sup>
26.3	59.711 <sup>237</sup>	71.54 <sup>63</sup>	62.492 <sup>188</sup>	54.32 <sup>38</sup>	35.349 <sup>197</sup>	36.07 <sup>32</sup>	47.059 <sup>186</sup>	60.15 <sup>39</sup>
Oct. 6.2	59.484 <sup>238</sup>	72.17 <sup>22</sup>	62.304 <sup>194</sup>	54.76 <sup>9</sup>	35.152 <sup>206</sup>	36.39 <sup>19</sup>	46.864 <sup>191</sup>	60.54 <sup>9</sup>
16.2	59.246 <sup>267</sup>	72.39 <sup>23</sup>	62.116 <sup>192</sup>	54.79 <sup>25</sup>	34.946 <sup>208</sup>	36.58 <sup>6</sup>	46.673 <sup>189</sup>	60.63 <sup>20</sup>
26.2	59.009 <sup>281</sup>	72.17 <sup>66</sup>	61.918 <sup>180</sup>	54.56 <sup>53</sup>	34.743 <sup>188</sup>	36.84 <sup>8</sup>	46.484 <sup>179</sup>	60.43 <sup>47</sup>
Nov. 5.2	58.788 <sup>199</sup>	71.51 <sup>107</sup>	61.738 <sup>158</sup>	54.03 <sup>88</sup>	34.556 <sup>162</sup>	36.56 <sup>22</sup>	46.305 <sup>158</sup>	59.96 <sup>80</sup>
15.1	58.569 <sup>186</sup>	70.44 <sup>142</sup>	61.580 <sup>128</sup>	53.20 <sup>118</sup>	34.393 <sup>128</sup>	36.34 <sup>34</sup>	46.147 <sup>129</sup>	59.16 <sup>107</sup>
25.1	58.421 <sup>131</sup>	68.92 <sup>189</sup>	61.452 <sup>95</sup>	52.07 <sup>140</sup>	34.263 <sup>86</sup>	36.00 <sup>44</sup>	46.013 <sup>95</sup>	58.09 <sup>134</sup>
Dec. 5.1	58.290 <sup>88</sup>	67.03 <sup>238</sup>	61.357 <sup>53</sup>	50.87 <sup>184</sup>	34.179 <sup>39</sup>	35.56 <sup>50</sup>	45.923 <sup>58</sup>	56.75 <sup>155</sup>
15.1	58.202 <sup>43</sup>	64.81 <sup>251</sup>	61.304 <sup>11</sup>	49.03 <sup>185</sup>	34.140 <sup>10</sup>	35.06 <sup>55</sup>	45.865 <sup>14</sup>	55.20 <sup>179</sup>
25.0	58.159 <sup>7</sup>	62.90 <sup>272</sup>	61.293 <sup>23</sup>	47.18 <sup>200</sup>	34.150 <sup>60</sup>	34.51 <sup>58</sup>	45.851 <sup>27</sup>	53.41 <sup>193</sup>
35.0	58.104 <sup>45</sup>	59.58 <sup>284</sup>	61.825 <sup>74</sup>	45.18 <sup>208</sup>	34.210 <sup>107</sup>	33.93 <sup>58</sup>	45.878 <sup>70</sup>	51.48 <sup>202</sup>
Mean Place	57.023	44.24	59.463	31.02	31.836	45.41	43.963	36.81
Sec δ, Tan δ	1.187	+0.639	1.035	+0.267	1.155	-0.577	1.029	+0.245
D <sub>pa</sub> , D <sub>sa</sub>	+0.045	-0.010	+0.064	-0.004	+0.076	+0.010	+0.055	-0.004
D <sub>pd</sub> , D <sub>sd</sub>	+0.10	-0.97	+0.10	-0.97	+0.10	-0.97	+0.11	-0.98

FOR THE UPPER TRANSIT AT WASHINGTON.

Washington Mean Time.	λ Aquilæ. Mag. 3.6		α Coronæ Australis. Mag. 4.1		ι Lyræ. Mag. 5.1		π Sagittarii. Mag. 3.0	
	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.
	h m 19 1	° ' " -4 59	h m 19 4	° ' " -38 1	h m 19 4	° ' " +35 58	h m 19 4	° ' " -21 8
Jan. 1.0	59.740	66.57	1.161	45.27	25.870	33.99	59.941	61.66
11.0	59.850 <sup>110</sup>	67.52 <sup>95</sup>	1.301 <sup>140</sup>	44.16 <sup>111</sup>	25.943 <sup>73</sup>	31.07 <sup>292</sup>	60.061 <sup>120</sup>	61.60 <sup>6</sup>
21.0	59.996 <sup>146</sup>	68.44 <sup>93</sup>	1.487 <sup>186</sup>	43.06 <sup>111</sup>	26.063 <sup>130</sup>	28.16 <sup>291</sup>	60.222 <sup>161</sup>	61.52 <sup>3</sup>
30.9	60.175 <sup>179</sup>	69.30 <sup>86</sup>	1.713 <sup>236</sup>	41.97 <sup>108</sup>	26.227 <sup>164</sup>	25.39 <sup>277</sup>	60.414 <sup>192</sup>	61.42 <sup>10</sup>
Feb. 9.9	60.381 <sup>206</sup>	70.03 <sup>73</sup>	1.974 <sup>291</sup>	40.93 <sup>104</sup>	26.436 <sup>208</sup>	22.87 <sup>262</sup>	60.637 <sup>223</sup>	61.27 <sup>15</sup>
19.9	60.610 <sup>229</sup>	70.59 <sup>56</sup>	2.265 <sup>351</sup>	39.96 <sup>97</sup>	26.668 <sup>258</sup>	20.70 <sup>217</sup>	60.883 <sup>246</sup>	61.08 <sup>19</sup>
29.9	60.858 <sup>248</sup>	70.98 <sup>39</sup>	2.579 <sup>314</sup>	39.04 <sup>92</sup>	26.936 <sup>295</sup>	18.96 <sup>174</sup>	61.150 <sup>267</sup>	60.79 <sup>29</sup>
Mar. 10.8	61.123 <sup>265</sup>	71.12 <sup>14</sup>	2.914 <sup>335</sup>	38.18 <sup>86</sup>	27.227 <sup>291</sup>	17.73 <sup>133</sup>	61.435 <sup>285</sup>	60.42 <sup>37</sup>
20.8	61.400 <sup>277</sup>	70.99 <sup>13</sup>	3.263 <sup>349</sup>	37.39 <sup>79</sup>	27.537 <sup>310</sup>	17.95 <sup>68</sup>	61.732 <sup>297</sup>	59.94 <sup>43</sup>
30.8	61.684 <sup>284</sup>	70.62 <sup>27</sup>	3.623 <sup>360</sup>	36.69 <sup>70</sup>	27.858 <sup>321</sup>	16.95 <sup>10</sup>	62.038 <sup>306</sup>	59.38 <sup>56</sup>
Apr. 9.7	61.973 <sup>290</sup>	70.00 <sup>82</sup>	3.986 <sup>363</sup>	36.07 <sup>62</sup>	28.184 <sup>326</sup>	17.44 <sup>49</sup>	62.349 <sup>311</sup>	58.74 <sup>64</sup>
19.7	62.263 <sup>290</sup>	69.15 <sup>85</sup>	4.351 <sup>335</sup>	35.58 <sup>49</sup>	28.509 <sup>335</sup>	18.47 <sup>106</sup>	62.661 <sup>312</sup>	58.03 <sup>71</sup>
29.7	62.548 <sup>285</sup>	68.10 <sup>105</sup>	4.711 <sup>300</sup>	35.20 <sup>33</sup>	28.826 <sup>317</sup>	20.02 <sup>155</sup>	62.969 <sup>308</sup>	57.30 <sup>73</sup>
May 9.7	62.825 <sup>277</sup>	66.91 <sup>119</sup>	5.061 <sup>330</sup>	34.97 <sup>23</sup>	29.126 <sup>300</sup>	22.02 <sup>290</sup>	63.268 <sup>306</sup>	56.54 <sup>76</sup>
19.6	63.087 <sup>262</sup>	65.61 <sup>130</sup>	5.392 <sup>331</sup>	34.90 <sup>7</sup>	29.405 <sup>370</sup>	24.40 <sup>286</sup>	63.553 <sup>285</sup>	55.81 <sup>73</sup>
29.6	63.330 <sup>243</sup>	64.23 <sup>138</sup>	5.700 <sup>308</sup>	34.98 <sup>8</sup>	29.655 <sup>360</sup>	27.09 <sup>299</sup>	63.819 <sup>265</sup>	55.14 <sup>67</sup>
June 8.6	63.547 <sup>217</sup>	62.86 <sup>127</sup>	5.975 <sup>275</sup>	35.25 <sup>27</sup>	29.870 <sup>315</sup>	30.00 <sup>291</sup>	64.056 <sup>237</sup>	54.54 <sup>60</sup>
18.6	63.732 <sup>185</sup>	61.49 <sup>137</sup>	6.214 <sup>230</sup>	35.68 <sup>43</sup>	30.045 <sup>175</sup>	33.05 <sup>305</sup>	64.263 <sup>207</sup>	54.04 <sup>50</sup>
28.5	63.883 <sup>151</sup>	60.20 <sup>129</sup>	6.407 <sup>193</sup>	36.26 <sup>88</sup>	30.176 <sup>131</sup>	36.15 <sup>310</sup>	64.432 <sup>169</sup>	53.64 <sup>40</sup>
July 8.5	63.994 <sup>111</sup>	59.00 <sup>120</sup>	6.552 <sup>145</sup>	36.97 <sup>71</sup>	30.259 <sup>71</sup>	39.20 <sup>305</sup>	64.560 <sup>128</sup>	53.37 <sup>27</sup>
18.5	64.064 <sup>70</sup>	57.92 <sup>108</sup>	6.646 <sup>94</sup>	37.81 <sup>84</sup>	30.292 <sup>33</sup>	42.17 <sup>297</sup>	64.642 <sup>82</sup>	53.21 <sup>16</sup>
28.4	64.090 <sup>26</sup>	56.98 <sup>94</sup>	6.683 <sup>37</sup>	38.72 <sup>91</sup>	30.275 <sup>17</sup>	44.97 <sup>280</sup>	64.678 <sup>36</sup>	53.18 <sup>3</sup>
Aug. 7.4	64.072 <sup>18</sup>	56.19 <sup>79</sup>	6.666 <sup>17</sup>	39.67 <sup>95</sup>	30.208 <sup>67</sup>	47.52 <sup>255</sup>	64.667 <sup>11</sup>	53.24 <sup>6</sup>
17.4	64.013 <sup>59</sup>	55.53 <sup>66</sup>	6.596 <sup>70</sup>	40.62 <sup>95</sup>	30.095 <sup>113</sup>	49.81 <sup>230</sup>	64.611 <sup>56</sup>	53.37 <sup>13</sup>
27.4	63.916 <sup>97</sup>	55.05 <sup>48</sup>	6.478 <sup>118</sup>	41.50 <sup>88</sup>	29.940 <sup>155</sup>	51.76 <sup>195</sup>	64.514 <sup>97</sup>	53.57 <sup>20</sup>
Sept. 6.3	63.786 <sup>130</sup>	54.70 <sup>35</sup>	6.317 <sup>161</sup>	42.30 <sup>80</sup>	29.749 <sup>191</sup>	53.34 <sup>158</sup>	64.514 <sup>134</sup>	53.57 <sup>22</sup>
16.3	63.832 <sup>154</sup>	54.49 <sup>21</sup>	6.123 <sup>194</sup>	42.95 <sup>65</sup>	29.529 <sup>220</sup>	54.54 <sup>129</sup>	64.380 <sup>160</sup>	53.79 <sup>23</sup>
26.3	63.460 <sup>172</sup>	54.42 <sup>7</sup>	5.906 <sup>217</sup>	43.43 <sup>48</sup>	29.291 <sup>233</sup>	55.30 <sup>76</sup>	64.220 <sup>181</sup>	54.02 <sup>21</sup>
Oct. 6.3	63.279 <sup>181</sup>	54.48 <sup>6</sup>	5.680 <sup>226</sup>	43.71 <sup>28</sup>	29.042 <sup>249</sup>	55.62 <sup>32</sup>	64.039 <sup>181</sup>	54.23 <sup>19</sup>
16.2	63.102 <sup>177</sup>	54.65 <sup>17</sup>	5.455 <sup>225</sup>	43.77 <sup>6</sup>	28.794 <sup>248</sup>	55.50 <sup>19</sup>	63.850 <sup>189</sup>	54.41 <sup>15</sup>
26.2	62.937 <sup>165</sup>	54.95 <sup>30</sup>	5.244 <sup>211</sup>	43.60 <sup>17</sup>	28.558 <sup>236</sup>	54.92 <sup>88</sup>	63.663 <sup>175</sup>	54.55 <sup>9</sup>
Nov. 5.2	62.792 <sup>145</sup>	55.37 <sup>42</sup>	5.059 <sup>185</sup>	43.22 <sup>38</sup>	28.343 <sup>215</sup>	53.88 <sup>104</sup>	63.488 <sup>153</sup>	54.64 <sup>5</sup>
15.1	62.877 <sup>115</sup>	55.90 <sup>58</sup>	4.910 <sup>149</sup>	42.64 <sup>88</sup>	28.156 <sup>187</sup>	52.42 <sup>146</sup>	63.335 <sup>123</sup>	54.69 <sup>1</sup>
25.1	62.597 <sup>30</sup>	56.56 <sup>66</sup>	4.806 <sup>104</sup>	41.89 <sup>75</sup>	28.008 <sup>148</sup>	50.54 <sup>184</sup>	63.212 <sup>83</sup>	54.68 <sup>2</sup>
Dec. 5.1	62.555 <sup>42</sup>	57.30 <sup>74</sup>	4.752 <sup>54</sup>	40.98 <sup>91</sup>	27.992 <sup>108</sup>	48.30 <sup>255</sup>	63.129 <sup>42</sup>	54.66 <sup>4</sup>
15.1	62.558 <sup>3</sup>	58.16 <sup>86</sup>	4.751 <sup>1</sup>	39.99 <sup>99</sup>	27.843 <sup>39</sup>	45.75 <sup>265</sup>	63.067 <sup>3</sup>	54.62 <sup>5</sup>
25.0	62.601 <sup>43</sup>	59.09 <sup>93</sup>	4.805 <sup>54</sup>	38.94 <sup>105</sup>	27.834 <sup>9</sup>	42.97 <sup>278</sup>	63.000 <sup>49</sup>	54.57 <sup>4</sup>
35.0	62.684 <sup>33</sup>	60.05 <sup>96</sup>	4.912 <sup>107</sup>	37.85 <sup>109</sup>	27.875 <sup>41</sup>	40.95 <sup>292</sup>	63.139 <sup>92</sup>	54.53 <sup>4</sup>
Mean Place	60.201	72.40	1.805	50.13	26.844	26.22	60.419	66.92
Sec δ, Tan δ	1.004	-0.088	1.269	-0.782	1.236	+0.726	1.072	-0.357
D <sub>α</sub> , D <sub>ω</sub>	+0.063	+0.002	+0.081	+0.014	+0.043	-0.013	+0.071	+0.007
D <sub>β</sub> , D <sub>δ</sub>	+0.11	-0.96	+0.11	-0.96	+0.11	-0.96	+0.11	-0.96

# APPARENT PLACES OF STARS, 1920.

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FOR THE UPPER TRANSIT AT WASHINGTON.

Washington Mean Time.	$\psi$ Sagittarii. Mag. 4.9		$\delta$ Draconis. Mag. 3.2		$d$ Sagittarii. Mag. 5.0		$\theta$ Lyrae. Mag. 4.5	
	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.
	h m 19 10	° ' " -25 23	h m 19 12	° ' " +67 31	h m 19 12	° ' " -19 5	h m 19 13	° ' " +37 59
Jan. 1.0	37.665	39.58	29.27	24.79	56.825	41.90	34.419	34.67
11.0	37.784 <sup>139</sup>	39.49	29.25 <sup>2</sup>	21.37 <sup>342</sup>	56.936 <sup>111</sup>	41.94 <sup>4</sup>	34.478 <sup>50</sup>	31.70 <sup>297</sup>
21.0	37.942 <sup>188</sup>	39.13 <sup>36</sup>	29.34 <sup>9</sup>	17.89 <sup>348</sup>	57.085 <sup>149</sup>	41.96 <sup>2</sup>	34.587 <sup>109</sup>	28.73 <sup>297</sup>
30.9	38.135 <sup>188</sup>	38.75 <sup>36</sup>	29.54 <sup>30</sup>	14.53 <sup>336</sup>	57.267 <sup>182</sup>	41.95 <sup>1</sup>	34.740 <sup>153</sup>	25.89 <sup>284</sup>
Feb. 9.9	38.360 <sup>226</sup>	38.35 <sup>40</sup>	29.84 <sup>30</sup>	11.41 <sup>312</sup>	57.479 <sup>212</sup>	41.88 <sup>7</sup>	34.936 <sup>196</sup>	23.28 <sup>261</sup>
19.9	38.610 <sup>280</sup>	37.90 <sup>46</sup>	30.22 <sup>58</sup>	8.65 <sup>276</sup>	57.715 <sup>236</sup>	41.74 <sup>14</sup>	35.169 <sup>233</sup>	21.02 <sup>226</sup>
29.9	38.882 <sup>272</sup>	37.41 <sup>49</sup>	30.68 <sup>46</sup>	6.36 <sup>289</sup>	57.974 <sup>259</sup>	41.48 <sup>26</sup>	35.434 <sup>265</sup>	19.18 <sup>184</sup>
Mar. 10.8	39.171 <sup>280</sup>	36.87 <sup>54</sup>	31.21 <sup>53</sup>	4.82 <sup>174</sup>	58.249 <sup>276</sup>	41.18 <sup>35</sup>	35.725 <sup>291</sup>	17.85 <sup>133</sup>
20.8	39.476 <sup>306</sup>	36.28 <sup>59</sup>	31.78 <sup>57</sup>	3.49 <sup>118</sup>	58.538 <sup>289</sup>	40.66 <sup>47</sup>	36.038 <sup>313</sup>	17.07 <sup>78</sup>
30.8	39.789 <sup>313</sup>	35.63 <sup>65</sup>	32.39 <sup>61</sup>	3.01 <sup>48</sup>	58.836 <sup>296</sup>	40.07 <sup>59</sup>	36.364 <sup>326</sup>	16.88 <sup>19</sup>
Apr. 9.7	40.109 <sup>330</sup>	34.94 <sup>69</sup>	33.00 <sup>61</sup>	3.19 <sup>18</sup>	59.143 <sup>307</sup>	39.37 <sup>70</sup>	36.697 <sup>333</sup>	17.27 <sup>39</sup>
19.7	40.431 <sup>332</sup>	34.23 <sup>71</sup>	33.61 <sup>61</sup>	4.02 <sup>83</sup>	59.451 <sup>308</sup>	38.60 <sup>77</sup>	37.081 <sup>334</sup>	18.25 <sup>98</sup>
29.7	40.751 <sup>330</sup>	33.53 <sup>70</sup>	34.19 <sup>56</sup>	5.46 <sup>144</sup>	59.755 <sup>304</sup>	37.77 <sup>83</sup>	37.357 <sup>336</sup>	19.74 <sup>149</sup>
May 9.7	41.062 <sup>311</sup>	32.87 <sup>66</sup>	34.73 <sup>54</sup>	7.48 <sup>202</sup>	60.054 <sup>299</sup>	36.91 <sup>86</sup>	37.669 <sup>312</sup>	21.71 <sup>197</sup>
19.6	41.360 <sup>296</sup>	32.25 <sup>62</sup>	35.21 <sup>48</sup>	9.97 <sup>249</sup>	60.339 <sup>286</sup>	36.06 <sup>85</sup>	37.959 <sup>290</sup>	24.07 <sup>236</sup>
29.6	41.686 <sup>276</sup>	31.73 <sup>52</sup>	35.62 <sup>41</sup>	12.85 <sup>286</sup>	60.605 <sup>266</sup>	35.24 <sup>82</sup>	38.221 <sup>262</sup>	26.77 <sup>270</sup>
June 8.6	41.886 <sup>260</sup>	31.31 <sup>42</sup>	35.96 <sup>34</sup>	16.03 <sup>315</sup>	60.847 <sup>242</sup>	34.49 <sup>75</sup>	38.221 <sup>236</sup>	28.77 <sup>292</sup>
18.6	42.104 <sup>218</sup>	31.01 <sup>30</sup>	36.20 <sup>24</sup>	19.45 <sup>342</sup>	61.056 <sup>209</sup>	33.84 <sup>65</sup>	38.447 <sup>187</sup>	29.69 <sup>310</sup>
28.5	42.285 <sup>181</sup>	30.84 <sup>17</sup>	36.35 <sup>15</sup>	22.97 <sup>352</sup>	61.230 <sup>174</sup>	33.29 <sup>55</sup>	38.634 <sup>140</sup>	32.79 <sup>316</sup>
July 8.5	42.422 <sup>187</sup>	30.70 <sup>5</sup>	36.40 <sup>5</sup>	26.54 <sup>357</sup>	61.363 <sup>138</sup>	32.87 <sup>49</sup>	38.774 <sup>91</sup>	35.95 <sup>315</sup>
18.5	42.513 <sup>91</sup>	30.88 <sup>9</sup>	36.35 <sup>5</sup>	29.54 <sup>353</sup>	61.522 <sup>89</sup>	32.59 <sup>28</sup>	38.865 <sup>41</sup>	39.10 <sup>306</sup>
28.4	42.555 <sup>42</sup>	31.08 <sup>20</sup>	36.20 <sup>15</sup>	30.07 <sup>238</sup>	61.452 <sup>48</sup>	32.59 <sup>17</sup>	38.906 <sup>12</sup>	42.15 <sup>290</sup>
Aug. 7.4	42.555 <sup>6</sup>	31.08 <sup>20</sup>	36.20 <sup>15</sup>	33.45 <sup>328</sup>	61.495 <sup>48</sup>	32.42 <sup>6</sup>	38.894 <sup>12</sup>	45.05 <sup>290</sup>
17.4	42.549 <sup>6</sup>	31.36 <sup>28</sup>	35.96 <sup>24</sup>	36.81 <sup>316</sup>	61.491 <sup>4</sup>	32.36 <sup>6</sup>	38.832 <sup>62</sup>	47.73 <sup>268</sup>
27.4	42.496 <sup>58</sup>	31.71 <sup>35</sup>	35.62 <sup>34</sup>	39.50 <sup>289</sup>	61.443 <sup>48</sup>	32.40 <sup>4</sup>	38.722 <sup>110</sup>	50.15 <sup>242</sup>
Sept. 6.3	42.399 <sup>97</sup>	32.10 <sup>38</sup>	35.22 <sup>40</sup>	42.05 <sup>255</sup>	61.353 <sup>90</sup>	32.51 <sup>11</sup>	38.587 <sup>155</sup>	52.23 <sup>208</sup>
16.3	42.266 <sup>183</sup>	32.48 <sup>38</sup>	34.74 <sup>48</sup>	42.05 <sup>216</sup>	61.353 <sup>137</sup>	32.51 <sup>17</sup>	38.587 <sup>191</sup>	52.23 <sup>171</sup>
26.3	42.102 <sup>164</sup>	32.86 <sup>31</sup>	34.21 <sup>53</sup>	44.21 <sup>171</sup>	61.226 <sup>156</sup>	32.68 <sup>20</sup>	38.376 <sup>222</sup>	53.94 <sup>181</sup>
Oct. 6.3	42.102 <sup>183</sup>	32.86 <sup>31</sup>	34.21 <sup>53</sup>	45.92 <sup>122</sup>	61.070 <sup>175</sup>	32.88 <sup>30</sup>	38.154 <sup>244</sup>	55.25 <sup>89</sup>
16.2	41.919 <sup>195</sup>	33.17 <sup>24</sup>	33.64 <sup>59</sup>	47.14 <sup>70</sup>	60.895 <sup>185</sup>	33.08 <sup>30</sup>	37.910 <sup>255</sup>	56.14 <sup>44</sup>
26.2	41.724 <sup>193</sup>	33.41 <sup>15</sup>	33.05 <sup>60</sup>	47.84 <sup>18</sup>	60.710 <sup>186</sup>	33.28 <sup>17</sup>	37.655 <sup>265</sup>	56.58 <sup>2</sup>
36.2	41.561 <sup>152</sup>	33.56 <sup>7</sup>	32.45 <sup>59</sup>	49.02 <sup>89</sup>	60.524 <sup>175</sup>	33.45 <sup>15</sup>	37.400 <sup>247</sup>	56.56 <sup>49</sup>
Nov. 5.2	41.349 <sup>160</sup>	33.63 <sup>4</sup>	31.86 <sup>56</sup>	47.63 <sup>94</sup>	60.349 <sup>183</sup>	33.60 <sup>12</sup>	37.153 <sup>228</sup>	56.07 <sup>95</sup>
15.1	41.189 <sup>130</sup>	33.59 <sup>11</sup>	31.30 <sup>53</sup>	46.69 <sup>147</sup>	60.196 <sup>194</sup>	33.72 <sup>9</sup>	36.925 <sup>198</sup>	55.12 <sup>140</sup>
25.1	41.059 <sup>60</sup>	33.48 <sup>20</sup>	30.78 <sup>45</sup>	45.22 <sup>199</sup>	60.072 <sup>200</sup>	33.81 <sup>7</sup>	36.727 <sup>163</sup>	53.72 <sup>183</sup>
Dec. 5.1	40.969 <sup>48</sup>	33.28 <sup>28</sup>	30.33 <sup>36</sup>	43.23 <sup>246</sup>	59.933 <sup>46</sup>	33.83 <sup>7</sup>	36.564 <sup>120</sup>	51.89 <sup>222</sup>
15.1	40.921 <sup>2</sup>	33.03 <sup>28</sup>	29.95 <sup>29</sup>	40.77 <sup>286</sup>	59.935 <sup>4</sup>	33.95 <sup>6</sup>	36.444 <sup>73</sup>	49.67 <sup>284</sup>
25.0	40.919 <sup>43</sup>	32.75 <sup>31</sup>	29.66 <sup>19</sup>	37.91 <sup>327</sup>	59.931 <sup>40</sup>	34.01 <sup>7</sup>	36.371 <sup>24</sup>	47.13 <sup>279</sup>
35.0	40.962 <sup>68</sup>	32.44 <sup>32</sup>	29.47 <sup>9</sup>	34.74 <sup>340</sup>	59.971 <sup>58</sup>	34.06 <sup>7</sup>	36.347 <sup>26</sup>	44.34 <sup>294</sup>
35.0	41.062 <sup>68</sup>	32.12 <sup>32</sup>	29.38 <sup>9</sup>	31.34 <sup>340</sup>	60.054 <sup>58</sup>	34.15 <sup>7</sup>	36.373 <sup>26</sup>	41.40 <sup>294</sup>
Mean Place	38.168	44.84	32.479	14.83	57.290	47.18	35.430	26.17
Sec $\delta$ , Tan $\delta$	1.107	-0.475	2.616	+2.417	1.058	-0.346	1.269	+0.781
$D_{\alpha}$ , $D_{\delta}$	+0.073	+0.010	0.000	-0.050	+0.070	+0.067	+0.042	-0.026
$D_{\psi}$ , $D_{\theta}$	+0.12	-0.96	+0.12	-0.96	+0.12	-0.96	+0.13	-0.96

# APPARENT PLACES OF STARS, 1920.

FOR THE UPPER TRANSIT AT WASHINGTON.

Washington Mean Time.	♈ Aquilæ. Mag. 5.1		♐ Cygni. Mag. 4.0		♑ Draconis. Mag. 4.6		♒ Aquilæ. Mag. 3.4	
	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.
	h m 19 14	° ' " +11 26	h m 19 15	° ' " +53 13	h m 19 17	° ' " +73 12	h m 19 21	° ' " + 2 57
Jan. 1.0	3.140	67.49	13.622	22.78	1.62	37.23	27.418	21.86
11.0	3.226 <sup>86</sup>	65.65 <sup>184</sup>	13.652 <sup>80</sup>	19.46 <sup>332</sup>	1.54 <sup>8</sup>	33.82 <sup>341</sup>	27.504 <sup>86</sup>	20.50 <sup>136</sup>
21.0	3.349 <sup>123</sup>	63.83 <sup>182</sup>	13.749 <sup>97</sup>	16.12 <sup>334</sup>	1.60 <sup>6</sup>	30.37 <sup>345</sup>	27.628 <sup>124</sup>	19.18 <sup>132</sup>
30.9	3.507 <sup>158</sup>	62.11 <sup>172</sup>	13.909 <sup>160</sup>	12.90 <sup>323</sup>	1.62 <sup>22</sup>	27.00 <sup>337</sup>	27.781 <sup>153</sup>	17.92 <sup>126</sup>
Feb. 9.9	3.695 <sup>188</sup>	60.58 <sup>153</sup>	14.128 <sup>219</sup>	9.93 <sup>297</sup>	2.16 <sup>34</sup>	23.86 <sup>314</sup>	27.967 <sup>186</sup>	16.83 <sup>108</sup>
19.9	3.906 <sup>213</sup>	59.27 <sup>131</sup>	14.402 <sup>274</sup>	7.31 <sup>268</sup>	2.63 <sup>47</sup>	21.04 <sup>282</sup>	28.175 <sup>206</sup>	15.94 <sup>89</sup>
29.9	4.143 <sup>285</sup>	58.29 <sup>98</sup>	14.722 <sup>330</sup>	5.14 <sup>217</sup>	3.21 <sup>56</sup>	18.68 <sup>234</sup>	28.408 <sup>233</sup>	15.29 <sup>65</sup>
Mar. 10.8	4.398 <sup>355</sup>	57.66 <sup>63</sup>	15.081 <sup>359</sup>	3.52 <sup>162</sup>	3.87 <sup>66</sup>	16.86 <sup>182</sup>	28.660 <sup>252</sup>	15.29 <sup>35</sup>
20.8	4.667 <sup>380</sup>	57.43 <sup>23</sup>	15.468 <sup>387</sup>	2.50 <sup>102</sup>	4.62 <sup>75</sup>	16.63 <sup>128</sup>	28.925 <sup>285</sup>	14.94 <sup>2</sup>
30.8	4.947 <sup>380</sup>	57.60 <sup>17</sup>	15.875 <sup>407</sup>	2.12 <sup>38</sup>	5.39 <sup>77</sup>	16.05 <sup>58</sup>	29.203 <sup>278</sup>	15.23 <sup>31</sup>
Apr. 9.8	5.235 <sup>288</sup>	56.19 <sup>50</sup>	16.291 <sup>414</sup>	2.38 <sup>26</sup>	6.18 <sup>79</sup>	15.13 <sup>8</sup>	29.488 <sup>285</sup>	15.23 <sup>62</sup>
19.7	5.524 <sup>280</sup>	56.14 <sup>95</sup>	16.705 <sup>414</sup>	3.28 <sup>90</sup>	6.18 <sup>78</sup>	15.86 <sup>73</sup>	29.777 <sup>289</sup>	15.85 <sup>95</sup>
29.7	5.869 <sup>285</sup>	56.45 <sup>131</sup>	17.107 <sup>402</sup>	4.77 <sup>149</sup>	6.96 <sup>75</sup>	16.86 <sup>73</sup>	29.777 <sup>287</sup>	16.80 <sup>95</sup>
May 9.7	6.086 <sup>277</sup>	62.06 <sup>161</sup>	17.487 <sup>389</sup>	6.79 <sup>202</sup>	7.71 <sup>75</sup>	17.20 <sup>191</sup>	30.084 <sup>287</sup>	18.00 <sup>120</sup>
19.6	6.349 <sup>283</sup>	63.88 <sup>183</sup>	17.834 <sup>347</sup>	9.27 <sup>248</sup>	8.40 <sup>69</sup>	19.12 <sup>192</sup>	30.346 <sup>282</sup>	19.43 <sup>143</sup>
29.6	6.592 <sup>243</sup>	65.89 <sup>201</sup>	18.142 <sup>306</sup>	12.13 <sup>286</sup>	9.02 <sup>62</sup>	21.52 <sup>249</sup>	30.615 <sup>289</sup>	21.03 <sup>160</sup>
June 8.6	6.809 <sup>217</sup>	68.02 <sup>213</sup>	18.400 <sup>256</sup>	15.28 <sup>315</sup>	9.54 <sup>42</sup>	24.32 <sup>314</sup>	30.884 <sup>224</sup>	22.75 <sup>179</sup>
18.6	6.995 <sup>186</sup>	70.20 <sup>216</sup>	18.604 <sup>304</sup>	18.63 <sup>335</sup>	9.96 <sup>30</sup>	27.46 <sup>314</sup>	31.038 <sup>224</sup>	24.54 <sup>179</sup>
28.5	7.146 <sup>151</sup>	72.36 <sup>216</sup>	18.747 <sup>143</sup>	22.09 <sup>346</sup>	10.26 <sup>17</sup>	30.83 <sup>337</sup>	31.287 <sup>199</sup>	26.34 <sup>180</sup>
July 8.5	7.257 <sup>111</sup>	74.46 <sup>210</sup>	18.827 <sup>89</sup>	25.57 <sup>345</sup>	10.43 <sup>17</sup>	34.34 <sup>351</sup>	31.447 <sup>100</sup>	28.13 <sup>179</sup>
18.5	7.326 <sup>26</sup>	76.45 <sup>199</sup>	18.827 <sup>14</sup>	28.99 <sup>342</sup>	10.47 <sup>4</sup>	37.90 <sup>336</sup>	31.572 <sup>125</sup>	29.82 <sup>168</sup>
28.5	7.352 <sup>26</sup>	78.28 <sup>188</sup>	18.841 <sup>52</sup>	32.26 <sup>327</sup>	10.59 <sup>28</sup>	41.41 <sup>340</sup>	31.653 <sup>39</sup>	31.40 <sup>142</sup>
Aug. 7.4	7.333 <sup>19</sup>	79.93 <sup>165</sup>	18.789 <sup>115</sup>	32.26 <sup>327</sup>	10.16 <sup>28</sup>	44.81 <sup>340</sup>	31.692 <sup>39</sup>	32.82 <sup>127</sup>
17.4	7.271 <sup>62</sup>	81.37 <sup>144</sup>	18.674 <sup>176</sup>	35.30 <sup>394</sup>	9.83 <sup>32</sup>	48.62 <sup>331</sup>	31.636 <sup>6</sup>	34.09 <sup>127</sup>
27.4	7.171 <sup>100</sup>	82.56 <sup>119</sup>	18.498 <sup>296</sup>	38.07 <sup>377</sup>	9.38 <sup>45</sup>	50.96 <sup>294</sup>	31.638 <sup>48</sup>	35.16 <sup>107</sup>
Sept. 6.3	7.038 <sup>183</sup>	83.52 <sup>96</sup>	18.289 <sup>238</sup>	40.49 <sup>342</sup>	8.82 <sup>56</sup>	53.58 <sup>292</sup>	31.553 <sup>86</sup>	36.02 <sup>86</sup>
16.3	6.879 <sup>150</sup>	84.20 <sup>68</sup>	17.993 <sup>314</sup>	42.52 <sup>160</sup>	8.18 <sup>64</sup>	55.61 <sup>233</sup>	31.494 <sup>119</sup>	36.02 <sup>65</sup>
26.3	6.702 <sup>127</sup>	84.61 <sup>41</sup>	17.679 <sup>340</sup>	44.12 <sup>112</sup>	7.47 <sup>71</sup>	57.61 <sup>190</sup>	31.287 <sup>147</sup>	36.67 <sup>46</sup>
Oct. 6.3	6.515 <sup>187</sup>	84.73 <sup>12</sup>	17.339 <sup>340</sup>	45.24 <sup>63</sup>	7.47 <sup>78</sup>	58.93 <sup>133</sup>	31.118 <sup>199</sup>	37.13 <sup>26</sup>
16.2	6.328 <sup>187</sup>	84.59 <sup>14</sup>	16.963 <sup>356</sup>	45.87 <sup>10</sup>	6.89 <sup>80</sup>	59.78 <sup>33</sup>	31.118 <sup>177</sup>	37.39 <sup>6</sup>
26.2	6.151 <sup>177</sup>	84.18 <sup>41</sup>	16.623 <sup>349</sup>	45.97 <sup>42</sup>	6.07 <sup>82</sup>	60.65 <sup>29</sup>	30.941 <sup>181</sup>	37.45 <sup>15</sup>
Nov. 5.2	5.992 <sup>150</sup>	84.18 <sup>70</sup>	16.274 <sup>330</sup>	45.55 <sup>42</sup>	5.07 <sup>80</sup>	60.65 <sup>29</sup>	30.760 <sup>199</sup>	37.30 <sup>35</sup>
15.2	5.840 <sup>182</sup>	83.48 <sup>96</sup>	15.944 <sup>330</sup>	44.59 <sup>96</sup>	4.27 <sup>77</sup>	59.79 <sup>31</sup>	30.591 <sup>151</sup>	36.95 <sup>55</sup>
25.1	5.759 <sup>201</sup>	82.52 <sup>96</sup>	15.648 <sup>306</sup>	43.11 <sup>148</sup>	3.50 <sup>77</sup>	58.98 <sup>31</sup>	30.440 <sup>151</sup>	36.40 <sup>55</sup>
Dec. 5.1	5.697 <sup>63</sup>	81.32 <sup>120</sup>	15.305 <sup>268</sup>	41.15 <sup>196</sup>	2.79 <sup>71</sup>	57.62 <sup>186</sup>	30.313 <sup>127</sup>	35.68 <sup>72</sup>
15.1	5.676 <sup>21</sup>	79.90 <sup>142</sup>	15.193 <sup>202</sup>	38.75 <sup>246</sup>	2.14 <sup>65</sup>	55.78 <sup>189</sup>	30.216 <sup>97</sup>	34.78 <sup>90</sup>
25.0	5.695 <sup>19</sup>	78.28 <sup>136</sup>	15.050 <sup>89</sup>	35.97 <sup>246</sup>	1.69 <sup>45</sup>	56.38 <sup>260</sup>	30.166 <sup>18</sup>	33.71 <sup>107</sup>
35.0	5.754 <sup>59</sup>	76.52 <sup>185</sup>	14.970 <sup>13</sup>	32.88 <sup>246</sup>	1.16 <sup>43</sup>	50.61 <sup>377</sup>	30.138 <sup>18</sup>	32.54 <sup>117</sup>
Mean Place	3.683	60.61	15.293	18.26	6.124	36.55	27.893	15.96
Sec δ, Tan δ	1.020	+0.203	1.670	+1.338	3.462	+3.814	1.001	+0.052
D <sub>α</sub> , D <sub>αα</sub>	+0.056	-0.004	+0.028	-0.029	-0.022	-0.073	+0.060	-0.001
D <sub>δ</sub> , D <sub>δδ</sub>	+0.13	-0.95	+0.18	-0.95	+0.13	-0.94	+0.14	-0.94

# APPARENT PLACES OF STARS, 1920.

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FOR THE UPPER TRANSIT AT WASHINGTON.

Washington Mean Time.	β Cygni. Mag. 3.2		γ Cygni. Mag. 3.9		μ Aquilæ. Mag. 4.6		λ Sagittarii. Mag. 4.7	
	Right Ascension.	Declination.	Right Ascension.	Declination.	Right Ascension.	Declination.	Right Ascension.	Declination.
	h m 19 27	° ' " +27 47	h m 19 27	° ' " +51 33	h m 19 80	° ' " + 7 12	h m 19 31	° ' " -25 3
Jan. 1.0	28.948	35.89	39.862	42.19	10.423	36.73	49.920	36.29
11.0	29.007 <sup>50</sup>	32.83 <sup>256</sup>	39.878 <sup>16</sup>	38.94 <sup>325</sup>	10.497 <sup>74</sup>	35.16 <sup>157</sup>	50.015 <sup>95</sup>	35.91 <sup>38</sup>
21.0	29.105 <sup>98</sup>	30.28 <sup>257</sup>	39.956 <sup>78</sup>	35.66 <sup>296</sup>	10.608 <sup>111</sup>	33.60 <sup>156</sup>	50.151 <sup>136</sup>	35.49 <sup>42</sup>
31.0	29.244 <sup>139</sup>	27.80 <sup>246</sup>	40.097 <sup>141</sup>	32.46 <sup>339</sup>	10.752 <sup>144</sup>	32.12 <sup>148</sup>	50.321 <sup>170</sup>	35.03 <sup>46</sup>
Feb. 9.9	29.420 <sup>176</sup>	25.55 <sup>235</sup>	40.295 <sup>198</sup>	29.48 <sup>293</sup>	10.927 <sup>175</sup>	30.81 <sup>121</sup>	50.524 <sup>203</sup>	34.53 <sup>50</sup>
19.9	29.626 <sup>206</sup>	23.57 <sup>198</sup>	40.545 <sup>250</sup>	26.82 <sup>266</sup>	11.128 <sup>201</sup>	29.71 <sup>110</sup>	50.755 <sup>231</sup>	33.97 <sup>56</sup>
29.9	29.866 <sup>240</sup>	21.96 <sup>161</sup>	40.843 <sup>286</sup>	24.59 <sup>223</sup>	11.352 <sup>234</sup>	28.89 <sup>82</sup>	51.010 <sup>255</sup>	33.36 <sup>61</sup>
Mar. 10.8	30.126 <sup>280</sup>	20.83 <sup>113</sup>	41.180 <sup>337</sup>	22.89 <sup>170</sup>	11.597 <sup>245</sup>	28.40 <sup>49</sup>	51.286 <sup>276</sup>	32.66 <sup>68</sup>
20.8	30.407 <sup>281</sup>	20.17 <sup>66</sup>	41.547 <sup>367</sup>	21.77 <sup>112</sup>	11.856 <sup>262</sup>	28.25 <sup>15</sup>	51.579 <sup>293</sup>	31.94 <sup>74</sup>
30.8	30.703 <sup>296</sup>	20.04 <sup>13</sup>	41.937 <sup>390</sup>	21.28 <sup>49</sup>	12.134 <sup>275</sup>	28.47 <sup>23</sup>	51.885 <sup>306</sup>	31.13 <sup>81</sup>
Apr. 9.8	31.008 <sup>305</sup>	20.41 <sup>27</sup>	42.339 <sup>402</sup>	21.43 <sup>15</sup>	12.419 <sup>285</sup>	29.06 <sup>59</sup>	52.200 <sup>315</sup>	30.89 <sup>83</sup>
19.7	31.317 <sup>320</sup>	21.30 <sup>89</sup>	42.743 <sup>404</sup>	22.20 <sup>77</sup>	12.707 <sup>288</sup>	29.98 <sup>92</sup>	52.522 <sup>322</sup>	29.43 <sup>87</sup>
29.7	31.623 <sup>306</sup>	22.67 <sup>137</sup>	43.139 <sup>396</sup>	23.57 <sup>137</sup>	12.996 <sup>299</sup>	31.22 <sup>134</sup>	52.844 <sup>322</sup>	28.57 <sup>86</sup>
May 9.7	31.920 <sup>297</sup>	24.43 <sup>176</sup>	43.518 <sup>379</sup>	25.48 <sup>191</sup>	13.278 <sup>282</sup>	32.74 <sup>153</sup>	53.162 <sup>318</sup>	27.73 <sup>84</sup>
19.7	32.201 <sup>281</sup>	26.63 <sup>229</sup>	43.868 <sup>340</sup>	27.87 <sup>239</sup>	13.560 <sup>273</sup>	34.46 <sup>173</sup>	53.467 <sup>305</sup>	26.96 <sup>77</sup>
29.6	32.462 <sup>261</sup>	29.08 <sup>245</sup>	44.182 <sup>314</sup>	30.64 <sup>277</sup>	13.804 <sup>264</sup>	36.84 <sup>188</sup>	53.757 <sup>290</sup>	26.29 <sup>67</sup>
June 8.6	32.690 <sup>228</sup>	31.73 <sup>265</sup>	44.451 <sup>290</sup>	33.73 <sup>909</sup>	14.034 <sup>289</sup>	38.81 <sup>197</sup>	54.023 <sup>286</sup>	25.72 <sup>57</sup>
18.6	32.885 <sup>195</sup>	34.63 <sup>280</sup>	44.670 <sup>219</sup>	37.03 <sup>330</sup>	14.236 <sup>292</sup>	40.33 <sup>203</sup>	54.257 <sup>234</sup>	25.29 <sup>43</sup>
28.5	33.043 <sup>168</sup>	37.38 <sup>285</sup>	44.831 <sup>161</sup>	40.46 <sup>343</sup>	14.403 <sup>167</sup>	42.31 <sup>196</sup>	54.457 <sup>200</sup>	25.03 <sup>26</sup>
July 8.5	33.156 <sup>113</sup>	40.21 <sup>289</sup>	44.932 <sup>101</sup>	43.93 <sup>347</sup>	14.533 <sup>180</sup>	44.25 <sup>194</sup>	54.614 <sup>157</sup>	24.89 <sup>14</sup>
18.5	33.225 <sup>69</sup>	42.96 <sup>275</sup>	44.968 <sup>36</sup>	47.36 <sup>343</sup>	14.619 <sup>86</sup>	46.06 <sup>181</sup>	54.726 <sup>112</sup>	24.91 <sup>2</sup>
28.5	33.244 <sup>19</sup>	45.57 <sup>281</sup>	44.941 <sup>27</sup>	50.66 <sup>330</sup>	14.662 <sup>43</sup>	47.72 <sup>166</sup>	54.789 <sup>63</sup>	25.06 <sup>15</sup>
Aug. 7.4	33.217 <sup>37</sup>	48.00 <sup>243</sup>	44.851 <sup>90</sup>	53.75 <sup>369</sup>	14.662 <sup>0</sup>	49.22 <sup>150</sup>	54.804 <sup>15</sup>	25.32 <sup>37</sup>
17.4	33.146 <sup>71</sup>	50.15 <sup>215</sup>	44.702 <sup>149</sup>	56.59 <sup>284</sup>	14.619 <sup>43</sup>	50.50 <sup>128</sup>	54.770 <sup>34</sup>	25.69 <sup>26</sup>
27.4	33.032 <sup>114</sup>	52.02 <sup>187</sup>	44.500 <sup>202</sup>	59.11 <sup>262</sup>	14.536 <sup>83</sup>	51.58 <sup>196</sup>	54.691 <sup>79</sup>	26.11 <sup>42</sup>
Sept. 6.4	32.860 <sup>152</sup>	53.54 <sup>168</sup>	44.249 <sup>281</sup>	61.24 <sup>213</sup>	14.418 <sup>118</sup>	52.42 <sup>84</sup>	54.572 <sup>119</sup>	26.56 <sup>45</sup>
16.3	32.699 <sup>181</sup>	54.76 <sup>122</sup>	43.961 <sup>286</sup>	62.95 <sup>171</sup>	14.273 <sup>145</sup>	53.02 <sup>60</sup>	54.421 <sup>151</sup>	27.00 <sup>44</sup>
26.3	32.498 <sup>201</sup>	55.58 <sup>82</sup>	43.643 <sup>318</sup>	64.21 <sup>126</sup>	14.105 <sup>168</sup>	53.39 <sup>37</sup>	54.245 <sup>176</sup>	27.41 <sup>41</sup>
Oct. 6.3	32.286 <sup>212</sup>	56.03 <sup>45</sup>	43.308 <sup>335</sup>	64.98 <sup>77</sup>	13.928 <sup>177</sup>	53.52 <sup>12</sup>	54.055 <sup>190</sup>	27.76 <sup>35</sup>
16.2	32.068 <sup>218</sup>	56.06 <sup>3</sup>	42.966 <sup>342</sup>	65.23 <sup>25</sup>	13.748 <sup>180</sup>	53.41 <sup>11</sup>	53.863 <sup>192</sup>	28.02 <sup>26</sup>
26.2	31.857 <sup>211</sup>	55.68 <sup>38</sup>	42.681 <sup>335</sup>	64.97 <sup>26</sup>	13.574 <sup>174</sup>	53.07 <sup>24</sup>	53.677 <sup>186</sup>	28.18 <sup>16</sup>
Nov. 5.2	31.664 <sup>193</sup>	54.91 <sup>77</sup>	42.315 <sup>316</sup>	64.17 <sup>89</sup>	13.416 <sup>158</sup>	52.49 <sup>56</sup>	53.677 <sup>167</sup>	28.18 <sup>7</sup>
15.2	31.495 <sup>169</sup>	53.75 <sup>116</sup>	42.026 <sup>289</sup>	62.86 <sup>131</sup>	13.281 <sup>135</sup>	51.69 <sup>80</sup>	53.510 <sup>139</sup>	28.25 <sup>3</sup>
25.1	31.358 <sup>137</sup>	52.22 <sup>158</sup>	41.776 <sup>250</sup>	61.04 <sup>183</sup>	13.177 <sup>104</sup>	50.68 <sup>101</sup>	53.371 <sup>106</sup>	28.22 <sup>11</sup>
Dec. 5.1	31.254 <sup>102</sup>	50.35 <sup>187</sup>	41.574 <sup>202</sup>	58.78 <sup>296</sup>	13.109 <sup>68</sup>	49.47 <sup>121</sup>	53.265 <sup>65</sup>	28.11 <sup>20</sup>
15.1	31.196 <sup>40</sup>	48.19 <sup>216</sup>	41.426 <sup>146</sup>	56.12 <sup>266</sup>	13.079 <sup>30</sup>	48.09 <sup>138</sup>	53.200 <sup>22</sup>	27.91 <sup>24</sup>
25.1	31.180 <sup>16</sup>	45.80 <sup>289</sup>	41.838 <sup>88</sup>	53.14 <sup>266</sup>	13.087 <sup>8</sup>	46.59 <sup>150</sup>	53.178 <sup>23</sup>	27.67 <sup>29</sup>
35.0	31.206 <sup>30</sup>	43.26 <sup>264</sup>	41.812 <sup>26</sup>	49.95 <sup>319</sup>	13.186 <sup>49</sup>	45.01 <sup>168</sup>	53.200 <sup>67</sup>	27.38 <sup>29</sup>
35.0	31.206 <sup>30</sup>	43.26 <sup>264</sup>	41.812 <sup>26</sup>	49.95 <sup>319</sup>	13.186 <sup>49</sup>	45.01 <sup>168</sup>	53.268 <sup>67</sup>	27.03 <sup>85</sup>
Mean Place	29.683	26.76	41.375	31.75	10.907	29.70	50.417	40.83
Sec δ, Tan δ	1.130	+0.527	1.609	+1.260	1.008	+0.127	1.104	-0.468
D <sub>α</sub> , D <sub>ω</sub>	+0.048	-0.013	+0.030	-0.031	+0.053	-0.003	+0.073	+0.012
D <sub>γ</sub> , D <sub>δ</sub>	+0.15	-0.93	+0.15	-0.93	+0.15	-0.92	+0.16	-0.92

# APPARENT PLACES OF STARS, 1920.

FOR THE UPPER TRANSIT AT WASHINGTON.

Washington Mean Time.	κ Aquilæ. Mag. 5.0		θ Cygni. Mag. 4.6		54 Sagittari. Mag. 5.4		β Sagittæ. Mag. 4.4	
	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.
	h m 19 82	° ' " - 7 12	h m 19 84	° ' " +50 1	h m 19 86	° ' " -16 28	h m 19 87	° ' " +17 17
Jan. 1.0	34.893	16.65	16.391	77.71	8.093	34.89	26.767	31.52
11.0	34.975 <sup>82</sup>	17.38 <sup>73</sup>	16.401 <sup>10</sup>	74.52 <sup>319</sup>	8.123 <sup>85</sup>	35.04 <sup>15</sup>	26.825 <sup>58</sup>	29.45 <sup>207</sup>
21.0	35.094 <sup>119</sup>	18.07 <sup>60</sup>	16.471 <sup>70</sup>	71.28 <sup>394</sup>	8.245 <sup>122</sup>	35.16 <sup>12</sup>	26.923 <sup>98</sup>	27.38 <sup>207</sup>
31.0	35.246 <sup>158</sup>	18.70 <sup>63</sup>	16.601 <sup>130</sup>	68.11 <sup>517</sup>	8.401 <sup>166</sup>	35.22 <sup>6</sup>	27.064 <sup>121</sup>	25.42 <sup>196</sup>
Feb. 9.9	35.426 <sup>180</sup>	19.22 <sup>52</sup>	16.787 <sup>186</sup>	65.14 <sup>307</sup>	8.568 <sup>187</sup>	35.19 <sup>3</sup>	27.219 <sup>145</sup>	23.61 <sup>151</sup>
	35.426 <sup>207</sup>	19.22 <sup>38</sup>	16.787 <sup>238</sup>	65.14 <sup>306</sup>	8.568 <sup>214</sup>	35.19 <sup>12</sup>	27.219 <sup>198</sup>	23.61 <sup>157</sup>
19.9	35.633	19.60	17.025	62.49	8.802	35.07	27.412	22.04
29.9	35.862 <sup>239</sup>	19.73 <sup>15</sup>	17.397 <sup>282</sup>	60.26 <sup>222</sup>	9.039 <sup>237</sup>	34.81 <sup>26</sup>	27.683 <sup>221</sup>	20.31 <sup>123</sup>
Mar. 10.8	36.111 <sup>249</sup>	19.75 <sup>3</sup>	17.629 <sup>322</sup>	58.53 <sup>173</sup>	9.296 <sup>257</sup>	34.43 <sup>38</sup>	27.877 <sup>244</sup>	19.96 <sup>83</sup>
20.8	36.376 <sup>265</sup>	19.49 <sup>26</sup>	17.984 <sup>355</sup>	57.38 <sup>115</sup>	9.570 <sup>274</sup>	33.89 <sup>54</sup>	28.141 <sup>284</sup>	19.54 <sup>42</sup>
30.8	36.653 <sup>277</sup>	19.00 <sup>49</sup>	18.360 <sup>376</sup>	56.84 <sup>54</sup>	9.859 <sup>289</sup>	33.20 <sup>68</sup>	28.417 <sup>276</sup>	19.54 <sup>0</sup>
	36.653 <sup>283</sup>	19.00 <sup>73</sup>	18.360 <sup>389</sup>	56.84 <sup>10</sup>	9.859 <sup>308</sup>	33.20 <sup>81</sup>	28.417 <sup>300</sup>	19.54 <sup>47</sup>
Apr. 9.8	36.941	18.27	18.749	56.94	10.157	32.39	28.707	20.01
19.7	37.233 <sup>292</sup>	17.35 <sup>92</sup>	19.143 <sup>394</sup>	57.66 <sup>72</sup>	10.461 <sup>804</sup>	31.47 <sup>92</sup>	29.002 <sup>295</sup>	20.90 <sup>89</sup>
29.7	37.526 <sup>298</sup>	16.24 <sup>111</sup>	19.532 <sup>399</sup>	58.97 <sup>131</sup>	10.767 <sup>866</sup>	30.46 <sup>101</sup>	29.296 <sup>294</sup>	22.20 <sup>130</sup>
May 9.7	37.815 <sup>299</sup>	15.01 <sup>123</sup>	19.906 <sup>374</sup>	60.83 <sup>186</sup>	11.068 <sup>901</sup>	29.41 <sup>105</sup>	29.586 <sup>290</sup>	23.83 <sup>163</sup>
19.7	38.095 <sup>280</sup>	13.67 <sup>134</sup>	20.254 <sup>348</sup>	63.16 <sup>233</sup>	11.360 <sup>992</sup>	28.34 <sup>107</sup>	29.861 <sup>275</sup>	25.78 <sup>165</sup>
	38.095 <sup>292</sup>	13.67 <sup>138</sup>	20.254 <sup>315</sup>	63.16 <sup>278</sup>	11.360 <sup>977</sup>	28.34 <sup>105</sup>	29.861 <sup>258</sup>	25.78 <sup>217</sup>
29.6	38.357	12.29	20.569	65.89	11.637	27.29	30.119	27.95
June 8.6	38.593 <sup>241</sup>	10.90 <sup>139</sup>	20.841 <sup>272</sup>	68.94 <sup>306</sup>	11.891 <sup>354</sup>	26.31 <sup>96</sup>	30.355 <sup>236</sup>	30.29 <sup>234</sup>
18.6	38.810 <sup>212</sup>	9.55 <sup>135</sup>	21.065 <sup>224</sup>	72.21 <sup>337</sup>	12.116 <sup>235</sup>	25.42 <sup>89</sup>	30.559 <sup>204</sup>	32.70 <sup>241</sup>
28.5	38.990 <sup>180</sup>	8.27 <sup>128</sup>	21.235 <sup>170</sup>	75.61 <sup>340</sup>	12.308 <sup>192</sup>	24.65 <sup>77</sup>	30.727 <sup>168</sup>	35.16 <sup>246</sup>
July 8.5	39.132 <sup>142</sup>	7.12 <sup>115</sup>	21.346 <sup>111</sup>	79.07 <sup>346</sup>	12.459 <sup>151</sup>	23.99 <sup>66</sup>	30.858 <sup>121</sup>	37.60 <sup>244</sup>
	39.132 <sup>99</sup>	7.12 <sup>104</sup>	21.346 <sup>49</sup>	79.07 <sup>342</sup>	12.459 <sup>110</sup>	23.99 <sup>49</sup>	30.858 <sup>85</sup>	37.60 <sup>233</sup>
18.5	39.231 <sup>85</sup>	6.08 <sup>89</sup>	21.395 <sup>13</sup>	82.49 <sup>330</sup>	12.569 <sup>62</sup>	23.50 <sup>36</sup>	30.943 <sup>42</sup>	39.93 <sup>219</sup>
28.5	39.236 <sup>10</sup>	5.19 <sup>72</sup>	21.382 <sup>73</sup>	85.79 <sup>311</sup>	12.681 <sup>18</sup>	23.14 <sup>21</sup>	30.985 <sup>5</sup>	42.12 <sup>200</sup>
Aug. 7.4	39.296 <sup>34</sup>	4.47 <sup>58</sup>	21.309 <sup>133</sup>	88.90 <sup>287</sup>	12.649 <sup>15</sup>	22.93 <sup>10</sup>	30.980 <sup>48</sup>	44.12 <sup>179</sup>
17.4	39.262 <sup>75</sup>	3.89 <sup>42</sup>	21.176 <sup>186</sup>	91.77 <sup>264</sup>	12.619 <sup>80</sup>	22.83 <sup>3</sup>	30.932 <sup>87</sup>	45.91 <sup>151</sup>
27.4	39.187 <sup>110</sup>	3.47 <sup>27</sup>	20.990 <sup>283</sup>	94.31 <sup>218</sup>	12.549 <sup>110</sup>	22.86 <sup>19</sup>	30.845 <sup>122</sup>	47.42 <sup>125</sup>
Sept. 6.4	39.077	3.20	20.757	96.49	12.439	22.96	30.722	48.67
16.3	38.938 <sup>139</sup>	3.06 <sup>14</sup>	20.485 <sup>272</sup>	98.25 <sup>176</sup>	12.298 <sup>141</sup>	23.14 <sup>18</sup>	30.568 <sup>154</sup>	49.65 <sup>98</sup>
26.3	38.776 <sup>162</sup>	3.03 <sup>3</sup>	20.184 <sup>301</sup>	99.57 <sup>123</sup>	12.134 <sup>164</sup>	23.36 <sup>23</sup>	30.393 <sup>175</sup>	50.29 <sup>64</sup>
Oct. 6.3	38.602 <sup>174</sup>	3.12 <sup>9</sup>	19.865 <sup>319</sup>	100.41 <sup>84</sup>	11.953 <sup>176</sup>	23.61 <sup>25</sup>	30.204 <sup>189</sup>	50.60 <sup>31</sup>
16.2	38.426 <sup>176</sup>	3.32 <sup>20</sup>	19.539 <sup>326</sup>	100.73 <sup>23</sup>	11.777 <sup>181</sup>	23.86 <sup>25</sup>	30.013 <sup>191</sup>	50.64 <sup>4</sup>
	38.426 <sup>180</sup>	3.32 <sup>28</sup>	19.539 <sup>322</sup>	100.73 <sup>19</sup>	11.777 <sup>175</sup>	23.86 <sup>24</sup>	30.013 <sup>185</sup>	50.64 <sup>32</sup>
26.2	38.257	3.60	19.217	100.54	11.602	24.10	29.823	50.32
Nov. 5.2	38.103 <sup>154</sup>	3.97 <sup>37</sup>	18.912 <sup>306</sup>	99.83 <sup>71</sup>	11.444 <sup>158</sup>	24.33 <sup>28</sup>	29.653 <sup>178</sup>	49.68 <sup>64</sup>
15.2	37.974 <sup>129</sup>	4.43 <sup>46</sup>	18.632 <sup>300</sup>	98.60 <sup>126</sup>	11.310 <sup>134</sup>	24.56 <sup>28</sup>	29.502 <sup>151</sup>	48.73 <sup>95</sup>
25.1	37.875 <sup>99</sup>	4.97 <sup>54</sup>	18.390 <sup>242</sup>	96.87 <sup>178</sup>	11.208 <sup>102</sup>	24.78 <sup>22</sup>	29.382 <sup>130</sup>	47.49 <sup>134</sup>
Dec. 5.1	37.814 <sup>61</sup>	5.58 <sup>61</sup>	18.192 <sup>196</sup>	94.69 <sup>218</sup>	11.143 <sup>65</sup>	24.99 <sup>21</sup>	29.288 <sup>84</sup>	45.98 <sup>151</sup>
	37.814 <sup>28</sup>	5.58 <sup>63</sup>	18.192 <sup>146</sup>	94.69 <sup>206</sup>	11.143 <sup>28</sup>	24.99 <sup>20</sup>	29.288 <sup>50</sup>	45.98 <sup>176</sup>
15.1	37.791	6.26	18.046	92.11	11.120	25.19	29.248	44.22
25.1	37.806 <sup>17</sup>	6.99 <sup>73</sup>	17.957 <sup>80</sup>	89.21 <sup>300</sup>	11.136 <sup>16</sup>	25.39 <sup>20</sup>	29.238 <sup>10</sup>	42.28 <sup>194</sup>
35.0	37.864 <sup>80</sup>	7.75 <sup>76</sup>	17.927 <sup>39</sup>	86.09 <sup>312</sup>	11.195 <sup>59</sup>	25.58 <sup>19</sup>	29.268 <sup>30</sup>	40.22 <sup>206</sup>
Mean Place	35.324	22.51	17.790	66.85	8.482	39.98	27.325	28.37
Sec δ, Tan δ	1.008	-0.126	1.557	+1.193	1.043	-0.296	1.647	+0.311
D <sub>α</sub> , D <sub>ω</sub>	+0.064	+0.003	+0.032	-0.032	+0.063	+0.008	+0.054	-0.009
D <sub>β</sub> , D <sub>δ</sub>	+0.16	-0.92	+0.16	-0.92	+0.16	-0.91	+0.16	-0.91

# APPARENT PLACES OF STARS, 1920.

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FOR THE UPPER TRANSIT AT WASHINGTON.

Washington Mean Time.	15 Cygni. Mag. 5.0		f Sagittarii. Mag. 5.1		γ Aquilae. Mag. 2.8		δ Cygni. Mag. 3.0	
	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.
	h m 19 41	° ' " +87 9	h m 19 41	° ' " -19 56	h m 19 42	° ' " +10 25	h m 19 42	° ' " +44 55
Jan. 1.0	22.636	48.13	41.345	71.32	28.891	10.09	27.388	76.40
11.0	22.665	45.29	41.425	71.25	26.950	8.39	27.402	73.35
21.0	22.740	42.41	41.544	71.12	27.047	6.70	27.466	70.24
31.0	22.861	39.60	41.698	70.95	27.175	5.08	27.584	67.19
Feb. 9.9	23.026	36.98	41.883	70.70	27.339	3.62	27.752	64.33
19.9	23.229	34.64	42.096	70.37	27.528	2.39	27.968	61.77
29.9	23.467	32.69	42.333	69.93	27.744	1.44	28.226	59.61
Mar. 10.9	23.737	31.21	42.591	69.39	27.981	0.82	28.516	57.89
20.8	24.032	30.26	42.867	68.72	28.238	0.55	28.839	56.77
30.8	24.346	29.86	43.158	67.94	28.508	0.70	29.183	56.24
Apr. 9.8	24.672	30.04	43.462	67.07	28.791	1.24	29.543	56.30
19.7	25.005	30.79	43.772	66.11	29.080	2.16	29.911	56.98
29.7	25.338	32.08	44.084	65.11	29.371	3.41	30.274	58.23
May 9.7	25.661	33.85	44.392	64.11	29.660	4.97	30.628	60.01
19.7	25.968	36.06	44.693	63.11	29.935	6.77	30.958	62.25
29.6	26.252	38.62	44.977	62.17	30.195	8.74	31.264	64.89
June 8.6	26.504	41.45	45.240	61.31	30.433	10.83	31.531	67.84
18.6	26.719	44.48	45.474	60.57	30.642	13.01	31.757	71.00
28.6	26.892	47.61	45.674	59.96	30.817	15.17	31.933	74.30
July 8.5	27.018	50.77	45.835	59.50	30.956	17.29	32.056	77.65
18.5	27.093	53.88	45.951	59.19	31.051	19.30	32.124	80.99
28.5	27.116	56.86	46.021	59.03	31.102	21.19	32.134	84.22
Aug. 7.4	27.088	59.67	46.044	59.01	31.111	22.87	32.089	87.25
17.4	27.009	62.23	46.018	59.11	31.075	24.35	31.988	90.04
27.4	26.884	64.50	45.950	59.30	31.001	25.61	31.837	92.53
Sept. 6.4	26.719	66.42	45.842	59.57	30.887	26.61	31.640	94.69
16.3	26.519	67.97	45.701	59.87	30.746	27.39	31.407	96.42
26.3	26.295	69.12	45.536	60.19	30.579	27.86	31.147	97.73
Oct. 6.3	26.055	69.83	45.357	60.52	30.402	28.12	30.867	98.60
16.3	25.808	70.09	45.172	60.81	30.220	28.10	30.581	98.97
26.2	25.564	69.89	44.993	61.05	30.042	27.79	30.296	98.84
Nov. 5.2	25.334	69.23	44.830	61.25	29.878	27.23	30.027	98.20
15.2	25.128	68.11	44.690	61.41	29.736	26.40	29.780	97.06
25.1	24.953	66.55	44.583	61.51	29.623	25.34	29.566	95.44
Dec. 5.1	24.815	64.59	44.514	61.58	29.544	24.06	29.391	93.38
15.1	24.718	62.29	44.483	61.61	29.499	22.62	29.265	90.93
25.1	24.667	59.69	44.495	61.61	29.495	21.02	29.187	88.17
35.0	24.664	56.90	44.549	61.58	29.527	19.31	29.164	85.18
Mean Place	23.526	37.86	41.799	76.08	27.373	2.46	28.525	65.36
Sec δ, Tan δ	1.255	+0.758	1.064	-0.363	1.017	+0.184	1.413	+0.998
D <sub>α</sub> , D <sub>ω</sub>	+0.043	-0.022	+0.070	+0.010	+0.057	-0.005	+0.037	-0.029
D <sub>δ</sub> , D <sub>ε</sub>	+0.17	-0.90	+0.17	-0.90	+0.17	-0.90	+0.17	-0.90

FOR THE UPPER TRANSIT AT WASHINGTON.

Washington Mean Time.	δ Sagittæ. Mag. 3.8		α Aquilæ. (Altair.) Mag. 0.9		γ Aquilæ. Var. 3.7-4.4		ε Draconis. Mag. 4.0	
	Right Ascension.	Declination.	Right Ascension.	Declination.	Right Ascension.	Declination.	Right Ascension.	Declination.
	h m	° '	h m	° '	h m	° '	h m	° '
	19 43	+18 20	19 46	+ 8 39	19 48	+ 0 47	19 48	+70 3
	s	"	s	"	s	"	s	"
Jan. 1.0	48.687	18.47	52.341	20.17	23.409	64.43	23.85	64.34
11.0	48.737 <sup>50</sup>	16.38 <sup>200</sup>	52.400 <sup>80</sup>	27.56 <sup>188</sup>	23.530 <sup>61</sup>	63.27 <sup>116</sup>	23.71 <sup>14</sup>	61.06 <sup>328</sup>
21.0	48.826 <sup>80</sup>	14.28 <sup>210</sup>	52.498 <sup>98</sup>	26.02 <sup>157</sup>	23.627 <sup>97</sup>	62.14 <sup>113</sup>	23.70 <sup>1</sup>	57.65 <sup>341</sup>
31.0	48.951 <sup>125</sup>	12.26 <sup>203</sup>	52.626 <sup>128</sup>	24.53 <sup>149</sup>	23.757 <sup>120</sup>	61.07 <sup>107</sup>	23.81 <sup>11</sup>	54.25 <sup>340</sup>
Feb. 9.9	49.110 <sup>159</sup>	10.40 <sup>186</sup>	52.791 <sup>165</sup>	23.19 <sup>134</sup>	23.918 <sup>161</sup>	60.14 <sup>98</sup>	24.04 <sup>23</sup>	50.98 <sup>327</sup>
19.9	49.298 <sup>188</sup>	8.79 <sup>161</sup>	52.979 <sup>186</sup>	22.08 <sup>111</sup>	24.106 <sup>157</sup>	59.40 <sup>74</sup>	24.37 <sup>23</sup>	47.98 <sup>300</sup>
29.9	49.514 <sup>216</sup>	7.51 <sup>128</sup>	53.194 <sup>215</sup>	21.23 <sup>85</sup>	24.318 <sup>212</sup>	58.88 <sup>52</sup>	24.80 <sup>43</sup>	45.36 <sup>292</sup>
Mar. 10.9	49.754 <sup>240</sup>	6.60 <sup>91</sup>	53.432 <sup>248</sup>	20.71 <sup>52</sup>	24.552 <sup>284</sup>	58.64 <sup>24</sup>	25.33 <sup>53</sup>	43.23 <sup>213</sup>
20.8	50.015 <sup>261</sup>	6.12 <sup>48</sup>	53.686 <sup>254</sup>	20.55 <sup>16</sup>	24.805 <sup>263</sup>	58.63 <sup>4</sup>	25.92 <sup>59</sup>	41.66 <sup>157</sup>
30.8	50.292 <sup>277</sup>	6.09 <sup>3</sup>	53.958 <sup>272</sup>	20.75 <sup>20</sup>	25.073 <sup>268</sup>	59.04 <sup>36</sup>	26.56 <sup>64</sup>	40.72 <sup>94</sup>
Apr. 9.8	50.580 <sup>288</sup>	6.52 <sup>43</sup>	54.240 <sup>282</sup>	21.33 <sup>58</sup>	25.353 <sup>280</sup>	59.71 <sup>67</sup>	27.24 <sup>68</sup>	40.41 <sup>31</sup>
19.7	50.875 <sup>295</sup>	7.39 <sup>87</sup>	54.530 <sup>290</sup>	22.28 <sup>95</sup>	25.640 <sup>267</sup>	60.65 <sup>94</sup>	27.93 <sup>69</sup>	40.76 <sup>35</sup>
29.7	51.171 <sup>296</sup>	8.67 <sup>123</sup>	54.821 <sup>291</sup>	23.55 <sup>127</sup>	25.931 <sup>291</sup>	61.85 <sup>120</sup>	28.59 <sup>66</sup>	41.75 <sup>99</sup>
May 9.7	51.463 <sup>292</sup>	10.32 <sup>165</sup>	55.111 <sup>290</sup>	25.10 <sup>155</sup>	26.219 <sup>288</sup>	63.27 <sup>142</sup>	29.23 <sup>64</sup>	43.33 <sup>158</sup>
19.7	51.744 <sup>281</sup>	12.26 <sup>194</sup>	55.383 <sup>277</sup>	26.89 <sup>179</sup>	26.500 <sup>261</sup>	64.86 <sup>159</sup>	29.82 <sup>69</sup>	45.45 <sup>212</sup>
29.6	52.007 <sup>263</sup>	14.46 <sup>220</sup>	55.649 <sup>261</sup>	28.83 <sup>194</sup>	26.765 <sup>265</sup>	66.56 <sup>170</sup>	30.35 <sup>53</sup>	48.03 <sup>256</sup>
June 8.6	52.247 <sup>240</sup>	16.82 <sup>236</sup>	55.889 <sup>240</sup>	30.92 <sup>209</sup>	27.011 <sup>246</sup>	68.32 <sup>176</sup>	30.80 <sup>45</sup>	50.99 <sup>298</sup>
18.6	52.457 <sup>210</sup>	19.29 <sup>247</sup>	56.193 <sup>214</sup>	33.93 <sup>211</sup>	27.229 <sup>218</sup>	70.09 <sup>177</sup>	31.15 <sup>35</sup>	54.24 <sup>325</sup>
28.6	52.631 <sup>174</sup>	21.80 <sup>261</sup>	56.282 <sup>179</sup>	35.12 <sup>209</sup>	27.416 <sup>187</sup>	71.82 <sup>173</sup>	31.40 <sup>26</sup>	57.71 <sup>347</sup>
July 8.5	52.766 <sup>135</sup>	24.28 <sup>248</sup>	56.423 <sup>141</sup>	37.16 <sup>204</sup>	27.565 <sup>149</sup>	73.45 <sup>163</sup>	31.53 <sup>13</sup>	61.29 <sup>358</sup>
18.5	52.859 <sup>93</sup>	26.68 <sup>240</sup>	56.521 <sup>197</sup>	39.13 <sup>197</sup>	27.673 <sup>108</sup>	74.98 <sup>158</sup>	31.57 <sup>4</sup>	64.90 <sup>361</sup>
28.5	52.905 <sup>46</sup>	28.94 <sup>226</sup>	56.577 <sup>56</sup>	40.94 <sup>181</sup>	27.787 <sup>64</sup>	76.35 <sup>137</sup>	31.49 <sup>8</sup>	68.45 <sup>355</sup>
Aug. 7.4	52.906 <sup>1</sup>	31.01 <sup>207</sup>	56.590 <sup>13</sup>	42.52 <sup>186</sup>	27.757 <sup>20</sup>	77.55 <sup>120</sup>	31.30 <sup>19</sup>	71.87 <sup>342</sup>
17.4	52.863 <sup>43</sup>	32.87 <sup>186</sup>	56.556 <sup>34</sup>	43.92 <sup>140</sup>	27.733 <sup>24</sup>	78.57 <sup>102</sup>	31.00 <sup>10</sup>	75.09 <sup>322</sup>
27.4	52.779 <sup>84</sup>	34.46 <sup>159</sup>	56.485 <sup>71</sup>	45.12 <sup>120</sup>	27.663 <sup>65</sup>	79.39 <sup>82</sup>	30.62 <sup>39</sup>	78.01 <sup>292</sup>
Sept. 6.4	52.653 <sup>121</sup>	35.79 <sup>133</sup>	56.376 <sup>109</sup>	46.06 <sup>94</sup>	27.563 <sup>100</sup>	80.01 <sup>62</sup>	30.62 <sup>47</sup>	80.00 <sup>259</sup>
16.3	52.507 <sup>151</sup>	36.81 <sup>102</sup>	56.237 <sup>139</sup>	46.77 <sup>71</sup>	27.435 <sup>133</sup>	80.45 <sup>44</sup>	30.15 <sup>54</sup>	80.00 <sup>220</sup>
26.3	52.333 <sup>174</sup>	37.52 <sup>71</sup>	56.077 <sup>160</sup>	47.22 <sup>45</sup>	27.290 <sup>156</sup>	80.68 <sup>23</sup>	29.61 <sup>60</sup>	82.80 <sup>175</sup>
Oct. 6.3	52.145 <sup>188</sup>	37.92 <sup>40</sup>	55.905 <sup>172</sup>	47.44 <sup>22</sup>	27.110 <sup>179</sup>	80.74 <sup>6</sup>	29.01 <sup>64</sup>	84.55 <sup>126</sup>
16.3	51.952 <sup>193</sup>	37.98 <sup>6</sup>	55.723 <sup>179</sup>	47.38 <sup>6</sup>	26.935 <sup>175</sup>	80.63 <sup>11</sup>	28.37 <sup>64</sup>	85.81 <sup>126</sup>
26.2	51.763 <sup>189</sup>	37.70 <sup>28</sup>	55.551 <sup>175</sup>	47.31 <sup>31</sup>	26.764 <sup>171</sup>	80.63 <sup>30</sup>	27.71 <sup>66</sup>	86.55 <sup>74</sup>
Nov. 5.2	51.587 <sup>178</sup>	37.70 <sup>60</sup>	55.390 <sup>161</sup>	47.07 <sup>55</sup>	26.607 <sup>157</sup>	80.33 <sup>30</sup>	27.05 <sup>66</sup>	86.75 <sup>20</sup>
15.2	51.434 <sup>153</sup>	36.18 <sup>92</sup>	55.249 <sup>141</sup>	46.52 <sup>55</sup>	26.470 <sup>127</sup>	79.87 <sup>46</sup>	26.39 <sup>66</sup>	86.39 <sup>36</sup>
25.1	51.308 <sup>128</sup>	34.94 <sup>124</sup>	55.138 <sup>111</sup>	45.76 <sup>76</sup>	26.362 <sup>108</sup>	79.25 <sup>62</sup>	25.77 <sup>62</sup>	85.45 <sup>94</sup>
Dec. 5.1	51.215 <sup>93</sup>	34.94 <sup>150</sup>	55.080 <sup>78</sup>	44.76 <sup>100</sup>	26.262 <sup>75</sup>	78.47 <sup>78</sup>	25.21 <sup>58</sup>	83.96 <sup>149</sup>
15.1	51.160 <sup>55</sup>	33.44 <sup>176</sup>	55.000 <sup>41</sup>	43.56 <sup>120</sup>	26.287 <sup>29</sup>	77.57 <sup>99</sup>	24.71 <sup>60</sup>	81.96 <sup>200</sup>
25.1	51.144 <sup>16</sup>	31.68 <sup>194</sup>	55.019 <sup>4</sup>	42.19 <sup>137</sup>	26.248 <sup>2</sup>	76.54 <sup>108</sup>	24.30 <sup>51</sup>	79.48 <sup>248</sup>
35.0	51.169 <sup>25</sup>	29.74 <sup>207</sup>	55.015 <sup>4</sup>	40.70 <sup>149</sup>	26.245 <sup>2</sup>	75.42 <sup>113</sup>	23.99 <sup>31</sup>	76.62 <sup>286</sup>
		27.67 <sup>207</sup>	55.048 <sup>33</sup>	39.11 <sup>159</sup>	26.231 <sup>36</sup>	74.24 <sup>118</sup>	23.79 <sup>30</sup>	73.43 <sup>319</sup>
Mean Place	49.239	9.97	52.805	21.75	23.889	57.70	27.183	50.30
Sec δ, Tan δ	.1054	+0.832	1.012	+0.152	1.000	+0.614	2.933	+2.753
D <sub>δ</sub> α, D <sub>α</sub> α	+0.053	-0.010	+0.058	-0.005	+0.061	0.000	-0.004	-0.084
D <sub>δ</sub> δ, D <sub>α</sub> δ	+0.17	-0.90	+0.18	-0.89	+0.18	-0.89	+0.18	-0.89



FOR THE UPPER TRANSIT AT WASHINGTON.

Washington Mean Time.	ε Sagittarii. Mag. 4.3		ε Pavonia. Mag. 4.1		β Aquilae. Mag. 3.9		γ Sagittae. Mag. 3.7	
	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.
	h m 19 49	° ' " -42 4	h m 19 51	° ' " -73 6	h m 19 51	° ' " + 6 12	h m 19 55	° ' " +19 16
Jan. 1.1	43.907	44.13	18.56	82.54	22.576	29.68	11.401	35.52
11.0	43.900	42.68	18.64	79.52	22.630	27.62	11.440	33.41
21.0	44.121	41.18	18.87	76.44	22.722	26.15	11.517	31.31
31.0	44.298	39.62	19.21	73.41	22.845	24.79	11.630	29.26
Feb. 9.9	44.516	38.07	19.68	70.46	22.999	23.54	11.777	27.36
19.9	44.771	36.55	20.26	67.69	23.184	22.51	11.956	25.71
29.9	45.058	35.06	20.92	65.16	23.391	21.73	12.164	24.37
Mar. 10.9	45.374	33.63	21.66	62.89	23.623	21.25	12.396	23.40
20.8	45.713	32.29	22.46	60.94	23.875	21.12	12.652	22.85
30.8	46.072	31.04	23.31	59.37	24.141	21.34	12.925	22.77
Apr. 9.8	46.445	29.91	24.20	58.17	24.421	21.91	13.212	23.14
19.7	46.827	28.95	25.10	57.38	24.710	22.82	13.508	23.96
29.7	47.213	28.16	26.00	57.01	25.001	24.04	13.897	25.20
May 9.7	47.598	27.55	26.88	57.06	25.289	25.53	14.108	26.82
19.7	47.970	27.17	27.73	57.54	25.572	27.21	14.390	28.75
29.6	48.325	27.01	28.53	58.44	25.857	29.09	14.661	30.95
June 8.6	48.653	27.09	29.25	59.72	26.080	31.02	14.909	33.33
18.6	48.946	27.41	29.98	61.37	26.300	33.01	15.128	35.83
28.6	49.197	27.95	30.42	63.32	26.484	34.99	15.313	38.38
July 8.5	49.402	28.71	30.92	65.55	26.630	36.90	15.456	40.92
18.5	49.551	29.66	31.09	67.96	26.738	38.72	15.561	43.39
28.5	49.642	30.76	31.23	70.50	26.800	40.37	15.618	45.72
Aug. 7.4	49.674	31.96	31.23	73.07	26.820	41.85	15.630	47.87
17.4	49.648	33.22	31.10	75.58	26.794	43.14	15.596	49.82
27.4	49.566	34.47	30.82	77.96	26.729	44.24	15.521	51.51
Sept. 6.4	49.483	35.66	30.42	80.09	26.627	45.10	15.407	52.93
16.3	49.256	36.74	29.91	81.91	26.493	45.72	15.262	54.04
26.3	49.047	37.63	29.32	83.33	26.337	46.10	15.093	54.83
Oct. 6.3	48.818	38.32	28.66	84.29	26.167	46.26	14.908	55.31
16.3	48.578	38.77	27.98	84.73	25.991	46.20	14.716	55.45
26.2	48.343	38.94	27.30	84.65	25.819	45.90	14.526	55.25
Nov. 5.2	48.125	38.83	26.66	84.02	25.656	45.39	14.347	54.72
15.2	47.934	38.44	26.07	82.87	25.516	44.66	14.189	53.85
25.1	47.780	37.77	25.56	81.23	25.406	43.73	14.056	52.67
Dec. 5.1	47.673	36.89	25.16	79.15	25.323	42.61	13.956	51.20
15.1	47.616	35.91	24.88	76.71	25.276	41.35	13.891	49.47
25.1	47.610	34.56	24.75	73.99	25.267	39.97	13.864	47.55
35.0	47.659	33.18	24.74	71.06	25.296	38.52	13.877	45.48
Mean Place	44.639	46.87	21.652	83.98	23.015	21.71	11.983	26.48
Sec δ, Tan δ	1.347	-0.903	3.444	-3.295	1.006	+0.169	1.059	+0.350
D <sub>α</sub> , D <sub>ω</sub>	+0.062	+0.028	+0.133	+0.163	+0.059	-0.003	+0.053	-0.011
D <sub>β</sub> , D <sub>δ</sub>	+0.18	-0.89	+0.19	-0.88	+0.19	-0.88	+0.19	-0.88

FOR THE UPPER TRANSIT AT WASHINGTON.

Washington Mean Time.	♄ Sagittarii. Mag. 4.6		♑ Aquilae. Mag. 5.6		♐ Aquilae. Mag. 3.4		♅ Oryni, seq. Mag. 4.0	
	Right Ascension.	Declination.	Right Ascension.	Declination.	Right Ascension.	Declination.	Right Ascension.	Declination.
	h m	° ' "	h m	° ' "	h m	° ' "	h m	° ' "
	19 57	-27 55	20 0	+ 7 3	20 7	- 1 9	20 11	+46 29
	s	"	s	"	s	"	s	"
Jan. 1.1	43.984	56.48	13.505	13.18	10.277	28.14	5.761	66.44
11.0	44.052 <sup>68</sup>	55.87	13.550 <sup>45</sup>	11.72 <sup>146</sup>	10.323 <sup>48</sup>	29.13 <sup>90</sup>	5.732 <sup>29</sup>	63.49 <sup>285</sup>
21.0	44.161 <sup>109</sup>	55.21 <sup>68</sup>	13.631 <sup>81</sup>	10.25 <sup>147</sup>	10.402 <sup>70</sup>	30.11 <sup>98</sup>	5.756 <sup>79</sup>	60.42 <sup>307</sup>
31.0	44.306 <sup>145</sup>	54.47 <sup>74</sup>	13.745 <sup>114</sup>	8.86 <sup>189</sup>	10.516 <sup>114</sup>	31.02 <sup>91</sup>	5.835 <sup>79</sup>	57.36 <sup>308</sup>
Feb. 10.0	44.486 <sup>180</sup>	53.08 <sup>79</sup>	13.892 <sup>147</sup>	7.61 <sup>128</sup>	10.680 <sup>144</sup>	31.80 <sup>78</sup>	5.967 <sup>132</sup>	54.41 <sup>295</sup>
	211	84	176	106	172	61	182	271
19.9	44.697	52.84	14.068	6.56	10.832	32.41	6.149	51.70
29.9	44.935 <sup>238</sup>	51.93 <sup>91</sup>	14.269 <sup>201</sup>	5.78 <sup>80</sup>	11.030 <sup>198</sup>	32.81 <sup>40</sup>	6.377 <sup>228</sup>	49.34 <sup>298</sup>
Mar. 10.9	45.198 <sup>268</sup>	50.97 <sup>96</sup>	14.495 <sup>226</sup>	5.28 <sup>46</sup>	11.253 <sup>223</sup>	32.95 <sup>14</sup>	6.649 <sup>272</sup>	47.42 <sup>193</sup>
20.8	45.481 <sup>283</sup>	49.96 <sup>101</sup>	14.743 <sup>248</sup>	5.11 <sup>17</sup>	11.497 <sup>244</sup>	32.81 <sup>14</sup>	6.957 <sup>306</sup>	46.03 <sup>120</sup>
30.8	45.782 <sup>301</sup>	48.91 <sup>108</sup>	15.007 <sup>264</sup>	5.31 <sup>20</sup>	11.757 <sup>260</sup>	32.38 <sup>43</sup>	7.293 <sup>336</sup>	45.20 <sup>83</sup>
	316	107	276	58	276	71	360	23
Apr. 9.8	46.098	47.84	15.283	5.80	12.032	31.67	7.653	44.97
19.8	46.424 <sup>336</sup>	46.78 <sup>106</sup>	15.571 <sup>268</sup>	6.80 <sup>91</sup>	12.320 <sup>288</sup>	30.69 <sup>96</sup>	8.026 <sup>373</sup>	45.36 <sup>39</sup>
29.7	46.754 <sup>330</sup>	45.74 <sup>104</sup>	15.862 <sup>291</sup>	8.02 <sup>122</sup>	12.613 <sup>298</sup>	29.48 <sup>121</sup>	8.403 <sup>377</sup>	46.33 <sup>97</sup>
May 9.7	47.084 <sup>380</sup>	44.77 <sup>97</sup>	16.154 <sup>292</sup>	9.53 <sup>151</sup>	12.906 <sup>298</sup>	28.06 <sup>142</sup>	8.775 <sup>372</sup>	47.87 <sup>154</sup>
19.7	47.408 <sup>324</sup>	43.90 <sup>87</sup>	16.437 <sup>268</sup>	11.26 <sup>173</sup>	13.194 <sup>288</sup>	26.48 <sup>158</sup>	9.133 <sup>358</sup>	49.90 <sup>208</sup>
	309	78	270	188	276	171	335	246
29.7	47.717	43.15	16.707	13.14	13.470	24.77	9.469	52.36
June 8.6	48.006 <sup>280</sup>	42.55 <sup>80</sup>	16.956 <sup>240</sup>	15.14 <sup>200</sup>	13.729 <sup>250</sup>	23.05 <sup>172</sup>	9.769 <sup>301</sup>	55.16 <sup>280</sup>
18.6	48.266 <sup>260</sup>	42.11 <sup>44</sup>	17.181 <sup>226</sup>	17.21 <sup>207</sup>	13.962 <sup>233</sup>	21.33 <sup>173</sup>	10.031 <sup>262</sup>	58.26 <sup>310</sup>
28.6	48.492 <sup>226</sup>	41.86 <sup>25</sup>	17.373 <sup>193</sup>	19.25 <sup>204</sup>	14.164 <sup>202</sup>	19.65 <sup>168</sup>	10.246 <sup>215</sup>	61.53 <sup>327</sup>
July 8.5	48.678 <sup>186</sup>	41.80 <sup>6</sup>	17.528 <sup>155</sup>	21.24 <sup>190</sup>	14.331 <sup>167</sup>	18.05 <sup>160</sup>	10.410 <sup>164</sup>	64.91 <sup>338</sup>
	141	11	115	188	128	145	106	340
18.5	48.819	41.91	17.643	23.12	14.456	16.60	10.516	68.31
28.5	48.909 <sup>90</sup>	42.19 <sup>28</sup>	17.713 <sup>70</sup>	24.87 <sup>175</sup>	14.539 <sup>63</sup>	15.28 <sup>132</sup>	10.563 <sup>47</sup>	71.65 <sup>334</sup>
Aug. 7.5	48.949 <sup>40</sup>	42.60 <sup>41</sup>	17.742 <sup>20</sup>	28.44 <sup>157</sup>	14.578 <sup>30</sup>	14.13 <sup>115</sup>	10.551 <sup>12</sup>	74.86 <sup>321</sup>
17.4	48.939 <sup>10</sup>	43.13 <sup>46</sup>	17.725 <sup>17</sup>	27.80 <sup>136</sup>	14.574 <sup>4</sup>	13.18 <sup>95</sup>	10.483 <sup>68</sup>	77.86 <sup>300</sup>
27.4	48.881 <sup>58</sup>	43.74 <sup>61</sup>	17.666 <sup>59</sup>	28.96 <sup>116</sup>	14.525 <sup>49</sup>	12.41 <sup>77</sup>	10.360 <sup>123</sup>	80.61 <sup>275</sup>
	101	65	96	94	86	57	172	242
Sept. 6.4	48.780	44.39	17.568	29.90	14.439	11.84	10.188	83.03
16.4	48.642 <sup>138</sup>	45.04 <sup>66</sup>	17.440 <sup>128</sup>	30.58 <sup>66</sup>	14.319 <sup>120</sup>	11.46 <sup>38</sup>	9.974 <sup>214</sup>	85.09 <sup>206</sup>
26.3	48.474 <sup>166</sup>	45.64 <sup>60</sup>	17.288 <sup>152</sup>	31.08 <sup>45</sup>	14.174 <sup>145</sup>	11.23 <sup>23</sup>	9.726 <sup>248</sup>	86.73 <sup>164</sup>
Oct. 6.3	48.288 <sup>186</sup>	46.17 <sup>53</sup>	17.118 <sup>170</sup>	31.24 <sup>21</sup>	14.012 <sup>162</sup>	11.21 <sup>2</sup>	9.454 <sup>272</sup>	87.93 <sup>120</sup>
16.3	48.093 <sup>195</sup>	46.60 <sup>48</sup>	16.943 <sup>175</sup>	31.24 <sup>9</sup>	13.841 <sup>171</sup>	11.33 <sup>12</sup>	9.169 <sup>285</sup>	88.65 <sup>72</sup>
	192	28	173	28	168	27	289	22
26.2	47.901	46.88	16.770	30.99	13.673	11.60	8.860	88.87
Nov. 5.2	47.722 <sup>179</sup>	47.06 <sup>17</sup>	16.607 <sup>163</sup>	30.51 <sup>48</sup>	13.513 <sup>160</sup>	12.03 <sup>43</sup>	8.593 <sup>282</sup>	88.59 <sup>28</sup>
15.2	47.566 <sup>156</sup>	47.07 <sup>2</sup>	16.463 <sup>144</sup>	29.81 <sup>70</sup>	13.371 <sup>142</sup>	12.60 <sup>57</sup>	8.335 <sup>263</sup>	87.79 <sup>80</sup>
25.2	47.442 <sup>124</sup>	46.95 <sup>12</sup>	16.347 <sup>116</sup>	28.90 <sup>91</sup>	13.256 <sup>115</sup>	13.29 <sup>60</sup>	8.097 <sup>238</sup>	86.50 <sup>129</sup>
Dec. 5.1	47.354 <sup>88</sup>	46.70 <sup>25</sup>	16.259 <sup>88</sup>	27.80 <sup>110</sup>	13.171 <sup>85</sup>	14.10 <sup>81</sup>	7.894 <sup>203</sup>	84.71 <sup>179</sup>
	48	35	55	126	53	91	161	220
15.1	47.306	46.35	16.204	26.54	13.118	15.01	7.733	82.51
25.1	47.302 <sup>4</sup>	45.90 <sup>45</sup>	16.188 <sup>16</sup>	25.15 <sup>139</sup>	13.102 <sup>16</sup>	16.00 <sup>99</sup>	7.618 <sup>115</sup>	79.94 <sup>257</sup>
35.1	47.342 <sup>40</sup>	45.37 <sup>53</sup>	16.206 <sup>18</sup>	23.71 <sup>144</sup>	13.125 <sup>23</sup>	17.03 <sup>102</sup>	7.554 <sup>64</sup>	77.09 <sup>265</sup>
Mean Place	44.484	60.07	13.928	5.56	10.659	34.79	6.802	53.27
Sec δ, Tan δ	1.132	-0.530	1.008	+0.124	1.000	-0.018	1.453	+1.054
D <sub>α</sub> , D <sub>α</sub> α	+0.073	+0.017	+0.058	-0.004	+0.062	+0.001	+0.038	-0.038
D <sub>δ</sub> , D <sub>α</sub> δ	+0.20	-0.87	+0.20	-0.87	+0.21	-0.85	+0.22	-0.84

FOR THE UPPER TRANSIT AT WASHINGTON.

Washington Mean Time.	$\alpha$ Cephei. Mag. 4.4		$\gamma$ Vulpeculae. Mag. 5.4		$\alpha^2$ Capricorni. Mag. 3.8		$\beta$ Capricorni. Mag. 3.2	
	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.
	h m 20 11	° ' " +77 28	h m 20 18	° ' " +24 25	h m 20 18	° ' " -12 47	h m 20 16	° ' " -15 1
Jan. 1.1	31.30 <sup>s</sup>	31.86	21.178	36.41	36.657	32.40	30.741	61.06
11.0	30.95 <sup>35</sup>	28.76 <sup>310</sup>	21.193 <sup>15</sup>	34.16 <sup>225</sup>	36.704 <sup>47</sup>	32.71 <sup>31</sup>	30.784 <sup>43</sup>	61.23 <sup>17</sup>
21.0	30.76 <sup>19</sup>	25.47 <sup>329</sup>	21.246 <sup>53</sup>	31.86 <sup>230</sup>	36.784 <sup>80</sup>	32.96 <sup>25</sup>	30.863 <sup>79</sup>	61.33 <sup>10</sup>
31.0	30.78 <sup>2</sup>	22.10 <sup>337</sup>	21.337 <sup>91</sup>	29.60 <sup>226</sup>	36.900 <sup>116</sup>	33.12 <sup>16</sup>	30.977 <sup>114</sup>	61.35 <sup>2</sup>
Feb. 10.0	30.99 <sup>21</sup>	18.79 <sup>331</sup>	21.464 <sup>127</sup>	27.48 <sup>212</sup>	37.044 <sup>144</sup>	33.20 <sup>8</sup>	31.121 <sup>144</sup>	61.27 <sup>8</sup>
19.9	31.38	15.67 <sup>312</sup>	21.627 <sup>163</sup>	25.57 <sup>191</sup>	37.221 <sup>177</sup>	33.14 <sup>6</sup>	31.296 <sup>175</sup>	61.06 <sup>21</sup>
29.9	31.95 <sup>57</sup>	12.85 <sup>282</sup>	21.821 <sup>194</sup>	23.98 <sup>150</sup>	37.221 <sup>201</sup>	32.91 <sup>23</sup>	31.498 <sup>202</sup>	61.06 <sup>35</sup>
Mar. 10.9	32.68 <sup>71</sup>	10.45 <sup>240</sup>	22.045 <sup>234</sup>	22.77 <sup>121</sup>	37.650 <sup>228</sup>	32.48 <sup>43</sup>	31.722 <sup>204</sup>	60.71 <sup>51</sup>
20.8	33.50 <sup>84</sup>	8.57 <sup>188</sup>	22.295 <sup>250</sup>	22.00 <sup>77</sup>	37.896 <sup>246</sup>	31.90 <sup>58</sup>	31.971 <sup>249</sup>	59.51 <sup>69</sup>
30.8	34.45 <sup>96</sup>	7.27 <sup>130</sup>	22.566 <sup>271</sup>	21.71 <sup>29</sup>	38.163 <sup>267</sup>	31.14 <sup>76</sup>	32.238 <sup>267</sup>	58.67 <sup>84</sup>
Apr. 9.8	35.45 <sup>100</sup>	6.58 <sup>69</sup>	22.855 <sup>280</sup>	21.90 <sup>19</sup>	38.446 <sup>283</sup>	30.19 <sup>95</sup>	32.521 <sup>283</sup>	57.68 <sup>99</sup>
19.8	36.49 <sup>104</sup>	6.55 <sup>3</sup>	23.157 <sup>302</sup>	22.58 <sup>68</sup>	38.741 <sup>295</sup>	29.10 <sup>100</sup>	32.817 <sup>296</sup>	56.55 <sup>113</sup>
29.7	37.52 <sup>103</sup>	7.14 <sup>59</sup>	23.464 <sup>307</sup>	23.72 <sup>114</sup>	39.042 <sup>301</sup>	27.88 <sup>122</sup>	33.122 <sup>305</sup>	55.32 <sup>123</sup>
May 9.7	38.51 <sup>99</sup>	8.35 <sup>121</sup>	23.771 <sup>307</sup>	25.29 <sup>157</sup>	39.345 <sup>303</sup>	26.57 <sup>131</sup>	33.428 <sup>306</sup>	54.03 <sup>129</sup>
19.7	39.43 <sup>92</sup>	10.11 <sup>176</sup>	24.070 <sup>299</sup>	27.21 <sup>192</sup>	39.646 <sup>301</sup>	25.22 <sup>135</sup>	33.790 <sup>302</sup>	52.72 <sup>131</sup>
29.7	40.27 <sup>84</sup>	12.38 <sup>227</sup>	24.356 <sup>286</sup>	29.46 <sup>226</sup>	39.934 <sup>288</sup>	23.87 <sup>135</sup>	34.024 <sup>294</sup>	51.42 <sup>130</sup>
June 8.6	40.99 <sup>72</sup>	15.08 <sup>270</sup>	24.619 <sup>263</sup>	31.93 <sup>247</sup>	40.205 <sup>271</sup>	22.53 <sup>134</sup>	34.301 <sup>277</sup>	50.17 <sup>125</sup>
18.6	41.57 <sup>58</sup>	18.13 <sup>305</sup>	24.855 <sup>236</sup>	34.58 <sup>265</sup>	40.454 <sup>249</sup>	21.32 <sup>121</sup>	34.554 <sup>253</sup>	49.03 <sup>114</sup>
28.6	41.99 <sup>42</sup>	21.44 <sup>331</sup>	25.056 <sup>301</sup>	37.31 <sup>273</sup>	40.671 <sup>217</sup>	20.21 <sup>111</sup>	34.777 <sup>223</sup>	48.01 <sup>102</sup>
July 8.5	42.25 <sup>26</sup>	24.94 <sup>350</sup>	25.218 <sup>162</sup>	40.06 <sup>275</sup>	40.852 <sup>181</sup>	19.21 <sup>100</sup>	34.963 <sup>186</sup>	47.15 <sup>86</sup>
18.5	42.35 <sup>10</sup>	28.58 <sup>359</sup>	25.335 <sup>117</sup>	42.78 <sup>272</sup>	40.993 <sup>141</sup>	18.40 <sup>81</sup>	35.108 <sup>145</sup>	46.45 <sup>70</sup>
28.5	42.26 <sup>9</sup>	32.12 <sup>359</sup>	25.407 <sup>72</sup>	45.39 <sup>261</sup>	41.087 <sup>94</sup>	17.76 <sup>64</sup>	35.209 <sup>101</sup>	45.92 <sup>53</sup>
Aug. 7.5	42.02 <sup>24</sup>	35.64 <sup>352</sup>	25.432 <sup>25</sup>	47.93 <sup>244</sup>	41.138 <sup>51</sup>	17.27 <sup>49</sup>	35.263 <sup>54</sup>	45.56 <sup>36</sup>
17.4	41.62 <sup>40</sup>	39.02 <sup>338</sup>	25.410 <sup>22</sup>	50.07 <sup>224</sup>	41.142 <sup>4</sup>	16.95 <sup>32</sup>	35.270 <sup>7</sup>	45.38 <sup>18</sup>
27.4	41.06 <sup>56</sup>	42.18 <sup>316</sup>	25.343 <sup>67</sup>	52.05 <sup>198</sup>	41.103 <sup>39</sup>	16.79 <sup>16</sup>	35.233 <sup>37</sup>	45.34 <sup>4</sup>
Sept. 6.4	40.36 <sup>70</sup>	45.06 <sup>288</sup>	25.236 <sup>107</sup>	53.76 <sup>171</sup>	41.022 <sup>81</sup>	16.78 <sup>1</sup>	35.154 <sup>79</sup>	45.43 <sup>9</sup>
16.4	39.56 <sup>80</sup>	47.59 <sup>253</sup>	25.097 <sup>139</sup>	55.16 <sup>140</sup>	40.907 <sup>115</sup>	16.87 <sup>9</sup>	35.040 <sup>114</sup>	45.64 <sup>21</sup>
26.3	38.65 <sup>91</sup>	49.72 <sup>213</sup>	24.928 <sup>169</sup>	56.23 <sup>107</sup>	40.764 <sup>143</sup>	17.06 <sup>19</sup>	34.898 <sup>142</sup>	45.91 <sup>27</sup>
Oct. 6.3	37.65 <sup>100</sup>	51.39 <sup>167</sup>	24.741 <sup>187</sup>	56.94 <sup>71</sup>	40.603 <sup>161</sup>	17.31 <sup>25</sup>	34.736 <sup>162</sup>	46.23 <sup>32</sup>
16.3	36.61 <sup>104</sup>	52.57 <sup>118</sup>	24.545 <sup>196</sup>	57.27 <sup>33</sup>	40.431 <sup>172</sup>	17.61 <sup>30</sup>	34.564 <sup>172</sup>	46.59 <sup>36</sup>
26.2	35.54 <sup>107</sup>	53.22 <sup>65</sup>	24.347 <sup>198</sup>	57.24 <sup>3</sup>	40.262 <sup>169</sup>	17.96 <sup>35</sup>	34.391 <sup>173</sup>	46.95 <sup>36</sup>
Nov. 5.2	34.47 <sup>107</sup>	53.31 <sup>9</sup>	24.157 <sup>190</sup>	56.83 <sup>41</sup>	40.100 <sup>162</sup>	18.33 <sup>37</sup>	34.223 <sup>163</sup>	47.32 <sup>37</sup>
15.2	33.44 <sup>108</sup>	52.82 <sup>49</sup>	23.984 <sup>173</sup>	56.05 <sup>78</sup>	39.956 <sup>144</sup>	18.71 <sup>38</sup>	34.082 <sup>145</sup>	47.67 <sup>35</sup>
25.2	32.47 <sup>97</sup>	51.76 <sup>106</sup>	23.833 <sup>151</sup>	54.91 <sup>114</sup>	39.838 <sup>118</sup>	19.10 <sup>39</sup>	33.961 <sup>121</sup>	48.00 <sup>33</sup>
Dec. 5.1	31.58 <sup>89</sup>	50.16 <sup>160</sup>	23.713 <sup>120</sup>	53.44 <sup>147</sup>	39.751 <sup>87</sup>	19.50 <sup>40</sup>	33.870 <sup>91</sup>	48.31 <sup>31</sup>
15.1	30.80 <sup>78</sup>	48.04 <sup>212</sup>	23.625 <sup>88</sup>	51.66 <sup>178</sup>	39.696 <sup>56</sup>	19.89 <sup>39</sup>	33.814 <sup>56</sup>	48.31 <sup>29</sup>
25.1	30.17 <sup>68</sup>	45.47 <sup>257</sup>	23.574 <sup>51</sup>	49.64 <sup>202</sup>	39.679 <sup>17</sup>	20.29 <sup>40</sup>	33.796 <sup>18</sup>	48.60 <sup>26</sup>
35.1	29.70 <sup>47</sup>	42.52 <sup>295</sup>	23.563 <sup>11</sup>	47.44 <sup>220</sup>	39.699 <sup>20</sup>	20.63 <sup>34</sup>	33.814 <sup>18</sup>	48.86 <sup>26</sup>
35.1	29.70 <sup>47</sup>	42.52 <sup>295</sup>	23.563 <sup>11</sup>	47.44 <sup>220</sup>	39.699 <sup>20</sup>	20.63 <sup>34</sup>	33.814 <sup>18</sup>	49.07 <sup>21</sup>
Mean Place	36.617	15.93	21.710	26.01	37.036	37.43	31.119	65.75
Sec $\delta$ , Tan $\delta$	4.611	+4.501	1.098	+0.454	1.025	-0.227	1.035	-0.269
$D_{\delta a}$ , $D_{\delta \alpha}$	-0.039	-0.163	+0.051	-0.017	+0.066	+0.008	+0.067	+0.010
$D_{\delta \delta}$ , $D_{\delta \delta}$	+0.22	-0.84	+0.22	-0.84	+0.22	-0.83	+0.22	-0.83

FOR THE UPPER TRANSIT AT WASHINGTON.

Washington Mean Time.	$\alpha$ Pavonis. Mag. 2.1		$\gamma$ Cygni. Mag. 2.3		$\tau$ Capricorni. Mag. 5.2		$\rho$ Capricorni. Mag. 5.0	
	Right Ascension.	Declination.	Right Ascension.	Declination.	Right Ascension.	Declination.	Right Ascension.	Declination.
	h m 20 19	° ' " -56 59	h m 20 19	° ' " +39 50	h m 20 23	° ' " -18 23	h m 20 24	° ' " -18 4
Jan. 1.1	18.365	53.68	20.812	72.07	44.235	25.17	17.564	40.57
11.0	18.398 33	51.45 223	20.592 20	69.91 279	44.273 38	25.12 5	17.621 37	40.54 3
21.0	18.498 100	29.04 241	20.619 27	67.05 286	44.346 73	25.00 12	17.694 73	40.44 10
31.0	18.665 167	26.59 245	20.692 73	64.18 287	44.456 110	24.78 23	17.802 108	40.24 20
Feb. 10.0	18.890 225	24.13 246	20.811 119	61.43 275	44.598 142	24.45 33	17.941 139	39.95 29
19.9	19.174 294	21.71 242	20.811 105	58.92 251	44.769 171	24.02 43	18.111 170	39.54 41
29.9	19.504 330	19.38 233	21.183 207	56.72 220	44.968 199	23.47 55	18.306 297	39.00 54
Mar. 10.9	19.880 376	17.18 220	21.427 244	54.95 177	45.195 227	22.77 70	18.531 322	38.31 69
20.9	20.293 413	15.15 203	21.703 276	53.65 130	45.442 247	21.94 83	18.776 245	37.48 83
30.8	20.742 449	13.34 181	22.009 306	52.91 74	45.713 271	20.96 98	19.044 263	36.52 96
Apr. 9.8	21.217 475	11.78 156	22.335 226	52.75 16	46.001 268	19.86 110	19.328 284	35.43 109
19.8	21.709 492	10.49 129	22.678 243	53.15 40	46.299 296	18.63 118	19.628 300	34.23 120
29.7	22.214 505	9.51 98	23.026 248	54.13 98	46.608 309	17.43 125	19.936 308	32.97 126
May 9.7	22.719 505	8.86 65	23.373 247	55.62 149	46.922 314	16.14 129	20.248 312	31.63 129
19.7	23.215 496	8.54 33	23.708 335	57.00 198	47.233 311	14.87 127	20.557 309	30.33 130
29.7	23.692 477	8.59 5	24.025 317	59.96 236	47.534 301	13.69 121	20.857 300	29.13 125
June 8.6	24.141 449	9.00 41	24.318 298	62.66 270	47.817 283	12.52 114	21.142 285	27.96 115
18.6	24.548 407	9.75 75	24.573 255	65.63 297	48.078 261	11.51 101	21.404 282	26.93 105
28.6	24.904 358	10.81 108	24.790 217	68.76 313	48.310 232	10.63 96	21.636 282	26.03 90
July 8.6	25.200 296	12.18 137	24.960 170	71.99 323	48.505 195	9.93 79	21.832 296	25.30 73
18.5	25.425 225	13.18 160	25.121 121	75.23 324	48.658 163	9.40 53	21.987 155	25.30 55
28.5	25.425 151	13.78 182	25.061 64	75.23 317	48.657 110	9.40 34	21.987 110	24.75 37
38.5	25.576 76	15.60 195	25.145 12	78.40 308	48.767 60	9.06 17	22.097 62	24.38 18
Aug. 7.5	25.652 5	17.55 195	25.157 12	81.43 286	48.827 14	8.80 1	22.150 16	24.20 2
17.4	25.647 84	19.55 200	25.117 40	84.34 286	48.841 21	8.90 14	22.175 31	24.18 12
27.4	25.563 156	21.52 197	25.026 91	86.93 231	48.810 75	9.04 26	22.144 73	24.30 26
Sept. 6.4	25.407 116	23.41 173	24.888 177	89.24 106	48.735 112	9.30 34	22.071 110	24.56 33
16.4	25.191 270	25.14 146	24.711 208	91.19 157	48.628 140	9.64 41	21.961 140	24.89 40
26.3	24.921 309	26.60 119	24.503 233	92.76 114	48.483 163	10.05 43	21.821 161	25.29 43
Oct. 6.3	24.612 333	27.79 80	24.270 246	93.90 68	48.321 176	10.46 45	21.660 173	25.72 43
16.3	24.279 338	28.59 40	24.024 249	94.58 24	48.146 174	10.98 49	21.487 175	26.15 41
26.3	23.941 327	29.99 2	23.775 244	94.82 25	47.972 167	11.33 36	21.312 166	26.56 37
Nov. 5.2	23.614 300	28.97 45	23.531 230	94.57 76	47.805 149	11.69 32	21.146 151	26.93 33
15.2	23.314 299	28.52 89	23.301 206	93.82 119	47.656 127	12.01 25	20.995 126	27.26 27
25.2	23.055 210	27.63 30	23.096 173	92.63 107	47.529 96	12.26 21	20.869 97	27.53 21
Dec. 5.1	22.845 148	26.36 100	22.923 128	90.96 206	47.424 63	12.47 15	20.772 62	27.74 16
15.1	22.697 89	24.76 191	22.785 97	88.90 237	47.871 24	12.62 2	20.710 25	27.90 11
25.1	22.614 12	22.85 211	22.688 50	86.53 206	47.347 11	12.69 2	20.635 11	28.01 4
35.1	22.602	20.74	22.638	83.87	47.358	12.71	20.696	28.05
Mean Place	19.625	53.82	21.406	59.81	44.622	29.23	17.963	44.63
Sec $\delta$ , Tan $\delta$	1.886	-1.539	1.305	+0.839	1.054	-0.364	1.032	-0.326
$D_{\alpha}$ , $D_{\alpha\alpha}$	+0.095	+0.059	+0.043	-0.032	+0.068	+0.013	+0.068	+0.013
$D_{\delta}$ , $D_{\delta\delta}$	+0.23	-0.82	+0.23	-0.82	+0.23	-0.81	+0.23	-0.81

# APPARENT PLACES OF STARS, 1920.

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FOR THE UPPER TRANSIT AT WASHINGTON.

Washington Mean Time.	$\alpha$ Cygni. Mag. 4.1		$\theta$ Cephei. Mag. 4.3		$\epsilon$ Delphini. Mag. 4.0		Groombridge 3241. Mag. 6.4	
	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.
	h m 26 26	° ' " +80 5	h m 20 28	° ' " +62 43	h m 20 29	° ' " +11 1	h m 20 30	° ' " +72 15
Jan. 1.1	7.094	76.08	12.68	45.57	23.118	58.54	18.58	55.74
11.0	7.087 <sup>7</sup>	72.62 <sup>241</sup>	12.55 <sup>13</sup>	42.52 <sup>305</sup>	23.133 <sup>15</sup>	56.95 <sup>150</sup>	18.30 <sup>26</sup>	52.71 <sup>303</sup>
21.0	7.120 <sup>33</sup>	70.13 <sup>249</sup>	12.49 <sup>6</sup>	39.28 <sup>324</sup>	23.181 <sup>43</sup>	55.36 <sup>159</sup>	18.15 <sup>15</sup>	49.47 <sup>324</sup>
31.0	7.194 <sup>74</sup>	67.66 <sup>247</sup>	12.52 <sup>3</sup>	36.95 <sup>333</sup>	23.266 <sup>85</sup>	53.82 <sup>154</sup>	18.13 <sup>2</sup>	46.12 <sup>335</sup>
Feb. 10.0	7.306 <sup>112</sup>	65.28 <sup>233</sup>	12.62 <sup>10</sup>	32.67 <sup>326</sup>	23.331 <sup>115</sup>	52.39 <sup>143</sup>	18.25 <sup>12</sup>	42.79 <sup>333</sup>
19.9	7.457 <sup>181</sup>	63.12 <sup>216</sup>	12.82 <sup>20</sup>	29.58 <sup>309</sup>	23.529 <sup>148</sup>	51.15 <sup>124</sup>	18.50 <sup>25</sup>	39.59 <sup>320</sup>
29.9	7.643 <sup>186</sup>	61.27 <sup>185</sup>	13.10 <sup>28</sup>	26.77 <sup>261</sup>	23.704 <sup>175</sup>	50.17 <sup>98</sup>	18.87 <sup>37</sup>	36.68 <sup>291</sup>
Mar. 10.9	7.863 <sup>230</sup>	59.80 <sup>147</sup>	13.44 <sup>34</sup>	24.33 <sup>289</sup>	23.909 <sup>205</sup>	49.50 <sup>67</sup>	19.35 <sup>46</sup>	34.15 <sup>253</sup>
20.9	8.112 <sup>249</sup>	58.78 <sup>103</sup>	13.85 <sup>41</sup>	22.50 <sup>198</sup>	24.138 <sup>229</sup>	49.19 <sup>31</sup>	19.93 <sup>56</sup>	32.13 <sup>202</sup>
30.8	8.387 <sup>275</sup>	58.26 <sup>52</sup>	14.31 <sup>46</sup>	21.20 <sup>130</sup>	24.339 <sup>251</sup>	49.25 <sup>6</sup>	20.59 <sup>66</sup>	30.65 <sup>148</sup>
Apr. 9.8	8.682 <sup>265</sup>	56.37 <sup>1</sup>	14.81 <sup>50</sup>	20.50 <sup>70</sup>	24.657 <sup>268</sup>	49.70 <sup>45</sup>	21.31 <sup>72</sup>	29.80 <sup>85</sup>
19.8	8.993 <sup>311</sup>	56.79 <sup>53</sup>	15.33 <sup>53</sup>	20.46 <sup>4</sup>	24.940 <sup>283</sup>	50.58 <sup>83</sup>	22.05 <sup>74</sup>	29.57 <sup>23</sup>
29.7	9.312 <sup>319</sup>	56.80 <sup>101</sup>	15.85 <sup>53</sup>	21.04 <sup>58</sup>	25.234 <sup>294</sup>	51.70 <sup>117</sup>	22.81 <sup>75</sup>	29.98 <sup>41</sup>
May 9.7	9.632 <sup>330</sup>	61.20 <sup>149</sup>	16.38 <sup>53</sup>	22.24 <sup>120</sup>	25.530 <sup>296</sup>	53.20 <sup>150</sup>	23.56 <sup>75</sup>	31.02 <sup>104</sup>
19.7	9.945 <sup>313</sup>	63.20 <sup>191</sup>	16.88 <sup>50</sup>	23.09 <sup>175</sup>	25.823 <sup>293</sup>	54.96 <sup>176</sup>	24.27 <sup>71</sup>	32.65 <sup>163</sup>
29.7	10.245 <sup>300</sup>	65.46 <sup>226</sup>	17.35 <sup>47</sup>	23.28 <sup>228</sup>	26.109 <sup>286</sup>	56.93 <sup>197</sup>	24.93 <sup>66</sup>	34.80 <sup>215</sup>
June 8.6	10.524 <sup>379</sup>	68.00 <sup>254</sup>	17.77 <sup>43</sup>	23.98 <sup>271</sup>	26.376 <sup>267</sup>	59.04 <sup>211</sup>	25.51 <sup>56</sup>	37.40 <sup>260</sup>
18.6	10.775 <sup>281</sup>	70.76 <sup>276</sup>	18.13 <sup>36</sup>	32.04 <sup>306</sup>	26.619 <sup>243</sup>	61.26 <sup>222</sup>	26.00 <sup>49</sup>	40.37 <sup>297</sup>
28.6	10.989 <sup>214</sup>	73.65 <sup>289</sup>	18.43 <sup>30</sup>	35.37 <sup>333</sup>	26.885 <sup>216</sup>	63.50 <sup>234</sup>	26.39 <sup>39</sup>	43.65 <sup>328</sup>
July 8.6	11.164 <sup>175</sup>	76.60 <sup>265</sup>	18.64 <sup>31</sup>	38.90 <sup>353</sup>	27.014 <sup>179</sup>	65.71 <sup>221</sup>	26.66 <sup>37</sup>	47.13 <sup>348</sup>
18.5	11.293 <sup>130</sup>	78.60 <sup>294</sup>	18.64 <sup>14</sup>	38.90 <sup>361</sup>	27.014 <sup>183</sup>	65.71 <sup>217</sup>	26.66 <sup>16</sup>	47.13 <sup>362</sup>
28.5	11.293 <sup>81</sup>	79.54 <sup>286</sup>	18.78 <sup>5</sup>	42.51 <sup>363</sup>	27.152 <sup>98</sup>	67.88 <sup>202</sup>	26.82 <sup>8</sup>	50.75 <sup>366</sup>
Aug. 7.5	11.374 <sup>34</sup>	82.40 <sup>271</sup>	18.88 <sup>3</sup>	46.14 <sup>355</sup>	27.250 <sup>50</sup>	69.90 <sup>183</sup>	26.85 <sup>9</sup>	54.41 <sup>361</sup>
17.4	11.391 <sup>17</sup>	85.11 <sup>253</sup>	18.80 <sup>11</sup>	49.69 <sup>342</sup>	27.300 <sup>9</sup>	71.73 <sup>166</sup>	26.76 <sup>20</sup>	58.02 <sup>351</sup>
27.4	11.329 <sup>62</sup>	87.64 <sup>228</sup>	18.69 <sup>20</sup>	53.11 <sup>320</sup>	27.309 <sup>37</sup>	73.39 <sup>143</sup>	26.56 <sup>22</sup>	61.53 <sup>339</sup>
37.4	11.329 <sup>108</sup>	89.92 <sup>200</sup>	18.49 <sup>27</sup>	56.31 <sup>290</sup>	27.272 <sup>74</sup>	74.82 <sup>118</sup>	26.24 <sup>43</sup>	64.82 <sup>304</sup>
Sept. 6.4	11.223	91.92	18.22	59.21	27.198	76.00	25.81	67.86
16.4	11.082 <sup>141</sup>	93.59 <sup>167</sup>	17.90 <sup>32</sup>	61.78 <sup>267</sup>	27.086 <sup>112</sup>	76.95 <sup>95</sup>	25.30 <sup>51</sup>	70.57 <sup>271</sup>
26.3	10.910 <sup>172</sup>	94.92 <sup>133</sup>	17.52 <sup>38</sup>	63.93 <sup>215</sup>	26.947 <sup>139</sup>	77.61 <sup>66</sup>	24.71 <sup>59</sup>	72.89 <sup>232</sup>
Oct. 6.3	10.716 <sup>194</sup>	95.87 <sup>95</sup>	17.10 <sup>42</sup>	65.64 <sup>171</sup>	26.789 <sup>153</sup>	78.02 <sup>41</sup>	24.05 <sup>66</sup>	74.78 <sup>199</sup>
16.3	10.510 <sup>206</sup>	96.42 <sup>55</sup>	16.66 <sup>44</sup>	66.86 <sup>122</sup>	26.620 <sup>169</sup>	78.16 <sup>14</sup>	23.35 <sup>70</sup>	76.17 <sup>139</sup>
26.3	10.300 <sup>210</sup>	96.42 <sup>14</sup>	16.66 <sup>46</sup>	66.86 <sup>68</sup>	26.620 <sup>173</sup>	78.16 <sup>11</sup>	23.35 <sup>72</sup>	76.17 <sup>96</sup>
Nov. 26.3	10.360	96.56	16.20	67.54	26.447	78.05	22.63	77.03
5.2	10.086 <sup>304</sup>	96.29 <sup>37</sup>	15.74 <sup>46</sup>	67.67 <sup>13</sup>	26.281 <sup>166</sup>	77.68 <sup>37</sup>	21.90 <sup>73</sup>	77.32 <sup>29</sup>
15.2	9.908 <sup>190</sup>	95.60 <sup>60</sup>	15.29 <sup>45</sup>	67.23 <sup>44</sup>	26.126 <sup>153</sup>	77.04 <sup>64</sup>	21.18 <sup>72</sup>	77.05 <sup>37</sup>
25.2	9.736 <sup>170</sup>	94.52 <sup>103</sup>	14.87 <sup>42</sup>	66.22 <sup>101</sup>	25.994 <sup>132</sup>	76.16 <sup>88</sup>	20.50 <sup>68</sup>	76.18 <sup>87</sup>
Dec. 5.1	9.594 <sup>142</sup>	93.05 <sup>147</sup>	14.49 <sup>33</sup>	64.67 <sup>155</sup>	25.888 <sup>106</sup>	75.07 <sup>109</sup>	19.87 <sup>63</sup>	74.76 <sup>142</sup>
15.1	9.456 <sup>108</sup>	91.23 <sup>183</sup>	14.49 <sup>32</sup>	64.67 <sup>206</sup>	25.888 <sup>76</sup>	75.07 <sup>129</sup>	19.87 <sup>55</sup>	74.76 <sup>196</sup>
25.1	9.412 <sup>74</sup>	89.12 <sup>211</sup>	13.90 <sup>37</sup>	60.09 <sup>253</sup>	25.812 <sup>45</sup>	73.78 <sup>144</sup>	19.32 <sup>45</sup>	72.80 <sup>244</sup>
35.1	9.378 <sup>34</sup>	86.79 <sup>233</sup>	13.72 <sup>18</sup>	57.21 <sup>289</sup>	25.759 <sup>8</sup>	70.79 <sup>155</sup>	18.51 <sup>36</sup>	67.51 <sup>285</sup>
Mean Place	7.653	63.26	14.549	29.43	23.476	49.79	21.800	38.62
Sec $\delta$ , Tan $\delta$	1.156	+0.580	2.183	+1.940	1.019	+0.195	3.283	+3.127
$D\alpha$ , $D_{\alpha}$	+0.049	-0.023	+0.020	-0.078	+0.057	-0.008	-0.004	-0.127
$D\delta$ , $D_{\delta}$	+0.24	-0.36	+0.24	-0.80	+0.24	-0.79	+0.24	-0.79

FOR THE UPPER TRANSIT AT WASHINGTON.

Washington Mean Time.	$\alpha$ Indi. Mag. 3.2		$\beta$ Delphini. Mag. 3.7		$\nu$ Capricorni. Mag. 5.3		$\alpha$ Delphini. Mag. 3.9	
	Right Ascension.	Declination.	Right Ascension.	Declination.	Right Ascension.	Declination.	Right Ascension.	Declination.
	h m 20 31	° ' " -47 33	h m 20 33	° ' " +14 18	h m 20 35	° ' " -18 24	h m 20 35	° ' " +15 37
Jan. 1.1	55.804	77.96	47.532	67.14	29.499	71.95	54.983	55.17
11.1	55.826 22	76.21 175	47.541 9	65.42 172	29.525 26	71.89 6	54.989 6	53.40 177
21.0	55.901 75	74.32 189	47.533 42	63.66 176	29.566 61	71.76 13	55.027 38	51.59 191
31.0	56.028 127	72.32 200	47.660 77	61.95 171	29.681 95	71.51 25	55.101 74	49.80 179
Feb. 10.0	56.202 174	70.26 206	47.770 110	60.35 160	29.809 128	71.16 35	55.207 106	48.14 168
19.9	56.419 217	68.19 207	47.912 142	58.94 141	29.968 159	70.69 47	55.349 142	46.68 146
29.9	56.677 268	66.14 205	48.085 173	57.79 115	30.154 188	70.09 60	55.518 160	45.47 121
Mar. 10.9	56.972 296	64.14 200	48.286 201	56.97 82	30.369 215	69.33 76	55.718 200	44.57 90
20.9	57.301 329	62.21 193	48.513 227	56.50 47	30.607 238	68.44 89	55.945 227	44.05 52
30.8	57.659 358	60.42 179	48.763 250	56.44 6	30.869 262	67.40 104	56.196 251	43.96 9
Apr. 9.8	58.042 383	58.80 162	49.033 270	56.80 36	31.149 280	66.23 117	56.465 269	44.26 30
19.8	58.443 401	57.35 145	49.318 285	57.56 76	31.445 296	64.98 125	56.752 287	44.99 72
29.8	58.858 415	56.15 122	49.614 298	58.70 114	31.754 309	63.65 183	57.049 297	46.10 111
May 9.7	59.277 419	55.15 98	49.913 299	60.19 149	32.067 313	62.30 185	57.348 299	47.59 149
19.7	59.694 417	54.45 70	50.210 297	61.97 178	32.380 318	60.95 185	57.649 301	49.37 178
29.7	60.100 406	54.05 40	50.498 288	64.00 208	32.685 305	59.65 190	57.938 299	51.43 206
June 8.6	60.484 384	53.96 9	50.769 271	66.20 290	32.976 291	58.45 190	58.209 271	53.67 224
18.6	60.839 355	54.18 23	51.017 248	68.52 233	33.245 299	57.36 190	58.466 247	56.01 234
28.6	61.153 314	54.70 52	51.234 217	70.90 238	33.486 241	56.43 93	58.677 221	58.43 242
July 8.6	61.419 266	55.52 82	51.417 183	73.26 236	33.691 205	55.68 75	58.860 183	60.86 242
18.5	61.629 210	56.59 107	51.617 142	75.57 231	33.856 165	55.10 58	59.004 144	63.23 237
28.5	61.811 152	57.88 129	51.868 99	77.75 218	33.976 120	54.72 38	59.103 99	65.49 226
Aug. 7.5	61.868 87	59.33 145	51.712 54	79.77 202	34.050 74	54.54 18	59.156 53	67.59 210
17.5	61.890 22	60.94 181	51.721 9	81.61 184	34.076 26	54.53 1	59.168 12	69.48 189
27.4	61.847 43	62.58 164	51.686 85	83.21 160	34.055 21	54.67 14	59.133 35	71.15 167
Sept. 6.4	61.743 104	64.19 161	51.611 75	84.57 186	33.991 64	54.95 26	59.060 73	72.60 145
16.4	61.587 156	65.72 153	51.500 111	85.66 109	33.890 101	55.38 38	58.949 111	73.75 115
26.3	61.386 201	67.08 136	51.362 138	86.47 81	33.757 133	55.77 44	58.811 138	74.62 87
Oct. 6.3	61.152 234	68.23 115	51.202 160	87.00 53	33.602 155	56.24 47	58.653 158	75.21 59
16.3	60.899 253	69.10 87	51.031 171	87.24 24	33.432 170	56.72 48	58.481 172	75.50 29
26.3	60.637 282	69.55 55	50.858 175	87.24 4	33.259 173	57.17 45	58.302 179	75.47 3
Nov. 5.2	60.382 255	69.87 22	50.685 171	86.85 35	33.093 166	57.59 42	58.181 171	75.17 30
15.2	60.147 235	69.72 15	50.528 157	86.23 62	32.939 154	57.95 26	57.972 159	74.54 63
25.2	59.942 205	69.23 49	50.390 138	85.34 89	32.808 131	58.25 30	57.833 139	73.64 90
Dec. 5.2	59.777 165	68.40 83	50.278 112	84.19 112	32.705 103	58.47 22	57.718 117	72.48 116
15.1	59.659 118	67.28 112	50.196 82	82.82 137	32.635 70	58.64 17	57.630 86	71.07 141
25.1	59.592 67	65.89 139	50.145 51	81.26 156	32.600 35	58.74 10	57.574 56	69.47 160
35.1	59.579 13	64.28 161	50.129 16	79.56 170	32.600 0	58.76 2	57.556 18	67.74 178
Mean Place	56.645	78.09	47.895	57.72	29.858	75.75	55.348	45.48
Sec $\delta$ , Tan $\delta$	1.482	-1.064	1.032	+0.255	1.054	-0.333	1.038	+0.280
$D_{\nu\alpha}$ , $D_{\nu\delta}$	+0.084	+0.045	+0.056	-0.011	+0.068	+0.014	+0.056	-0.012
$D_{\beta\delta}$ , $D_{\nu\delta}$	+0.24	-0.79	+0.25	-0.78	+0.25	-0.78	+0.25	-0.78

# APPARENT PLACES OF STARS, 1920.

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FOR THE UPPER TRANSIT AT WASHINGTON.

Washington Mean Time.	$\beta$ Pavonis. Mag. 3.6		$\alpha$ Cygni. (Deneb). Mag. 1.3		$\delta$ Delphini. Mag. 4.5		$\psi$ Capricorni. Mag. 4.3	
	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.
	h m 20 37	° ' " -06 29	h m 20 38	° ' " +44 59	h m 20 39	° ' " +14 47	h m 20 41	° ' " -25 33
	s	"	s	"	s	"	s	"
Jan. 1.1	44.00	33.35	41.435	52.42	43.106	21.65	21.317	30.17
11.1	43.97 <sup>3</sup>	30.89 <sup>266</sup>	41.379	49.66 <sup>276</sup>	43.108	19.94 <sup>171</sup>	21.337 <sup>20</sup>	29.70 <sup>47</sup>
21.0	44.03	27.83 <sup>286</sup>	41.371 <sup>8</sup>	46.76 <sup>290</sup>	43.144	18.18 <sup>176</sup>	21.395 <sup>56</sup>	29.12 <sup>58</sup>
31.0	44.18	24.89 <sup>294</sup>	41.415 <sup>44</sup>	43.80 <sup>296</sup>	43.215	16.45 <sup>173</sup>	21.488 <sup>96</sup>	28.41 <sup>71</sup>
Feb. 10.0	44.42	21.91 <sup>298</sup>	41.510 <sup>95</sup>	40.89 <sup>291</sup>	43.319 <sup>104</sup>	14.84 <sup>161</sup>	21.616 <sup>126</sup>	27.61 <sup>80</sup>
19.9	44.74	18.99 <sup>293</sup>	41.653 <sup>143</sup>	38.17 <sup>272</sup>	43.455 <sup>136</sup>	13.41 <sup>143</sup>	21.776 <sup>160</sup>	26.71 <sup>90</sup>
29.9	45.13	16.13 <sup>286</sup>	41.847 <sup>194</sup>	35.73 <sup>244</sup>	43.622 <sup>167</sup>	12.24 <sup>117</sup>	21.967 <sup>191</sup>	25.69 <sup>102</sup>
Mar. 10.9	45.69	13.52 <sup>261</sup>	42.083 <sup>236</sup>	33.70 <sup>203</sup>	43.817 <sup>195</sup>	11.39 <sup>85</sup>	22.186 <sup>219</sup>	24.87 <sup>112</sup>
20.9	46.10	11.10 <sup>243</sup>	42.362 <sup>279</sup>	32.15 <sup>155</sup>	44.040 <sup>223</sup>	10.89 <sup>90</sup>	22.432 <sup>246</sup>	23.36 <sup>121</sup>
30.8	46.67	8.95 <sup>315</sup>	42.672 <sup>310</sup>	31.12 <sup>103</sup>	44.287 <sup>247</sup>	10.80 <sup>9</sup>	22.701 <sup>290</sup>	22.08 <sup>128</sup>
Apr. 9.8	47.28	7.09 <sup>180</sup>	43.011 <sup>339</sup>	30.68 <sup>44</sup>	44.554 <sup>267</sup>	11.12 <sup>32</sup>	22.990 <sup>289</sup>	20.74 <sup>134</sup>
19.8	47.92	5.59 <sup>114</sup>	43.372 <sup>361</sup>	30.81 <sup>13</sup>	44.837 <sup>283</sup>	11.85 <sup>73</sup>	23.298 <sup>306</sup>	19.37 <sup>137</sup>
29.8	48.57	4.45 <sup>76</sup>	43.741 <sup>370</sup>	31.54 <sup>73</sup>	45.132 <sup>295</sup>	12.97 <sup>112</sup>	23.618 <sup>320</sup>	18.00 <sup>137</sup>
May 9.7	49.24	3.69 <sup>33</sup>	44.115 <sup>347</sup>	32.83 <sup>129</sup>	45.431 <sup>299</sup>	14.43 <sup>146</sup>	23.945 <sup>327</sup>	16.67 <sup>133</sup>
19.7	49.89	3.86 <sup>8</sup>	44.480 <sup>365</sup>	34.62 <sup>179</sup>	45.729 <sup>298</sup>	16.21 <sup>178</sup>	24.272 <sup>321</sup>	15.42 <sup>125</sup>
29.7	50.53	3.44 <sup>53</sup>	44.827 <sup>323</sup>	36.88 <sup>264</sup>	46.019 <sup>275</sup>	18.24 <sup>220</sup>	24.593 <sup>306</sup>	14.29 <sup>99</sup>
June 8.6	51.13	3.97 <sup>92</sup>	45.160 <sup>287</sup>	39.52 <sup>294</sup>	46.294 <sup>251</sup>	20.44 <sup>234</sup>	24.899 <sup>286</sup>	13.30 <sup>81</sup>
18.6	51.68	4.89 <sup>139</sup>	45.437 <sup>247</sup>	42.46 <sup>818</sup>	46.545 <sup>222</sup>	22.78 <sup>239</sup>	25.185 <sup>256</sup>	12.49 <sup>61</sup>
28.6	52.16	6.18 <sup>164</sup>	45.684 <sup>196</sup>	45.64 <sup>329</sup>	46.767 <sup>188</sup>	25.17 <sup>233</sup>	25.441 <sup>230</sup>	11.88 <sup>40</sup>
July 8.6	52.57	7.82 <sup>193</sup>	45.880 <sup>144</sup>	48.93 <sup>336</sup>	46.955 <sup>147</sup>	27.55 <sup>233</sup>	25.661 <sup>179</sup>	11.48 <sup>18</sup>
18.5	52.89	9.75 <sup>219</sup>	46.024 <sup>87</sup>	52.29 <sup>335</sup>	47.102 <sup>104</sup>	29.88 <sup>222</sup>	25.840 <sup>132</sup>	11.30 <sup>3</sup>
28.5	53.11	11.94 <sup>232</sup>	46.111 <sup>30</sup>	55.64 <sup>325</sup>	47.206 <sup>60</sup>	32.10 <sup>206</sup>	25.972 <sup>84</sup>	11.33 <sup>24</sup>
Aug. 7.5	53.23	14.26 <sup>240</sup>	46.141 <sup>26</sup>	58.89 <sup>310</sup>	47.266 <sup>18</sup>	34.16 <sup>187</sup>	26.056 <sup>38</sup>	11.87 <sup>40</sup>
17.5	53.24	16.66 <sup>239</sup>	46.115 <sup>81</sup>	61.99 <sup>289</sup>	47.279 <sup>30</sup>	36.03 <sup>164</sup>	26.089 <sup>16</sup>	11.97 <sup>55</sup>
27.4	53.15	19.05 <sup>228</sup>	46.084 <sup>134</sup>	64.88 <sup>258</sup>	47.249 <sup>70</sup>	37.67 <sup>140</sup>	26.073 <sup>61</sup>	12.52 <sup>64</sup>
Sept. 6.4	52.96	21.83 <sup>210</sup>	45.900 <sup>175</sup>	67.46 <sup>227</sup>	47.179 <sup>107</sup>	39.07 <sup>118</sup>	26.012 <sup>103</sup>	13.16 <sup>72</sup>
16.4	52.67	23.43 <sup>184</sup>	45.725 <sup>215</sup>	69.73 <sup>187</sup>	47.072 <sup>135</sup>	40.20 <sup>86</sup>	25.909 <sup>136</sup>	13.88 <sup>73</sup>
26.3	52.32	25.27 <sup>146</sup>	45.510 <sup>241</sup>	71.60 <sup>145</sup>	46.937 <sup>157</sup>	41.06 <sup>56</sup>	25.773 <sup>162</sup>	14.61 <sup>69</sup>
Oct. 6.3	51.90	26.73 <sup>104</sup>	45.269 <sup>260</sup>	73.05 <sup>101</sup>	46.780 <sup>170</sup>	41.62 <sup>28</sup>	25.611 <sup>177</sup>	15.30 <sup>65</sup>
16.3	51.44	27.77 <sup>59</sup>	45.009 <sup>269</sup>	74.06 <sup>51</sup>	46.610 <sup>175</sup>	41.90 <sup>1</sup>	25.434 <sup>183</sup>	15.95 <sup>55</sup>
26.3	50.96	28.36 <sup>6</sup>	44.740 <sup>267</sup>	74.57 <sup>3</sup>	46.435 <sup>171</sup>	41.89 <sup>32</sup>	25.251 <sup>178</sup>	16.50 <sup>43</sup>
Nov. 5.2	50.49	28.42 <sup>45</sup>	44.473 <sup>257</sup>	74.60 <sup>50</sup>	46.264 <sup>158</sup>	41.57 <sup>59</sup>	25.073 <sup>164</sup>	16.93 <sup>31</sup>
15.2	50.04	27.97 <sup>98</sup>	44.216 <sup>338</sup>	74.10 <sup>99</sup>	46.106 <sup>141</sup>	40.98 <sup>87</sup>	24.909 <sup>142</sup>	17.24 <sup>15</sup>
25.2	49.63	27.01 <sup>141</sup>	43.978 <sup>210</sup>	73.11 <sup>175</sup>	45.965 <sup>115</sup>	40.11 <sup>113</sup>	24.767 <sup>113</sup>	17.39 <sup>1</sup>
Dec. 5.2	49.29	25.60 <sup>183</sup>	43.768 <sup>175</sup>	71.64 <sup>198</sup>	45.850 <sup>87</sup>	38.98 <sup>135</sup>	24.654 <sup>80</sup>	17.40 <sup>11</sup>
15.1	49.02	23.77 <sup>220</sup>	43.593 <sup>132</sup>	69.71 <sup>232</sup>	45.763 <sup>55</sup>	37.63 <sup>154</sup>	24.574 <sup>44</sup>	17.29 <sup>26</sup>
25.1	48.83	21.57 <sup>249</sup>	43.461 <sup>90</sup>	67.39 <sup>262</sup>	45.708 <sup>21</sup>	36.09 <sup>170</sup>	24.530 <sup>5</sup>	17.03 <sup>38</sup>
35.1	48.74	19.08	43.371	64.77	45.687	34.39	24.525	16.65
Mean Place	45.998	31.73	42.253	37.77	43.447	12.02	21.719	32.72
Sec $\delta$ , Tan $\delta$	2.507	-2.299	1.414	+1.000	1.034	+0.264	1.108	-0.478
$D\psi_a, D\omega_a$	+0.108	+0.098	+0.041	-0.043	+0.056	-0.011	+0.071	+0.021
$D\psi\delta, D\omega\delta$	+0.25	-0.77	+0.25	-0.77	+0.26	-0.77	+0.26	-0.76

APPARENT PLACES OF STARS, 1920.

FOR THE UPPER TRANSIT AT WASHINGTON.

Washington Mean Time.	γ Delphini seq. Mag. 4.5		ε Cygni. Mag. 2.6		ε Aquarii. Mag. 3.8		γ Cephei. Mag. 3.6	
	Right Ascension.	Declination.	Right Ascension.	Declination.	Right Ascension.	Declination.	Right Ascension.	Declination.
	h m	° '	h m	° '	h m	° '	h m	° '
	20 42	+15 50	20 42	+33 40	20 43	- 9 46	20 43	+61 31
Jan. 1.1	56.460	16.74	57.917	24.78	20.502	76.80	58.30	56.97
11.1	56.457 <sup>3</sup>	14.98 <sup>176</sup>	57.886 <sup>31</sup>	22.35 <sup>243</sup>	20.518 <sup>18</sup>	77.24 <sup>44</sup>	58.14 <sup>16</sup>	54.07 <sup>290</sup>
21.0	56.450 <sup>32</sup>	13.17 <sup>181</sup>	57.898 <sup>13</sup>	19.81 <sup>264</sup>	20.567 <sup>49</sup>	77.61 <sup>37</sup>	58.07 <sup>7</sup>	50.93 <sup>314</sup>
31.0	56.556 <sup>67</sup>	11.39 <sup>178</sup>	57.950 <sup>53</sup>	17.24 <sup>257</sup>	20.649 <sup>83</sup>	77.90 <sup>30</sup>	58.07 <sup>0</sup>	47.68 <sup>325</sup>
Feb. 10.0	56.656 <sup>100</sup>	9.71 <sup>168</sup>	58.044 <sup>94</sup>	14.75 <sup>249</sup>	20.762 <sup>113</sup>	78.06 <sup>16</sup>	58.15 <sup>8</sup>	44.44 <sup>324</sup>
19.9	56.788 <sup>132</sup>	8.23 <sup>148</sup>	58.179 <sup>135</sup>	12.44 <sup>231</sup>	20.906 <sup>144</sup>	78.06 <sup>2</sup>	58.31 <sup>16</sup>	41.34 <sup>310</sup>
29.9	56.952 <sup>194</sup>	6.99 <sup>91</sup>	58.351 <sup>173</sup>	10.41 <sup>203</sup>	21.077 <sup>171</sup>	77.93 <sup>15</sup>	58.55 <sup>24</sup>	38.50 <sup>284</sup>
Mar. 10.9	57.146 <sup>194</sup>	6.06 <sup>91</sup>	58.562 <sup>211</sup>	8.76 <sup>165</sup>	21.276 <sup>199</sup>	77.58 <sup>36</sup>	58.86 <sup>31</sup>	36.95 <sup>245</sup>
20.9	57.366 <sup>230</sup>	5.55 <sup>53</sup>	58.806 <sup>244</sup>	7.54 <sup>123</sup>	21.500 <sup>234</sup>	77.02 <sup>56</sup>	59.24 <sup>38</sup>	34.08 <sup>197</sup>
30.8	57.612 <sup>246</sup>	5.41 <sup>14</sup>	59.079 <sup>273</sup>	6.83 <sup>71</sup>	21.747 <sup>247</sup>	76.24 <sup>78</sup>	59.67 <sup>43</sup>	32.66 <sup>142</sup>
Apr. 9.8	57.880 <sup>268</sup>	5.69 <sup>28</sup>	59.375 <sup>296</sup>	6.65 <sup>18</sup>	22.015 <sup>268</sup>	75.26 <sup>98</sup>	60.14 <sup>47</sup>	31.83 <sup>83</sup>
19.8	58.164 <sup>284</sup>	6.39 <sup>70</sup>	59.693 <sup>313</sup>	6.98 <sup>33</sup>	22.296 <sup>283</sup>	74.08 <sup>113</sup>	60.64 <sup>50</sup>	31.64 <sup>19</sup>
29.8	58.460 <sup>296</sup>	7.48 <sup>100</sup>	60.020 <sup>327</sup>	7.86 <sup>87</sup>	22.594 <sup>306</sup>	72.76 <sup>133</sup>	61.15 <sup>51</sup>	32.09 <sup>45</sup>
May 9.7	58.761 <sup>301</sup>	8.93 <sup>145</sup>	60.354 <sup>334</sup>	9.28 <sup>133</sup>	22.896 <sup>302</sup>	71.32 <sup>144</sup>	61.66 <sup>51</sup>	33.14 <sup>106</sup>
19.7	59.062 <sup>301</sup>	10.70 <sup>177</sup>	60.683 <sup>329</sup>	11.06 <sup>180</sup>	23.199 <sup>308</sup>	69.79 <sup>153</sup>	62.16 <sup>50</sup>	34.77 <sup>163</sup>
29.7	59.353 <sup>291</sup>	12.73 <sup>203</sup>	60.999 <sup>316</sup>	13.24 <sup>221</sup>	23.496 <sup>297</sup>	68.23 <sup>156</sup>	62.63 <sup>47</sup>	36.92 <sup>215</sup>
June 8.6	59.629 <sup>276</sup>	14.96 <sup>223</sup>	61.294 <sup>295</sup>	15.78 <sup>264</sup>	23.779 <sup>289</sup>	66.69 <sup>184</sup>	63.06 <sup>43</sup>	39.53 <sup>261</sup>
18.6	59.884 <sup>255</sup>	17.30 <sup>224</sup>	61.564 <sup>270</sup>	18.56 <sup>273</sup>	24.043 <sup>264</sup>	65.21 <sup>143</sup>	63.44 <sup>38</sup>	42.51 <sup>296</sup>
28.6	60.109 <sup>225</sup>	19.73 <sup>243</sup>	61.797 <sup>233</sup>	21.51 <sup>295</sup>	24.279 <sup>236</sup>	63.85 <sup>126</sup>	63.74 <sup>30</sup>	45.79 <sup>326</sup>
July 8.6	60.299 <sup>190</sup>	22.16 <sup>243</sup>	61.991 <sup>194</sup>	24.55 <sup>304</sup>	24.482 <sup>263</sup>	62.61 <sup>124</sup>	63.98 <sup>24</sup>	49.29 <sup>350</sup>
18.5	60.449 <sup>150</sup>	24.54 <sup>223</sup>	62.139 <sup>148</sup>	27.63 <sup>303</sup>	24.645 <sup>163</sup>	61.53 <sup>106</sup>	64.15 <sup>17</sup>	49.29 <sup>361</sup>
28.5	60.556 <sup>107</sup>	26.81 <sup>237</sup>	62.239 <sup>100</sup>	30.64 <sup>301</sup>	24.767 <sup>122</sup>	60.63 <sup>90</sup>	64.24 <sup>9</sup>	52.90 <sup>365</sup>
Aug. 7.5	60.617 <sup>61</sup>	28.93 <sup>213</sup>	62.288 <sup>49</sup>	33.57 <sup>283</sup>	24.767 <sup>77</sup>	59.93 <sup>80</sup>	64.25 <sup>1</sup>	56.55 <sup>363</sup>
17.5	60.632 <sup>15</sup>	30.86 <sup>193</sup>	62.235 <sup>3</sup>	36.30 <sup>273</sup>	24.844 <sup>31</sup>	59.41 <sup>72</sup>	64.25 <sup>8</sup>	60.17 <sup>349</sup>
27.4	60.604 <sup>28</sup>	32.56 <sup>170</sup>	62.236 <sup>49</sup>	38.81 <sup>251</sup>	24.875 <sup>14</sup>	59.08 <sup>38</sup>	64.17 <sup>15</sup>	63.66 <sup>331</sup>
Sept. 6.4	60.536 <sup>68</sup>	34.01 <sup>145</sup>	62.236 <sup>93</sup>	41.06 <sup>225</sup>	24.861 <sup>55</sup>	59.08 <sup>17</sup>	64.02 <sup>22</sup>	66.97 <sup>304</sup>
16.4	60.431 <sup>105</sup>	35.20 <sup>119</sup>	62.143 <sup>133</sup>	41.06 <sup>191</sup>	24.806 <sup>91</sup>	58.91 <sup>1</sup>	63.80 <sup>29</sup>	70.01 <sup>271</sup>
26.3	60.431 <sup>135</sup>	35.20 <sup>90</sup>	62.010 <sup>167</sup>	42.97 <sup>157</sup>	24.715 <sup>124</sup>	58.90 <sup>12</sup>	63.51 <sup>33</sup>	72.72 <sup>225</sup>
Oct. 6.3	60.140 <sup>156</sup>	36.71 <sup>61</sup>	61.843 <sup>192</sup>	44.54 <sup>130</sup>	24.591 <sup>147</sup>	59.02 <sup>23</sup>	63.18 <sup>38</sup>	75.07 <sup>190</sup>
16.3	59.969 <sup>171</sup>	37.02 <sup>31</sup>	61.651 <sup>209</sup>	45.74 <sup>73</sup>	24.444 <sup>159</sup>	59.25 <sup>31</sup>	62.80 <sup>41</sup>	76.97 <sup>141</sup>
26.3	59.969 <sup>174</sup>	37.02 <sup>2</sup>	61.442 <sup>215</sup>	46.52 <sup>37</sup>	24.285 <sup>164</sup>	59.56 <sup>30</sup>	62.39 <sup>43</sup>	78.38 <sup>90</sup>
Nov. 5.2	59.795 <sup>172</sup>	37.04 <sup>30</sup>	61.227 <sup>212</sup>	46.89 <sup>11</sup>	24.121 <sup>160</sup>	59.95 <sup>44</sup>	61.96 <sup>44</sup>	79.28 <sup>35</sup>
15.2	59.623 <sup>161</sup>	36.74 <sup>59</sup>	61.015 <sup>203</sup>	46.78 <sup>51</sup>	23.981 <sup>147</sup>	60.39 <sup>47</sup>	61.52 <sup>42</sup>	79.63 <sup>21</sup>
25.2	59.462 <sup>142</sup>	36.15 <sup>87</sup>	60.812 <sup>188</sup>	46.27 <sup>95</sup>	23.814 <sup>138</sup>	60.96 <sup>40</sup>	61.10 <sup>41</sup>	79.42 <sup>78</sup>
Dec. 5.2	59.320 <sup>118</sup>	35.28 <sup>112</sup>	60.627 <sup>158</sup>	45.32 <sup>137</sup>	23.636 <sup>108</sup>	61.35 <sup>52</sup>	60.69 <sup>37</sup>	78.64 <sup>134</sup>
15.1	59.202 <sup>90</sup>	34.16 <sup>133</sup>	60.469 <sup>129</sup>	43.95 <sup>172</sup>	23.583 <sup>73</sup>	61.87 <sup>53</sup>	60.32 <sup>32</sup>	77.30 <sup>136</sup>
25.1	59.112 <sup>59</sup>	32.78 <sup>159</sup>	60.340 <sup>96</sup>	42.23 <sup>209</sup>	23.510 <sup>41</sup>	62.39 <sup>59</sup>	60.00 <sup>27</sup>	75.44 <sup>234</sup>
35.1	59.053 <sup>27</sup>	31.19 <sup>172</sup>	60.244 <sup>56</sup>	40.14 <sup>233</sup>	23.469 <sup>3</sup>	62.91 <sup>49</sup>	59.73 <sup>20</sup>	73.10 <sup>272</sup>
35.1	59.028 <sup>27</sup>	29.47 <sup>172</sup>	60.188 <sup>56</sup>	37.81 <sup>233</sup>	23.461 <sup>3</sup>	63.40 <sup>49</sup>	59.53 <sup>20</sup>	70.38 <sup>272</sup>
Mean Place	56.797	6.83	58.452	11.70	20.800	81.95	59.898	59.87
Sec δ, Tan δ	1.040	+0.284	1.202	+0.667	1.015	-0.172	2.098	+1.844
D <sub>φ</sub> α, D <sub>ω</sub> α	+0.056	-0.012	+0.048	-0.029	+0.065	+0.607	+0.024	-0.061
D <sub>φ</sub> δ, D <sub>ω</sub> δ	+0.26	-0.76	+0.26	-0.76	+0.26	-0.76	+0.26	-0.76



# APPARENT PLACES OF STARS, 1920.

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## FOR THE UPPER TRANSIT AT WASHINGTON.

Washington Mean Time.	$\mu$ Aquarii. Mag. 4.8		$\beta$ Indi. Mag. 3.7		$\delta$ Vulpeculae. Mag. 5.2		$\epsilon$ Draconis. Mag. 5.6	
	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.
	h m 20 48	° ' " - 9 16	h m 20 48	° ' " -58 44	h m 20 51	° ' " +27 45	h m 20 51	° ' " +80 15
Jan. 1.1	20.186	58.83	32.787	56.53	8.599	22.13	9.97	30.40
11.1	20.145	59.30	32.760	54.24	8.572	19.92	9.28	27.64
21.0	20.190	59.69	32.804	51.77	8.563	17.61	8.82	24.57
31.0	20.266	60.00	32.914	49.15	8.632	15.29	8.60	21.32
Feb. 10.0	20.374	60.17	33.090	46.48	8.719	13.06	8.62	18.00
20.0	20.512	60.31	33.327	43.81	8.841	10.98	8.90	14.75
29.9	20.680	60.07	33.620	41.18	9.001	9.17	9.40	11.70
Mar. 10.9	20.873	59.78	33.964	38.66	9.195	7.72	10.13	8.96
20.9	21.093	59.17	34.356	36.28	9.421	6.69	11.05	6.66
30.8	21.336	58.39	34.788	34.10	9.676	6.10	12.13	4.86
Apr. 9.8	21.601	57.41	35.254	32.14	9.955	6.08	13.34	3.64
19.8	21.883	56.24	35.750	30.46	10.254	6.44	14.61	3.03
29.8	22.178	54.91	36.264	29.12	10.567	7.34	15.92	3.06
May 9.7	22.480	53.45	36.788	28.11	10.885	8.70	17.22	3.70
19.7	22.784	51.92	37.311	27.46	11.202	10.47	18.48	4.94
29.7	23.081	50.34	37.833	27.20	11.510	12.59	19.63	6.72
June 8.7	23.365	48.76	38.311	27.33	11.802	15.00	20.68	9.00
18.6	23.629	47.24	38.763	27.83	12.071	17.63	21.57	11.71
28.6	23.869	45.84	39.168	28.72	12.306	20.41	22.28	14.77
July 8.6	24.075	44.55	39.515	29.95	12.505	23.27	22.81	18.09
18.5	24.244	43.43	39.795	31.49	12.661	26.13	23.12	21.60
28.5	24.370	42.48	40.000	33.27	12.770	28.94	23.24	25.22
Aug. 7.5	24.450	41.74	40.124	35.25	12.832	31.63	23.18	28.86
17.5	24.486	41.18	40.165	37.37	12.846	34.14	22.81	32.44
27.4	24.476	40.79	40.123	39.52	12.813	36.44	22.31	35.89
Sept. 6.4	24.426	40.60	40.008	41.62	12.738	38.47	21.60	39.14
16.4	24.337	40.56	39.811	43.61	12.624	40.21	20.74	42.11
26.4	24.218	40.68	39.558	45.59	12.477	41.62	19.72	44.75
Oct. 6.3	24.075	40.90	39.256	47.87	12.306	42.66	18.57	46.99
16.3	23.919	41.20	38.922	49.80	12.118	43.35	17.33	48.78
26.3	23.756	41.59	38.570	51.73	11.922	43.64	16.02	50.08
Nov. 5.2	23.595	42.04	38.221	53.79	11.729	43.54	14.67	50.83
15.2	23.447	42.51	37.896	55.86	11.545	43.05	13.32	51.01
25.2	23.319	43.06	37.585	57.84	11.377	42.17	12.01	50.59
Dec. 5.2	23.215	43.57	37.283	59.78	11.231	40.92	10.70	49.60
15.1	23.127	44.11	37.126	61.72	11.112	39.34	9.64	48.04
25.1	23.052	44.64	36.989	63.61	11.026	37.46	8.64	45.96
35.1	23.080	45.17	36.917	65.51	10.974	35.35	7.83	43.40
Mean Place	20.418	64.00	34.104	54.63	9.007	9.76	15.802	11.15
Sec $\delta$ , Tan $\delta$	1.013	-0.163	1.928	-1.048	1.180	+0.526	5.908	+5.824
D $\delta$ , D $\delta$	+0.004	+0.067	+0.004	+0.074	+0.051	-0.024	-0.062	-0.264
D $\delta$ , D $\delta$	+0.37	-0.74	+0.37	-0.74	+0.37	-0.73	+0.37	-0.73

APPARENT PLACES OF STARS, 1920.

FOR THE UPPER TRANSIT AT WASHINGTON.

Washington Mean Time.	γ Cygni. Mag. 4.0		α Octantis. Mag. 5.2		γ Microscopi. Mag. 4.7		θ Capricorni. Mag. 4.2	
	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.
	h m 20 54	° ' " +40 51	h m 20 55	° ' " -77 19	h m 20 56	° ' " -32 33	h m 21 1	° ' " -17 32
Jan. 1.1	10.790	45.86	0.26	54.25	22.859	75.85	26.840	62.60
11.1	10.729 <sup>61</sup>	42.79 <sup>257</sup>	0.04 <sup>22</sup>	51.22 <sup>308</sup>	22.862 <sup>3</sup>	74.98 <sup>87</sup>	26.841 <sup>1</sup>	62.58 <sup>2</sup>
21.0	10.713 <sup>16</sup>	40.06 <sup>278</sup>	0.01 <sup>3</sup>	47.99 <sup>323</sup>	22.902 <sup>40</sup>	73.96 <sup>102</sup>	26.874 <sup>33</sup>	62.47 <sup>11</sup>
31.0	10.742 <sup>29</sup>	37.25 <sup>281</sup>	0.13 <sup>12</sup>	44.63 <sup>336</sup>	22.962 <sup>80</sup>	72.79 <sup>117</sup>	26.943 <sup>69</sup>	62.23 <sup>24</sup>
Feb. 10.0	10.818 <sup>76</sup>	34.49 <sup>276</sup>	0.42 <sup>29</sup>	41.23 <sup>340</sup>	23.099 <sup>117</sup>	71.52 <sup>137</sup>	27.042 <sup>99</sup>	61.87 <sup>26</sup>
20.0	10.941 <sup>123</sup>	31.90 <sup>259</sup>	0.88 <sup>46</sup>	37.89 <sup>324</sup>	23.251 <sup>152</sup>	70.14 <sup>128</sup>	27.172 <sup>130</sup>	61.36 <sup>51</sup>
29.9	11.108 <sup>167</sup>	29.55 <sup>285</sup>	1.47 <sup>89</sup>	34.67 <sup>323</sup>	23.437 <sup>186</sup>	68.67 <sup>147</sup>	27.333 <sup>161</sup>	60.71 <sup>65</sup>
Mar. 10.9	11.318 <sup>210</sup>	27.58 <sup>197</sup>	2.19 <sup>72</sup>	31.64 <sup>303</sup>	23.653 <sup>216</sup>	67.13 <sup>154</sup>	27.523 <sup>190</sup>	59.91 <sup>80</sup>
20.9	11.568 <sup>260</sup>	26.04 <sup>154</sup>	3.03 <sup>84</sup>	28.86 <sup>278</sup>	23.902 <sup>249</sup>	65.55 <sup>168</sup>	27.739 <sup>216</sup>	58.94 <sup>97</sup>
30.9	11.852 <sup>284</sup>	25.02 <sup>102</sup>	3.97 <sup>94</sup>	26.40 <sup>246</sup>	24.177 <sup>275</sup>	63.94 <sup>161</sup>	27.932 <sup>243</sup>	57.82 <sup>112</sup>
Apr. 9.8	12.166 <sup>314</sup>	24.55 <sup>47</sup>	4.98 <sup>101</sup>	24.29 <sup>211</sup>	24.476 <sup>299</sup>	62.32 <sup>168</sup>	28.248 <sup>206</sup>	56.56 <sup>126</sup>
19.8	12.501 <sup>335</sup>	24.65 <sup>10</sup>	6.06 <sup>108</sup>	22.59 <sup>170</sup>	24.796 <sup>320</sup>	60.76 <sup>166</sup>	28.534 <sup>286</sup>	55.18 <sup>138</sup>
29.8	12.853 <sup>352</sup>	25.30 <sup>65</sup>	7.18 <sup>112</sup>	21.31 <sup>128</sup>	25.131 <sup>335</sup>	59.25 <sup>151</sup>	28.835 <sup>301</sup>	53.74 <sup>144</sup>
May 9.7	13.209 <sup>356</sup>	26.49 <sup>119</sup>	8.31 <sup>113</sup>	20.51 <sup>80</sup>	25.478 <sup>347</sup>	57.86 <sup>139</sup>	29.146 <sup>311</sup>	52.23 <sup>151</sup>
19.7	13.562 <sup>353</sup>	28.19 <sup>170</sup>	9.44 <sup>113</sup>	20.17 <sup>34</sup>	25.826 <sup>348</sup>	56.60 <sup>136</sup>	29.460 <sup>314</sup>	50.73 <sup>150</sup>
29.7	13.905 <sup>343</sup>	30.33 <sup>214</sup>	10.54 <sup>110</sup>	20.32 <sup>15</sup>	26.171 <sup>345</sup>	55.54 <sup>106</sup>	29.772 <sup>312</sup>	49.27 <sup>146</sup>
June 8.7	14.226 <sup>321</sup>	32.85 <sup>252</sup>	11.58 <sup>104</sup>	20.94 <sup>62</sup>	26.501 <sup>330</sup>	54.68 <sup>86</sup>	30.073 <sup>301</sup>	47.90 <sup>137</sup>
18.6	14.517 <sup>291</sup>	35.66 <sup>281</sup>	12.54 <sup>96</sup>	22.02 <sup>108</sup>	26.813 <sup>312</sup>	54.06 <sup>62</sup>	30.356 <sup>283</sup>	46.64 <sup>126</sup>
28.6	14.771 <sup>254</sup>	38.71 <sup>305</sup>	13.39 <sup>85</sup>	23.54 <sup>142</sup>	27.097 <sup>284</sup>	53.70 <sup>32</sup>	30.613 <sup>257</sup>	45.56 <sup>108</sup>
July 8.6	14.982 <sup>211</sup>	41.90 <sup>319</sup>	14.12 <sup>73</sup>	25.43 <sup>189</sup>	27.344 <sup>247</sup>	53.59 <sup>11</sup>	30.838 <sup>225</sup>	44.65 <sup>91</sup>
18.5	15.145 <sup>163</sup>	45.16 <sup>326</sup>	14.70 <sup>56</sup>	27.67 <sup>224</sup>	27.547 <sup>208</sup>	53.74 <sup>15</sup>	30.838 <sup>187</sup>	44.65 <sup>70</sup>
28.5	15.255 <sup>110</sup>	48.41 <sup>325</sup>	15.10 <sup>40</sup>	30.17 <sup>250</sup>	27.702 <sup>155</sup>	54.13 <sup>39</sup>	31.025 <sup>145</sup>	43.95 <sup>50</sup>
Aug. 7.5	15.311 <sup>56</sup>	51.59 <sup>318</sup>	15.33 <sup>23</sup>	32.85 <sup>268</sup>	27.702 <sup>104</sup>	54.13 <sup>61</sup>	31.170 <sup>98</sup>	43.45 <sup>28</sup>
17.5	15.311 <sup>0</sup>	54.61 <sup>302</sup>	15.38 <sup>5</sup>	35.63 <sup>278</sup>	27.806 <sup>51</sup>	54.74 <sup>78</sup>	31.268 <sup>51</sup>	43.17 <sup>9</sup>
27.4	15.260 <sup>51</sup>	57.43 <sup>282</sup>	15.23 <sup>15</sup>	38.40 <sup>277</sup>	27.854 <sup>3</sup>	55.52 <sup>94</sup>	31.319 <sup>5</sup>	43.08 <sup>10</sup>
Sept. 6.4	15.160 <sup>100</sup>	59.98 <sup>255</sup>	15.23 <sup>32</sup>	38.40 <sup>265</sup>	27.854 <sup>62</sup>	56.46 <sup>102</sup>	31.324 <sup>40</sup>	43.18 <sup>26</sup>
16.4	15.160 <sup>142</sup>	59.98 <sup>224</sup>	14.91 <sup>49</sup>	41.05 <sup>246</sup>	27.802 <sup>98</sup>	57.48 <sup>106</sup>	31.234 <sup>80</sup>	43.43 <sup>28</sup>
26.4	15.018 <sup>181</sup>	62.22 <sup>188</sup>	14.42 <sup>65</sup>	43.51 <sup>214</sup>	27.704 <sup>137</sup>	58.54 <sup>105</sup>	31.204 <sup>113</sup>	43.81 <sup>48</sup>
Oct. 6.3	14.837 <sup>209</sup>	64.10 <sup>149</sup>	13.77 <sup>76</sup>	45.65 <sup>175</sup>	27.567 <sup>165</sup>	59.59 <sup>98</sup>	31.091 <sup>141</sup>	44.29 <sup>53</sup>
16.3	14.628 <sup>229</sup>	65.59 <sup>105</sup>	13.01 <sup>84</sup>	47.40 <sup>127</sup>	27.402 <sup>185</sup>	60.57 <sup>70</sup>	30.950 <sup>156</sup>	44.81 <sup>55</sup>
26.3	14.399 <sup>239</sup>	66.64 <sup>60</sup>	12.17 <sup>91</sup>	48.67 <sup>75</sup>	27.217 <sup>195</sup>	61.43 <sup>70</sup>	30.794 <sup>166</sup>	45.36 <sup>55</sup>
Nov. 5.2	14.160 <sup>241</sup>	67.24 <sup>13</sup>	11.26 <sup>82</sup>	49.42 <sup>18</sup>	27.022 <sup>192</sup>	62.13 <sup>52</sup>	30.628 <sup>104</sup>	45.91 <sup>51</sup>
15.2	13.919 <sup>224</sup>	67.37 <sup>36</sup>	10.34 <sup>90</sup>	49.60 <sup>41</sup>	26.830 <sup>182</sup>	62.65 <sup>8</sup>	30.464 <sup>155</sup>	46.42 <sup>47</sup>
25.2	13.685 <sup>216</sup>	67.01 <sup>83</sup>	9.44 <sup>98</sup>	49.19 <sup>99</sup>	26.645 <sup>163</sup>	62.95 <sup>8</sup>	30.309 <sup>138</sup>	46.89 <sup>40</sup>
Dec. 5.2	13.469 <sup>195</sup>	66.18 <sup>130</sup>	8.61 <sup>75</sup>	48.20 <sup>164</sup>	26.485 <sup>138</sup>	63.03 <sup>14</sup>	30.171 <sup>114</sup>	47.29 <sup>33</sup>
15.1	13.274 <sup>163</sup>	64.88 <sup>174</sup>	7.86 <sup>62</sup>	46.66 <sup>204</sup>	26.352 <sup>101</sup>	62.89 <sup>86</sup>	30.057 <sup>86</sup>	47.62 <sup>24</sup>
25.1	13.111 <sup>129</sup>	63.14 <sup>212</sup>	7.24 <sup>45</sup>	44.62 <sup>247</sup>	26.251 <sup>65</sup>	62.53 <sup>65</sup>	29.971 <sup>57</sup>	47.86 <sup>17</sup>
35.1	12.982 <sup>89</sup>	61.02 <sup>242</sup>	6.76 <sup>32</sup>	42.15 <sup>282</sup>	26.136 <sup>28</sup>	61.98 <sup>73</sup>	29.914 <sup>21</sup>	48.03 <sup>7</sup>
35.1	12.893 <sup>89</sup>	58.60 <sup>242</sup>	6.44 <sup>32</sup>	39.33 <sup>282</sup>	26.163 <sup>28</sup>	61.25 <sup>73</sup>	29.896 <sup>21</sup>	48.10 <sup>7</sup>
Mean Place	11.396	30.54	4.527	51.05	23.317	76.74	27.193	65.97
Sec δ, Tan δ	1.322	+0.865	4.558	-4.447	1.187	-0.639	1.049	-0.316
D <sub>γa</sub> , D <sub>ωa</sub>	+0.045	-0.040	+0.146	+0.206	+0.973	+0.690	+0.967	+0.015
D <sub>γδ</sub> , D <sub>ωδ</sub>	+0.27	-0.72	+0.28	-0.72	+0.28	-0.72	+0.28	-0.70

# APPARENT PLACES OF STARS, 1920.

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## FOR THE UPPER TRANSIT AT WASHINGTON.

Washington Mean Time.	ξ Cygni. Mag. 3.9		61 Cygni pr. Mag. 5.6		ν Aquarii. Mag. 4.5		Bradley 2777. Mag. 5.9	
	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.
	h m 21 2	° ' " +43 36	h m 21 8	° ' " +88 21	h m 21 5	° ' " -11 41	h m 21 7	° ' " +77 48
	s	"	s	"	s	"	s	"
Jan. 1.1	0.606	45.22	18.012	38.52	14.015	42.11	3.69	23.23
11.1	0.528	42.66	17.964	31.15	14.011	42.42	3.11	25.58
21.0	0.497	39.89	17.956	28.64	14.040	42.64	2.70	22.59
31.0	0.512	37.04	17.991	26.04	14.101	42.77	2.47	19.38
Feb. 10.0	0.576	34.21	18.072	23.48	14.192	42.77	2.44	16.07
20.0	0.689	31.50	18.195	21.07	14.315	42.62	2.60	12.79
29.9	0.850	29.06	18.365	18.93	14.468	42.30	2.96	9.67
Mar. 10.9	1.057	26.96	18.573	17.12	14.648	41.79	3.49	6.84
20.9	1.306	25.29	18.821	15.76	14.856	41.07	4.18	4.41
30.9	1.593	24.12	19.108	14.88	15.090	40.15	5.02	2.47
Apr. 9.8	1.912	23.51	19.415	14.58	15.348	39.04	5.97	1.09
19.8	2.257	23.48	19.748	14.75	15.625	37.77	6.98	0.31
29.8	2.618	24.01	20.097	15.50	15.918	36.35	8.04	0.16
May 9.7	2.986	25.10	20.454	16.78	16.222	34.83	9.11	0.64
19.7	3.354	26.70	20.808	18.54	16.529	33.28	10.15	1.72
29.7	3.709	28.78	21.155	20.74	16.833	31.66	11.14	3.36
June 8.7	4.045	31.25	21.482	23.30	17.128	30.10	12.04	5.52
18.6	4.351	34.05	21.784	26.17	17.406	28.61	12.82	8.13
28.6	4.619	37.10	22.049	29.25	17.658	27.24	13.47	11.11
July 8.6	4.843	40.33	22.273	32.48	17.879	26.03	13.99	14.89
18.6	5.017	43.64	22.449	35.77	18.065	24.98	14.34	17.89
28.5	5.137	46.97	22.578	39.04	18.208	24.13	14.51	21.51
Aug. 7.5	5.201	50.24	22.652	42.22	18.306	23.49	14.52	25.20
17.5	5.209	53.38	22.675	45.28	18.359	23.05	14.36	28.86
27.4	5.161	56.31	22.645	48.11	18.365	22.81	14.04	32.39
Sept. 6.4	5.064	59.00	22.588	50.70	18.329	22.74	13.57	35.77
16.4	4.921	61.39	22.448	52.99	18.254	22.38	12.95	38.88
26.4	4.738	63.42	22.291	54.89	18.146	23.07	12.20	41.69
Oct. 6.3	4.523	65.05	22.107	56.43	18.013	23.39	11.35	44.11
16.3	4.287	66.25	21.903	57.54	17.863	23.80	10.41	46.09
26.3	4.038	66.99	21.688	58.21	17.704	24.26	9.41	47.58
Nov. 5.3	3.786	67.25	21.472	58.42	17.545	24.75	8.36	48.52
15.2	3.539	67.02	21.259	58.17	17.394	25.25	7.31	48.90
25.2	3.306	66.28	21.063	57.48	17.260	25.75	6.28	48.69
Dec. 5.2	3.096	65.07	20.890	56.32	17.148	26.23	5.28	47.80
15.1	2.914	63.39	20.743	54.75	17.061	26.69	4.37	46.49
25.1	2.768	61.31	20.631	52.82	17.005	27.12	3.57	44.56
35.1	2.660	58.88	20.556	50.56	16.979	27.50	2.89	42.14
Mean Place	1.219	29.58	18.522	18.99	14.255	46.57	7.757	8.03
Sec δ, Tan δ	1.381	+0.963	1.275	+0.791	1.021	-0.997	4.735	+4.628
D <sub>α</sub> , D <sub>β</sub>	+0.044	-0.045	+0.047	-0.038	+0.065	+0.010	-0.023	-0.225
D <sub>γ</sub> , D <sub>δ</sub>	+0.28	-0.79	+0.29	-0.79	+0.29	-0.69	+0.29	-0.68

APPARENT PLACES OF STARS, 1920.

FOR THE UPPER TRANSIT AT WASHINGTON.

Washington Mean Time.	♈ Pisces Australis. Mag. 5.6		♁ Cygni. Mag. 3.4		♄ Cygni. Mag. 3.6		♋ Equulei. Mag. 4.1	
	Right Ascension.	Declination.	Right Ascension.	Declination.	Right Ascension.	Declination.	Right Ascension.	Declination.
	h m	° ' "	h m	° ' "	h m	° ' "	h m	° ' "
	21 8	-27 56	21 9	+29 53	21 11	+87 42	21 11	+ 4 54
	s	"	"	"	"	"	"	"
Jan. 1.1	32.533	45.89	31.496	66.45	35.389	27.01	49.316	67.00
11.1	32.524	45.90	31.449	64.29	35.322	24.66	49.301	65.85
21.1	32.552	44.57	31.436	61.98	35.294	22.12	49.315	64.69
31.0	32.616	43.67	31.464	59.63	35.308	19.49	49.361	63.59
Feb. 10.0	32.714	42.06	31.527	57.33	35.366	16.90	49.487	62.58
20.0	32.846	41.51	31.632	55.17	35.406	14.42	49.544	61.73
29.9	33.011	40.25	31.775	53.26	35.610	12.19	49.681	61.10
Mar. 10.9	33.208	38.87	31.954	51.66	35.795	10.26	49.849	60.73
20.9	33.434	37.41	32.168	50.45	36.021	8.76	50.045	60.65
30.9	33.689	35.87	32.414	49.71	36.282	7.74	50.268	60.89
Apr. 9.8	33.969	34.29	32.685	49.46	36.576	7.23	50.516	61.47
19.8	34.272	32.69	32.982	49.69	36.892	7.28	50.785	62.36
29.8	34.589	31.12	33.297	50.44	37.227	7.86	51.070	63.56
May 9.8	34.920	29.60	33.619	51.66	37.573	8.96	51.366	65.01
19.7	35.256	28.19	33.946	53.29	37.920	10.55	51.666	66.70
29.7	35.590	26.92	34.285	55.32	38.260	12.58	51.965	68.56
June 8.7	35.914	25.82	34.589	57.66	38.584	14.98	52.253	70.54
18.6	36.220	24.92	34.853	60.27	38.882	17.69	52.523	72.58
28.6	36.500	24.27	35.105	63.06	39.143	20.62	52.769	74.64
July 8.6	36.747	23.66	35.321	65.96	39.375	23.72	52.985	76.64
18.6	36.954	23.69	35.497	68.87	39.557	26.89	53.164	78.55
28.5	37.115	23.78	35.627	71.78	39.689	30.06	53.304	80.32
Aug. 7.5	37.228	24.10	35.710	74.81	39.770	33.17	53.399	81.92
17.5	37.290	24.61	35.744	77.27	39.799	36.14	53.449	83.33
27.4	37.301	25.30	35.729	79.72	39.775	38.98	53.455	84.54
Sept. 6.4	37.264	26.12	35.667	81.94	39.704	41.47	53.421	85.52
16.4	37.184	27.02	35.566	83.83	39.589	43.71	53.350	86.27
26.4	37.065	27.94	35.432	85.42	39.437	45.68	53.245	86.78
Oct. 6.3	36.917	28.85	35.271	86.67	39.256	47.17	53.117	87.09
16.3	36.747	29.69	35.090	87.53	39.053	48.31	52.970	87.17
26.3	36.569	30.42	34.897	88.03	38.836	49.01	52.816	87.06
Nov. 5.3	36.368	31.01	34.702	88.00	38.615	49.27	52.660	86.75
15.2	36.217	31.44	34.513	87.75	38.400	49.07	52.510	86.25
25.2	36.062	31.69	34.337	87.02	38.196	48.41	52.373	85.56
Dec. 5.2	35.932	31.77	34.180	85.91	38.011	47.30	52.256	84.74
15.1	35.830	31.65	34.048	84.41	37.852	45.77	52.163	83.78
25.1	35.762	31.36	33.945	82.63	37.724	43.87	52.097	82.70
35.1	35.728	30.88	33.871	80.57	37.629	41.64	52.059	81.54
Mean Place	32.895	47.10	31.832	53.00	35.515	12.02	49.503	58.99
Sec δ, Tan δ	1.132	-0.530	1.154	+0.575	1.264	+0.773	1.004	+0.666
D <sub>α</sub> , D <sub>ω</sub>	+0.071	+0.026	+0.061	-0.028	+0.049	-0.068	+0.060	-0.094
D <sub>γ</sub> , D <sub>δ</sub>	+0.29	-0.68	+0.29	-0.68	+0.30	-0.67	+0.30	-0.67

# APPARENT PLACES OF STARS, 1920.

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## FOR THE UPPER TRANSIT AT WASHINGTON.

Washington Mean Time.	α Cygni. Mag. 4.8		β Microscopi. Mag. 4.9		γ Cephei. Mag. 2.6		ι Capricorni. Mag. 4.3	
	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.
	h m 21 14	° ' " +89 3	h m 21 15	° ' " -41 8	h m 21 16	° ' " +62 14	h m 21 17	° ' " -17 10
Jan. 1.1	15.929 <sup>78</sup>	47.58	38.253 <sup>26</sup>	56.61	39.07 <sup>21</sup>	65.81	47.449 <sup>14</sup>	30.57 <sup>0</sup>
11.1	15.854 <sup>25</sup>	45.18	38.225 <sup>26</sup>	54.71 <sup>130</sup>	38.86 <sup>14</sup>	63.16 <sup>265</sup>	47.435 <sup>14</sup>	30.57 <sup>0</sup>
21.1	15.819 <sup>0</sup>	42.62	38.240 <sup>15</sup>	58.31 <sup>150</sup>	38.72 <sup>14</sup>	60.21 <sup>205</sup>	47.452 <sup>17</sup>	30.48 <sup>9</sup>
31.0	15.828	39.94	38.298 <sup>58</sup>	51.52 <sup>160</sup>	38.65 <sup>7</sup>	57.03 <sup>318</sup>	47.502 <sup>50</sup>	30.24 <sup>24</sup>
Feb. 10.0	15.882 <sup>54</sup>	37.28	38.308 <sup>160</sup>	49.71 <sup>131</sup>	38.67 <sup>2</sup>	53.80 <sup>328</sup>	47.584 <sup>82</sup>	29.87 <sup>37</sup>
20.0	15.979 <sup>97</sup>	34.73	38.566 <sup>138</sup>	47.78 <sup>183</sup>	38.77 <sup>10</sup>	50.63 <sup>317</sup>	47.637 <sup>113</sup>	29.35 <sup>52</sup>
29.9	16.120 <sup>141</sup>	32.42	38.716 <sup>180</sup>	45.78 <sup>200</sup>	38.95 <sup>16</sup>	47.65 <sup>268</sup>	47.840 <sup>143</sup>	28.66 <sup>69</sup>
Mar. 10.9	16.305 <sup>185</sup>	30.42	38.932 <sup>216</sup>	43.73 <sup>205</sup>	39.20 <sup>25</sup>	44.96 <sup>260</sup>	48.013 <sup>173</sup>	27.82 <sup>84</sup>
20.9	16.530 <sup>225</sup>	28.85	39.164 <sup>262</sup>	41.68 <sup>205</sup>	39.53 <sup>33</sup>	42.69 <sup>237</sup>	48.218 <sup>203</sup>	26.81 <sup>101</sup>
30.9	16.793 <sup>268</sup>	27.76	39.463 <sup>294</sup>	39.66 <sup>232</sup>	39.93 <sup>40</sup>	40.92 <sup>177</sup>	48.446 <sup>230</sup>	25.63 <sup>118</sup>
Apr. 9.8	17.089 <sup>298</sup>	27.18	39.782 <sup>280</sup>	37.71 <sup>195</sup>	40.38 <sup>45</sup>	39.69 <sup>138</sup>	48.702 <sup>256</sup>	24.90 <sup>133</sup>
19.8	17.406 <sup>330</sup>	27.15	40.121 <sup>330</sup>	35.86 <sup>185</sup>	40.87 <sup>49</sup>	39.69 <sup>60</sup>	48.979 <sup>277</sup>	22.86 <sup>144</sup>
29.8	17.749 <sup>360</sup>	27.67	40.482 <sup>361</sup>	34.16 <sup>170</sup>	41.39 <sup>82</sup>	39.69 <sup>0</sup>	49.274 <sup>295</sup>	21.34 <sup>152</sup>
May 9.8	18.100 <sup>351</sup>	26.71	40.857 <sup>375</sup>	32.64 <sup>182</sup>	41.92 <sup>53</sup>	39.73 <sup>64</sup>	49.583 <sup>309</sup>	19.75 <sup>159</sup>
19.7	18.452 <sup>352</sup>	30.27	41.338 <sup>381</sup>	31.34 <sup>130</sup>	42.44 <sup>52</sup>	40.95 <sup>122</sup>	49.897 <sup>314</sup>	18.17 <sup>158</sup>
29.7	18.797 <sup>345</sup>	32.26	41.618 <sup>380</sup>	30.31 <sup>108</sup>	42.95 <sup>81</sup>	42.74 <sup>179</sup>	50.211 <sup>314</sup>	16.62 <sup>155</sup>
June 8.7	19.126 <sup>330</sup>	34.64	41.989 <sup>371</sup>	29.57 <sup>74</sup>	43.43 <sup>48</sup>	44.99 <sup>226</sup>	50.516 <sup>205</sup>	15.15 <sup>147</sup>
18.6	19.490 <sup>304</sup>	37.33	42.340 <sup>351</sup>	29.13 <sup>44</sup>	43.86 <sup>43</sup>	47.69 <sup>270</sup>	50.807 <sup>291</sup>	13.81 <sup>134</sup>
28.6	19.701 <sup>271</sup>	40.28	42.663 <sup>333</sup>	29.01 <sup>12</sup>	44.23 <sup>37</sup>	50.75 <sup>268</sup>	51.073 <sup>266</sup>	12.62 <sup>119</sup>
July 8.6	19.932 <sup>251</sup>	43.37	42.949 <sup>306</sup>	29.21 <sup>20</sup>	44.54 <sup>31</sup>	54.09 <sup>284</sup>	51.311 <sup>238</sup>	11.62 <sup>100</sup>
18.6	20.117 <sup>185</sup>	46.56	43.191 <sup>292</sup>	29.70 <sup>49</sup>	44.78 <sup>24</sup>	57.60 <sup>251</sup>	51.311 <sup>201</sup>	10.83 <sup>79</sup>
28.5	20.252 <sup>135</sup>	49.76	43.381 <sup>190</sup>	30.50 <sup>80</sup>	44.93 <sup>15</sup>	61.23 <sup>583</sup>	51.512 <sup>158</sup>	10.27 <sup>56</sup>
Aug. 7.5	20.334 <sup>82</sup>	52.90	43.515 <sup>134</sup>	31.53 <sup>103</sup>	45.01 <sup>5</sup>	64.89 <sup>850</sup>	51.670 <sup>114</sup>	9.92 <sup>33</sup>
17.5	20.365 <sup>31</sup>	55.93	43.690 <sup>75</sup>	32.78 <sup>125</sup>	45.00 <sup>1</sup>	68.48 <sup>866</sup>	51.784 <sup>66</sup>	9.79 <sup>15</sup>
27.5	20.342 <sup>23</sup>	58.77	43.866 <sup>234</sup>	34.17 <sup>130</sup>	44.92 <sup>8</sup>	71.95 <sup>847</sup>	51.860 <sup>20</sup>	9.79 <sup>6</sup>
Sept. 6.4	20.271 <sup>71</sup>	61.36	44.006 <sup>49</sup>	34.17 <sup>148</sup>	44.92 <sup>16</sup>	75.21 <sup>826</sup>	51.870 <sup>25</sup>	9.85 <sup>25</sup>
16.4	20.156 <sup>115</sup>	63.67	43.568 <sup>281</sup>	35.65 <sup>151</sup>	44.76 <sup>23</sup>	78.21 <sup>298</sup>	51.845 <sup>66</sup>	10.10 <sup>37</sup>
26.4	20.003 <sup>153</sup>	65.64	43.476 <sup>197</sup>	37.16 <sup>146</sup>	44.53 <sup>26</sup>	78.19 <sup>268</sup>	51.779 <sup>100</sup>	10.47 <sup>50</sup>
Oct. 6.3	20.003 <sup>185</sup>	65.64	43.338 <sup>188</sup>	38.62 <sup>146</sup>	44.24 <sup>26</sup>	80.88 <sup>268</sup>	51.679 <sup>100</sup>	10.97 <sup>50</sup>
16.3	19.818 <sup>185</sup>	67.23	43.163 <sup>175</sup>	39.97 <sup>185</sup>	43.89 <sup>35</sup>	83.14 <sup>236</sup>	51.549 <sup>130</sup>	11.62 <sup>55</sup>
26.3	19.612 <sup>206</sup>	68.42	42.962 <sup>201</sup>	41.13 <sup>116</sup>	43.51 <sup>33</sup>	84.96 <sup>183</sup>	51.400 <sup>149</sup>	12.12 <sup>60</sup>
Nov. 5.3	19.392 <sup>230</sup>	69.18	42.744 <sup>218</sup>	42.08 <sup>95</sup>	43.10 <sup>41</sup>	86.29 <sup>133</sup>	51.242 <sup>158</sup>	12.71 <sup>59</sup>
15.2	19.167 <sup>265</sup>	69.49	42.524 <sup>230</sup>	42.74 <sup>66</sup>	43.10 <sup>42</sup>	86.29 <sup>79</sup>	51.242 <sup>162</sup>	12.71 <sup>58</sup>
25.2	18.944 <sup>223</sup>	69.31	42.311 <sup>213</sup>	43.11 <sup>87</sup>	42.68 <sup>43</sup>	87.06 <sup>26</sup>	51.080 <sup>155</sup>	13.23 <sup>52</sup>
Dec. 5.2	18.784 <sup>210</sup>	68.68	42.116 <sup>196</sup>	43.17 <sup>6</sup>	42.25 <sup>43</sup>	87.34 <sup>26</sup>	50.925 <sup>142</sup>	13.81 <sup>46</sup>
15.2	18.543 <sup>191</sup>	67.58	41.946 <sup>160</sup>	42.89 <sup>28</sup>	41.83 <sup>42</sup>	86.98 <sup>36</sup>	50.783 <sup>120</sup>	14.27 <sup>39</sup>
25.1	18.377 <sup>166</sup>	66.66	41.712 <sup>136</sup>	42.89 <sup>57</sup>	41.44 <sup>36</sup>	86.05 <sup>98</sup>	50.663 <sup>95</sup>	14.66 <sup>29</sup>
35.1	18.241 <sup>136</sup>	64.13	41.510 <sup>114</sup>	42.82 <sup>86</sup>	41.06 <sup>32</sup>	84.61 <sup>197</sup>	50.563 <sup>67</sup>	14.95 <sup>20</sup>
Mean Place	18.366	32.31	38.618	54.72	40.327	46.67	47.682	33.63
Sec δ, Tan δ	1.288	+0.812	1.323	-0.874	2.148	+1.901	1.047	-0.300
D <sub>α</sub> , D <sub>ω</sub>	+0.047	-0.041	+0.076	+0.044	+0.028	-0.096	+0.066	+0.036
D <sub>δ</sub> , D <sub>ε</sub>	+0.80	-0.66	+0.80	-0.66	+0.80	-0.65	+0.80	-0.65

FOR THE UPPER TRANSIT AT WASHINGTON.

Washington Mean Time.	1 Pegasi. Mag. 4.2		γ Favis. Mag. 4.8		ζ Capricorn. Mag. 3.9		θ Cygni. Mag. 5.3	
	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.
	h m	° '	h m	° '	h m	° '	h m	° '
	21 18	+19 27	21 19	-65 43	21 22	-22 45	21 26	+46 11
	s	"	s	"	s	"	s	"
Jan. 1.1	22.984	58.08	49.07	50.29	5.916	29.19	29.294	31.76
11.1	22.947 37	51.28 176	48.94 13	47.80 340	5.897 19	28.88 31	29.181 113	29.35 241
21.1	22.942 5	49.44 184	48.90 4	45.04 276	5.910 13	28.44 44	29.113 66	26.67 268
31.0	22.970 23	47.58 186	48.94 4	42.00 206	5.956 46	27.85 50	29.092 21	23.85 262
Feb. 10.0	23.032 63	45.79 179	49.07 13	39.02 307	6.034 78	27.14 71	29.121 29	20.99 286
	96	164	20	312	114	87	80	279
20.0	23.128	44.15 143	49.27	35.90	6.148	26.27	29.201	18.20
29.9	23.258 130	42.72 143	49.55 26	32.81 309	6.290 142	25.26 101	29.333 132	15.62 258
Mar. 10.9	23.422 164	41.60 112	49.90 36	29.79 302	6.465 175	24.06 118	29.516 183	13.34 228
20.9	23.618 196	40.84 76	50.32 42	26.93 296	6.671 206	22.79 129	29.747 231	11.44 190
30.9	23.843 225	40.47 37	50.80 46	24.27 288	6.906 285	21.35 144	30.023 276	10.02 142
	264	6	52	341	361	159	314	88
Apr. 9.8	24.097	40.53	51.32	21.86	7.167	19.83	30.337	9.14
19.8	24.372 375	41.01 48	51.90 58	19.76 219	7.450 283	18.24 169	30.682 345	8.81 33
29.8	24.666 294	41.92 91	52.50 60	18.02 174	7.753 303	16.64 180	31.050 368	9.06 25
May 9.8	24.971 305	43.22 130	53.13 62	16.65 137	8.069 316	15.01 163	31.432 382	9.88 82
19.7	25.281 310	44.89 167	53.76 63	15.71 94	8.393 334	13.46 165	31.818 386	11.24 126
	306	196	64	51	334	160	379	185
29.7	25.587	46.85	54.40	15.20	8.717	11.96	32.197	13.09
June 8.7	25.884 397	49.07 222	55.01 61	15.13 7	9.033 316	10.64 182	32.559 362	15.38 229
18.6	26.162 378	51.46 239	55.59 66	15.52 39	9.334 361	9.48 116	32.896 337	18.04 266
28.6	26.414 262	53.97 281	56.12 53	16.34 82	9.612 378	8.50 98	33.197 301	21.00 296
July 8.6	26.634 230	56.58 266	56.58 46	17.57 128	9.860 346	7.77 73	33.455 258	24.18 313
	182	265	40	160	369	82	206	321
18.6	26.816 142	59.08	56.98	19.17	10.069 169	7.25 26	33.663 154	27.49 338
28.5	26.958 95	61.57 249	57.28 30	21.09 192	10.238 122	6.99 5	33.817 96	30.87 326
Aug. 7.5	27.063 50	63.94 237	57.48 20	23.27 218	10.360 75	6.94 18	33.915 39	34.23 328
17.5	27.103 5	66.14 220	57.59 11	25.61 234	10.485 25	7.12 41	33.964 18	37.51 311
27.5	27.108 38	68.13 174	57.59 10	28.06 245	10.460 21	7.53 63	33.986 71	40.62 291
Sept. 6.4	27.070	69.87	57.49	30.51	10.489	8.06	33.865	43.53
16.4	26.992 78	71.37 150	57.30 19	32.86 285	10.372 67	8.73 67	33.749 122	46.16 263
26.4	26.882 110	72.57 120	57.02 28	35.02 219	10.272 100	9.49 76	33.578 165	48.47 231
Oct. 6.3	26.746 126	73.48 91	56.67 35	36.90 186	10.189 133	10.27 78	33.378 200	50.40 193
16.3	26.590 156	74.07 59	56.28 41	38.40 159	9.968 151	11.04 77	33.150 228	51.92 162
	167	27	44	199	166	75	247	106
26.3	26.423	74.84	55.82	39.49	9.822	11.79	32.993	52.98
Nov. 5.3	26.254 169	74.30 4	55.37 45	40.09 80	9.654 166	12.41 68	32.847 256	53.55 57
15.2	26.090 164	73.93 37	54.92 45	40.17 8	9.491 163	12.95 64	32.391 266	53.63 8
25.2	25.937 153	73.24 69	54.49 43	39.73 44	9.342 149	13.35 40	32.142 249	53.20 43
Dec. 5.2	25.801 113	72.28 98	54.11 33	38.78 144	9.214 126	13.62 37	31.910 232	52.26 94
		126	33	144	168	12	207	142
15.2	25.688	71.00	53.78	37.34	9.111	13.74	31.793	50.84
25.1	25.600 88	69.51 149	53.52 26	35.45 189	9.696 75	13.71 3	31.527 176	48.98 186
35.1	25.542 58	67.81 170	53.34 18	33.19 236	8.999 40	13.54 17	31.385 142	46.73 226
Mean Place	23.186	41.67	50.860	45.89	6.182	30.94	29.780	14.57
Sec δ, Tan δ	1.061	+0.353	2.432	-2.217	1.064	-0.419	1.445	+1.043
D <sub>pa</sub> , D <sub>sa</sub>	+0.055	-0.018	+0.099	+0.113	+0.068	+0.022	+0.044	-0.054
D <sub>pd</sub> , D <sub>sd</sub>	+0.30	-0.65	+0.30	-0.64	+0.81	-0.64	+0.81	-0.63

FOR THE UPPER TRANSIT AT WASHINGTON.

Washington Mean Time.	$\beta$ Aquarii. Mag. 3.1		$\beta$ Cephei. Mag. 3.3		$\xi$ Aquarii. Mag. 4.8		74 Cygni. Mag. 5.1	
	Right Ascension.	Declination.	Right Ascension.	Declination.	Right Ascension.	Declination.	Right Ascension.	Declination.
	h m 21 27	° ' " - 5 55	h m 21 27	° ' " +70 12	h m 21 23	° ' " - 8 12	h m 21 23	° ' " +40 3
	s	"	s	"	s	"	s	"
Jan. 1.1	20.777	20.46	36.24	54.33	29.546	44.34	44.188	29.09
11.1	20.756 <sup>21</sup>	21.06 <sup>60</sup>	35.88 <sup>36</sup>	51.80 <sup>263</sup>	29.519 <sup>37</sup>	44.82 <sup>48</sup>	44.091 <sup>97</sup>	26.83 <sup>226</sup>
21.1	20.761 <sup>5</sup>	21.61 <sup>55</sup>	35.62 <sup>26</sup>	48.93 <sup>287</sup>	29.520 <sup>1</sup>	45.21 <sup>39</sup>	44.094 <sup>57</sup>	24.34 <sup>249</sup>
31.0	20.798 <sup>37</sup>	22.04 <sup>43</sup>	35.46 <sup>16</sup>	45.78 <sup>315</sup>	29.551 <sup>31</sup>	45.51 <sup>30</sup>	44.018 <sup>16</sup>	21.71 <sup>363</sup>
Feb. 10.0	20.863 <sup>65</sup>	22.36 <sup>32</sup>	35.42 <sup>4</sup>	42.52 <sup>336</sup>	29.612 <sup>61</sup>	45.68 <sup>17</sup>	44.045 <sup>27</sup>	19.06 <sup>266</sup>
20.0	20.961 <sup>96</sup>	22.52 <sup>16</sup>	35.49 <sup>7</sup>	39.24 <sup>333</sup>	29.703 <sup>91</sup>	45.67 <sup>1</sup>	44.118 <sup>73</sup>	16.48 <sup>258</sup>
Mar. 1.0	21.085 <sup>124</sup>	22.48 <sup>4</sup>	35.68 <sup>19</sup>	36.09 <sup>315</sup>	29.825 <sup>123</sup>	45.48 <sup>19</sup>	44.236 <sup>113</sup>	14.11 <sup>237</sup>
10.9	21.244 <sup>159</sup>	22.23 <sup>36</sup>	35.99 <sup>31</sup>	33.22 <sup>287</sup>	29.979 <sup>154</sup>	45.11 <sup>37</sup>	44.401 <sup>168</sup>	12.02 <sup>209</sup>
20.9	21.429 <sup>185</sup>	21.76 <sup>47</sup>	36.40 <sup>41</sup>	30.73 <sup>249</sup>	30.160 <sup>181</sup>	44.50 <sup>61</sup>	44.609 <sup>205</sup>	10.31 <sup>171</sup>
30.9	21.644 <sup>215</sup>	21.02 <sup>74</sup>	36.90 <sup>50</sup>	28.71 <sup>202</sup>	30.371 <sup>211</sup>	43.66 <sup>84</sup>	44.856 <sup>249</sup>	9.06 <sup>125</sup>
Apr. 9.8	21.892 <sup>238</sup>	20.05 <sup>97</sup>	37.48 <sup>56</sup>	27.22 <sup>149</sup>	30.606 <sup>287</sup>	42.59 <sup>107</sup>	45.142 <sup>284</sup>	8.31 <sup>75</sup>
19.8	22.147 <sup>265</sup>	18.86 <sup>119</sup>	38.12 <sup>64</sup>	26.32 <sup>90</sup>	30.869 <sup>261</sup>	41.83 <sup>126</sup>	45.457 <sup>315</sup>	8.09 <sup>22</sup>
29.8	22.490 <sup>298</sup>	17.47 <sup>139</sup>	38.80 <sup>68</sup>	26.02 <sup>20</sup>	31.151 <sup>289</sup>	39.89 <sup>144</sup>	45.795 <sup>338</sup>	8.43 <sup>34</sup>
May 9.8	22.726 <sup>266</sup>	15.91 <sup>156</sup>	39.50 <sup>70</sup>	26.35 <sup>23</sup>	31.447 <sup>298</sup>	38.29 <sup>169</sup>	46.149 <sup>354</sup>	9.29 <sup>86</sup>
19.7	23.028 <sup>302</sup>	14.25 <sup>166</sup>	40.19 <sup>69</sup>	27.31 <sup>96</sup>	31.752 <sup>306</sup>	36.61 <sup>168</sup>	46.509 <sup>360</sup>	10.67 <sup>138</sup>
29.7	23.333 <sup>306</sup>	12.48 <sup>177</sup>	40.86 <sup>67</sup>	28.55 <sup>184</sup>	32.057 <sup>305</sup>	34.86 <sup>178</sup>	46.864 <sup>355</sup>	12.51 <sup>184</sup>
June 8.7	23.630 <sup>297</sup>	10.71 <sup>177</sup>	41.49 <sup>68</sup>	30.90 <sup>206</sup>	32.358 <sup>301</sup>	33.12 <sup>174</sup>	47.207 <sup>343</sup>	14.75 <sup>224</sup>
18.7	23.912 <sup>282</sup>	8.97 <sup>174</sup>	42.06 <sup>57</sup>	33.42 <sup>258</sup>	32.643 <sup>269</sup>	31.42 <sup>170</sup>	47.528 <sup>321</sup>	17.34 <sup>269</sup>
28.6	24.171 <sup>269</sup>	7.27 <sup>170</sup>	42.56 <sup>50</sup>	36.35 <sup>293</sup>	32.909 <sup>269</sup>	29.81 <sup>161</sup>	47.819 <sup>291</sup>	20.19 <sup>285</sup>
July 8.6	24.404 <sup>197</sup>	5.72 <sup>155</sup>	42.96 <sup>40</sup>	39.59 <sup>324</sup>	33.150 <sup>241</sup>	28.34 <sup>147</sup>	48.071 <sup>252</sup>	23.25 <sup>306</sup>
18.6	24.601 <sup>157</sup>	4.33 <sup>139</sup>	43.28 <sup>32</sup>	43.06 <sup>347</sup>	33.354 <sup>204</sup>	27.03 <sup>181</sup>	48.380 <sup>209</sup>	26.42 <sup>317</sup>
28.5	24.758 <sup>116</sup>	3.09 <sup>124</sup>	43.49 <sup>21</sup>	46.70 <sup>364</sup>	33.518 <sup>164</sup>	25.91 <sup>112</sup>	48.440 <sup>160</sup>	29.64 <sup>322</sup>
Aug. 7.5	24.874 <sup>69</sup>	2.06 <sup>108</sup>	43.59 <sup>10</sup>	50.40 <sup>370</sup>	33.641 <sup>128</sup>	25.01 <sup>90</sup>	48.547 <sup>107</sup>	32.88 <sup>319</sup>
17.5	24.943 <sup>69</sup>	1.23 <sup>83</sup>	43.58 <sup>1</sup>	54.10 <sup>370</sup>	33.718 <sup>77</sup>	24.32 <sup>69</sup>	48.602 <sup>55</sup>	35.91 <sup>306</sup>
27.5	24.971 <sup>28</sup>	0.62 <sup>61</sup>	43.47 <sup>11</sup>	57.70 <sup>360</sup>	33.753 <sup>35</sup>	23.85 <sup>47</sup>	48.608 <sup>1</sup>	38.85 <sup>294</sup>
Sept. 6.4	24.954 <sup>17</sup>	0.22 <sup>40</sup>	43.28 <sup>21</sup>	61.14 <sup>344</sup>	33.742 <sup>11</sup>	23.59 <sup>26</sup>	48.608 <sup>49</sup>	38.85 <sup>278</sup>
16.4	24.900 <sup>54</sup>	0.04 <sup>18</sup>	42.95 <sup>21</sup>	64.35 <sup>321</sup>	33.742 <sup>49</sup>	23.59 <sup>9</sup>	48.554 <sup>93</sup>	41.58 <sup>245</sup>
26.4	24.808 <sup>99</sup>	0.03 <sup>1</sup>	42.55 <sup>49</sup>	67.26 <sup>291</sup>	33.693 <sup>85</sup>	23.50 <sup>6</sup>	48.461 <sup>135</sup>	44.03 <sup>213</sup>
Oct. 6.4	24.693 <sup>115</sup>	0.14 <sup>11</sup>	42.09 <sup>46</sup>	69.82 <sup>256</sup>	33.496 <sup>112</sup>	23.80 <sup>24</sup>	48.326 <sup>160</sup>	46.16 <sup>178</sup>
16.3	24.557 <sup>126</sup>	0.40 <sup>26</sup>	41.56 <sup>58</sup>	71.93 <sup>211</sup>	33.362 <sup>124</sup>	24.15 <sup>35</sup>	48.157 <sup>194</sup>	47.94 <sup>130</sup>
26.3	24.408 <sup>149</sup>	0.79 <sup>39</sup>	41.56 <sup>57</sup>	73.56 <sup>168</sup>	33.362 <sup>146</sup>	24.15 <sup>45</sup>	47.963 <sup>213</sup>	49.33 <sup>96</sup>
Nov. 5.3	24.257 <sup>151</sup>	1.25 <sup>46</sup>	40.99 <sup>60</sup>	73.56 <sup>169</sup>	33.216 <sup>150</sup>	24.60 <sup>50</sup>	47.750 <sup>221</sup>	50.29 <sup>51</sup>
15.2	24.111 <sup>146</sup>	1.79 <sup>54</sup>	40.39 <sup>61</sup>	74.65 <sup>56</sup>	33.006 <sup>147</sup>	25.10 <sup>56</sup>	47.529 <sup>220</sup>	50.80 <sup>4</sup>
25.2	23.978 <sup>125</sup>	2.37 <sup>58</sup>	39.78 <sup>61</sup>	75.21 <sup>5</sup>	32.919 <sup>137</sup>	25.66 <sup>58</sup>	47.309 <sup>214</sup>	50.84 <sup>48</sup>
Dec. 5.2	23.858 <sup>118</sup>	2.99 <sup>62</sup>	39.17 <sup>62</sup>	75.16 <sup>66</sup>	32.782 <sup>129</sup>	26.24 <sup>59</sup>	47.095 <sup>200</sup>	50.41 <sup>90</sup>
15.2	23.858 <sup>97</sup>	2.99 <sup>65</sup>	38.58 <sup>56</sup>	74.50 <sup>121</sup>	32.662 <sup>98</sup>	26.33 <sup>61</sup>	46.895 <sup>180</sup>	49.51 <sup>134</sup>
25.1	23.741 <sup>71</sup>	3.64 <sup>65</sup>	38.03 <sup>49</sup>	73.29 <sup>180</sup>	32.564 <sup>74</sup>	27.44 <sup>57</sup>	46.715 <sup>152</sup>	48.17 <sup>176</sup>
35.1	23.645 <sup>45</sup>	4.29 <sup>65</sup>	37.54 <sup>41</sup>	71.49 <sup>227</sup>	32.460 <sup>48</sup>	28.01 <sup>55</sup>	46.563 <sup>121</sup>	46.41 <sup>211</sup>
35.1	23.645 <sup>45</sup>	4.29 <sup>65</sup>	37.13 <sup>41</sup>	69.22 <sup>227</sup>	32.442 <sup>48</sup>	28.56 <sup>55</sup>	46.442 <sup>121</sup>	44.30 <sup>211</sup>
Mean Place	20.921	35.86	38.064	33.56	29.676	49.11	44.502	12.82
Sec $\delta$ , Tan $\delta$	1.005	-0.104	2.954	+2.780	1.010	-0.144	1.307	+0.841
$D_{\alpha\alpha}$ , $D_{\alpha\delta}$	+0.063	+0.005	+0.016	-0.146	+0.063	+0.006	+0.048	-0.045
$D_{\delta\delta}$ , $D_{\delta\alpha}$	+0.31	-0.62	+0.31	-0.62	+0.32	-0.69	+0.32	-0.60

FOR THE UPPER TRANSIT AT WASHINGTON.

Washington Mean Time.	γ Capricorn. Mag. 3.8		ε Pegasi. Mag. 2.5		11 Cephei. Mag. 4.8		δ Capricorn. Mag. 3.0	
	Right Ascension.	Declination.	Right Ascension.	Declination.	Right Ascension.	Declination.	Right Ascension.	Declination.
	h m 21 35	° ' " -17 1	h m 21 40	° ' " + 9 30	h m 21 40	° ' " +70 56	h m 21 42	° ' " -16 29
	s	"	s	"	s	"	s	"
Jan. 1.1	39.489	24.69	15.322	36.45	43.60	55.70	37.498	24.91
11.1	39.460 <sup>20</sup>	24.72 <sup>3</sup>	15.280 <sup>42</sup>	35.19 <sup>126</sup>	43.20 <sup>49</sup>	53.32 <sup>298</sup>	37.464 <sup>34</sup>	24.99 <sup>8</sup>
21.1	39.460 <sup>0</sup>	24.62 <sup>10</sup>	15.266 <sup>14</sup>	33.86 <sup>183</sup>	42.89 <sup>31</sup>	50.55 <sup>277</sup>	37.457 <sup>7</sup>	24.93 <sup>6</sup>
31.0	39.492 <sup>22</sup>	24.38 <sup>24</sup>	15.281 <sup>15</sup>	32.56 <sup>180</sup>	42.68 <sup>21</sup>	47.49 <sup>306</sup>	37.483 <sup>26</sup>	24.73 <sup>20</sup>
Feb. 10.0	39.555 <sup>63</sup>	23.99 <sup>39</sup>	15.327 <sup>46</sup>	31.36 <sup>120</sup>	42.60 <sup>8</sup>	44.27 <sup>322</sup>	37.538 <sup>55</sup>	24.37 <sup>36</sup>
	93	54	78	108	4	326	85	51
20.0	39.648	23.45	15.405	30.28	42.64	41.01	37.623	23.86
Mar. 1.0	39.774 <sup>126</sup>	22.73 <sup>72</sup>	15.514 <sup>100</sup>	29.43 <sup>85</sup>	42.80 <sup>16</sup>	37.85 <sup>316</sup>	37.740 <sup>117</sup>	23.16 <sup>70</sup>
10.9	39.930 <sup>156</sup>	21.84 <sup>89</sup>	15.655 <sup>141</sup>	28.82 <sup>61</sup>	43.08 <sup>28</sup>	34.91 <sup>294</sup>	37.888 <sup>148</sup>	22.29 <sup>87</sup>
20.9	40.115 <sup>185</sup>	20.78 <sup>106</sup>	15.827 <sup>172</sup>	28.51 <sup>81</sup>	43.47 <sup>39</sup>	32.30 <sup>261</sup>	38.068 <sup>180</sup>	21.23 <sup>106</sup>
30.9	40.331 <sup>216</sup>	19.54 <sup>124</sup>	16.081 <sup>204</sup>	28.53 <sup>2</sup>	43.96 <sup>49</sup>	30.14 <sup>216</sup>	38.278 <sup>210</sup>	20.01 <sup>123</sup>
	242	138	232	38	58	165	237	138
Apr. 9.9	40.573	18.16	16.263	28.31	44.54 <sup>64</sup>	28.49 <sup>108</sup>	38.515	18.63
19.8	40.841 <sup>268</sup>	16.85 <sup>151</sup>	16.520 <sup>257</sup>	29.65 <sup>74</sup>	45.18 <sup>64</sup>	27.41 <sup>45</sup>	38.779 <sup>264</sup>	17.10 <sup>153</sup>
29.8	41.129 <sup>298</sup>	15.08 <sup>162</sup>	16.798 <sup>278</sup>	30.74 <sup>100</sup>	45.87 <sup>69</sup>	26.06 <sup>45</sup>	39.064 <sup>285</sup>	15.48 <sup>162</sup>
May 9.8	41.433 <sup>304</sup>	13.37 <sup>166</sup>	17.090 <sup>292</sup>	32.08 <sup>184</sup>	46.59 <sup>72</sup>	27.12 <sup>16</sup>	39.366 <sup>302</sup>	13.80 <sup>168</sup>
19.7	41.746 <sup>313</sup>	11.70 <sup>167</sup>	17.391 <sup>301</sup>	33.72 <sup>164</sup>	47.31 <sup>72</sup>	27.89 <sup>77</sup>	39.678 <sup>312</sup>	12.10 <sup>179</sup>
	316	163	304	188	71	186	316	169
29.7	42.062	10.07	17.695	35.60	48.02	29.25	39.994	10.41
June 8.7	42.372 <sup>310</sup>	8.50 <sup>157</sup>	17.992 <sup>297</sup>	37.65 <sup>205</sup>	48.69 <sup>67</sup>	31.15 <sup>190</sup>	40.305 <sup>311</sup>	8.81 <sup>160</sup>
18.7	42.670 <sup>298</sup>	7.06 <sup>144</sup>	18.279 <sup>287</sup>	39.79 <sup>214</sup>	49.30 <sup>61</sup>	33.54 <sup>239</sup>	40.607 <sup>302</sup>	7.94 <sup>147</sup>
28.6	42.948 <sup>278</sup>	5.78 <sup>128</sup>	18.542 <sup>263</sup>	42.00 <sup>221</sup>	49.84 <sup>54</sup>	36.32 <sup>278</sup>	40.887 <sup>290</sup>	6.01 <sup>133</sup>
July 8.6	43.187 <sup>249</sup>	4.71 <sup>107</sup>	18.777 <sup>235</sup>	44.21 <sup>231</sup>	50.30 <sup>46</sup>	39.47 <sup>315</sup>	41.140 <sup>258</sup>	4.90 <sup>111</sup>
	214	87	208	216	35	340	220	93
18.6	43.411 <sup>176</sup>	3.34 <sup>68</sup>	18.980 <sup>161</sup>	46.37 <sup>203</sup>	50.65 <sup>25</sup>	42.87 <sup>359</sup>	41.360 <sup>181</sup>	3.97 <sup>67</sup>
28.6	43.587 <sup>180</sup>	3.21 <sup>40</sup>	19.141 <sup>123</sup>	48.40 <sup>189</sup>	50.90 <sup>15</sup>	46.46 <sup>370</sup>	41.541 <sup>136</sup>	3.30 <sup>44</sup>
Aug. 7.5	43.717 <sup>86</sup>	2.81 <sup>16</sup>	19.263 <sup>76</sup>	50.29 <sup>173</sup>	51.05 <sup>4</sup>	50.16 <sup>371</sup>	41.677 <sup>92</sup>	2.86 <sup>21</sup>
17.5	43.802 <sup>28</sup>	2.65 <sup>4</sup>	19.339 <sup>34</sup>	52.02 <sup>150</sup>	51.09 <sup>9</sup>	53.87 <sup>366</sup>	41.769 <sup>44</sup>	2.65 <sup>2</sup>
27.5	43.840 <sup>8</sup>	2.69 <sup>24</sup>	19.373 <sup>11</sup>	53.52 <sup>127</sup>	51.00 <sup>18</sup>	57.53 <sup>352</sup>	41.818 <sup>0</sup>	2.67 <sup>23</sup>
Sept. 6.4	43.832	2.93	19.362	54.79	50.82	61.05	41.813	2.89
16.4	43.784 <sup>48</sup>	3.32 <sup>39</sup>	19.318 <sup>69</sup>	55.85 <sup>108</sup>	50.54 <sup>28</sup>	64.38 <sup>333</sup>	41.769 <sup>44</sup>	3.27 <sup>38</sup>
26.4	43.697 <sup>87</sup>	3.84 <sup>52</sup>	19.232 <sup>81</sup>	56.65 <sup>80</sup>	50.17 <sup>37</sup>	67.42 <sup>304</sup>	41.690 <sup>79</sup>	3.78 <sup>51</sup>
Oct. 6.4	43.581 <sup>116</sup>	4.44 <sup>60</sup>	19.120 <sup>112</sup>	57.39 <sup>54</sup>	49.72 <sup>45</sup>	70.11 <sup>269</sup>	41.579 <sup>111</sup>	4.39 <sup>61</sup>
16.3	43.443 <sup>138</sup>	5.09 <sup>65</sup>	18.938 <sup>132</sup>	57.51 <sup>33</sup>	49.20 <sup>53</sup>	72.40 <sup>229</sup>	41.448 <sup>133</sup>	5.06 <sup>67</sup>
	192	69	144	6	58	182	148	67
26.3	43.291	5.75	18.844	57.57	48.62	74.22	41.298	5.73
Nov. 5.3	43.134 <sup>157</sup>	6.40 <sup>65</sup>	18.693 <sup>151</sup>	57.40 <sup>17</sup>	48.02 <sup>60</sup>	75.53 <sup>131</sup>	41.145 <sup>152</sup>	6.40 <sup>67</sup>
15.3	42.981 <sup>183</sup>	6.99 <sup>59</sup>	18.544 <sup>149</sup>	57.02 <sup>38</sup>	47.39 <sup>63</sup>	76.28 <sup>76</sup>	40.993 <sup>152</sup>	7.03 <sup>63</sup>
25.2	42.838 <sup>143</sup>	7.51 <sup>52</sup>	18.404 <sup>140</sup>	56.43 <sup>59</sup>	46.76 <sup>63</sup>	76.45 <sup>17</sup>	40.851 <sup>142</sup>	7.59 <sup>56</sup>
Dec. 5.2	42.713 <sup>125</sup>	7.95 <sup>44</sup>	18.278 <sup>126</sup>	55.63 <sup>80</sup>	46.15 <sup>61</sup>	76.00 <sup>45</sup>	40.723 <sup>128</sup>	8.67 <sup>48</sup>
	104	35	110	98	57	108	106	38
15.2	42.609	8.30	18.168	54.65	45.58	74.97	40.617	8.45
25.1	42.581 <sup>78</sup>	8.54 <sup>24</sup>	18.081 <sup>87</sup>	53.52 <sup>113</sup>	45.05 <sup>53</sup>	73.37 <sup>160</sup>	40.535 <sup>82</sup>	8.73 <sup>28</sup>
35.1	42.480 <sup>51</sup>	8.66 <sup>12</sup>	18.020 <sup>61</sup>	52.28 <sup>126</sup>	44.59 <sup>46</sup>	71.25 <sup>212</sup>	40.490 <sup>55</sup>	8.91 <sup>18</sup>
Mean Place	39.657	27.36	15.391	37.27	45.276	34.15	37.639	27.52
Sec & Tan δ	1.046	-0.366	1.014	+0.168	3.063	+2.896	1.043	-0.296
D <sub>α</sub> , D <sub>ω</sub>	+0.066	+0.017	+0.059	-0.009	+0.017	-0.159	+0.066	+0.016
D <sub>β</sub> , D <sub>δ</sub>	+0.33	-0.50	+0.33	-0.57	+0.33	-0.57	+0.33	-0.56



# APPARENT PLACES OF STARS, 1920.

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## FOR THE UPPER TRANSIT AT WASHINGTON.

Washington Mean Time.	$\alpha$ Ceyg. Mag. 4.3		$\mu$ Capricorn. Mag. 5.2		$\gamma$ Grus. Mag. 3.2		16 Pegasi. Mag. 5.0	
	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.
	h m 21 48	° ' " +48 56	h m 21 48	° ' " -13 55	h m 21 49	° ' " -37 44	h m 21 49	° ' " +25 32
	s	"	s	"	s	"	s	"
Jan. 1.1	49.782	38.65	56.061	41.81	4.961	32.97	25.201	67.20
11.1	49.638 <sup>144</sup>	36.34 <sup>231</sup>	56.020 <sup>41</sup>	41.99 <sup>18</sup>	4.891 <sup>60</sup>	31.97 <sup>100</sup>	25.127 <sup>74</sup>	65.39 <sup>181</sup>
21.1	49.598 <sup>100</sup>	33.72 <sup>269</sup>	56.008 <sup>12</sup>	42.06 <sup>7</sup>	4.867 <sup>24</sup>	30.72 <sup>126</sup>	25.068 <sup>39</sup>	63.44 <sup>195</sup>
31.0	49.486 <sup>52</sup>	30.91 <sup>231</sup>	56.025 <sup>17</sup>	42.01 <sup>5</sup>	4.880 <sup>13</sup>	29.26 <sup>146</sup>	25.078 <sup>10</sup>	61.41 <sup>203</sup>
Feb. 10.0	49.487 <sup>1</sup>	28.01 <sup>290</sup>	56.072 <sup>47</sup>	41.80 <sup>21</sup>	4.932 <sup>52</sup>	27.69 <sup>167</sup>	25.104 <sup>26</sup>	59.41 <sup>200</sup>
	55 <sup>298</sup>		80 <sup>298</sup>		91 <sup>182</sup>	182 <sup>182</sup>	61 <sup>182</sup>	193 <sup>182</sup>
20.0	49.542	25.15	56.152	41.41	5.023	25.77	25.165	57.48
Mar. 1.0	49.652 <sup>110</sup>	22.43 <sup>273</sup>	56.261 <sup>109</sup>	40.86 <sup>58</sup>	5.151 <sup>138</sup>	23.62 <sup>195</sup>	25.264 <sup>99</sup>	55.75 <sup>173</sup>
10.9	49.818 <sup>108</sup>	19.99 <sup>244</sup>	56.403 <sup>142</sup>	40.11 <sup>75</sup>	5.316 <sup>165</sup>	21.77 <sup>208</sup>	25.400 <sup>136</sup>	54.29 <sup>146</sup>
20.9	50.038 <sup>290</sup>	17.92 <sup>267</sup>	56.575 <sup>173</sup>	39.16 <sup>95</sup>	5.520 <sup>204</sup>	19.65 <sup>212</sup>	25.570 <sup>170</sup>	53.15 <sup>114</sup>
30.9	50.307 <sup>298</sup>	16.29 <sup>163</sup>	56.778 <sup>203</sup>	38.01 <sup>115</sup>	5.758 <sup>238</sup>	17.51 <sup>214</sup>	25.779 <sup>209</sup>	52.41 <sup>74</sup>
	313 <sup>230</sup>	113 <sup>230</sup>	133 <sup>230</sup>		273 <sup>273</sup>	214 <sup>214</sup>	242 <sup>242</sup>	29 <sup>29</sup>
Apr. 9.9	50.620	15.17	57.008	36.69	6.061	16.67	26.021	52.12
19.8	50.970 <sup>250</sup>	14.60 <sup>57</sup>	57.266 <sup>258</sup>	35.22 <sup>147</sup>	6.332 <sup>301</sup>	13.29 <sup>268</sup>	26.201 <sup>270</sup>	52.27 <sup>15</sup>
29.8	51.349 <sup>379</sup>	14.63 <sup>3</sup>	57.546 <sup>280</sup>	33.62 <sup>160</sup>	6.660 <sup>328</sup>	11.90 <sup>199</sup>	26.581 <sup>290</sup>	52.87 <sup>60</sup>
May 9.8	51.746 <sup>297</sup>	15.21 <sup>58</sup>	57.841 <sup>298</sup>	31.94 <sup>168</sup>	7.011 <sup>351</sup>	9.48 <sup>182</sup>	26.892 <sup>311</sup>	53.92 <sup>105</sup>
19.7	52.160 <sup>404</sup>	16.35 <sup>114</sup>	58.150 <sup>309</sup>	30.20 <sup>174</sup>	7.372 <sup>381</sup>	7.82 <sup>166</sup>	27.213 <sup>321</sup>	55.38 <sup>146</sup>
	400 <sup>166</sup>	166 <sup>166</sup>	313 <sup>175</sup>		368 <sup>142</sup>	142 <sup>142</sup>	322 <sup>322</sup>	182 <sup>182</sup>
29.7	52.550	18.01	58.463	28.45	7.740	6.40	27.535	57.20
June 8.7	52.938 <sup>288</sup>	20.14 <sup>213</sup>	58.773 <sup>310</sup>	26.76 <sup>199</sup>	8.104 <sup>384</sup>	5.24 <sup>116</sup>	27.848 <sup>313</sup>	59.33 <sup>213</sup>
18.7	53.300 <sup>362</sup>	22.67 <sup>239</sup>	59.071 <sup>296</sup>	25.19 <sup>187</sup>	8.457 <sup>353</sup>	4.88 <sup>86</sup>	28.148 <sup>300</sup>	61.72 <sup>239</sup>
28.6	53.629 <sup>339</sup>	25.52 <sup>235</sup>	59.352 <sup>281</sup>	23.73 <sup>146</sup>	8.789 <sup>332</sup>	3.85 <sup>53</sup>	28.428 <sup>280</sup>	64.29 <sup>257</sup>
July 8.6	53.915 <sup>288</sup>	28.65 <sup>313</sup>	59.606 <sup>264</sup>	22.46 <sup>127</sup>	9.069 <sup>300</sup>	3.63 <sup>22</sup>	28.676 <sup>243</sup>	66.98 <sup>269</sup>
	237 <sup>339</sup>	339 <sup>339</sup>	222 <sup>106</sup>		268 <sup>268</sup>	14 <sup>14</sup>	210 <sup>210</sup>	274 <sup>274</sup>
18.6	54.152 <sup>181</sup>	31.94 <sup>340</sup>	59.823 <sup>184</sup>	21.38 <sup>84</sup>	9.352 <sup>217</sup>	3.77 <sup>44</sup>	28.886 <sup>173</sup>	69.72 <sup>272</sup>
28.6	54.333 <sup>123</sup>	35.34 <sup>343</sup>	60.012 <sup>141</sup>	20.54 <sup>61</sup>	9.569 <sup>187</sup>	4.21 <sup>76</sup>	29.059 <sup>125</sup>	72.44 <sup>265</sup>
Aug. 7.5	54.456 <sup>64</sup>	38.77 <sup>343</sup>	60.158 <sup>141</sup>	19.98 <sup>38</sup>	9.736 <sup>112</sup>	4.96 <sup>100</sup>	29.184 <sup>81</sup>	75.09 <sup>254</sup>
17.5	54.520 <sup>124</sup>	42.14 <sup>337</sup>	60.249 <sup>96</sup>	19.55 <sup>38</sup>	9.848 <sup>112</sup>	5.96 <sup>180</sup>	29.285 <sup>81</sup>	77.63 <sup>254</sup>
27.5	54.523 <sup>3</sup>	45.40 <sup>336</sup>	60.301 <sup>53</sup>	19.41 <sup>14</sup>	9.904 <sup>56</sup>	7.18 <sup>122</sup>	29.298 <sup>23</sup>	80.00 <sup>287</sup>
	53 <sup>307</sup>	307 <sup>307</sup>	4 <sup>6</sup>		3 <sup>187</sup>	187 <sup>187</sup>	8 <sup>8</sup>	213 <sup>213</sup>
Sept. 6.4	54.470	48.47	60.305	19.47	9.907	8.55	29.290	82.13
16.4	54.364 <sup>108</sup>	51.30 <sup>288</sup>	60.268 <sup>37</sup>	19.70 <sup>23</sup>	9.856 <sup>51</sup>	10.02 <sup>147</sup>	29.237 <sup>53</sup>	84.01 <sup>188</sup>
26.4	54.210 <sup>154</sup>	58.81 <sup>281</sup>	60.196 <sup>73</sup>	20.09 <sup>39</sup>	9.760 <sup>96</sup>	11.51 <sup>149</sup>	29.146 <sup>91</sup>	85.64 <sup>163</sup>
Oct. 6.4	54.017 <sup>193</sup>	55.97 <sup>216</sup>	60.092 <sup>194</sup>	20.59 <sup>50</sup>	9.622 <sup>128</sup>	12.98 <sup>147</sup>	29.029 <sup>117</sup>	86.92 <sup>128</sup>
16.3	53.791 <sup>226</sup>	57.72 <sup>175</sup>	59.964 <sup>128</sup>	21.17 <sup>56</sup>	9.455 <sup>107</sup>	14.32 <sup>134</sup>	28.883 <sup>146</sup>	87.89 <sup>97</sup>
	243 <sup>131</sup>	131 <sup>131</sup>	141 <sup>141</sup>		196 <sup>196</sup>	117 <sup>117</sup>	180 <sup>180</sup>	63 <sup>63</sup>
26.3	53.543	59.08	59.823	21.79	9.269	15.49	28.723	88.52
Nov. 5.3	53.279 <sup>264</sup>	59.87 <sup>84</sup>	59.673 <sup>180</sup>	22.43 <sup>64</sup>	9.070 <sup>199</sup>	16.45 <sup>96</sup>	28.554 <sup>169</sup>	88.80 <sup>28</sup>
15.3	53.011 <sup>265</sup>	60.19 <sup>32</sup>	59.525 <sup>146</sup>	23.05 <sup>63</sup>	8.873 <sup>197</sup>	17.14 <sup>99</sup>	28.384 <sup>170</sup>	88.70 <sup>10</sup>
25.2	52.746 <sup>265</sup>	59.99 <sup>20</sup>	59.384 <sup>141</sup>	23.64 <sup>59</sup>	8.683 <sup>190</sup>	17.52 <sup>28</sup>	28.221 <sup>163</sup>	88.22 <sup>48</sup>
Dec. 5.2	52.494 <sup>263</sup>	59.27 <sup>72</sup>	59.258 <sup>126</sup>	24.19 <sup>55</sup>	8.513 <sup>170</sup>	17.61 <sup>9</sup>	28.067 <sup>154</sup>	87.43 <sup>79</sup>
	233 <sup>123</sup>	123 <sup>123</sup>	107 <sup>107</sup>	45 <sup>45</sup>	149 <sup>149</sup>	21 <sup>21</sup>	137 <sup>137</sup>	114 <sup>114</sup>
15.2	52.261	58.05	59.151	24.64	8.364	17.40	27.930	86.29
25.1	52.056 <sup>205</sup>	56.35 <sup>170</sup>	59.067 <sup>84</sup>	25.02 <sup>38</sup>	8.247 <sup>117</sup>	16.87 <sup>53</sup>	27.815 <sup>115</sup>	84.84 <sup>145</sup>
35.1	51.886 <sup>170</sup>	54.22 <sup>213</sup>	59.009 <sup>56</sup>	25.30 <sup>28</sup>	8.162 <sup>85</sup>	16.06 <sup>81</sup>	27.723 <sup>92</sup>	83.16 <sup>168</sup>
Mean Place	50.184	20.25	56.159	44.87	5.335	30.67	25.268	53.85
Sec $\delta$ , Tan $\delta$	1.523	+1.148	1.030	-0.248	1.265	-0.774	1.108	+0.478
$D\psi_a, D\omega_a$	+0.044	-0.063	+0.065	+0.014	+0.072	+0.043	+0.054	-0.027
$D\psi_\delta, D\omega_\delta$	+0.33	-0.56	+0.33	-0.54	+0.33	-0.54	+0.34	-0.54

APPARENT PLACES OF STARS, 1920.

FOR THE UPPER TRANSIT AT WASHINGTON.

Washington Mean Time.	79 Draconis. Mag. 6.6		29 Pegasi. Mag. 5.7		ε Indi. Mag. 4.7		α Aquarii. Mag. 3.2	
	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.
	h m	° '	h m	° '	h m	° '	h m	° '
	21 51	+73 19	21 57	+12 44	21 57	-57 6	22 1	- 0 42
	s	"	s	"	s	"	s	"
Jan. 1.1	49.62	47.36	11.499	20.16	13.950	61.46	40.559	25.98
11.1	49.12 50	45.11 225	11.441 58	18.88 133	13.826 124	59.68 180	40.510 49	26.78 80
21.1	48.78 89	42.43 268	11.410 31	17.48 140	13.757 69	57.55 213	40.483 27	27.54 76
31.1	48.46 27	39.44 299	11.407 3	16.02 141	13.746 11	55.15 240	40.483 0	28.23 69
Feb. 10.0	48.31 16	36.24 330	11.434 27	14.67 126	13.794 45	52.54 261	40.514 31	28.81 58
	0	337	59	128	106	275	56	43
20.0	48.31	32.97	11.493	18.44	18.900	49.79	40.572	29.24
Mar. 1.0	48.45 14	29.78 319	11.564 91	12.40 104	14.064 164	46.95 294	40.663 91	29.48 24
10.9	48.72 27	26.76 302	11.709 126	11.61 79	14.282 218	44.09 298	40.785 123	29.49 1
20.9	49.13 41	24.03 273	11.867 168	11.11 50	14.556 274	41.26 283	40.939 154	29.24 25
30.9	49.65 52	21.78 290	12.057 199	10.96 15	14.882 328	38.52 274	41.123 184	28.72 53
	68	180	222	26	374	286	217	80
Apr. 9.9	50.38	19.93	12.279	11.16	15.256	35.94	41.340	27.92
19.8	50.99 71	18.68 125	12.529 259	11.74 86	15.672 416	33.56 298	41.584 244	26.87 105
29.8	51.76 77	18.02 66	12.801 272	12.67 98	16.125 453	31.44 212	41.849 265	25.55 132
May 9.8	52.56 80	17.99 3	13.092 291	13.94 197	16.695 480	29.61 153	42.186 287	24.03 152
19.8	53.38 82	18.57 58	13.396 364	15.63 159	17.106 501	28.14 147	42.434 296	22.32 171
	80	118	307	182	609	109	308	184
29.7	54.18	19.75	13.703	17.36	17.615	27.05	42.787	20.48
June 8.7	54.94 76	21.47 172	14.006 303	19.41 205	18.121 506	26.87 68	43.040 308	18.57 191
18.7	55.64 70	23.70 223	14.300 294	21.60 219	18.611 690	26.12 25	43.333 303	16.61 196
28.6	56.27 68	26.37 267	14.574 274	23.88 228	19.075 464	26.32 30	43.608 275	14.68 163
July 8.6	56.80 43	29.42 338	14.821 247	26.18 230	19.497 523	26.98 61	43.861 253	12.85 172
			215	228	632	106	221	178
18.6	57.23 31	32.75 344	15.066 178	28.46 236	19.969 818	27.96 141	44.082 188	11.12 158
28.6	57.54 19	36.29 367	15.214 136	30.66 206	20.182 818	29.37 175	44.285 145	9.54 137
Aug. 7.5	57.73 7	39.96 347	15.360 93	32.72 202	20.424 242	31.12 107	44.410 101	8.17 117
17.5	57.80 6	43.69 371	15.443 48	34.63 171	20.591 167	33.14 202	44.511 58	7.00 96
27.5	57.74 18	47.40 359	15.491 6	36.84 149	20.680 10	35.85 283	44.569 15	6.04 73
Sept. 6.5	57.56 29	50.99 342	15.497 35	37.63 134	20.690 66	37.68 286	44.584 24	5.31 50
16.4	57.27 40	54.41 318	15.462 70	39.07 100	20.624 135	40.04 299	44.590 63	4.81 31
26.4	56.87 49	57.59 286	15.392 99	40.07 74	20.489 196	42.96 214	44.496 89	4.50 10
Oct. 6.4	56.38 63	60.45 201	15.293 138	41.29 21	20.293 232	44.47 168	44.409 181	4.40 25
16.3	55.81 63	62.91 246	15.170 138	41.29 21	20.047 246	46.37 190	44.296 114	4.48 8
						166	181	25
26.3	55.18 68	64.92 150	15.032 146	41.50 3	19.765 303	47.96 118	44.164 129	4.73 39
Nov. 5.3	54.50 71	66.42 94	14.886 149	41.47 30	19.462 810	49.11 75	44.026 139	5.12 50
15.3	53.79 73	67.36 88	14.738 144	41.17 83	19.152 301	49.98 27	43.886 137	5.62 69
25.2	53.06 68	67.74 24	14.594 133	40.65 77	18.851 281	50.18 68	43.749 124	6.22 60
Dec. 5.2	52.35 68	67.50 85	14.462 116	39.88 96	18.570 248	49.96 68	43.625 111	6.91 75
15.2	51.67 63	66.65 143	14.346 98	38.92 115	18.322 307	49.25 114	43.514 91	7.66 79
25.2	51.04 56	65.22 196	14.248 75	37.77 126	18.115 160	48.11 154	43.423 68	8.45 82
35.1	50.48	63.26	14.173	36.48	17.966	46.57	43.355	9.27
Mean Place	51.398	25.01	11.482	10.66	14.925	55.62	40.541	32.33
Sec δ, Tan δ	3.486	+3.339	1.025	+0.226	1.842	-1.546	1.000	-0.012
D <sub>α</sub> , D <sub>αα</sub>	+0.014	-0.189	+0.058	-0.013	+0.062	+0.069	+0.061	+0.001
D <sub>δ</sub> , D <sub>δδ</sub>	+0.34	-0.53	+0.34	-0.51	+0.34	-0.51	+0.35	-0.49

# APPARENT PLACES OF STARS, 1920.

495

## FOR THE UPPER TRANSIT AT WASHINGTON.

Washington Mean Time.	♈ Aquarii. Mag. 4.4		♁ Cephei. Mag. 5.4		♊ Gruis. Mag. 2.2		♈ Pegasi. Mag. 4.0	
	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.
	h m 22 2	° ' " -14 15	h m 22 2	° ' " +62 23	h m 22 3	° ' " -47 20	h m 22 3	° ' " +24 57
Jan. 1.1	7.043 <sup>52</sup>	27.58 <sup>17</sup>	33.95 <sup>17</sup>	63.19 <sup>17</sup>	11.290 <sup>100</sup>	62.28 <sup>100</sup>	17.177 <sup>79</sup>	27.16 <sup>170</sup>
11.1	6.991 <sup>28</sup>	27.75 <sup>7</sup>	33.67 <sup>26</sup>	60.99 <sup>220</sup>	11.190 <sup>100</sup>	60.83 <sup>140</sup>	17.098 <sup>52</sup>	25.46 <sup>170</sup>
21.1	6.968 <sup>—</sup>	27.82 <sup>—</sup>	33.46 <sup>21</sup>	58.39 <sup>200</sup>	11.130 <sup>60</sup>	59.14 <sup>160</sup>	17.046 <sup>21</sup>	23.61 <sup>185</sup>
31.1	6.972 <sup>4</sup>	27.74 <sup>8</sup>	33.31 <sup>15</sup>	55.50 <sup>230</sup>	11.115 <sup>15</sup>	57.18 <sup>196</sup>	17.025 <sup>21</sup>	21.67 <sup>194</sup>
Feb. 10.0	7.005 <sup>38</sup>	27.49 <sup>26</sup>	33.23 <sup>8</sup>	52.41 <sup>300</sup>	11.144 <sup>20</sup>	55.01 <sup>217</sup>	17.037 <sup>12</sup>	19.72 <sup>195</sup>
20.0	7.069 <sup>—</sup>	27.06 <sup>—</sup>	33.23 <sup>—</sup>	49.27 <sup>—</sup>	11.220 <sup>—</sup>	52.64 <sup>—</sup>	17.062 <sup>—</sup>	17.85 <sup>—</sup>
Mar. 1.0	7.163 <sup>94</sup>	26.48 <sup>60</sup>	33.32 <sup>9</sup>	46.21 <sup>306</sup>	11.341 <sup>121</sup>	50.15 <sup>240</sup>	17.166 <sup>84</sup>	16.16 <sup>160</sup>
10.9	7.290 <sup>127</sup>	25.69 <sup>79</sup>	33.49 <sup>17</sup>	43.33 <sup>288</sup>	11.507 <sup>106</sup>	47.50 <sup>266</sup>	17.288 <sup>122</sup>	14.70 <sup>146</sup>
20.9	7.449 <sup>159</sup>	24.70 <sup>99</sup>	33.74 <sup>25</sup>	40.76 <sup>267</sup>	11.717 <sup>210</sup>	45.00 <sup>266</sup>	17.447 <sup>159</sup>	13.57 <sup>113</sup>
30.9	7.639 <sup>190</sup>	23.50 <sup>120</sup>	34.08 <sup>34</sup>	38.60 <sup>216</sup>	11.970 <sup>253</sup>	42.43 <sup>257</sup>	17.642 <sup>195</sup>	12.81 <sup>76</sup>
Apr. 9.9	7.860 <sup>221</sup>	22.14 <sup>186</sup>	34.48 <sup>40</sup>	36.03 <sup>167</sup>	12.264 <sup>294</sup>	39.64 <sup>249</sup>	17.871 <sup>229</sup>	12.47 <sup>34</sup>
19.8	8.109 <sup>249</sup>	20.61 <sup>163</sup>	34.93 <sup>45</sup>	35.81 <sup>112</sup>	12.564 <sup>330</sup>	37.55 <sup>239</sup>	18.132 <sup>261</sup>	12.57 <sup>10</sup>
29.8	8.382 <sup>273</sup>	18.95 <sup>166</sup>	35.42 <sup>49</sup>	35.28 <sup>53</sup>	12.955 <sup>361</sup>	35.36 <sup>219</sup>	18.418 <sup>236</sup>	13.12 <sup>55</sup>
May 9.8	8.674 <sup>292</sup>	17.21 <sup>174</sup>	35.94 <sup>52</sup>	35.36 <sup>8</sup>	13.341 <sup>396</sup>	33.37 <sup>199</sup>	18.724 <sup>306</sup>	14.10 <sup>98</sup>
19.8	8.981 <sup>307</sup>	15.42 <sup>179</sup>	36.48 <sup>54</sup>	36.03 <sup>67</sup>	13.747 <sup>406</sup>	31.67 <sup>170</sup>	19.042 <sup>318</sup>	15.48 <sup>138</sup>
29.7	9.294 <sup>318</sup>	13.64 <sup>178</sup>	37.02 <sup>54</sup>	37.28 <sup>135</sup>	14.162 <sup>415</sup>	30.28 <sup>139</sup>	19.365 <sup>323</sup>	17.23 <sup>175</sup>
June 8.7	9.607 <sup>313</sup>	11.91 <sup>173</sup>	37.54 <sup>53</sup>	39.07 <sup>179</sup>	14.573 <sup>411</sup>	29.23 <sup>106</sup>	19.685 <sup>320</sup>	19.31 <sup>208</sup>
18.7	9.910 <sup>303</sup>	10.29 <sup>163</sup>	38.03 <sup>49</sup>	41.33 <sup>226</sup>	14.976 <sup>408</sup>	28.54 <sup>66</sup>	19.992 <sup>307</sup>	21.62 <sup>231</sup>
28.6	10.197 <sup>287</sup>	8.79 <sup>160</sup>	38.47 <sup>44</sup>	44.02 <sup>260</sup>	15.355 <sup>370</sup>	28.24 <sup>30</sup>	20.279 <sup>287</sup>	24.14 <sup>252</sup>
July 8.6	10.459 <sup>262</sup>	7.48 <sup>181</sup>	38.86 <sup>39</sup>	47.06 <sup>304</sup>	15.707 <sup>352</sup>	28.37 <sup>13</sup>	20.537 <sup>258</sup>	26.77 <sup>263</sup>
18.6	10.691 <sup>232</sup>	6.39 <sup>109</sup>	39.19 <sup>33</sup>	50.36 <sup>330</sup>	16.014 <sup>307</sup>	28.85 <sup>48</sup>	20.762 <sup>225</sup>	29.47 <sup>270</sup>
28.6	10.885 <sup>194</sup>	5.51 <sup>88</sup>	39.43 <sup>24</sup>	53.86 <sup>350</sup>	16.272 <sup>258</sup>	29.71 <sup>86</sup>	20.948 <sup>186</sup>	32.17 <sup>270</sup>
Aug. 7.5	11.037 <sup>152</sup>	4.90 <sup>61</sup>	39.61 <sup>18</sup>	57.47 <sup>361</sup>	16.476 <sup>204</sup>	30.90 <sup>119</sup>	21.090 <sup>142</sup>	34.80 <sup>268</sup>
17.5	11.145 <sup>108</sup>	4.51 <sup>39</sup>	39.70 <sup>9</sup>	61.12 <sup>365</sup>	16.619 <sup>148</sup>	32.37 <sup>147</sup>	21.186 <sup>96</sup>	37.31 <sup>251</sup>
27.5	11.208 <sup>63</sup>	4.37 <sup>14</sup>	39.72 <sup>2</sup>	64.73 <sup>361</sup>	16.697 <sup>78</sup>	34.07 <sup>170</sup>	21.236 <sup>50</sup>	39.66 <sup>235</sup>
Sept. 6.5	11.225 <sup>17</sup>	4.44 <sup>7</sup>	39.66 <sup>6</sup>	68.22 <sup>349</sup>	16.710 <sup>13</sup>	35.94 <sup>187</sup>	21.241 <sup>5</sup>	41.79 <sup>213</sup>
16.4	11.201 <sup>24</sup>	4.71 <sup>27</sup>	39.53 <sup>13</sup>	71.52 <sup>330</sup>	16.668 <sup>47</sup>	37.88 <sup>194</sup>	21.205 <sup>36</sup>	43.70 <sup>191</sup>
26.4	11.138 <sup>68</sup>	5.13 <sup>42</sup>	39.33 <sup>20</sup>	74.55 <sup>308</sup>	16.561 <sup>109</sup>	39.88 <sup>195</sup>	21.130 <sup>75</sup>	45.32 <sup>162</sup>
Oct. 6.4	11.045 <sup>93</sup>	5.67 <sup>54</sup>	39.06 <sup>27</sup>	77.27 <sup>272</sup>	16.411 <sup>150</sup>	41.67 <sup>134</sup>	21.024 <sup>106</sup>	46.66 <sup>134</sup>
16.3	10.926 <sup>119</sup>	6.30 <sup>68</sup>	38.75 <sup>31</sup>	79.60 <sup>233</sup>	16.221 <sup>190</sup>	43.35 <sup>168</sup>	20.894 <sup>130</sup>	47.67 <sup>101</sup>
26.3	10.790 <sup>136</sup>	6.98 <sup>68</sup>	38.34 <sup>34</sup>	81.48 <sup>188</sup>	16.000 <sup>221</sup>	44.82 <sup>147</sup>	20.745 <sup>149</sup>	48.35 <sup>68</sup>
Nov. 5.3	10.645 <sup>145</sup>	7.67 <sup>69</sup>	38.59 <sup>38</sup>	82.87 <sup>139</sup>	16.000 <sup>236</sup>	44.82 <sup>114</sup>	20.745 <sup>160</sup>	48.35 <sup>33</sup>
15.3	10.498 <sup>147</sup>	8.34 <sup>67</sup>	38.01 <sup>40</sup>	82.87 <sup>85</sup>	15.764 <sup>236</sup>	45.96 <sup>80</sup>	20.585 <sup>163</sup>	48.68 <sup>1</sup>
25.2	10.357 <sup>141</sup>	8.97 <sup>68</sup>	37.61 <sup>41</sup>	83.72 <sup>30</sup>	15.521 <sup>243</sup>	46.76 <sup>43</sup>	20.422 <sup>161</sup>	48.67 <sup>37</sup>
Dec. 5.2	10.228 <sup>129</sup>	9.53 <sup>56</sup>	37.20 <sup>40</sup>	84.02 <sup>29</sup>	15.288 <sup>220</sup>	47.19 <sup>0</sup>	20.261 <sup>152</sup>	48.30 <sup>71</sup>
15.2	10.116 <sup>112</sup>	10.02 <sup>49</sup>	36.80 <sup>39</sup>	83.73 <sup>86</sup>	15.068 <sup>196</sup>	47.19 <sup>38</sup>	20.109 <sup>138</sup>	47.59 <sup>104</sup>
25.2	10.023 <sup>98</sup>	10.41 <sup>39</sup>	36.41 <sup>35</sup>	82.87 <sup>144</sup>	14.870 <sup>163</sup>	46.81 <sup>78</sup>	19.971 <sup>119</sup>	46.55 <sup>133</sup>
35.1	9.955 <sup>68</sup>	10.70 <sup>29</sup>	36.06 <sup>31</sup>	81.48 <sup>193</sup>	14.707 <sup>128</sup>	46.03 <sup>116</sup>	19.852 <sup>98</sup>	45.22 <sup>160</sup>
35.1	9.955 <sup>68</sup>	10.70 <sup>29</sup>	35.75 <sup>31</sup>	79.50 <sup>193</sup>	14.579 <sup>128</sup>	44.87 <sup>116</sup>	19.754 <sup>98</sup>	43.62 <sup>160</sup>
Mean Place	7.089	30.24	34.590	41.75	11.852	57.47	17.152	13.75
Sec δ, Tan δ	1.032	-0.254	2.158	+1.913	1.476	-1.085	1.103	+0.465
D <sub>α</sub> , D <sub>ωα</sub>	+0.064	+0.015	+0.036	-0.111	+0.075	+0.063	+0.055	-0.027
D <sub>δ</sub> , D <sub>ωδ</sub>	+0.35	-0.49	+0.35	-0.49	+0.35	-0.49	+0.35	-0.49

FOR THE UPPER TRANSIT AT WASHINGTON.

Washington Mean Time.	θ Pegasi. Mag. 3.7		τ Pegasi. Mag. 4.4		γ Cephei. Mag. 3.6		24 Cephei. Mag. 5.0	
	Right Ascension.	Declination.	Right Ascension.	Declination.	Right Ascension.	Declination.	Right Ascension.	Declination.
	h m	° ' "	h m	° ' "	h m	° ' "	h m	° ' "
	22 6	+ 5 48	22 6	+32 47	22 8	+57 48	22 8	+71 56
	"	"	"	"	"	"	"	"
Jan. 1.1	9.941	21.95	25.986	22.17	4.219	44.67	15.13	71.06
11.1	9.884	20.90	25.886	22.17	3.987	42.61	14.65	69.59
21.1	9.852	19.84	25.816	18.20	3.804	39.98	14.26	67.05
31.1	9.845	18.81	25.779	15.97	3.677	37.17	13.97	64.18
Feb. 10.0	9.868	17.86	25.777	13.69	3.613	34.17	13.80	61.06
20.0	9.920	17.04	25.815	11.46	3.618	31.13	13.75	57.83
Mar. 1.0	10.005	16.42	25.893	9.38	3.695	28.16	13.83	54.62
11.0	10.121	16.03	26.014	7.58	3.844	25.38	14.04	51.56
20.9	10.271	15.91	26.176	6.01	4.062	22.90	14.38	48.76
30.9	10.452	16.10	26.379	4.88	4.347	20.83	14.83	46.35
Apr. 9.9	10.666	16.59	26.619	4.30	4.602	19.24	15.39	44.40
19.8	10.907	17.41	26.893	3.99	5.068	18.18	16.02	43.00
29.8	11.174	18.54	27.195	4.27	5.525	17.71	16.72	42.17
May 9.8	11.459	19.94	27.517	5.04	5.968	17.83	17.46	41.96
19.8	11.758	21.59	27.853	6.28	6.468	18.58	18.22	42.35
29.7	12.064	23.43	28.193	7.94	6.948	19.81	18.98	43.35
June 8.7	12.387	25.41	28.529	9.97	7.417	21.60	19.72	44.91
18.7	12.662	27.48	28.851	12.32	7.861	23.37	20.40	46.98
28.7	12.940	29.58	29.151	14.96	8.267	26.52	21.02	49.51
July 8.6	13.193	31.67	29.421	17.71	8.627	29.53	21.56	52.43
18.6	13.416	33.68	29.656	20.62	8.983	32.80	22.01	55.66
28.6	13.603	35.57	29.848	23.57	9.174	36.23	22.36	59.15
Aug. 7.5	13.750	37.31	29.994	26.50	9.348	39.79	22.60	62.79
17.5	13.854	38.85	30.092	29.35	9.453	43.36	22.71	66.51
27.5	13.914	40.19	30.142	32.66	9.487	46.90	22.72	70.24
Sept. 6.5	13.931	41.30	30.144	34.56	9.453	50.29	22.62	73.89
16.4	13.909	42.19	30.102	36.87	9.353	53.50	22.41	77.38
26.4	13.851	42.83	30.020	38.87	9.194	56.46	22.09	80.65
Oct. 6.4	13.763	43.26	29.903	40.56	8.981	59.09	21.69	83.62
16.4	13.651	43.45	29.760	41.92	8.725	61.86	21.21	86.23
26.3	13.523	43.45	29.596	42.89	8.434	63.16	20.67	88.41
Nov. 5.3	13.385	43.24	29.420	43.48	8.116	64.49	20.07	90.11
15.3	13.245	42.86	29.238	43.66	7.781	65.32	19.44	91.26
25.2	13.108	42.30	29.057	43.43	7.442	65.87	18.79	91.84
Dec. 5.2	12.981	41.58	28.884	42.79	7.108	65.87	18.14	91.81
15.2	12.869	40.74	28.724	41.75	6.787	64.42	17.51	91.18
25.2	12.774	39.78	28.581	40.36	6.461	63.02	16.92	89.95
35.1	12.700	38.75	28.463	38.63	6.230	61.13	16.39	88.16
Mean Place	9.885	13.81	25.985	6.70	4.601	23.78	16.356	48.75
Sec δ, Tan δ	1.005	+0.102	1.190	+0.644	1.877	+1.589	3.228	+3.069
D <sub>v</sub> α, D <sub>ω</sub> α	+0.060	-0.006	+0.053	-0.038	+0.041	-0.004	+0.023	-0.181
D <sub>v</sub> δ, D <sub>ω</sub> δ	+0.35	-0.48	+0.35	-0.48	+0.35	-0.47	+0.35	-0.47

# APPARENT PLACES OF STARS, 1920.

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FOR THE UPPER TRANSIT AT WASHINGTON.

Washington Mean Time.	θ Aquarii. Mag. 4.3		α Tucanæ. Mag. 2.9		γ Aquarii. Mag. 4.0		β Pegasi. Mag. 4.9	
	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.
	h m 22 12	° ' " - 8 10	h m 22 13	° ' " -60 38	h m 22 17	° ' " - 1 46	h m 22 17	° ' " +11 48
	s	"	s	"	s	"	s	"
Jan. 1.1	36.833 <sup>59</sup>	51.46 <sup>46</sup>	0.79 <sup>19</sup>	98.71 <sup>191</sup>	31.572 <sup>62</sup>	81.14 <sup>73</sup>	34.943 <sup>70</sup>	15.55 <sup>122</sup>
11.1	36.774 <sup>32</sup>	51.92 <sup>39</sup>	0.60 <sup>13</sup>	96.80 <sup>227</sup>	31.510 <sup>37</sup>	81.87 <sup>68</sup>	34.873 <sup>48</sup>	14.33 <sup>129</sup>
21.1	36.742 <sup>8</sup>	52.31 <sup>28</sup>	0.47 <sup>7</sup>	94.53 <sup>258</sup>	31.473 <sup>16</sup>	82.55 <sup>60</sup>	34.825 <sup>19</sup>	13.04 <sup>130</sup>
31.1	36.734 <sup>23</sup>	52.57 <sup>11</sup>	0.40 <sup>1</sup>	91.95 <sup>283</sup>	31.457 <sup>16</sup>	83.15 <sup>48</sup>	34.806 <sup>8</sup>	11.74 <sup>125</sup>
Feb. 10.0	36.757 <sup>50</sup>	52.68 <sup>5</sup>	0.39 <sup>7</sup>	89.12 <sup>298</sup>	31.473 <sup>44</sup>	83.63 <sup>36</sup>	34.814 <sup>38</sup>	10.49 <sup>114</sup>
20.0	36.807 <sup>83</sup>	52.63 <sup>24</sup>	0.46 <sup>12</sup>	86.14 <sup>310</sup>	31.517 <sup>75</sup>	83.99 <sup>15</sup>	34.852 <sup>71</sup>	9.35 <sup>97</sup>
Mar. 1.0	36.890 <sup>113</sup>	52.39 <sup>43</sup>	0.58 <sup>19</sup>	83.04 <sup>313</sup>	31.592 <sup>105</sup>	84.14 <sup>8</sup>	34.923 <sup>104</sup>	8.38 <sup>74</sup>
11.0	37.003 <sup>145</sup>	51.96 <sup>69</sup>	0.77 <sup>25</sup>	79.91 <sup>311</sup>	31.697 <sup>141</sup>	84.06 <sup>33</sup>	35.027 <sup>188</sup>	7.64 <sup>46</sup>
20.9	37.148 <sup>178</sup>	51.27 <sup>91</sup>	1.02 <sup>31</sup>	76.80 <sup>302</sup>	31.838 <sup>171</sup>	83.73 <sup>58</sup>	35.165 <sup>173</sup>	7.18 <sup>13</sup>
30.9	37.326 <sup>210</sup>	50.36 <sup>114</sup>	1.33 <sup>37</sup>	73.78 <sup>287</sup>	32.009 <sup>206</sup>	83.15 <sup>84</sup>	35.338 <sup>206</sup>	7.05 <sup>21</sup>
Apr. 9.9	37.536 <sup>238</sup>	49.22 <sup>135</sup>	1.70 <sup>42</sup>	70.91 <sup>264</sup>	32.215 <sup>233</sup>	82.31 <sup>110</sup>	35.544 <sup>236</sup>	7.26 <sup>56</sup>
19.8	37.774 <sup>263</sup>	47.87 <sup>152</sup>	2.12 <sup>46</sup>	68.27 <sup>238</sup>	32.448 <sup>268</sup>	81.21 <sup>135</sup>	35.780 <sup>264</sup>	7.82 <sup>90</sup>
29.8	38.037 <sup>286</sup>	46.35 <sup>167</sup>	2.58 <sup>50</sup>	65.89 <sup>207</sup>	32.706 <sup>281</sup>	79.86 <sup>156</sup>	36.044 <sup>294</sup>	8.72 <sup>125</sup>
May 9.8	38.323 <sup>298</sup>	44.68 <sup>179</sup>	3.08 <sup>53</sup>	63.82 <sup>169</sup>	32.987 <sup>266</sup>	78.30 <sup>184</sup>	36.328 <sup>299</sup>	9.97 <sup>154</sup>
19.8	38.621 <sup>308</sup>	42.89 <sup>184</sup>	3.60 <sup>54</sup>	62.13 <sup>129</sup>	33.283 <sup>304</sup>	76.57 <sup>184</sup>	36.627 <sup>308</sup>	11.51 <sup>179</sup>
29.7	38.929 <sup>307</sup>	41.05 <sup>185</sup>	4.13 <sup>54</sup>	60.84 <sup>86</sup>	33.587 <sup>306</sup>	74.73 <sup>192</sup>	36.935 <sup>308</sup>	13.30 <sup>199</sup>
June 8.7	39.236 <sup>301</sup>	39.20 <sup>181</sup>	4.67 <sup>52</sup>	59.98 <sup>40</sup>	33.893 <sup>298</sup>	72.81 <sup>194</sup>	37.243 <sup>299</sup>	15.29 <sup>215</sup>
18.7	39.537 <sup>286</sup>	37.39 <sup>173</sup>	5.19 <sup>50</sup>	59.58 <sup>8</sup>	34.191 <sup>263</sup>	70.87 <sup>194</sup>	37.542 <sup>264</sup>	17.44 <sup>224</sup>
28.7	39.823 <sup>284</sup>	35.66 <sup>157</sup>	5.69 <sup>47</sup>	59.66 <sup>96</sup>	34.474 <sup>261</sup>	68.93 <sup>182</sup>	37.826 <sup>260</sup>	19.68 <sup>225</sup>
July 8.6	40.086 <sup>262</sup>	34.09 <sup>140</sup>	6.16 <sup>40</sup>	60.19 <sup>35</sup>	34.735 <sup>234</sup>	67.11 <sup>170</sup>	38.086 <sup>233</sup>	21.93 <sup>224</sup>
18.6	40.319 <sup>197</sup>	32.69 <sup>123</sup>	6.56 <sup>35</sup>	61.15 <sup>139</sup>	34.969 <sup>197</sup>	65.41 <sup>154</sup>	38.319 <sup>184</sup>	24.17 <sup>217</sup>
28.6	40.516 <sup>157</sup>	31.46 <sup>99</sup>	6.91 <sup>27</sup>	62.54 <sup>175</sup>	35.166 <sup>161</sup>	63.87 <sup>135</sup>	38.513 <sup>156</sup>	26.34 <sup>203</sup>
Aug. 7.5	40.673 <sup>116</sup>	30.47 <sup>77</sup>	7.18 <sup>19</sup>	64.29 <sup>203</sup>	35.327 <sup>116</sup>	62.52 <sup>113</sup>	38.668 <sup>113</sup>	28.37 <sup>188</sup>
17.5	40.789 <sup>70</sup>	29.70 <sup>52</sup>	7.37 <sup>11</sup>	66.32 <sup>229</sup>	35.443 <sup>74</sup>	61.39 <sup>90</sup>	38.781 <sup>69</sup>	30.25 <sup>168</sup>
27.5	40.859 <sup>28</sup>	29.18 <sup>29</sup>	7.48 <sup>2</sup>	68.61 <sup>241</sup>	35.517 <sup>20</sup>	60.49 <sup>69</sup>	38.850 <sup>27</sup>	31.93 <sup>147</sup>
Sept. 6.5	40.887 <sup>14</sup>	28.89 <sup>10</sup>	7.50 <sup>6</sup>	71.02 <sup>246</sup>	35.546 <sup>10</sup>	59.80 <sup>45</sup>	38.877 <sup>14</sup>	33.40 <sup>123</sup>
16.4	40.873 <sup>50</sup>	28.79 <sup>11</sup>	7.44 <sup>15</sup>	73.48 <sup>242</sup>	35.536 <sup>44</sup>	59.35 <sup>24</sup>	38.863 <sup>50</sup>	34.63 <sup>100</sup>
26.4	40.823 <sup>83</sup>	28.90 <sup>28</sup>	7.29 <sup>21</sup>	75.90 <sup>228</sup>	35.492 <sup>78</sup>	59.11 <sup>6</sup>	38.813 <sup>82</sup>	35.63 <sup>78</sup>
Oct. 6.4	40.740 <sup>107</sup>	29.18 <sup>41</sup>	7.08 <sup>28</sup>	78.18 <sup>202</sup>	35.414 <sup>101</sup>	59.05 <sup>12</sup>	38.731 <sup>106</sup>	36.36 <sup>49</sup>
16.4	40.633 <sup>126</sup>	29.59 <sup>50</sup>	6.80 <sup>31</sup>	80.20 <sup>169</sup>	35.313 <sup>122</sup>	59.17 <sup>28</sup>	38.625 <sup>126</sup>	36.85 <sup>23</sup>
26.3	40.507 <sup>136</sup>	30.09 <sup>57</sup>	6.49 <sup>35</sup>	81.89 <sup>128</sup>	35.191 <sup>132</sup>	59.45 <sup>42</sup>	38.500 <sup>136</sup>	37.08 <sup>0</sup>
Nov. 5.3	40.371 <sup>139</sup>	30.66 <sup>62</sup>	6.14 <sup>36</sup>	83.17 <sup>86</sup>	35.059 <sup>135</sup>	59.87 <sup>53</sup>	38.364 <sup>141</sup>	37.08 <sup>25</sup>
15.3	40.232 <sup>138</sup>	31.28 <sup>65</sup>	5.78 <sup>36</sup>	84.03 <sup>34</sup>	34.924 <sup>135</sup>	60.40 <sup>60</sup>	38.223 <sup>139</sup>	36.83 <sup>46</sup>
25.2	40.094 <sup>125</sup>	31.93 <sup>65</sup>	5.42 <sup>35</sup>	84.37 <sup>17</sup>	34.789 <sup>125</sup>	61.00 <sup>69</sup>	38.084 <sup>120</sup>	36.37 <sup>87</sup>
Dec. 5.2	39.969 <sup>114</sup>	32.58 <sup>62</sup>	5.07 <sup>31</sup>	84.20 <sup>69</sup>	34.664 <sup>114</sup>	61.69 <sup>72</sup>	37.952 <sup>120</sup>	35.68 <sup>104</sup>
15.2	39.855 <sup>95</sup>	33.20 <sup>59</sup>	4.76 <sup>28</sup>	83.51 <sup>117</sup>	34.550 <sup>99</sup>	62.41 <sup>76</sup>	37.832 <sup>106</sup>	34.81 <sup>87</sup>
25.2	39.760 <sup>73</sup>	33.79 <sup>52</sup>	4.48 <sup>22</sup>	82.34 <sup>162</sup>	34.451 <sup>75</sup>	63.17 <sup>76</sup>	37.726 <sup>86</sup>	33.77 <sup>104</sup>
35.1	39.837	34.31	4.26	80.72	34.376	63.93	37.640	32.57 <sup>120</sup>
Mean Place	36.796	55.54	1.891	91.46	31.482	86.96	34.819	5.75
Sec δ, Tan δ	1.016	-0.144	2.041	-1.779	1.000	-0.031	1.022	+0.209
D <sub>α</sub> , D <sub>ω</sub>	+0.063	+0.008	+0.082	+0.106	+0.062	+0.002	+0.059	-0.013
D <sub>δ</sub> , D <sub>ε</sub>	+0.36	-0.45	+0.36	-0.45	+0.36	-0.43	+0.36	-0.43

APPARENT PLACES OF STARS, 1920.

FOR THE UPPER TRANSIT AT WASHINGTON.

Washington Mean Time.	♁ Lacertæ. Mag. 4.6		♈ Aquarii. Mag. 4.6		♉ Aquarii. Mag. 4.9		♊ Lacertæ. Mag. 3.8	
	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.
	h m 22 20	° ' " +51 49	h m 22 21	° ' " + 0 58	h m 22 26	° ' " -11 4	h m 22 27	° ' " +49 52
	s	"	s	"	s	"	s	"
Jan. 1.2	24.609	60.47	11.598	21.90	25.004	72.81	59.623	34.72
11.1	24.415 <sup>194</sup>	58.46	11.534 <sup>64</sup>	21.07 <sup>83</sup>	24.935 <sup>69</sup>	73.16 <sup>35</sup>	59.436 <sup>187</sup>	32.81 <sup>191</sup>
21.1	24.260 <sup>155</sup>	56.10 <sup>201</sup>	11.493 <sup>41</sup>	20.25 <sup>82</sup>	24.891 <sup>44</sup>	73.40 <sup>24</sup>	59.284 <sup>182</sup>	30.53 <sup>228</sup>
31.1	24.149 <sup>111</sup>	53.44 <sup>266</sup>	11.475 <sup>18</sup>	19.51 <sup>74</sup>	24.872 <sup>19</sup>	73.49 <sup>9</sup>	59.174 <sup>110</sup>	27.97 <sup>256</sup>
Feb. 10.0	24.090 <sup>59</sup>	50.62 <sup>282</sup>	11.485 <sup>10</sup>	18.87 <sup>64</sup>	24.879 <sup>7</sup>	73.42 <sup>7</sup>	59.112 <sup>62</sup>	25.24 <sup>273</sup>
	2	287	38	49	38	24	10	280
20.0	24.088	47.75	11.523	18.38	24.917	73.18	59.102	22.44
Mar. 1.0	24.144 <sup>56</sup>	44.93 <sup>262</sup>	11.593 <sup>70</sup>	18.05 <sup>33</sup>	24.984 <sup>67</sup>	72.75 <sup>43</sup>	59.150 <sup>48</sup>	19.69 <sup>275</sup>
11.0	24.262 <sup>118</sup>	42.29 <sup>264</sup>	11.695 <sup>102</sup>	17.96 <sup>9</sup>	25.084 <sup>100</sup>	72.10 <sup>65</sup>	59.254 <sup>104</sup>	17.12 <sup>257</sup>
20.9	24.441 <sup>179</sup>	39.94 <sup>235</sup>	11.830 <sup>135</sup>	18.11 <sup>15</sup>	25.218 <sup>134</sup>	71.24 <sup>86</sup>	59.418 <sup>184</sup>	14.81 <sup>221</sup>
30.9	24.679 <sup>238</sup>	37.98 <sup>196</sup>	11.998 <sup>168</sup>	18.55 <sup>44</sup>	25.384 <sup>166</sup>	70.15 <sup>109</sup>	59.639 <sup>221</sup>	12.88 <sup>193</sup>
	292	151	202	72	200	129	274	148
Apr. 9.9	24.971	36.47	12.200	19.27	25.584	68.86	59.913	11.40
19.9	25.309 <sup>338</sup>	35.48 <sup>99</sup>	12.431 <sup>231</sup>	20.26 <sup>99</sup>	25.812 <sup>228</sup>	67.39 <sup>147</sup>	60.233 <sup>330</sup>	10.40 <sup>160</sup>
29.8	25.686 <sup>377</sup>	35.05 <sup>43</sup>	12.687 <sup>256</sup>	21.52 <sup>126</sup>	26.070 <sup>258</sup>	65.76 <sup>163</sup>	60.594 <sup>361</sup>	9.98 <sup>42</sup>
May 9.8	26.092 <sup>406</sup>	35.18 <sup>13</sup>	12.967 <sup>290</sup>	23.02 <sup>150</sup>	26.352 <sup>282</sup>	64.00 <sup>176</sup>	60.984 <sup>360</sup>	10.10 <sup>12</sup>
19.8	26.516 <sup>424</sup>	35.88 <sup>70</sup>	13.262 <sup>295</sup>	24.70 <sup>168</sup>	26.649 <sup>297</sup>	62.15 <sup>185</sup>	61.393 <sup>409</sup>	10.76 <sup>66</sup>
	430	124	303	184	306	188	417	121
29.7	26.946	37.12	13.565	26.54	26.955	60.27	61.810	11.97
June 8.7	27.369 <sup>423</sup>	38.86 <sup>174</sup>	13.870 <sup>306</sup>	28.49 <sup>195</sup>	27.266 <sup>311</sup>	58.42 <sup>185</sup>	62.224 <sup>414</sup>	13.66 <sup>160</sup>
18.7	27.775 <sup>406</sup>	41.05 <sup>219</sup>	14.168 <sup>298</sup>	30.49 <sup>200</sup>	27.572 <sup>306</sup>	56.63 <sup>179</sup>	62.623 <sup>399</sup>	15.80 <sup>214</sup>
28.7	28.154 <sup>379</sup>	43.63 <sup>258</sup>	14.452 <sup>284</sup>	32.47 <sup>198</sup>	27.866 <sup>294</sup>	54.95 <sup>168</sup>	62.997 <sup>374</sup>	18.33 <sup>263</sup>
July 8.6	28.494 <sup>340</sup>	46.52 <sup>289</sup>	14.714 <sup>262</sup>	34.41 <sup>194</sup>	28.139 <sup>273</sup>	53.43 <sup>152</sup>	63.336 <sup>380</sup>	21.17 <sup>284</sup>
	294	316	285	182	244	132	298	316
18.6	28.788	49.68	14.949	36.23	28.383	52.11	63.634	24.27
28.6	29.029 <sup>241</sup>	52.99 <sup>331</sup>	15.143 <sup>199</sup>	37.90 <sup>167</sup>	28.594 <sup>211</sup>	51.00 <sup>111</sup>	63.890 <sup>246</sup>	27.53 <sup>326</sup>
Aug. 7.6	29.211 <sup>182</sup>	56.41 <sup>342</sup>	15.310 <sup>162</sup>	39.40 <sup>150</sup>	28.765 <sup>171</sup>	50.14 <sup>86</sup>	64.071 <sup>191</sup>	30.89 <sup>336</sup>
17.5	29.335 <sup>124</sup>	59.85 <sup>344</sup>	15.428 <sup>118</sup>	40.71 <sup>131</sup>	28.895 <sup>130</sup>	49.52 <sup>62</sup>	64.203 <sup>123</sup>	34.28 <sup>339</sup>
27.5	29.396 <sup>61</sup>	63.24 <sup>339</sup>	15.503 <sup>75</sup>	41.78 <sup>107</sup>	28.979 <sup>84</sup>	49.16 <sup>36</sup>	64.278 <sup>75</sup>	37.62 <sup>334</sup>
	1	227	35	84	41	13	16	323
Sept. 6.5	29.395	66.51	15.538	42.62	29.020	49.03	64.294	40.85
16.4	29.338 <sup>57</sup>	69.58 <sup>307</sup>	15.532 <sup>6</sup>	43.25 <sup>63</sup>	29.020 <sup>0</sup>	49.10 <sup>7</sup>	64.255 <sup>39</sup>	43.90 <sup>305</sup>
26.4	29.228 <sup>110</sup>	72.42 <sup>284</sup>	15.489 <sup>43</sup>	43.64 <sup>39</sup>	28.981 <sup>39</sup>	49.38 <sup>28</sup>	64.164 <sup>91</sup>	46.71 <sup>281</sup>
Oct. 6.4	29.071 <sup>157</sup>	74.94 <sup>252</sup>	15.414 <sup>75</sup>	43.82 <sup>18</sup>	28.910 <sup>71</sup>	49.82 <sup>44</sup>	64.026 <sup>188</sup>	49.21 <sup>250</sup>
16.4	28.874 <sup>197</sup>	77.10 <sup>216</sup>	15.315 <sup>99</sup>	43.83 <sup>1</sup>	28.810 <sup>100</sup>	50.37 <sup>55</sup>	63.850 <sup>176</sup>	51.36 <sup>215</sup>
	228	174	120	17	118	64	208	176
26.3	28.646	78.84	15.195	43.66	28.692	51.01	63.642	53.12
Nov. 5.3	28.393 <sup>253</sup>	80.13 <sup>129</sup>	15.065 <sup>130</sup>	43.32 <sup>34</sup>	28.560 <sup>132</sup>	51.70 <sup>69</sup>	63.411 <sup>281</sup>	54.43 <sup>181</sup>
15.3	28.125 <sup>268</sup>	80.93 <sup>80</sup>	14.931 <sup>134</sup>	42.85 <sup>47</sup>	28.422 <sup>138</sup>	52.41 <sup>71</sup>	63.163 <sup>248</sup>	55.26 <sup>83</sup>
25.3	27.850 <sup>275</sup>	81.22 <sup>29</sup>	14.797 <sup>184</sup>	42.26 <sup>59</sup>	28.286 <sup>136</sup>	53.09 <sup>68</sup>	62.908 <sup>255</sup>	55.59 <sup>33</sup>
Dec. 5.2	27.577 <sup>273</sup>	80.97 <sup>25</sup>	14.672 <sup>125</sup>	41.58 <sup>68</sup>	28.156 <sup>130</sup>	53.74 <sup>65</sup>	62.652 <sup>256</sup>	55.40 <sup>19</sup>
	282	79	115	78	118	59	247	71
15.2	27.315	80.18	14.557	40.80	28.038	54.33	62.405	54.69
25.2	27.070 <sup>245</sup>	78.89 <sup>129</sup>	14.456 <sup>101</sup>	39.98 <sup>82</sup>	27.987 <sup>101</sup>	54.84 <sup>51</sup>	62.173 <sup>233</sup>	53.47 <sup>122</sup>
35.1	26.854 <sup>216</sup>	77.12 <sup>177</sup>	14.376 <sup>80</sup>	39.14 <sup>84</sup>	27.855 <sup>82</sup>	55.28 <sup>44</sup>	61.965 <sup>208</sup>	51.79 <sup>168</sup>
Mean Place	24.704	40.34	11.482	15.32	24.921	75.76	59.606	14.82
Sec δ, Tan δ	1.618	+1.272	1.000	+0.017	1.019	-0.196	1.552	+1.187
D <sub>δ</sub> a, D <sub>α</sub> a	+0.047	-0.077	+0.061	-0.001	+0.063	+0.012	+0.049	-0.073
D <sub>δ</sub> δ, D <sub>α</sub> δ	+0.36	-0.42	+0.36	-0.42	+0.37	-0.40	+0.37	-0.39

# APPARENT PLACES OF STARS, 1920.

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## FOR THE UPPER TRANSIT AT WASHINGTON.

Washington Mean Time.	♈ Aquarii. Mag. 5.3		ε B. Cephei. Mag. 5.7		♏ Aquarii. Mag. 4.1		10 Lacertæ. Mag. 4.9	
	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.
	h m 22 30	° ' " -21 6	h m 22 30	° ' " +75 48	h m 22 31	° ' " - 0 31	h m 22 35	° ' " +38 37
	s	"	s	"	s	"	s	"
Jan. 1.2	19.173	66.94	51.31	74.76	14.916	42.79	40.360	77.92
11.1	19.099	66.87	50.63	72.98	14.844	43.55	40.222	76.17
21.1	19.048	66.80	50.05	70.73	14.795	44.28	40.111	74.12
31.1	19.025	66.15	49.59	68.05	14.768	44.93	40.032	71.87
Feb. 10.1	19.029	65.48	49.27	65.06	14.771	45.48	39.989	69.50
20.0	19.064	64.62	49.11	61.88	14.799	45.88	39.987	67.10
Mar. 1.0	19.131	63.57	49.11	58.65	14.860	46.11	40.029	64.78
11.0	19.231	62.32	49.27	55.49	14.952	46.10	40.117	62.64
20.9	19.365	60.89	49.60	52.55	15.077	45.84	40.253	60.77
30.9	19.534	59.29	50.09	49.91	15.237	45.33	40.437	59.25
Apr. 9.9	19.737	57.56	50.71	47.68	15.429	44.55	40.664	58.16
19.9	19.971	55.71	51.45	45.93	15.653	43.49	40.933	57.54
29.8	20.236	53.79	52.28	44.76	15.905	42.18	41.236	57.41
May 9.8	20.524	51.84	53.18	44.18	16.181	40.64	41.567	57.79
19.8	20.832	49.89	54.11	44.18	16.474	38.93	41.918	58.66
29.8	21.152	48.01	55.06	44.80	16.777	37.09	42.279	60.01
June 8.7	21.476	46.25	55.98	45.99	17.083	35.15	42.640	61.78
18.7	21.796	44.65	56.87	47.72	17.385	33.18	42.991	63.93
28.7	22.103	43.25	57.68	49.95	17.673	31.23	43.325	66.40
July 8.6	22.390	42.09	58.40	52.62	17.941	29.33	43.631	69.12
18.6	22.649	41.19	59.02	55.67	18.184	27.55	43.902	72.02
28.6	22.873	40.58	59.52	59.00	18.391	25.93	44.132	75.06
Aug. 7.6	23.058	40.26	59.88	62.52	18.562	24.51	44.316	78.12
17.5	23.198	40.21	60.11	66.20	18.691	23.27	44.452	81.16
27.5	23.292	40.45	60.21	69.95	18.779	22.27	44.538	84.18
Sept. 6.5	23.339	40.91	60.16	73.69	18.823	21.51	44.573	86.96
16.4	23.342	41.59	59.97	77.36	18.827	20.97	44.561	89.58
26.4	23.303	42.41	59.66	80.84	18.792	20.67	44.505	91.97
Oct. 6.4	23.228	43.35	59.22	84.06	18.728	20.55	44.411	94.07
16.4	23.125	44.34	58.68	86.96	18.635	20.63	44.283	95.83
26.3	22.998	45.35	58.04	89.48	18.523	20.86	44.128	97.23
Nov. 5.3	22.858	46.31	57.33	91.55	18.397	21.25	43.955	98.23
15.3	22.711	47.19	56.55	93.09	18.267	21.76	43.769	98.81
25.3	22.564	47.93	55.73	94.10	18.134	22.36	43.577	98.95
Dec. 5.2	22.424	48.55	54.90	94.47	18.008	23.05	43.385	98.64
15.2	22.296	49.00	54.08	94.22	17.893	23.79	43.200	97.90
25.2	22.185	49.25	53.28	93.37	17.791	24.57	43.027	96.73
35.1	22.094	49.33	52.54	91.94	17.706	25.35	42.873	95.16
Mean Place	19.153	66.97	52.428	50.66	14.753	48.78	40.171	60.52
Sec δ, Tan δ	1.072	-0.386	4.082	+3.958	1.000	-0.009	1.280	+0.799
D <sub>α</sub> , D <sub>αα</sub>	+0.065	+0.024	+0.021	-0.244	+0.061	+0.001	+0.054	-0.050
D <sub>β</sub> , D <sub>ββ</sub>	+0.37	-0.38	+0.37	-0.38	+0.37	-0.38	+0.37	-0.36

APPARENT PLACES OF STARS, 1920.

FOR THE UPPER TRANSIT AT WASHINGTON.

Washington Mean Time.	ε Piscis Australis. Mag. 4.2		ζ Pegasi. Mag. 3.6		β Gravis. Mag. 2.2		γ Pegasi. Mag. 3.1	
	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.
	h m 22 36	° ' -27 27	h m 22 37	° ' +10 24	h m 22 37	° ' -47 17	h m 22 39	° ' +29 48
	s	"	s	"	s	"	s	"
Jan. 1.2	13.988 <sup>87</sup>	43.26	28.528 <sup>80</sup>	57.17	53.429 <sup>140</sup>	79.22	15.241	23.43
11.1	13.901 <sup>61</sup>	42.93 <sup>33</sup>	28.448 <sup>59</sup>	56.06 <sup>111</sup>	53.289 <sup>103</sup>	78.07 <sup>116</sup>	15.128 <sup>90</sup>	21.86 <sup>157</sup>
21.1	13.840 <sup>33</sup>	42.38 <sup>57</sup>	28.389 <sup>38</sup>	54.87 <sup>119</sup>	53.186 <sup>118</sup>	76.55 <sup>162</sup>	15.038 <sup>63</sup>	20.03 <sup>183</sup>
31.1	13.807 <sup>4</sup>	41.55 <sup>81</sup>	28.351 <sup>10</sup>	53.69 <sup>116</sup>	53.120 <sup>23</sup>	74.71 <sup>184</sup>	14.975 <sup>32</sup>	18.08 <sup>195</sup>
Feb. 10.1	13.803 <sup>28</sup>	40.52 <sup>103</sup>	28.341 <sup>18</sup>	52.53 <sup>102</sup>	53.097 <sup>21</sup>	72.58 <sup>213</sup>	14.943 <sup>5</sup>	16.04 <sup>204</sup>
20.0	13.831 <sup>62</sup>	39.27 <sup>144</sup>	28.359 <sup>53</sup>	51.51 <sup>87</sup>	53.118 <sup>64</sup>	70.23 <sup>253</sup>	14.948 <sup>42</sup>	14.02 <sup>193</sup>
Mar. 1.0	13.893 <sup>95</sup>	37.83 <sup>164</sup>	28.412 <sup>82</sup>	50.64 <sup>65</sup>	53.182 <sup>110</sup>	67.70 <sup>268</sup>	14.990 <sup>92</sup>	12.09 <sup>173</sup>
11.0	13.988 <sup>132</sup>	36.19 <sup>179</sup>	28.494 <sup>122</sup>	49.99 <sup>37</sup>	53.292 <sup>157</sup>	65.02 <sup>274</sup>	15.072 <sup>126</sup>	10.36 <sup>144</sup>
20.9	14.120 <sup>169</sup>	34.40 <sup>192</sup>	28.616 <sup>156</sup>	49.62 <sup>9</sup>	53.449 <sup>203</sup>	62.28 <sup>278</sup>	15.197 <sup>166</sup>	8.92 <sup>111</sup>
30.9	14.289 <sup>204</sup>	32.48 <sup>202</sup>	28.772 <sup>190</sup>	49.53 <sup>24</sup>	53.652 <sup>249</sup>	59.50 <sup>274</sup>	15.363 <sup>209</sup>	7.81 <sup>72</sup>
Apr. 9.9	14.493 <sup>238</sup>	30.46 <sup>211</sup>	28.962 <sup>223</sup>	49.77 <sup>59</sup>	53.901 <sup>291</sup>	56.76 <sup>265</sup>	15.572 <sup>243</sup>	7.09 <sup>29</sup>
19.9	14.731 <sup>269</sup>	28.35 <sup>212</sup>	29.185 <sup>250</sup>	50.36 <sup>89</sup>	54.192 <sup>329</sup>	54.11 <sup>252</sup>	15.815 <sup>278</sup>	6.81 <sup>16</sup>
29.8	15.000 <sup>296</sup>	26.23 <sup>208</sup>	29.435 <sup>277</sup>	51.25 <sup>124</sup>	54.521 <sup>361</sup>	51.59 <sup>232</sup>	16.093 <sup>306</sup>	6.97 <sup>63</sup>
May 9.8	15.296 <sup>316</sup>	24.15 <sup>202</sup>	29.712 <sup>295</sup>	52.49 <sup>152</sup>	54.882 <sup>387</sup>	49.27 <sup>207</sup>	16.398 <sup>322</sup>	7.60 <sup>107</sup>
19.8	15.612 <sup>330</sup>	22.13 <sup>190</sup>	30.007 <sup>306</sup>	54.01 <sup>175</sup>	55.269 <sup>404</sup>	47.20 <sup>177</sup>	16.720 <sup>335</sup>	8.87 <sup>147</sup>
29.8	15.942 <sup>336</sup>	20.23 <sup>172</sup>	30.313 <sup>309</sup>	55.76 <sup>195</sup>	55.673 <sup>412</sup>	45.43 <sup>142</sup>	17.055 <sup>336</sup>	10.14 <sup>194</sup>
June 8.7	16.278 <sup>333</sup>	18.51 <sup>151</sup>	30.622 <sup>304</sup>	57.71 <sup>209</sup>	56.085 <sup>410</sup>	44.01 <sup>105</sup>	17.391 <sup>329</sup>	11.98 <sup>216</sup>
18.7	16.611 <sup>322</sup>	17.00 <sup>125</sup>	30.926 <sup>294</sup>	59.80 <sup>218</sup>	56.495 <sup>396</sup>	42.96 <sup>63</sup>	17.720 <sup>315</sup>	14.14 <sup>240</sup>
28.7	16.933 <sup>300</sup>	15.75 <sup>95</sup>	31.220 <sup>270</sup>	61.98 <sup>220</sup>	56.891 <sup>371</sup>	42.33 <sup>23</sup>	18.035 <sup>289</sup>	16.54 <sup>269</sup>
July 8.6	17.233 <sup>274</sup>	14.80 <sup>65</sup>	31.490 <sup>245</sup>	64.18 <sup>217</sup>	57.262 <sup>339</sup>	42.10 <sup>20</sup>	18.324 <sup>289</sup>	19.13 <sup>373</sup>
18.6	17.507 <sup>238</sup>	14.15 <sup>32</sup>	31.735 <sup>212</sup>	66.35 <sup>212</sup>	57.601 <sup>394</sup>	42.30 <sup>62</sup>	18.583 <sup>222</sup>	21.86 <sup>273</sup>
28.6	17.745 <sup>197</sup>	13.83 <sup>2</sup>	31.947 <sup>173</sup>	68.47 <sup>198</sup>	57.895 <sup>342</sup>	42.92 <sup>100</sup>	18.805 <sup>180</sup>	24.64 <sup>273</sup>
Aug. 7.6	17.942 <sup>151</sup>	13.81 <sup>30</sup>	32.120 <sup>133</sup>	70.45 <sup>182</sup>	58.137 <sup>187</sup>	43.92 <sup>134</sup>	18.985 <sup>136</sup>	27.42 <sup>371</sup>
17.5	18.093 <sup>103</sup>	14.11 <sup>59</sup>	32.253 <sup>90</sup>	72.27 <sup>162</sup>	58.324 <sup>123</sup>	45.26 <sup>164</sup>	19.121 <sup>89</sup>	30.13 <sup>261</sup>
27.5	18.196 <sup>55</sup>	14.70 <sup>82</sup>	32.343 <sup>48</sup>	73.89 <sup>141</sup>	58.447 <sup>62</sup>	46.90 <sup>186</sup>	19.210 <sup>44</sup>	32.74 <sup>243</sup>
Sept. 6.5	18.251 <sup>7</sup>	15.52 <sup>102</sup>	32.391 <sup>6</sup>	75.30 <sup>120</sup>	58.509 <sup>1</sup>	48.76 <sup>202</sup>	19.254 <sup>9</sup>	35.17 <sup>222</sup>
16.5	18.258 <sup>37</sup>	16.54 <sup>117</sup>	32.397 <sup>30</sup>	76.50 <sup>98</sup>	58.508 <sup>59</sup>	50.78 <sup>207</sup>	19.254 <sup>42</sup>	37.39 <sup>196</sup>
26.4	18.221 <sup>76</sup>	17.71 <sup>125</sup>	32.367 <sup>61</sup>	77.43 <sup>70</sup>	58.449 <sup>112</sup>	52.85 <sup>204</sup>	19.212 <sup>76</sup>	39.37 <sup>170</sup>
Oct. 6.4	18.145 <sup>108</sup>	18.96 <sup>127</sup>	32.306 <sup>91</sup>	78.13 <sup>21</sup>	58.337 <sup>155</sup>	54.91 <sup>196</sup>	19.136 <sup>106</sup>	41.07 <sup>139</sup>
16.4	18.037 <sup>132</sup>	20.23 <sup>123</sup>	32.215 <sup>108</sup>	78.60 <sup>82</sup>	58.182 <sup>192</sup>	56.85 <sup>176</sup>	19.030 <sup>180</sup>	42.46 <sup>165</sup>
26.3	17.905 <sup>149</sup>	21.46 <sup>113</sup>	32.107 <sup>125</sup>	78.81 <sup>0</sup>	57.990 <sup>217</sup>	58.61 <sup>148</sup>	18.900 <sup>146</sup>	43.51 <sup>71</sup>
Nov. 5.3	17.756 <sup>157</sup>	22.59 <sup>99</sup>	31.982 <sup>131</sup>	78.81 <sup>21</sup>	57.773 <sup>231</sup>	60.09 <sup>115</sup>	18.754 <sup>169</sup>	44.22 <sup>34</sup>
15.3	17.599 <sup>159</sup>	23.58 <sup>81</sup>	31.851 <sup>135</sup>	78.60 <sup>44</sup>	57.542 <sup>233</sup>	61.24 <sup>79</sup>	18.595 <sup>163</sup>	44.56 <sup>4</sup>
25.3	17.440 <sup>152</sup>	24.39 <sup>58</sup>	31.716 <sup>131</sup>	78.16 <sup>63</sup>	57.309 <sup>229</sup>	62.03 <sup>36</sup>	18.432 <sup>162</sup>	44.52 <sup>41</sup>
Dec. 5.2	17.288 <sup>141</sup>	24.97 <sup>36</sup>	31.585 <sup>122</sup>	77.53 <sup>82</sup>	57.080 <sup>213</sup>	62.39 <sup>7</sup>	18.270 <sup>165</sup>	44.11 <sup>78</sup>
15.2	17.147 <sup>123</sup>	25.33 <sup>10</sup>	31.463 <sup>110</sup>	76.71 <sup>96</sup>	56.867 <sup>191</sup>	62.32 <sup>48</sup>	18.115 <sup>143</sup>	43.33 <sup>212</sup>
25.2	17.024 <sup>104</sup>	25.43 <sup>14</sup>	31.353 <sup>94</sup>	75.75 <sup>106</sup>	56.676 <sup>161</sup>	61.84 <sup>90</sup>	17.972 <sup>127</sup>	42.21 <sup>143</sup>
35.2	16.920	25.29	31.259	74.69	56.515	60.94	17.845	40.78
Mean Place	14.012	41.38	28.300	47.90	53.823	72.74	14.994	8.38
Sec δ, Tan δ	1.127	-0.520	1.017	+0.184	1.475	-1.084	1.153	+0.573
D <sub>α</sub> , D <sub>ω</sub>	+0.066	+0.032	+0.060	-0.011	+0.071	+0.068	+0.056	-0.036
D <sub>δ</sub> , D <sub>ε</sub>	+0.37	-0.36	+0.37	-0.35	+0.37	-0.35	+0.37	-0.35



# APPARENT PLACES OF STARS, 1920.

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FOR THE UPPER TRANSIT AT WASHINGTON.

Washington Mean Time.	λ Pegasi. Mag. 4.1		ε Gravis. Mag. 3.7		τ Aquarii. Mag. 4.2		μ Pegasi. Mag. 3.7	
	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.
	h m 22 42	° ' " +23 8	h m 22 48	° ' " -51 43	h m 22 45	° ' " -14 0	h m 22 46	° ' " +24 10
	s	s	s	s	s	s	s	s
Jan. 1.2	40.821 <sup>101</sup>	52.62 <sup>143</sup>	43.242 <sup>169</sup>	83.71 <sup>129</sup>	21.645 <sup>81</sup>	52.94 <sup>24</sup>	8.732 <sup>104</sup>	57.16 <sup>142</sup>
11.1	40.720 <sup>79</sup>	51.19 <sup>160</sup>	43.073 <sup>129</sup>	82.42 <sup>169</sup>	21.564 <sup>58</sup>	53.18 <sup>11</sup>	8.628 <sup>83</sup>	55.74 <sup>161</sup>
21.1	40.641 <sup>55</sup>	49.59 <sup>171</sup>	42.944 <sup>87</sup>	80.73 <sup>203</sup>	21.506 <sup>37</sup>	53.29 <sup>6</sup>	8.545 <sup>58</sup>	54.13 <sup>172</sup>
31.1	40.586 <sup>26</sup>	47.88 <sup>174</sup>	42.857 <sup>41</sup>	78.70 <sup>233</sup>	21.469 <sup>10</sup>	53.23 <sup>25</sup>	8.487 <sup>30</sup>	52.41 <sup>177</sup>
Feb. 10.1	40.560 <sup>7</sup>	46.14 <sup>170</sup>	42.816 <sup>6</sup>	76.37 <sup>256</sup>	21.459 <sup>18</sup>	52.98 <sup>43</sup>	8.457 <sup>1</sup>	50.64 <sup>174</sup>
20.0	40.567	44.44	42.822	73.81	21.477	52.55	8.458	48.90
Mar. 1.0	40.607 <sup>40</sup>	42.87 <sup>157</sup>	42.878 <sup>56</sup>	71.06 <sup>275</sup>	21.524 <sup>47</sup>	51.91 <sup>64</sup>	8.496 <sup>38</sup>	47.28 <sup>162</sup>
11.0	40.685 <sup>78</sup>	41.49 <sup>138</sup>	42.983 <sup>105</sup>	68.19 <sup>267</sup>	21.605 <sup>81</sup>	51.08 <sup>83</sup>	8.571 <sup>75</sup>	45.85 <sup>148</sup>
20.9	40.803 <sup>118</sup>	40.38 <sup>111</sup>	43.142 <sup>159</sup>	65.23 <sup>296</sup>	21.720 <sup>115</sup>	50.03 <sup>105</sup>	8.685 <sup>114</sup>	44.68 <sup>117</sup>
30.9	40.960 <sup>157</sup>	39.61 <sup>77</sup>	43.350 <sup>208</sup>	62.28 <sup>295</sup>	21.869 <sup>149</sup>	48.76 <sup>127</sup>	8.839 <sup>164</sup>	43.84 <sup>84</sup>
Apr. 9.9	41.156 <sup>196</sup>	39.20 <sup>41</sup>	43.608 <sup>258</sup>	59.38 <sup>290</sup>	22.051 <sup>182</sup>	47.31 <sup>145</sup>	9.033 <sup>194</sup>	43.36 <sup>48</sup>
19.9	41.386 <sup>230</sup>	39.18 <sup>2</sup>	43.912 <sup>304</sup>	56.59 <sup>279</sup>	22.268 <sup>217</sup>	45.68 <sup>163</sup>	9.261 <sup>228</sup>	43.29 <sup>7</sup>
29.8	41.650 <sup>264</sup>	39.59 <sup>41</sup>	44.259 <sup>347</sup>	53.97 <sup>262</sup>	22.516 <sup>248</sup>	43.91 <sup>177</sup>	9.524 <sup>263</sup>	43.64 <sup>25</sup>
May 9.8	41.938 <sup>288</sup>	40.41 <sup>82</sup>	44.642 <sup>383</sup>	51.59 <sup>238</sup>	22.788 <sup>272</sup>	42.04 <sup>187</sup>	9.813 <sup>289</sup>	44.41 <sup>77</sup>
19.8	42.247 <sup>309</sup>	41.62 <sup>121</sup>	45.054 <sup>412</sup>	49.48 <sup>211</sup>	23.081 <sup>293</sup>	40.11 <sup>183</sup>	10.122 <sup>309</sup>	45.57 <sup>116</sup>
29.8	42.568 <sup>821</sup>	43.19 <sup>157</sup>	45.485 <sup>431</sup>	47.69 <sup>179</sup>	23.390 <sup>309</sup>	38.17 <sup>194</sup>	10.444 <sup>322</sup>	47.09 <sup>152</sup>
June 8.7	42.891 <sup>823</sup>	45.06 <sup>187</sup>	45.928 <sup>441</sup>	46.28 <sup>141</sup>	23.704 <sup>314</sup>	36.27 <sup>190</sup>	10.770 <sup>326</sup>	48.93 <sup>134</sup>
18.7	43.210 <sup>819</sup>	47.20 <sup>214</sup>	46.366 <sup>440</sup>	45.29 <sup>99</sup>	24.016 <sup>312</sup>	34.46 <sup>181</sup>	11.091 <sup>321</sup>	51.06 <sup>213</sup>
28.7	43.515 <sup>306</sup>	49.59 <sup>233</sup>	46.798 <sup>427</sup>	44.74 <sup>55</sup>	24.319 <sup>303</sup>	32.80 <sup>166</sup>	11.398 <sup>307</sup>	53.38 <sup>232</sup>
July 8.6	43.798 <sup>283</sup>	52.00 <sup>247</sup>	47.195 <sup>402</sup>	44.63 <sup>11</sup>	24.604 <sup>285</sup>	31.31 <sup>149</sup>	11.686 <sup>288</sup>	55.85 <sup>247</sup>
18.6	44.053 <sup>255</sup>	54.55 <sup>255</sup>	47.562 <sup>867</sup>	44.96 <sup>33</sup>	24.863 <sup>259</sup>	30.05 <sup>126</sup>	11.944 <sup>258</sup>	58.43 <sup>258</sup>
28.6	44.272 <sup>219</sup>	57.12 <sup>257</sup>	47.883 <sup>821</sup>	45.73 <sup>77</sup>	25.090 <sup>227</sup>	29.02 <sup>103</sup>	12.167 <sup>222</sup>	61.02 <sup>269</sup>
Aug. 7.6	44.452 <sup>180</sup>	59.65 <sup>253</sup>	48.150 <sup>867</sup>	46.90 <sup>117</sup>	25.280 <sup>190</sup>	28.27 <sup>75</sup>	12.353 <sup>186</sup>	63.57 <sup>255</sup>
17.5	44.591 <sup>139</sup>	62.06 <sup>243</sup>	48.356 <sup>206</sup>	48.43 <sup>153</sup>	25.428 <sup>148</sup>	27.78 <sup>49</sup>	12.495 <sup>143</sup>	66.04 <sup>247</sup>
27.5	44.684 <sup>93</sup>	64.38 <sup>230</sup>	48.495 <sup>139</sup>	50.25 <sup>182</sup>	25.533 <sup>105</sup>	27.56 <sup>22</sup>	12.592 <sup>97</sup>	68.38 <sup>234</sup>
Sept. 6.5	44.734 <sup>50</sup>	66.48 <sup>210</sup>	48.567 <sup>72</sup>	52.32 <sup>207</sup>	25.594 <sup>61</sup>	27.59 <sup>3</sup>	12.645 <sup>53</sup>	70.54 <sup>216</sup>
16.5	44.742 <sup>8</sup>	68.38 <sup>190</sup>	48.571 <sup>4</sup>	54.52 <sup>220</sup>	25.611 <sup>17</sup>	27.86 <sup>27</sup>	12.656 <sup>11</sup>	72.50 <sup>196</sup>
26.4	44.710 <sup>32</sup>	70.02 <sup>164</sup>	48.510 <sup>61</sup>	56.78 <sup>226</sup>	25.589 <sup>22</sup>	28.31 <sup>45</sup>	12.628 <sup>28</sup>	74.20 <sup>170</sup>
Oct. 6.4	44.645 <sup>65</sup>	71.40 <sup>138</sup>	48.390 <sup>120</sup>	59.01 <sup>223</sup>	25.532 <sup>57</sup>	28.92 <sup>61</sup>	12.565 <sup>68</sup>	75.65 <sup>145</sup>
16.4	44.551 <sup>94</sup>	72.49 <sup>109</sup>	48.220 <sup>170</sup>	61.11 <sup>210</sup>	25.446 <sup>86</sup>	29.65 <sup>73</sup>	12.474 <sup>91</sup>	76.79 <sup>114</sup>
26.3	44.434 <sup>117</sup>	73.28 <sup>79</sup>	48.220 <sup>210</sup>	61.11 <sup>188</sup>	25.446 <sup>108</sup>	29.65 <sup>80</sup>	12.474 <sup>116</sup>	76.79 <sup>84</sup>
Nov. 5.3	44.434	73.28	48.010	62.99 <sup>159</sup>	25.338 <sup>125</sup>	30.45 <sup>83</sup>	12.358 <sup>132</sup>	77.63 <sup>54</sup>
15.3	44.301 <sup>133</sup>	73.76 <sup>48</sup>	47.769 <sup>241</sup>	64.58 <sup>123</sup>	25.213 <sup>133</sup>	31.28 <sup>81</sup>	12.226 <sup>142</sup>	78.17 <sup>20</sup>
25.3	44.158 <sup>143</sup>	73.92 <sup>16</sup>	47.511 <sup>258</sup>	65.81 <sup>81</sup>	25.080 <sup>136</sup>	32.09 <sup>78</sup>	12.084 <sup>148</sup>	78.37 <sup>12</sup>
Dec. 5.2	44.011 <sup>147</sup>	73.75 <sup>17</sup>	47.246 <sup>265</sup>	66.62 <sup>36</sup>	24.944 <sup>132</sup>	32.87 <sup>69</sup>	11.936 <sup>147</sup>	78.25 <sup>44</sup>
15.2	43.864 <sup>140</sup>	73.28 <sup>79</sup>	46.987 <sup>245</sup>	66.98 <sup>11</sup>	24.812 <sup>123</sup>	33.56 <sup>61</sup>	11.789 <sup>142</sup>	77.81 <sup>76</sup>
25.2	43.724	72.49	46.742	66.87 <sup>56</sup>	24.689 <sup>109</sup>	34.17 <sup>49</sup>	11.647 <sup>132</sup>	77.05 <sup>106</sup>
35.2	43.595 <sup>129</sup>	71.42 <sup>107</sup>	46.520 <sup>222</sup>	66.31 <sup>101</sup>	24.580 <sup>95</sup>	34.66 <sup>37</sup>	11.515 <sup>117</sup>	76.00 <sup>106</sup>
	43.481 <sup>114</sup>	70.11 <sup>131</sup>	46.329 <sup>191</sup>	65.30 <sup>101</sup>	24.485 <sup>95</sup>	35.03 <sup>37</sup>	11.398 <sup>117</sup>	74.70 <sup>130</sup>
Mean Place	40.544	39.49	43.744	76.12	21.493	54.55	8.490	43.74
Sec δ, Tan δ	1.088	+0.428	1.615	-1.268	1.031	-0.250	1.096	+0.449
D <sub>ψ</sub> , D <sub>ω</sub>	+0.057	-0.027	+0.072	+0.080	+0.063	+0.016	+0.057	-0.028
D <sub>ψ</sub> , D <sub>ω</sub>	+0.38	-0.33	+0.38	-0.33	+0.38	-0.32	+0.38	-0.32

APPARENT PLACES OF STARS, 1920.

FOR THE UPPER TRANSIT AT WASHINGTON.

Washington Mean Time.	ε Cephei. Mag. 3.7		λ Aquarii. Mag. 3.8		ρ Indi. Mag. 6.1		δ Aquarii. Mag. 3.5	
	Right Ascension.	Declination.	Right Ascension.	Declination.	Right Ascension.	Declination.	Right Ascension.	Declination.
	h m	° ' "	h m	° ' "	h m	° ' "	h m	° ' "
	22 48	+65 46	22 48	- 7 59	22 49	-70 29	22 50	-16 14
	s	"	s	"	s	"	s	"
Jan. 1.2	49.64	68.93	26.714	77.03	4.82	75.91	24.523	47.00
11.1	49.25 <sup>39</sup>	67.25 <sup>168</sup>	26.633 <sup>81</sup>	77.50 <sup>47</sup>	4.43 <sup>39</sup>	73.96 <sup>195</sup>	24.437 <sup>86</sup>	47.19 <sup>19</sup>
21.1	48.92 <sup>33</sup>	65.07 <sup>218</sup>	26.571 <sup>64</sup>	77.89 <sup>39</sup>	4.10 <sup>33</sup>	71.56 <sup>240</sup>	24.372 <sup>65</sup>	47.19 <sup>0</sup>
31.1	48.66 <sup>26</sup>	62.50 <sup>257</sup>	26.534 <sup>37</sup>	78.12 <sup>23</sup>	3.85 <sup>25</sup>	68.78 <sup>278</sup>	24.331 <sup>41</sup>	47.01 <sup>18</sup>
Feb. 10.1	48.47 <sup>19</sup>	59.64 <sup>286</sup>	26.519 <sup>15</sup>	78.25 <sup>13</sup>	3.70 <sup>15</sup>	65.68 <sup>310</sup>	24.315 <sup>16</sup>	46.65 <sup>36</sup>
	11	305	14	8	6	332	11	57
20.0	48.36	58.59	26.533	78.17	3.64	62.36	24.326	46.06
Mar. 1.0	48.36 <sup>0</sup>	53.48 <sup>311</sup>	26.576 <sup>43</sup>	77.90 <sup>27</sup>	3.67 <sup>3</sup>	58.88 <sup>348</sup>	24.369 <sup>48</sup>	45.31 <sup>77</sup>
11.0	48.45 <sup>9</sup>	50.45 <sup>303</sup>	26.653 <sup>77</sup>	77.42 <sup>48</sup>	3.82 <sup>15</sup>	55.33 <sup>355</sup>	24.444 <sup>75</sup>	44.32 <sup>90</sup>
21.0	48.63 <sup>18</sup>	47.60 <sup>285</sup>	26.763 <sup>110</sup>	76.72 <sup>70</sup>	4.05 <sup>23</sup>	51.81 <sup>352</sup>	24.555 <sup>111</sup>	43.14 <sup>118</sup>
30.9	48.90 <sup>27</sup>	45.07 <sup>253</sup>	26.908 <sup>145</sup>	75.78 <sup>94</sup>	4.38 <sup>33</sup>	48.35 <sup>346</sup>	24.700 <sup>145</sup>	41.75 <sup>139</sup>
	37	214	180	117	41	330	181	158
Apr. 9.9	49.27	42.93	27.088	74.61	4.79	45.05	24.881	40.17
19.9	49.71 <sup>44</sup>	41.28 <sup>165</sup>	27.301 <sup>213</sup>	73.22 <sup>139</sup>	5.28 <sup>49</sup>	41.98 <sup>307</sup>	25.095 <sup>214</sup>	38.44 <sup>173</sup>
29.8	50.21 <sup>50</sup>	40.15 <sup>113</sup>	27.541 <sup>240</sup>	71.65 <sup>157</sup>	5.85 <sup>57</sup>	39.19 <sup>279</sup>	25.341 <sup>246</sup>	36.59 <sup>185</sup>
May 9.8	50.78 <sup>57</sup>	39.61 <sup>54</sup>	27.811 <sup>270</sup>	69.92 <sup>173</sup>	6.49 <sup>64</sup>	36.76 <sup>243</sup>	25.613 <sup>272</sup>	34.65 <sup>194</sup>
19.8	51.36 <sup>58</sup>	39.67 <sup>6</sup>	28.099 <sup>288</sup>	68.08 <sup>184</sup>	7.17 <sup>68</sup>	34.74 <sup>202</sup>	25.907 <sup>294</sup>	32.67 <sup>108</sup>
	61	63	304	194	72	159	310	197
29.8	51.97	40.30	28.403	66.14	7.89	33.15	26.217	30.70
June 8.7	52.57 <sup>60</sup>	41.50 <sup>120</sup>	28.712 <sup>309</sup>	64.21 <sup>198</sup>	8.62 <sup>78</sup>	32.06 <sup>109</sup>	26.534 <sup>317</sup>	28.79 <sup>191</sup>
18.7	53.15 <sup>58</sup>	43.23 <sup>173</sup>	29.019 <sup>307</sup>	62.29 <sup>192</sup>	9.35 <sup>73</sup>	31.47 <sup>59</sup>	26.848 <sup>314</sup>	27.00 <sup>179</sup>
28.7	53.70 <sup>55</sup>	45.44 <sup>221</sup>	29.317 <sup>298</sup>	60.49 <sup>180</sup>	10.07 <sup>72</sup>	31.41 <sup>6</sup>	27.155 <sup>307</sup>	25.36 <sup>164</sup>
July 8.7	54.19 <sup>49</sup>	48.07 <sup>263</sup>	29.598 <sup>281</sup>	58.80 <sup>169</sup>	10.74 <sup>67</sup>	31.88 <sup>47</sup>	27.444 <sup>299</sup>	23.93 <sup>143</sup>
	44	298	256	153	61	96	266	119
18.6	54.63	51.05	29.854	57.27	11.35	32.84	27.710	22.74
28.6	55.00 <sup>37</sup>	54.31 <sup>326</sup>	30.079 <sup>325</sup>	55.97 <sup>130</sup>	11.89 <sup>54</sup>	34.30 <sup>146</sup>	27.942 <sup>323</sup>	21.81 <sup>93</sup>
Aug. 7.6	55.29 <sup>29</sup>	57.79 <sup>348</sup>	30.265 <sup>186</sup>	54.88 <sup>109</sup>	12.34 <sup>45</sup>	36.16 <sup>196</sup>	28.137 <sup>196</sup>	21.15 <sup>66</sup>
17.5	55.50 <sup>21</sup>	61.39 <sup>360</sup>	30.413 <sup>148</sup>	54.05 <sup>82</sup>	12.68 <sup>34</sup>	38.40 <sup>224</sup>	28.292 <sup>155</sup>	20.77 <sup>38</sup>
27.5	55.63 <sup>18</sup>	65.05 <sup>366</sup>	30.519 <sup>105</sup>	53.47 <sup>58</sup>	12.91 <sup>23</sup>	40.93 <sup>253</sup>	28.402 <sup>110</sup>	20.68 <sup>9</sup>
	3	364	64	35	10	272	66	16
Sept. 6.5	55.66	68.69	30.583	53.12	13.01	43.65	28.468	20.84
16.5	55.61 <sup>5</sup>	72.22 <sup>353</sup>	30.603 <sup>20</sup>	53.03 <sup>9</sup>	12.99 <sup>2</sup>	46.47 <sup>282</sup>	28.492 <sup>24</sup>	21.23 <sup>39</sup>
26.4	55.49 <sup>12</sup>	75.58 <sup>336</sup>	30.584 <sup>19</sup>	53.15 <sup>12</sup>	12.85 <sup>14</sup>	49.29 <sup>282</sup>	28.473 <sup>19</sup>	21.81 <sup>58</sup>
Oct. 6.4	55.29 <sup>20</sup>	78.70 <sup>312</sup>	30.534 <sup>50</sup>	53.43 <sup>28</sup>	12.60 <sup>25</sup>	51.98 <sup>269</sup>	28.421 <sup>52</sup>	22.56 <sup>75</sup>
16.4	55.02 <sup>27</sup>	81.51 <sup>281</sup>	30.452 <sup>82</sup>	53.89 <sup>46</sup>	12.24 <sup>26</sup>	54.44 <sup>246</sup>	28.337 <sup>84</sup>	23.40 <sup>84</sup>
	32	243	100	55	43	212	107	80
26.4	54.70	83.94	30.352	54.44	11.81	56.56	28.230	24.29
Nov. 5.3	54.33 <sup>87</sup>	85.93 <sup>199</sup>	30.233 <sup>119</sup>	55.08 <sup>64</sup>	11.31 <sup>50</sup>	58.27 <sup>171</sup>	28.106 <sup>124</sup>	25.20 <sup>91</sup>
15.3	53.91 <sup>42</sup>	87.42 <sup>149</sup>	30.105 <sup>128</sup>	55.79 <sup>71</sup>	10.76 <sup>55</sup>	59.49 <sup>123</sup>	27.973 <sup>133</sup>	26.06 <sup>88</sup>
25.3	53.47 <sup>44</sup>	88.36 <sup>94</sup>	29.974 <sup>131</sup>	56.50 <sup>71</sup>	10.19 <sup>57</sup>	60.16 <sup>67</sup>	27.836 <sup>137</sup>	26.90 <sup>82</sup>
Dec. 5.2	53.02 <sup>45</sup>	88.74 <sup>38</sup>	29.849 <sup>125</sup>	57.20 <sup>70</sup>	9.63 <sup>56</sup>	60.25 <sup>9</sup>	27.701 <sup>135</sup>	27.62 <sup>72</sup>
	45	22	120	66	55	51	126	60
15.2	52.57	88.52	29.729	57.86	9.08	59.74	27.575	28.22
25.2	52.14 <sup>43</sup>	87.71 <sup>81</sup>	29.619 <sup>110</sup>	58.50 <sup>64</sup>	8.58 <sup>50</sup>	58.67 <sup>107</sup>	27.461 <sup>114</sup>	28.67 <sup>45</sup>
35.2	51.74 <sup>40</sup>	86.33 <sup>138</sup>	29.525 <sup>94</sup>	59.06 <sup>56</sup>	8.13 <sup>45</sup>	57.06 <sup>161</sup>	27.362 <sup>99</sup>	28.98 <sup>31</sup>
Mean Place	49.696	45.69	26.505	80.37	6.582	65.59	24.365	47.80
Sec δ, Tan δ	2.438	+2.224	1.010	-0.141	2.995	-2.824	1.042	-0.291
D <sub>α</sub> , D <sub>ωα</sub>	+0.043	-0.141	+0.062	+0.009	+0.084	+0.179	+0.064	+0.018
D <sub>δ</sub> , D <sub>ωδ</sub>	+0.38	-0.31	+0.38	-0.31	+0.38	-0.30	+0.38	-0.30

FOR THE UPPER TRANSIT AT WASHINGTON.

Washington Mean Time.	$\alpha$ Pisces Australis. (Fomalhaut.) Mag. 1.3			$\epsilon$ Andromedae. Mag. 3.6			$\beta$ Pegasi. Var. 2.2-2.7			$\alpha$ Pegasi. (Markab.) Mag. 2.6		
	Right Ascension.		Declina- tion.	Right Ascension.		Declina- tion.	Right Ascension.		Declina- tion.	Right Ascension.		Declina- tion.
	h m	s	° ' "	h m	s	° ' "	h m	s	° ' "	h m	s	° ' "
	22 53		-30 2	22 58		+41 53	22 59		+27 38	23 0		+14 46
Jan. 1.2	14.035 <sup>108</sup>	51.12	14.552	63.07	54.021	69.17	46.840	38.87				
11.1	13.932 <sup>82</sup>	50.77 <sup>35</sup>	14.389 <sup>163</sup>	61.48 <sup>159</sup>	53.904 <sup>117</sup>	67.77 <sup>140</sup>	46.740 <sup>100</sup>	37.71 <sup>116</sup>				
21.1	13.850 <sup>52</sup>	50.15 <sup>62</sup>	14.248 <sup>141</sup>	59.57 <sup>191</sup>	53.805 <sup>99</sup>	66.15 <sup>162</sup>	46.662 <sup>79</sup>	36.46 <sup>125</sup>				
31.1	13.798 <sup>24</sup>	49.25 <sup>90</sup>	14.138 <sup>110</sup>	57.38 <sup>219</sup>	53.729 <sup>76</sup>	64.36 <sup>179</sup>	46.603 <sup>59</sup>	35.16 <sup>130</sup>				
Feb. 10.1	13.774 <sup>6</sup>	48.11 <sup>114</sup>	14.063 <sup>75</sup>	55.02 <sup>236</sup>	53.680 <sup>49</sup>	62.50 <sup>186</sup>	46.569 <sup>34</sup>	33.86 <sup>121</sup>				
20.0	13.780	46.72	14.029	52.58	53.666	60.64	46.563	32.65				
Mar. 1.0	13.823 <sup>43</sup>	45.11 <sup>161</sup>	14.040	50.16 <sup>242</sup>	53.685 <sup>19</sup>	58.86 <sup>178</sup>	46.587 <sup>24</sup>	31.56 <sup>109</sup>				
11.0	13.899 <sup>76</sup>	43.31 <sup>190</sup>	14.101	47.87 <sup>229</sup>	53.745 <sup>60</sup>	57.25 <sup>161</sup>	46.647	30.64 <sup>92</sup>				
21.0	14.015 <sup>116</sup>	41.32 <sup>199</sup>	14.212 <sup>111</sup>	45.81 <sup>206</sup>	53.847 <sup>102</sup>	55.88 <sup>137</sup>	46.746	29.99 <sup>65</sup>				
30.9	14.167 <sup>152</sup>	39.25 <sup>207</sup>	14.375 <sup>163</sup>	44.07 <sup>174</sup>	53.990 <sup>143</sup>	54.82 <sup>108</sup>	46.882 <sup>136</sup>	29.64 <sup>35</sup>				
Apr. 9.9	14.360	37.04	14.588	42.72	54.177	54.14	47.058	29.60				
19.9	14.587 <sup>227</sup>	34.78 <sup>226</sup>	14.847 <sup>259</sup>	41.81 <sup>91</sup>	54.402 <sup>226</sup>	53.85 <sup>29</sup>	47.263 <sup>210</sup>	29.93 <sup>33</sup>				
29.8	14.849 <sup>262</sup>	32.49 <sup>229</sup>	15.147 <sup>300</sup>	41.39 <sup>42</sup>	54.662 <sup>260</sup>	54.00 <sup>15</sup>	47.504 <sup>241</sup>	30.60 <sup>67</sup>				
May 9.8	15.140 <sup>291</sup>	30.27 <sup>222</sup>	15.479 <sup>332</sup>	41.47 <sup>8</sup>	54.951 <sup>289</sup>	54.56 <sup>56</sup>	47.773 <sup>269</sup>	31.62 <sup>102</sup>				
19.8	15.456 <sup>316</sup>	28.13 <sup>214</sup>	15.838 <sup>359</sup>	42.05 <sup>68</sup>	55.264 <sup>313</sup>	55.57 <sup>101</sup>	48.064 <sup>291</sup>	32.94 <sup>132</sup>				
29.8	15.790	26.13	16.210	43.13	55.591	56.94	48.371	34.57				
June 8.7	16.123 <sup>338</sup>	24.33 <sup>180</sup>	16.588 <sup>378</sup>	44.66 <sup>153</sup>	55.925 <sup>334</sup>	58.67 <sup>173</sup>	48.635 <sup>314</sup>	36.44 <sup>187</sup>				
18.7	16.470 <sup>342</sup>	22.75 <sup>158</sup>	16.961 <sup>373</sup>	46.60 <sup>194</sup>	56.256 <sup>331</sup>	60.71 <sup>204</sup>	48.998 <sup>313</sup>	38.47 <sup>203</sup>				
28.7	16.802 <sup>332</sup>	21.49 <sup>126</sup>	17.319 <sup>358</sup>	48.89 <sup>229</sup>	56.576 <sup>320</sup>	63.00 <sup>229</sup>	49.301 <sup>303</sup>	40.66 <sup>219</sup>				
July 8.7	17.117 <sup>315</sup>	20.50 <sup>99</sup>	17.652 <sup>333</sup>	51.48 <sup>259</sup>	56.877 <sup>301</sup>	65.48 <sup>248</sup>	49.586 <sup>285</sup>	42.92 <sup>226</sup>				
18.6	17.408	19.87	17.953	54.31	57.149	68.07	49.846	45.21				
28.6	17.664 <sup>256</sup>	19.58 <sup>29</sup>	18.214 <sup>261</sup>	57.30 <sup>299</sup>	57.388 <sup>239</sup>	70.73 <sup>266</sup>	50.076 <sup>230</sup>	47.46 <sup>225</sup>				
Aug. 7.6	17.879 <sup>215</sup>	19.65 <sup>7</sup>	18.430 <sup>216</sup>	60.39 <sup>309</sup>	57.589 <sup>201</sup>	73.40 <sup>267</sup>	50.269 <sup>193</sup>	49.64 <sup>218</sup>				
17.5	18.051 <sup>172</sup>	20.04 <sup>39</sup>	18.597 <sup>167</sup>	63.50 <sup>311</sup>	57.746 <sup>157</sup>	76.01 <sup>261</sup>	50.425 <sup>156</sup>	51.66 <sup>202</sup>				
27.5	18.174 <sup>123</sup>	20.74 <sup>70</sup>	18.714 <sup>117</sup>	66.56 <sup>306</sup>	57.860 <sup>114</sup>	78.51 <sup>250</sup>	50.536 <sup>111</sup>	53.53 <sup>187</sup>				
Sept. 6.5	18.248	21.69	18.779	69.53	57.929	80.86	50.609	55.20				
16.5	18.274 <sup>26</sup>	22.88 <sup>119</sup>	18.796 <sup>17</sup>	72.35 <sup>282</sup>	57.954 <sup>25</sup>	83.01 <sup>215</sup>	50.637 <sup>26</sup>	56.65 <sup>145</sup>				
26.4	18.255 <sup>19</sup>	24.21 <sup>133</sup>	18.765 <sup>31</sup>	74.94 <sup>259</sup>	57.939 <sup>15</sup>	84.93 <sup>192</sup>	50.631 <sup>6</sup>	57.86 <sup>121</sup>				
Oct. 6.4	18.196 <sup>59</sup>	25.64 <sup>143</sup>	18.693 <sup>72</sup>	77.28 <sup>224</sup>	57.889 <sup>50</sup>	86.58 <sup>165</sup>	50.588 <sup>43</sup>	58.84 <sup>98</sup>				
16.4	18.099 <sup>97</sup>	27.10 <sup>146</sup>	18.583 <sup>110</sup>	79.31 <sup>203</sup>	57.807 <sup>32</sup>	87.96 <sup>138</sup>	50.519 <sup>69</sup>	59.55 <sup>71</sup>				
26.4	17.976 <sup>123</sup>	28.50 <sup>140</sup>	18.444 <sup>139</sup>	80.96 <sup>167</sup>	57.699 <sup>108</sup>	89.93 <sup>107</sup>	50.424 <sup>95</sup>	60.00 <sup>45</sup>				
Nov. 5.3	17.831 <sup>145</sup>	29.80 <sup>130</sup>	18.279 <sup>165</sup>	82.27 <sup>129</sup>	57.572 <sup>127</sup>	89.76 <sup>73</sup>	50.312 <sup>112</sup>	60.22 <sup>22</sup>				
15.3	17.677 <sup>154</sup>	30.96 <sup>116</sup>	18.097 <sup>182</sup>	83.14 <sup>87</sup>	57.430 <sup>142</sup>	90.17 <sup>41</sup>	50.189 <sup>123</sup>	60.19 <sup>3</sup>				
25.3	17.516 <sup>161</sup>	31.89 <sup>93</sup>	17.902 <sup>195</sup>	83.57 <sup>43</sup>	57.281 <sup>149</sup>	90.21 <sup>4</sup>	50.060 <sup>129</sup>	59.92 <sup>27</sup>				
Dec. 5.2	17.355 <sup>161</sup>	32.58 <sup>69</sup>	17.703 <sup>199</sup>	83.54 <sup>3</sup>	57.129 <sup>153</sup>	89.93 <sup>28</sup>	49.928 <sup>132</sup>	59.41 <sup>51</sup>				
15.2	17.206 <sup>149</sup>	33.00 <sup>42</sup>	17.504 <sup>199</sup>	83.05 <sup>49</sup>	56.980 <sup>149</sup>	89.28 <sup>65</sup>	49.801 <sup>127</sup>	58.68 <sup>73</sup>				
25.2	17.069 <sup>137</sup>	33.13 <sup>13</sup>	17.312 <sup>192</sup>	82.11 <sup>94</sup>	56.838 <sup>142</sup>	88.32 <sup>96</sup>	49.679 <sup>122</sup>	57.76 <sup>92</sup>				
35.2	16.952 <sup>117</sup>	33.00 <sup>13</sup>	17.132 <sup>180</sup>	80.75 <sup>136</sup>	56.707 <sup>131</sup>	87.06 <sup>126</sup>	49.571 <sup>108</sup>	56.68 <sup>108</sup>				
Mean Place	14.010	47.90	14.181	44.63	53.625	54.71	46.462	28.43				
Sec $\delta$ , Tan $\delta$	1.155	-0.578	1.344	+0.897	1.129	+0.524	1.034	+0.264				
$D\mu\alpha$ , $D\mu\delta$	+0.066	+0.037	+0.055	-0.053	+0.058	-0.034	+0.060	-0.017				
$D\delta$ , $D\alpha$	+0.38	-0.29	+0.38	-0.27	+0.38	-0.26	+0.38	-0.26				

APPARENT PLACES OF STARS, 1920.

FOR THE UPPER TRANSIT AT WASHINGTON.

Washington Mean Time.	55 Pegasi. Mag. 4.7		C <sup>3</sup> Aquarii. Mag. 3.8		γ Cephei. Mag. 4.6		ι Gravis. Mag. 4.1	
	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.
	h m 23 2	° ' " + 8 58	h m 23 5	° ' " -21 35	h m 23 5	° ' " +74 57	h m 23 5	° ' " -45 40
	s	"	s	"	s	"	s	"
Jan. 1.2	58.777	45.75	11.161	86.37	20.90	42.18	49.942	56.81
11.2	58.684 93	44.75 100	11.063 98	86.40 3	20.22 68	40.84 124	49.782 160	55.94 87
21.1	58.608 76	43.71 104	10.983 80	86.19 21	19.60 62	38.94 190	49.652 130	54.68 126
31.1	58.552 56	42.65 106	10.926 57	85.77 42	19.08 52	36.58 236	49.553 90	53.04 164
Feb. 10.1	58.519 33	41.64 101	10.893 33	85.10 67	18.67 41	33.84 274	49.491 62	51.10 194
	6	90	4	88	26	302	22	223
20.0	58.513	40.74	10.889	84.22	18.41	30.82	49.469	48.87
Mar. 1.0	58.538 25	39.98 76	10.916 27	83.11 111	18.29 12	27.66 316	49.491 22	46.43 244
11.0	58.596 58	39.42 56	10.975 59	81.78 133	18.33 4	24.49 317	49.556 65	43.79 264
21.0	58.690 94	39.11 81	11.073 98	80.26 152	18.53 20	21.43 306	49.667 111	41.04 275
30.9	58.820 130	39.08 3	11.204 131	78.55 171	18.87 24	18.59 284	49.825 158	38.21 283
	168	28	170	185	49	248	205	284
Apr. 9.9	58.988	39.36	11.374	76.70	19.36	16.11	50.030	35.37
19.9	59.192 204	39.95 59	11.580 206	74.70 200	19.98 62	14.05 206	50.279 240	32.56 261
29.9	59.427 235	40.85 90	11.820 240	72.63 207	20.71 73	12.50 155	50.572 293	29.87 260
May 9.8	59.691 264	42.07 122	12.089 260	70.51 212	21.52 81	11.49 101	50.901 328	27.33 254
19.8	59.977 286	43.55 148	12.384 295	68.38 213	22.39 87	11.09 40	51.262 361	24.99 234
	301	172	312	205	90	18	382	206
29.8	60.278	45.27	12.696	66.33	23.29	11.27	51.644	22.93
June 8.7	60.587 309	47.17 190	13.018 322	64.38 195	24.19 90	12.03 76	52.041 397	21.20 173
18.7	60.896 309	49.22 205	13.342 324	62.60 178	25.08 89	13.35 132	52.441 400	19.83 137
28.7	61.197 301	51.33 211	13.662 320	61.02 158	25.92 84	15.20 185	52.835 394	18.87 96
July 8.7	61.482 285	53.47 214	13.965 303	59.68 134	26.69 77	17.53 233	53.211 376	18.33 54
	260	212	270	105	66	274	350	10
18.6	61.742	55.59	14.244	58.63	27.38	20.27	53.561	18.23
28.6	61.971 229	57.63 204	14.494 250	57.89 74	27.97 59	23.35 308	53.873 312	18.55 32
Aug. 7.6	62.166 195	59.55 192	14.707 213	57.46 43	28.45 48	26.71 336	54.139 266	19.30 75
17.6	62.323 157	61.30 175	14.879 172	57.34 12	28.81 36	30.29 358	54.354 215	20.43 113
27.5	62.438 115	62.85 155	15.007 128	57.54 20	29.03 22	33.98 369	54.511 167	21.91 148
	73	135	83	45	10	375	98	176
Sept. 6.5	62.511	64.20	15.090	57.99	29.13	37.73	54.609	23.67
16.5	62.544 33	65.32 112	15.129 89	58.70 71	29.11 2	41.45 372	54.647 28	25.63 196
26.4	62.540 4	66.20 88	15.124 5	59.59 89	28.96 15	45.07 362	54.627 30	27.72 260
Oct. 6.4	62.502 38	66.85 65	15.081 43	60.63 104	28.67 29	48.49 342	54.554 73	29.85 213
16.4	62.435 67	67.27 42	15.006 75	61.76 113	28.29 38	51.66 317	54.434 120	31.92 207
	90	19	101	116	48	285	158	194
26.4	62.345	67.46	14.905	62.92	27.81	54.51	54.276	33.86
Nov. 5.3	62.238 107	67.43 3	14.782 123	64.06 114	27.24 57	56.94 243	54.087 189	35.57 171
15.3	62.119 119	67.21 22	14.650 132	65.13 107	26.58 66	58.90 196	53.879 208	37.00 143
25.3	61.994 125	66.81 40	14.508 142	66.05 92	25.88 70	60.32 142	53.660 219	38.06 106
Dec. 5.3	61.868 126	66.24 57	14.369 139	66.84 79	25.14 74	61.17 85	53.440 229	38.74 68
	122	74	136	61	77	25	312	26
15.2	61.746	65.50	14.233	67.45	24.37	61.42	53.228	39.00
25.2	61.631 115	64.64 86	14.108 125	67.85 40	23.62 75	61.04 88	53.030 198	38.83 17
35.2	61.527 104	63.66 98	13.996 112	68.03 18	22.89 73	60.03 101	52.853 177	38.23 60
Mean Place	58.405	37.21	10.981	85.10	20.935	17.41	50.140	49.33
Sec δ, Tan δ	1.012	+0.158	1.076	-0.396	3.854	+3.722	1.431	-1.024
D <sub>ψa</sub> , D <sub>ωa</sub>	+0.060	-0.010	+0.064	+0.026	+0.038	-0.241	+0.068	+0.066
D <sub>ψδ</sub> , D <sub>ωδ</sub>	+0.39	-0.25	+0.39	-0.24	+0.39	-0.24	+0.39	-0.23

# APPARENT PLACES OF STARS, 1920.

505

FOR THE UPPER TRANSIT AT WASHINGTON.

Washington Mean Time.	59 Pegasi. Mag. 5.2		5 H <sup>1</sup> . Cassiopeiae. Mag. 5.6		φ Aquarii. Mag. 4.4		ψ Aquarii. Mag. 4.5	
	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.
	h m 23 7	° ' " + 8 17	h m 23 9	° ' " +56 43	h m 23 10	° ' " - 6 28	h m 23 11	° ' " - 9 30
	s.	"	s	"	s	"	s	"
Jan. 1.2	42.201	16.00	25.965	57.50	11.104	46.62	42.419	82.91
11.2	42.107	15.03	25.702	56.03	11.011	47.18	42.325	83.36
21.1	42.027	14.01	25.468	54.10	10.935	47.63	42.249	83.69
31.1	41.968	13.01	25.274	51.80	10.879	47.96	42.193	83.88
Feb. 10.1	41.931	12.05	25.130	49.19	10.845	48.17	42.158	83.89
20.0	41.921	11.18	25.044	46.41	10.836	48.18	42.149	83.72
Mar. 1.0	41.942	10.47	25.022	43.56	10.857	48.00	42.169	83.36
11.0	41.996	9.96	25.070	40.75	10.911	47.59	42.222	82.78
21.0	42.085	9.68	25.190	38.12	10.997	46.98	42.307	81.96
30.9	42.211	9.69	25.383	35.75	11.120	46.11	42.429	80.92
Apr. 9.9	42.375	10.00	25.643	33.75	11.279	45.01	42.589	79.65
19.9	42.573	10.61	25.969	32.19	11.475	43.68	42.783	78.18
29.9	42.805	11.55	26.349	31.14	11.702	42.13	43.011	76.53
May 9.8	43.066	12.77	26.773	30.63	11.958	40.44	43.268	74.71
19.8	43.350	14.26	27.232	30.68	12.238	38.61	43.550	72.80
29.8	43.650	15.98	27.711	31.27	12.535	36.67	43.848	70.82
June 8.7	43.959	17.88	28.198	32.40	12.842	34.70	44.157	68.83
18.7	44.268	19.91	28.679	34.04	13.150	32.73	44.469	66.90
28.7	44.570	22.01	29.142	36.13	13.454	30.84	44.775	65.04
July 8.7	44.855	24.13	29.573	38.62	13.741	29.08	45.067	63.34
18.6	45.118	26.24	29.964	41.45	14.007	27.46	45.337	61.81
28.6	45.351	28.25	30.305	44.55	14.247	26.03	45.580	60.51
Aug. 7.6	45.550	30.13	30.589	47.84	14.449	24.83	45.787	59.46
17.6	45.711	31.85	30.814	51.26	14.616	23.90	45.956	58.67
27.5	45.830	33.38	30.974	54.73	14.742	23.19	46.085	58.15
Sept. 6.5	45.908	34.69	31.068	58.18	14.826	22.77	46.172	57.89
16.5	45.947	35.77	31.098	61.55	14.870	22.57	46.217	57.88
26.4	45.948	36.62	31.068	64.75	14.872	22.60	46.221	58.09
Oct. 6.4	45.914	37.23	30.980	67.73	14.842	22.84	46.192	58.49
16.4	45.852	37.62	30.840	70.41	14.780	23.26	46.131	59.04
26.4	45.766	37.78	30.654	72.76	14.697	23.80	46.047	59.72
Nov. 5.3	45.663	37.72	30.430	74.70	14.591	24.42	45.943	60.47
15.3	45.546	37.49	30.175	76.17	14.475	25.13	45.826	61.26
25.3	45.423	37.08	29.898	77.15	14.353	25.86	45.702	62.05
Dec. 5.3	45.298	36.50	29.606	77.60	14.229	26.60	45.578	62.82
15.2	45.176	35.77	29.308	77.50	14.107	27.33	45.456	63.53
25.2	45.061	34.93	29.014	76.85	13.994	28.03	45.341	64.17
35.2	44.955	33.99	28.733	75.67	13.891	28.66	45.238	64.72
Mean Place	41.804	7.76	25.537	35.56	10.771	49.93	42.100	85.20
Sec δ, Tan δ	1.011	+0.146	1.823	+1.524	1.006	-0.113	1.014	-0.168
D <sub>α</sub> , D <sub>αα</sub>	+0.060	-0.010	+0.052	-0.099	+0.062	+0.007	+0.062	+0.011
D <sub>δ</sub> , D <sub>δδ</sub>	+0.39	-0.23	+0.39	-0.22	+0.39	-0.22	+0.39	-0.21

FOR THE UPPER TRANSIT AT WASHINGTON.

Washington Mean Time.	$\gamma$ Tucanae. Mag. 4.1		$\gamma$ Piscium. Mag. 3.8		$\gamma$ Sculptoris. Mag. 4.5		$\epsilon$ Cephei. Mag. 4.9	
	Right Ascension.	Declination.	Right Ascension.	Declination.	Right Ascension.	Declination.	Right Ascension.	Declination.
	h m 23 12	° ' " -58 39	h m 23 13	° ' " + 2 50	h m 23 14	° ' " -32 57	h m 23 15	° ' " +67 40
Jan. 1.2	45.504	99.89	1.462	48.22	30.507	69.93	20.44	49.03
11.2	45.249 <sup>255</sup>	98.60 <sup>129</sup>	1.370 <sup>92</sup>	47.41 <sup>81</sup>	30.383 <sup>124</sup>	69.59 <sup>34</sup>	20.00 <sup>44</sup>	47.69 <sup>134</sup>
21.1	45.032 <sup>217</sup>	96.85 <sup>175</sup>	1.293 <sup>77</sup>	46.61 <sup>80</sup>	30.279 <sup>104</sup>	68.93 <sup>66</sup>	19.60 <sup>40</sup>	45.86 <sup>183</sup>
31.1	44.863 <sup>169</sup>	94.69 <sup>216</sup>	1.234 <sup>59</sup>	45.85 <sup>76</sup>	30.200 <sup>79</sup>	67.97 <sup>96</sup>	19.26 <sup>34</sup>	43.56 <sup>230</sup>
Feb. 10.1	44.743 <sup>120</sup>	92.17 <sup>252</sup>	1.197 <sup>37</sup>	45.19 <sup>66</sup>	30.148 <sup>52</sup>	66.70 <sup>127</sup>	18.99 <sup>27</sup>	40.90 <sup>266</sup>
	83	281	10	56	20	152	18	291
20.1	44.680	89.36	1.187	44.63	30.128	65.18	18.81	37.99
Mar. 1.0	44.674 <sup>6</sup>	86.34 <sup>302</sup>	1.205 <sup>18</sup>	44.25 <sup>38</sup>	30.142 <sup>14</sup>	63.42 <sup>176</sup>	18.73 <sup>8</sup>	34.94 <sup>306</sup>
11.0	44.728 <sup>54</sup>	83.15 <sup>319</sup>	1.254 <sup>49</sup>	44.07 <sup>18</sup>	30.192 <sup>50</sup>	61.45 <sup>197</sup>	18.75 <sup>3</sup>	31.87 <sup>307</sup>
21.0	44.846 <sup>118</sup>	79.87 <sup>328</sup>	1.339 <sup>85</sup>	44.13 <sup>6</sup>	30.281 <sup>89</sup>	59.28 <sup>217</sup>	18.87 <sup>13</sup>	28.93 <sup>294</sup>
30.9	45.026 <sup>180</sup>	76.57 <sup>330</sup>	1.460 <sup>121</sup>	44.45 <sup>32</sup>	30.411 <sup>180</sup>	56.99 <sup>229</sup>	19.11 <sup>24</sup>	26.20 <sup>273</sup>
	241	325	158	60	171	240	33	233
Apr. 9.9	45.267	73.32	1.618	45.05	30.582	54.59	19.44	23.82
19.9	45.569 <sup>302</sup>	70.20 <sup>312</sup>	1.812 <sup>194</sup>	45.92 <sup>87</sup>	30.792 <sup>210</sup>	52.13 <sup>246</sup>	19.86 <sup>42</sup>	21.87 <sup>195</sup>
29.9	45.923 <sup>354</sup>	67.25 <sup>295</sup>	2.039 <sup>227</sup>	47.08 <sup>116</sup>	31.041 <sup>249</sup>	49.67 <sup>246</sup>	20.36 <sup>50</sup>	20.41 <sup>146</sup>
May 9.8	46.328 <sup>406</sup>	64.55 <sup>270</sup>	2.295 <sup>256</sup>	48.47 <sup>139</sup>	31.322 <sup>281</sup>	47.26 <sup>241</sup>	20.93 <sup>57</sup>	19.48 <sup>93</sup>
19.8	46.773 <sup>445</sup>	62.16 <sup>239</sup>	2.575 <sup>280</sup>	50.10 <sup>163</sup>	31.632 <sup>310</sup>	44.95 <sup>231</sup>	21.54 <sup>61</sup>	19.14 <sup>34</sup>
	476	203	297	180	331	214	64	22
29.8	47.249	60.13	2.872	51.90	31.963	42.81	22.18	19.36
June 8.8	47.745 <sup>496</sup>	58.52 <sup>161</sup>	3.180 <sup>308</sup>	53.83 <sup>193</sup>	32.307 <sup>344</sup>	40.87 <sup>194</sup>	22.83 <sup>65</sup>	20.18 <sup>82</sup>
18.7	48.248 <sup>503</sup>	57.36 <sup>116</sup>	3.489 <sup>309</sup>	55.84 <sup>201</sup>	32.656 <sup>349</sup>	39.20 <sup>167</sup>	23.47 <sup>64</sup>	21.52 <sup>134</sup>
28.7	48.746 <sup>478</sup>	56.67 <sup>69</sup>	3.791 <sup>302</sup>	57.88 <sup>204</sup>	33.001 <sup>345</sup>	37.83 <sup>137</sup>	24.09 <sup>62</sup>	23.38 <sup>186</sup>
July 8.7	49.223 <sup>497</sup>	56.49 <sup>18</sup>	4.080 <sup>289</sup>	59.89 <sup>201</sup>	33.331 <sup>330</sup>	36.80 <sup>103</sup>	24.67 <sup>56</sup>	25.70 <sup>232</sup>
	446	31	267	193	308	66	52	270
18.6	49.669	56.80	4.347	61.82	33.639	36.14	25.19	28.40
28.6	50.068 <sup>399</sup>	57.60 <sup>80</sup>	4.586 <sup>239</sup>	63.63 <sup>181</sup>	33.916 <sup>277</sup>	35.86 <sup>28</sup>	25.64 <sup>45</sup>	31.46 <sup>306</sup>
Aug. 7.6	50.412 <sup>344</sup>	58.85 <sup>125</sup>	4.790 <sup>204</sup>	65.27 <sup>164</sup>	34.154 <sup>238</sup>	35.96 <sup>10</sup>	26.02 <sup>38</sup>	34.78 <sup>332</sup>
17.6	50.688 <sup>276</sup>	60.52 <sup>167</sup>	4.957 <sup>167</sup>	66.72 <sup>145</sup>	34.349 <sup>195</sup>	36.41 <sup>45</sup>	26.31 <sup>29</sup>	38.28 <sup>350</sup>
27.5	50.892 <sup>204</sup>	62.52 <sup>200</sup>	5.084 <sup>127</sup>	67.94 <sup>122</sup>	34.497 <sup>148</sup>	37.21 <sup>80</sup>	26.52 <sup>21</sup>	41.91 <sup>363</sup>
	126	230	86	100	98	109	12	367
Sept. 6.5	51.018	64.82	5.170	68.94	34.595	38.30	26.64	45.58
16.5	51.064 <sup>46</sup>	67.32 <sup>250</sup>	5.216 <sup>46</sup>	69.69 <sup>75</sup>	34.643 <sup>48</sup>	39.64 <sup>134</sup>	26.67 <sup>3</sup>	49.19 <sup>361</sup>
26.5	51.034 <sup>30</sup>	69.90 <sup>258</sup>	5.224 <sup>8</sup>	70.22 <sup>53</sup>	34.644 <sup>1</sup>	41.15 <sup>151</sup>	26.61 <sup>6</sup>	52.70 <sup>351</sup>
Oct. 6.4	50.928 <sup>106</sup>	72.46 <sup>256</sup>	5.197 <sup>27</sup>	70.52 <sup>30</sup>	34.602 <sup>42</sup>	42.78 <sup>163</sup>	26.46 <sup>15</sup>	56.02 <sup>332</sup>
16.4	50.756 <sup>172</sup>	74.92 <sup>246</sup>	5.141 <sup>56</sup>	70.61 <sup>9</sup>	34.520 <sup>82</sup>	44.45 <sup>167</sup>	26.25 <sup>21</sup>	59.09 <sup>307</sup>
	227	225	80	9	113	161	29	273
26.4	50.529	77.17	5.061	70.52	34.407	46.06	25.96	61.82
Nov. 5.3	50.254 <sup>275</sup>	79.10 <sup>193</sup>	4.963 <sup>98</sup>	70.25 <sup>27</sup>	34.269 <sup>138</sup>	47.58 <sup>152</sup>	25.61 <sup>35</sup>	64.16 <sup>234</sup>
15.3	49.950 <sup>304</sup>	80.65 <sup>155</sup>	4.852 <sup>111</sup>	69.84 <sup>41</sup>	34.115 <sup>154</sup>	48.92 <sup>134</sup>	25.21 <sup>40</sup>	66.05 <sup>189</sup>
25.3	49.626 <sup>324</sup>	81.76 <sup>111</sup>	4.733 <sup>119</sup>	69.31 <sup>53</sup>	33.951 <sup>164</sup>	50.03 <sup>111</sup>	24.77 <sup>44</sup>	67.39 <sup>134</sup>
Dec. 5.3	49.297 <sup>329</sup>	82.35 <sup>59</sup>	4.613 <sup>120</sup>	68.67 <sup>64</sup>	33.785 <sup>166</sup>	50.87 <sup>84</sup>	24.30 <sup>47</sup>	68.19 <sup>80</sup>
	324	8	117	74	161	54	49	19
15.2	48.973	82.43	4.496	67.93	33.624	51.41	23.81	68.38
25.2	48.667 <sup>306</sup>	81.97 <sup>46</sup>	4.383 <sup>113</sup>	67.15 <sup>78</sup>	33.472 <sup>152</sup>	51.62 <sup>21</sup>	23.33 <sup>46</sup>	68.00 <sup>38</sup>
35.2	48.389 <sup>278</sup>	81.02 <sup>95</sup>	4.280 <sup>103</sup>	66.32 <sup>83</sup>	33.335 <sup>137</sup>	51.50 <sup>12</sup>	22.86 <sup>47</sup>	67.02 <sup>98</sup>
Mean Place	46.103	89.72	1.059	41.88	30.417	65.13	20.030	25.11
Sec $\delta$ , Tan $\delta$	1.923	-1.643	1.001	+0.050	1.192	-0.649	2.633	+2.436
$D\psi\alpha$ , $D\omega\alpha$	+0.070	+0.107	+0.061	-0.003	+0.065	+0.042	+0.049	-0.160
$D\psi\delta$ , $D\omega\delta$	+0.39	-0.20	+0.39	-0.20	+0.39	-0.20	+0.39	-0.19

FOR THE UPPER TRANSIT AT WASHINGTON.

Washington Mean Time.	γ Pegasi. Mag. 4.6		δ <sup>1</sup> Aquarii. Mag. 4.2		4 Cassiopeae. Mag. 5.2		ν Pegasi. Mag. 4.6	
	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.
	h m 23 18	° ' " +23 18	h m 23 18	° ' " -20 31	h m 23 21	° ' " +61 50	h m 23 21	° ' " +22 57
Jan. 1.2	40.990	20.89	46.481	76.56	17.12	59.43	23.579	61.16
11.2	40.871 <sup>119</sup>	19.64 <sup>125</sup>	46.375 <sup>106</sup>	76.69 <sup>13</sup>	16.78 <sup>24</sup>	58.13 <sup>130</sup>	23.463 <sup>116</sup>	59.95 <sup>121</sup>
21.1	40.770 <sup>101</sup>	18.23 <sup>141</sup>	46.285 <sup>90</sup>	76.58 <sup>11</sup>	16.47 <sup>31</sup>	56.32 <sup>181</sup>	23.360 <sup>103</sup>	58.57 <sup>138</sup>
31.1	40.689 <sup>81</sup>	16.69 <sup>154</sup>	46.215 <sup>70</sup>	76.24 <sup>24</sup>	16.20 <sup>27</sup>	54.09 <sup>223</sup>	23.275 <sup>85</sup>	57.06 <sup>151</sup>
Feb. 10.1	40.632 <sup>57</sup>	15.07 <sup>162</sup>	46.170 <sup>45</sup>	75.66 <sup>58</sup>	15.99 <sup>21</sup>	51.51 <sup>258</sup>	23.215 <sup>60</sup>	55.48 <sup>158</sup>
20.1	40.603 <sup>29</sup>	13.44 <sup>163</sup>	46.152 <sup>18</sup>	74.85 <sup>81</sup>	15.85 <sup>14</sup>	48.69 <sup>282</sup>	23.183 <sup>32</sup>	53.91 <sup>157</sup>
Mar. 1.0	40.608 <sup>5</sup>	11.90 <sup>154</sup>	46.162 <sup>10</sup>	73.81 <sup>104</sup>	15.79 <sup>6</sup>	45.76 <sup>293</sup>	23.183 <sup>0</sup>	52.40 <sup>151</sup>
11.0	40.650 <sup>42</sup>	10.53 <sup>137</sup>	46.206 <sup>44</sup>	72.55 <sup>126</sup>	15.80 <sup>1</sup>	42.82 <sup>294</sup>	23.220 <sup>37</sup>	51.05 <sup>135</sup>
21.0	40.730 <sup>80</sup>	9.41 <sup>112</sup>	46.286 <sup>80</sup>	71.08 <sup>147</sup>	15.90 <sup>10</sup>	40.00 <sup>282</sup>	23.297 <sup>77</sup>	49.92 <sup>113</sup>
30.9	40.855 <sup>125</sup>	8.54 <sup>87</sup>	46.404 <sup>118</sup>	69.41 <sup>167</sup>	16.09 <sup>19</sup>	37.42 <sup>268</sup>	23.415 <sup>118</sup>	49.08 <sup>84</sup>
Apr. 9.9	41.020 <sup>166</sup>	8.02 <sup>52</sup>	46.559 <sup>155</sup>	67.57 <sup>184</sup>	16.35 <sup>26</sup>	35.17 <sup>225</sup>	23.575 <sup>160</sup>	48.55 <sup>58</sup>
19.9	41.225 <sup>205</sup>	7.88 <sup>14</sup>	46.752 <sup>198</sup>	65.59 <sup>193</sup>	16.69 <sup>34</sup>	33.34 <sup>183</sup>	23.775 <sup>200</sup>	48.40 <sup>15</sup>
29.9	41.468 <sup>243</sup>	8.11 <sup>28</sup>	46.979 <sup>227</sup>	63.51 <sup>208</sup>	17.10 <sup>41</sup>	32.00 <sup>134</sup>	24.011 <sup>286</sup>	48.63 <sup>23</sup>
May 9.8	41.738 <sup>270</sup>	8.75 <sup>64</sup>	47.238 <sup>259</sup>	61.38 <sup>213</sup>	17.56 <sup>46</sup>	31.18 <sup>82</sup>	24.280 <sup>289</sup>	49.26 <sup>68</sup>
19.8	42.036 <sup>298</sup>	9.76 <sup>101</sup>	47.523 <sup>285</sup>	59.23 <sup>215</sup>	18.08 <sup>52</sup>	30.93 <sup>25</sup>	24.576 <sup>296</sup>	50.26 <sup>100</sup>
29.8	42.352 <sup>316</sup>	11.14 <sup>138</sup>	47.830 <sup>307</sup>	57.11 <sup>212</sup>	18.61 <sup>53</sup>	31.24 <sup>31</sup>	24.889 <sup>313</sup>	51.61 <sup>126</sup>
June 8.8	42.675 <sup>323</sup>	12.84 <sup>170</sup>	48.147 <sup>317</sup>	55.11 <sup>200</sup>	18.81 <sup>54</sup>	32.11 <sup>87</sup>	25.213 <sup>324</sup>	53.28 <sup>167</sup>
18.7	43.003 <sup>328</sup>	14.79 <sup>195</sup>	48.469 <sup>322</sup>	53.25 <sup>196</sup>	19.69 <sup>54</sup>	33.49 <sup>138</sup>	25.540 <sup>327</sup>	55.22 <sup>194</sup>
28.7	43.319 <sup>316</sup>	16.97 <sup>218</sup>	48.789 <sup>320</sup>	51.59 <sup>166</sup>	20.21 <sup>52</sup>	35.39 <sup>190</sup>	25.858 <sup>318</sup>	57.38 <sup>216</sup>
July 8.7	43.620 <sup>301</sup>	19.31 <sup>234</sup>	49.094 <sup>305</sup>	50.16 <sup>143</sup>	20.70 <sup>49</sup>	37.71 <sup>232</sup>	26.161 <sup>303</sup>	59.69 <sup>231</sup>
18.6	43.900 <sup>280</sup>	21.76 <sup>245</sup>	49.379 <sup>285</sup>	49.02 <sup>114</sup>	21.14 <sup>44</sup>	40.41 <sup>270</sup>	26.448 <sup>282</sup>	62.11 <sup>242</sup>
28.6	44.146 <sup>246</sup>	24.24 <sup>248</sup>	49.635 <sup>256</sup>	48.17 <sup>85</sup>	21.54 <sup>40</sup>	43.43 <sup>302</sup>	26.694 <sup>251</sup>	64.57 <sup>246</sup>
Aug. 7.6	44.359 <sup>213</sup>	26.70 <sup>246</sup>	49.857 <sup>222</sup>	47.64 <sup>53</sup>	21.54 <sup>83</sup>	46.68 <sup>325</sup>	26.694 <sup>216</sup>	64.57 <sup>245</sup>
17.6	44.530 <sup>171</sup>	29.11 <sup>241</sup>	50.039 <sup>182</sup>	47.42 <sup>22</sup>	21.87 <sup>27</sup>	48.68 <sup>342</sup>	26.910 <sup>177</sup>	67.02 <sup>238</sup>
27.5	44.661 <sup>131</sup>	31.39 <sup>228</sup>	50.180 <sup>141</sup>	47.51 <sup>9</sup>	22.14 <sup>19</sup>	50.10 <sup>354</sup>	27.087 <sup>125</sup>	69.40 <sup>226</sup>
Sept. 6.5	44.751 <sup>90</sup>	33.53 <sup>214</sup>	50.275 <sup>95</sup>	47.90 <sup>39</sup>	22.33 <sup>12</sup>	53.64 <sup>354</sup>	27.222 <sup>94</sup>	71.66 <sup>210</sup>
16.5	44.797 <sup>46</sup>	35.46 <sup>193</sup>	50.328 <sup>53</sup>	47.90 <sup>64</sup>	22.45 <sup>4</sup>	57.18 <sup>349</sup>	27.316 <sup>51</sup>	73.76 <sup>196</sup>
26.5	44.801 <sup>4</sup>	37.16 <sup>170</sup>	50.338 <sup>10</sup>	48.54 <sup>85</sup>	22.49 <sup>3</sup>	60.67 <sup>338</sup>	27.367 <sup>12</sup>	75.69 <sup>160</sup>
Oct. 6.4	44.774 <sup>27</sup>	38.63 <sup>147</sup>	50.309 <sup>29</sup>	49.39 <sup>100</sup>	22.46 <sup>9</sup>	64.05 <sup>319</sup>	27.379 <sup>24</sup>	77.38 <sup>145</sup>
16.4	44.713 <sup>61</sup>	39.83 <sup>120</sup>	50.247 <sup>62</sup>	50.39 <sup>113</sup>	22.37 <sup>15</sup>	67.24 <sup>292</sup>	27.355 <sup>56</sup>	78.83 <sup>119</sup>
26.4	44.713 <sup>86</sup>	39.83 <sup>91</sup>	50.247 <sup>90</sup>	51.52 <sup>117</sup>	22.22 <sup>21</sup>	70.16 <sup>269</sup>	27.299 <sup>82</sup>	80.02 <sup>92</sup>
Nov. 5.3	44.627 <sup>109</sup>	40.74 <sup>63</sup>	50.157 <sup>111</sup>	52.69 <sup>117</sup>	22.01 <sup>26</sup>	72.75 <sup>221</sup>	27.217 <sup>103</sup>	80.94 <sup>62</sup>
15.3	44.518 <sup>125</sup>	41.37 <sup>31</sup>	50.046 <sup>127</sup>	53.86 <sup>110</sup>	21.75 <sup>29</sup>	74.96 <sup>175</sup>	27.114 <sup>120</sup>	81.56 <sup>32</sup>
25.3	44.393 <sup>133</sup>	41.68 <sup>2</sup>	49.919 <sup>134</sup>	54.96 <sup>102</sup>	21.46 <sup>35</sup>	76.71 <sup>126</sup>	26.994 <sup>130</sup>	81.88 <sup>4</sup>
Dec. 5.3	44.260 <sup>138</sup>	41.70 <sup>29</sup>	49.785 <sup>137</sup>	55.98 <sup>86</sup>	21.12 <sup>34</sup>	77.97 <sup>73</sup>	26.864 <sup>136</sup>	81.92 <sup>27</sup>
15.2	44.122 <sup>139</sup>	41.41 <sup>58</sup>	49.648 <sup>135</sup>	56.84 <sup>60</sup>	20.77 <sup>37</sup>	78.69 <sup>16</sup>	26.728 <sup>137</sup>	81.65 <sup>55</sup>
25.2	43.983 <sup>137</sup>	40.83 <sup>86</sup>	49.513 <sup>128</sup>	57.53 <sup>49</sup>	20.40 <sup>36</sup>	78.85 <sup>42</sup>	26.591 <sup>135</sup>	81.10 <sup>83</sup>
35.2	43.846 <sup>127</sup>	39.97 <sup>112</sup>	49.385 <sup>117</sup>	58.02 <sup>23</sup>	20.04 <sup>36</sup>	78.43 <sup>100</sup>	26.456 <sup>127</sup>	80.27 <sup>83</sup>
Mean Place	40.484	7.89	46.219	75.17	16.548	36.44	23.040	48.30
Sec δ, Tan δ	1.089	+0.431	1.068	-0.375	2.120	+1.869	1.086	+0.424
D <sub>φ</sub> α, D <sub>α</sub> α	+0.059	-0.028	+0.063	+0.025	+0.052	-0.123	+0.059	-0.028
D <sub>φ</sub> δ, D <sub>α</sub> δ	+0.39	-0.19	+0.39	-0.18	+0.39	-0.17	+0.39	-0.17

APPARENT PLACES OF STARS, 1920.

FOR THE UPPER TRANSIT AT WASHINGTON.

Washington Mean Time.	$\kappa$ Piscium. Mag. 4.9		$\theta$ Piscium. Mag. 4.4		70 Pegasi. Mag. 4.7		$\beta$ Sculptoris. Mag. 4.5	
	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.
	h m 23 22	° ' " + 0 49	h m 23 23	° ' " + 5 56	h m 23 25	° ' " +12 19	h m 23 28	° ' " -38 15
Jan. 1.2	50.330	8.59	55.024	29.18	6.955	17.94	41.214	46.51
11.2	50.233	7.83	54.923	28.30	6.849	16.94	41.065	46.08
21.1	50.148	7.10	54.836	27.40	6.757	15.86	40.936	45.28
31.1	50.081	6.45	54.767	26.53	6.683	14.73	40.833	44.13
Feb. 10.1	50.035	5.88	54.717	25.70	6.628	13.62	40.759	42.65
20.1	50.014	5.44	54.694	25.00	6.601	12.57	40.715	40.87
Mar. 1.0	50.022	5.19	54.697	24.44	6.602	11.64	40.708	38.83
11.0	50.060	5.14	54.735	24.08	6.637	10.90	40.739	36.58
21.0	50.134	5.30	54.807	23.93	6.709	10.38	40.812	34.15
30.9	50.244	5.74	54.918	24.07	6.819	10.14	40.928	31.56
Apr. 9.9	50.392	6.44	55.067	24.49	6.968	10.19	41.088	28.91
19.9	50.576	7.42	55.250	25.21	7.155	10.58	41.291	26.21
29.9	50.794	8.64	55.470	26.20	7.378	11.29	41.536	23.54
May 9.8	51.044	10.11	55.720	27.48	7.633	12.32	41.817	20.95
19.8	51.319	11.77	55.994	29.00	7.912	13.64	42.131	18.49
29.8	51.612	13.59	56.288	30.72	8.212	15.24	42.470	16.23
June 8.8	51.917	15.54	56.593	32.60	8.522	17.05	42.827	14.22
18.7	52.225	17.54	56.902	34.61	8.835	19.03	43.191	12.52
28.7	52.528	19.56	57.207	36.66	9.142	21.15	43.554	11.16
July 8.7	52.820	21.52	57.499	38.73	9.437	23.32	43.905	10.18
18.6	53.091	23.40	57.769	40.74	9.712	25.50	44.237	9.61
28.6	53.336	25.14	58.012	42.68	9.958	27.62	44.537	9.45
Aug. 7.6	53.547	26.68	58.224	44.44	10.171	29.67	44.800	9.71
17.6	53.721	28.03	58.399	46.05	10.348	31.59	45.020	10.36
27.5	53.857	29.15	58.535	47.46	10.485	33.34	45.190	11.39
Sept. 6.5	53.951	30.04	58.628	48.64	10.581	34.87	45.309	12.72
16.5	54.005	30.67	58.682	49.58	10.637	36.20	45.375	14.32
26.5	54.023	31.08	58.700	50.28	10.655	37.28	45.390	16.11
Oct. 6.4	54.004	31.25	58.681	50.78	10.637	38.14	45.356	18.02
16.4	53.956	31.22	58.635	51.04	10.591	38.76	45.280	19.95
26.4	53.883	31.02	58.563	51.09	10.518	39.14	45.167	21.83
Nov. 5.3	53.790	30.67	58.472	50.98	10.426	39.29	45.025	23.58
15.3	53.684	30.18	58.365	50.67	10.318	39.23	44.862	25.11
25.3	53.568	29.59	58.248	50.21	10.200	38.96	44.687	26.37
Dec. 5.3	53.448	28.92	58.128	49.61	10.077	38.49	44.505	27.32
15.2	53.330	28.19	58.007	48.90	9.953	37.83	44.324	27.91
25.2	53.214	27.43	57.890	48.10	9.832	37.02	44.150	28.12
35.2	53.107	26.64	57.781	47.27	9.719	36.07	43.991	27.95
Mean Place	49.884	3.13	54.544	22.01	6.435	8.64	41.127	39.81
Sec $\delta$ , Tan $\delta$	1.000	+0.014	1.005	+0.104	1.024	+0.218	1.273	-0.789
$D\psi_a$ , $D\omega_a$	+0.061	-0.001	+0.061	-0.007	+0.060	-0.014	+0.064	+0.052
$D\psi_\delta$ , $D\omega_\delta$	+0.39	-0.16	+0.39	-0.16	+0.39	-0.15	+0.39	-0.14



FOR THE UPPER TRANSIT AT WASHINGTON.

Washington Mean Time.	73 Pegasi (mean). Mag. 5.2		λ Andromedæ. Mag. 4.0		ι Andromedæ. Mag. 4.3		ι Piscium. Mag. 4.3	
	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.
	h m 23 29	° ' " +30 53	h m 23 83	° ' " +46 1	h m 23 84	° ' " +42 49	h m 23 85	° ' " + 5 11
Jan. 1.2	59.473	16.68	39.332	48.16	13.182	48.97	50.627	39.93
11.2	59.335 <sup>138</sup>	15.45 <sup>123</sup>	39.132 <sup>200</sup>	46.91 <sup>125</sup>	12.998 <sup>184</sup>	47.72 <sup>125</sup>	50.522 <sup>105</sup>	39.08 <sup>85</sup>
21.1	59.211 <sup>124</sup>	13.96 <sup>149</sup>	38.950 <sup>182</sup>	45.25 <sup>166</sup>	12.831 <sup>167</sup>	46.10 <sup>162</sup>	50.428 <sup>94</sup>	38.23 <sup>85</sup>
31.1	59.105 <sup>106</sup>	12.26 <sup>170</sup>	38.792 <sup>158</sup>	43.26 <sup>199</sup>	12.685 <sup>146</sup>	44.18 <sup>192</sup>	50.352 <sup>76</sup>	37.39 <sup>84</sup>
Feb. 10.1	59.025 <sup>80</sup>	10.43 <sup>183</sup>	38.667 <sup>125</sup>	41.02 <sup>224</sup>	12.570 <sup>115</sup>	42.01 <sup>217</sup>	50.296 <sup>56</sup>	36.62 <sup>77</sup>
20.1	58.974 <sup>51</sup>	8.54 <sup>189</sup>	38.581 <sup>86</sup>	38.61 <sup>241</sup>	12.491 <sup>79</sup>	39.70 <sup>231</sup>	50.261 <sup>35</sup>	35.95 <sup>67</sup>
Mar. 1.0	58.959 <sup>15</sup>	6.67 <sup>187</sup>	38.541 <sup>40</sup>	36.14 <sup>247</sup>	12.456 <sup>35</sup>	37.35 <sup>285</sup>	50.255 <sup>6</sup>	35.43 <sup>52</sup>
11.0	58.984 <sup>25</sup>	4.91 <sup>176</sup>	38.553 <sup>12</sup>	33.70 <sup>244</sup>	12.469 <sup>13</sup>	35.05 <sup>230</sup>	50.280 <sup>25</sup>	35.12 <sup>31</sup>
21.0	59.053 <sup>69</sup>	3.35 <sup>156</sup>	38.620 <sup>67</sup>	31.41 <sup>229</sup>	12.535 <sup>66</sup>	32.91 <sup>214</sup>	50.342 <sup>62</sup>	35.03 <sup>9</sup>
31.0	59.166 <sup>113</sup>	2.06 <sup>129</sup>	38.745 <sup>125</sup>	29.37 <sup>204</sup>	12.655 <sup>120</sup>	31.01 <sup>190</sup>	50.441 <sup>99</sup>	35.17 <sup>14</sup>
Apr. 9.9	59.324 <sup>158</sup>	1.09 <sup>97</sup>	38.927 <sup>182</sup>	27.66 <sup>171</sup>	12.830 <sup>175</sup>	29.45 <sup>156</sup>	50.580 <sup>139</sup>	35.61 <sup>44</sup>
19.9	59.529 <sup>205</sup>	0.50 <sup>59</sup>	39.164 <sup>287</sup>	26.33 <sup>133</sup>	13.056 <sup>226</sup>	28.28 <sup>117</sup>	50.754 <sup>174</sup>	36.33 <sup>72</sup>
29.9	59.773 <sup>244</sup>	0.34 <sup>16</sup>	39.449 <sup>285</sup>	25.46 <sup>87</sup>	13.329 <sup>273</sup>	27.55 <sup>73</sup>	50.965 <sup>211</sup>	37.32 <sup>99</sup>
May 9.8	60.051 <sup>278</sup>	0.59 <sup>25</sup>	39.777 <sup>228</sup>	25.08 <sup>38</sup>	13.643 <sup>314</sup>	27.30 <sup>25</sup>	51.209 <sup>244</sup>	38.61 <sup>129</sup>
19.8	60.359 <sup>308</sup>	1.27 <sup>68</sup>	40.139 <sup>262</sup>	25.19 <sup>11</sup>	13.990 <sup>347</sup>	27.53 <sup>23</sup>	51.476 <sup>267</sup>	40.13 <sup>152</sup>
29.8	60.688 <sup>329</sup>	2.36 <sup>109</sup>	40.525 <sup>286</sup>	25.80 <sup>61</sup>	14.359 <sup>369</sup>	28.24 <sup>71</sup>	51.769 <sup>293</sup>	41.82 <sup>166</sup>
June 8.8	61.028 <sup>340</sup>	3.84 <sup>148</sup>	40.926 <sup>401</sup>	26.90 <sup>110</sup>	14.742 <sup>383</sup>	29.42 <sup>118</sup>	52.073 <sup>304</sup>	43.68 <sup>186</sup>
18.7	61.372 <sup>344</sup>	5.64 <sup>180</sup>	41.328 <sup>402</sup>	28.44 <sup>154</sup>	15.128 <sup>386</sup>	31.03 <sup>161</sup>	52.382 <sup>309</sup>	45.66 <sup>196</sup>
28.7	61.709 <sup>337</sup>	7.74 <sup>210</sup>	41.721 <sup>293</sup>	30.39 <sup>195</sup>	15.506 <sup>378</sup>	33.02 <sup>199</sup>	52.690 <sup>308</sup>	47.69 <sup>203</sup>
July 8.7	62.031 <sup>322</sup>	10.07 <sup>233</sup>	42.096 <sup>375</sup>	32.68 <sup>229</sup>	15.866 <sup>360</sup>	35.33 <sup>231</sup>	52.985 <sup>295</sup>	49.72 <sup>202</sup>
18.7	62.329 <sup>298</sup>	12.57 <sup>250</sup>	42.443 <sup>347</sup>	35.28 <sup>260</sup>	16.201 <sup>335</sup>	37.92 <sup>259</sup>	53.264 <sup>279</sup>	51.69 <sup>197</sup>
28.6	62.597 <sup>268</sup>	15.20 <sup>263</sup>	42.756 <sup>313</sup>	38.10 <sup>282</sup>	16.502 <sup>301</sup>	40.71 <sup>273</sup>	53.514 <sup>250</sup>	53.58 <sup>189</sup>
Aug. 7.6	62.830 <sup>233</sup>	17.86 <sup>286</sup>	43.024 <sup>268</sup>	41.08 <sup>298</sup>	16.760 <sup>216</sup>	43.64 <sup>258</sup>	53.735 <sup>221</sup>	55.34 <sup>176</sup>
17.6	63.021 <sup>191</sup>	20.52 <sup>266</sup>	43.245 <sup>221</sup>	44.17 <sup>309</sup>	16.976 <sup>216</sup>	46.65 <sup>301</sup>	53.921 <sup>186</sup>	56.88 <sup>154</sup>
27.5	63.169 <sup>148</sup>	23.11 <sup>269</sup>	43.416 <sup>171</sup>	47.27 <sup>310</sup>	17.143 <sup>167</sup>	49.68 <sup>303</sup>	54.068 <sup>147</sup>	58.23 <sup>135</sup>
Sept. 6.5	63.274 <sup>105</sup>	25.60 <sup>249</sup>	43.536 <sup>120</sup>	50.34 <sup>307</sup>	17.260 <sup>117</sup>	52.66 <sup>298</sup>	54.177 <sup>109</sup>	59.37 <sup>114</sup>
16.5	63.335 <sup>61</sup>	27.93 <sup>263</sup>	43.604 <sup>68</sup>	53.32 <sup>288</sup>	17.328 <sup>68</sup>	55.52 <sup>286</sup>	54.245 <sup>68</sup>	60.26 <sup>89</sup>
26.5	63.354 <sup>19</sup>	30.05 <sup>212</sup>	43.622 <sup>18</sup>	56.16 <sup>284</sup>	17.348 <sup>20</sup>	58.23 <sup>271</sup>	54.276 <sup>31</sup>	60.91 <sup>65</sup>
Oct. 6.4	63.335 <sup>19</sup>	31.94 <sup>189</sup>	43.594 <sup>28</sup>	58.77 <sup>261</sup>	17.324 <sup>24</sup>	60.72 <sup>249</sup>	54.271 <sup>5</sup>	61.33 <sup>42</sup>
16.4	63.281 <sup>54</sup>	33.56 <sup>162</sup>	43.523 <sup>71</sup>	61.13 <sup>236</sup>	17.260 <sup>64</sup>	62.94 <sup>222</sup>	54.237 <sup>34</sup>	61.55 <sup>22</sup>
26.4	63.199 <sup>82</sup>	34.90 <sup>134</sup>	43.414 <sup>109</sup>	63.18 <sup>205</sup>	17.161 <sup>99</sup>	64.87 <sup>193</sup>	54.175 <sup>62</sup>	61.56 <sup>1</sup>
Nov. 5.4	63.093 <sup>106</sup>	35.91 <sup>101</sup>	43.274 <sup>140</sup>	64.86 <sup>168</sup>	17.031 <sup>130</sup>	66.44 <sup>157</sup>	54.094 <sup>81</sup>	61.38 <sup>13</sup>
15.3	62.966 <sup>127</sup>	36.59 <sup>68</sup>	43.107 <sup>167</sup>	66.15 <sup>129</sup>	16.876 <sup>155</sup>	67.62 <sup>118</sup>	53.994 <sup>100</sup>	61.07 <sup>31</sup>
25.3	62.826 <sup>140</sup>	36.92 <sup>33</sup>	42.919 <sup>188</sup>	67.01 <sup>86</sup>	16.703 <sup>173</sup>	68.38 <sup>76</sup>	53.885 <sup>109</sup>	60.58 <sup>49</sup>
Dec. 5.3	62.677 <sup>149</sup>	36.90 <sup>2</sup>	42.717 <sup>202</sup>	67.42 <sup>41</sup>	16.515 <sup>186</sup>	68.71 <sup>33</sup>	53.769 <sup>116</sup>	59.98 <sup>60</sup>
15.2	62.524 <sup>153</sup>	36.51 <sup>3</sup>	42.504 <sup>213</sup>	67.35 <sup>7</sup>	16.320 <sup>195</sup>	68.59 <sup>12</sup>	53.650 <sup>119</sup>	59.27 <sup>71</sup>
25.2	62.371 <sup>183</sup>	35.77 <sup>74</sup>	42.291 <sup>213</sup>	66.80 <sup>55</sup>	16.123 <sup>197</sup>	68.02 <sup>57</sup>	53.533 <sup>117</sup>	58.47 <sup>80</sup>
35.2	62.223 <sup>148</sup>	34.71 <sup>106</sup>	42.082 <sup>209</sup>	65.79 <sup>101</sup>	15.980 <sup>193</sup>	67.00 <sup>102</sup>	53.422 <sup>111</sup>	57.63 <sup>84</sup>
Mean Place	58.843	1.45	38.616	28.69	12.475	30.32	50.079	33.27
Sec δ, Tan δ	1.165	+0.598	1.440	+1.037	1.864	+0.927	1.004	+0.091
D <sub>γ</sub> , D <sub>α</sub>	+0.059	-0.040	+0.058	-0.069	+0.058	-0.062	+0.061	-0.006
D <sub>δ</sub> , D <sub>ε</sub>	+0.39	-0.13	+0.40	-0.11	+0.40	-0.11	+0.40	-0.11

FOR THE UPPER TRANSIT AT WASHINGTON.

Washington Mean Time.	γ Cephei. Mag. 3.4		κ Andromedæ. Mag. 4.3		ω <sup>3</sup> Aquarii. Mag. 4.6		ι <sup>1</sup> Aquarii. Mag. 5.3	
	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.
	h m 23 36	° ' " +77 11	h m 23 36	° ' " +43 53	h m 23 38	° ' " -14 58	h m 23 40	° ' " -18 42
Jan. 1.2	4.05 <sup>86</sup>	34.28 <sup>90</sup>	28.512 <sup>189</sup>	45.79 <sup>122</sup>	34.900 <sup>109</sup>	74.33 <sup>36</sup>	3.632 <sup>115</sup>	77.54 <sup>25</sup>
11.2	3.19 <sup>80</sup>	33.38 <sup>147</sup>	28.323 <sup>175</sup>	44.57 <sup>162</sup>	34.791 <sup>97</sup>	74.69 <sup>16</sup>	3.517 <sup>101</sup>	77.79 <sup>5</sup>
21.2	2.39 <sup>70</sup>	31.91 <sup>203</sup>	28.148 <sup>151</sup>	42.95 <sup>192</sup>	34.694 <sup>81</sup>	74.85 <sup>3</sup>	3.416 <sup>86</sup>	77.84 <sup>21</sup>
31.1	1.69 <sup>59</sup>	29.88 <sup>246</sup>	27.997 <sup>122</sup>	41.03 <sup>218</sup>	34.613 <sup>60</sup>	74.82 <sup>26</sup>	3.330 <sup>63</sup>	77.63 <sup>44</sup>
Feb. 10.1	1.10 <sup>44</sup>	27.42 <sup>281</sup>	27.875 <sup>83</sup>	38.85 <sup>283</sup>	34.553 <sup>37</sup>	74.56 <sup>46</sup>	3.267 <sup>39</sup>	77.19 <sup>68</sup>
20.1	0.66 <sup>27</sup>	24.61 <sup>304</sup>	27.792 <sup>40</sup>	36.52 <sup>288</sup>	34.516 <sup>8</sup>	74.10 <sup>70</sup>	3.228 <sup>11</sup>	76.51 <sup>92</sup>
Mar. 1.0	0.39 <sup>9</sup>	21.57 <sup>316</sup>	27.752 <sup>10</sup>	34.14 <sup>234</sup>	34.508 <sup>23</sup>	73.40 <sup>92</sup>	3.217 <sup>20</sup>	75.59 <sup>116</sup>
11.0	0.30 <sup>9</sup>	18.41 <sup>313</sup>	27.762 <sup>64</sup>	31.80 <sup>219</sup>	34.531 <sup>58</sup>	72.48 <sup>115</sup>	3.237 <sup>58</sup>	74.43 <sup>136</sup>
21.0	0.39 <sup>27</sup>	15.28 <sup>298</sup>	27.826 <sup>118</sup>	29.61 <sup>195</sup>	34.589 <sup>94</sup>	71.33 <sup>137</sup>	3.295 <sup>94</sup>	73.07 <sup>159</sup>
31.0	0.66 <sup>46</sup>	12.30 <sup>272</sup>	27.944 <sup>175</sup>	27.66 <sup>162</sup>	34.683 <sup>133</sup>	69.96 <sup>158</sup>	3.389 <sup>134</sup>	71.48 <sup>179</sup>
Apr. 9.9	1.12 <sup>61</sup>	9.58 <sup>238</sup>	28.119 <sup>227</sup>	26.04 <sup>194</sup>	34.816 <sup>172</sup>	68.38 <sup>175</sup>	3.523 <sup>172</sup>	69.69 <sup>195</sup>
19.9	1.73 <sup>76</sup>	7.20 <sup>188</sup>	28.346 <sup>275</sup>	24.80 <sup>78</sup>	34.988 <sup>209</sup>	66.63 <sup>191</sup>	3.695 <sup>210</sup>	67.74 <sup>205</sup>
29.9	2.49 <sup>87</sup>	5.32 <sup>143</sup>	28.621 <sup>316</sup>	24.02 <sup>32</sup>	35.197 <sup>241</sup>	64.72 <sup>203</sup>	3.905 <sup>240</sup>	65.69 <sup>216</sup>
May 9.8	3.36 <sup>97</sup>	3.89 <sup>86</sup>	28.937 <sup>351</sup>	23.70 <sup>18</sup>	35.438 <sup>270</sup>	62.69 <sup>210</sup>	4.145 <sup>272</sup>	63.53 <sup>219</sup>
19.8	4.33 <sup>102</sup>	3.03 <sup>26</sup>	29.288 <sup>374</sup>	23.88 <sup>67</sup>	35.708 <sup>292</sup>	60.59 <sup>210</sup>	4.417 <sup>296</sup>	61.34 <sup>216</sup>
29.8	5.35 <sup>105</sup>	2.77 <sup>30</sup>	29.662 <sup>389</sup>	24.55 <sup>113</sup>	36.000 <sup>308</sup>	58.49 <sup>208</sup>	4.713 <sup>310</sup>	59.18 <sup>211</sup>
June 8.8	6.40 <sup>104</sup>	3.07 <sup>87</sup>	30.051 <sup>391</sup>	25.68 <sup>156</sup>	36.308 <sup>315</sup>	56.41 <sup>199</sup>	5.023 <sup>318</sup>	57.07 <sup>195</sup>
18.7	7.44 <sup>102</sup>	3.94 <sup>142</sup>	30.442 <sup>384</sup>	27.24 <sup>195</sup>	36.623 <sup>314</sup>	54.42 <sup>184</sup>	5.341 <sup>318</sup>	55.12 <sup>180</sup>
28.7	8.46 <sup>96</sup>	5.36 <sup>193</sup>	30.826 <sup>367</sup>	29.19 <sup>230</sup>	36.937 <sup>304</sup>	52.58 <sup>165</sup>	5.659 <sup>306</sup>	53.32 <sup>158</sup>
July 8.7	9.42 <sup>89</sup>	7.29 <sup>240</sup>	31.193 <sup>341</sup>	31.49 <sup>267</sup>	37.241 <sup>287</sup>	50.93 <sup>143</sup>	5.967 <sup>292</sup>	51.74 <sup>131</sup>
18.7	10.31 <sup>78</sup>	9.69 <sup>278</sup>	31.534 <sup>306</sup>	34.06 <sup>280</sup>	37.528 <sup>262</sup>	49.50 <sup>115</sup>	6.259 <sup>267</sup>	50.43 <sup>103</sup>
28.6	11.09 <sup>67</sup>	12.47 <sup>312</sup>	31.840 <sup>265</sup>	36.86 <sup>294</sup>	37.790 <sup>232</sup>	48.35 <sup>88</sup>	6.526 <sup>285</sup>	49.40 <sup>69</sup>
Aug. 7.6	11.76 <sup>54</sup>	15.59 <sup>340</sup>	32.105 <sup>220</sup>	39.80 <sup>302</sup>	38.022 <sup>195</sup>	47.47 <sup>56</sup>	6.761 <sup>300</sup>	48.71 <sup>38</sup>
17.6	12.30 <sup>40</sup>	18.99 <sup>360</sup>	32.325 <sup>171</sup>	42.82 <sup>305</sup>	38.217 <sup>155</sup>	46.91 <sup>26</sup>	6.961 <sup>300</sup>	48.33 <sup>5</sup>
27.5	12.70 <sup>25</sup>	22.59 <sup>371</sup>	32.496 <sup>122</sup>	45.87 <sup>302</sup>	38.372 <sup>113</sup>	46.66 <sup>3</sup>	7.121 <sup>116</sup>	48.28 <sup>24</sup>
Sept. 6.5	12.95 <sup>11</sup>	26.30 <sup>378</sup>	32.618 <sup>71</sup>	48.89 <sup>291</sup>	38.485 <sup>72</sup>	46.69 <sup>81</sup>	7.237 <sup>75</sup>	48.52 <sup>32</sup>
16.5	13.06 <sup>3</sup>	30.06 <sup>374</sup>	32.689 <sup>24</sup>	51.80 <sup>274</sup>	38.557 <sup>82</sup>	47.00 <sup>54</sup>	7.312 <sup>32</sup>	49.04 <sup>76</sup>
26.5	13.03 <sup>19</sup>	33.80 <sup>362</sup>	32.713 <sup>21</sup>	54.54 <sup>255</sup>	38.589 <sup>6</sup>	47.54 <sup>75</sup>	7.344 <sup>5</sup>	49.80 <sup>96</sup>
Oct. 6.4	12.84 <sup>32</sup>	37.42 <sup>340</sup>	32.692 <sup>64</sup>	57.09 <sup>228</sup>	38.583 <sup>39</sup>	48.29 <sup>89</sup>	7.339 <sup>42</sup>	50.76 <sup>108</sup>
16.4	12.52 <sup>44</sup>	40.82 <sup>315</sup>	32.628 <sup>98</sup>	59.37 <sup>198</sup>	38.544 <sup>69</sup>	49.18 <sup>99</sup>	7.297 <sup>69</sup>	51.84 <sup>116</sup>
26.4	12.08 <sup>57</sup>	43.97 <sup>279</sup>	32.590 <sup>131</sup>	61.35 <sup>162</sup>	38.475 <sup>89</sup>	50.17 <sup>105</sup>	7.228 <sup>93</sup>	53.00 <sup>119</sup>
Nov. 5.4	11.51 <sup>68</sup>	46.76 <sup>238</sup>	32.399 <sup>156</sup>	62.97 <sup>126</sup>	38.386 <sup>107</sup>	51.22 <sup>104</sup>	7.135 <sup>110</sup>	54.19 <sup>117</sup>
15.3	10.83 <sup>76</sup>	49.14 <sup>187</sup>	32.243 <sup>176</sup>	64.22 <sup>82</sup>	38.279 <sup>120</sup>	52.26 <sup>99</sup>	7.025 <sup>126</sup>	55.36 <sup>109</sup>
25.3	10.07 <sup>83</sup>	51.01 <sup>133</sup>	32.067 <sup>191</sup>	65.04 <sup>38</sup>	38.159 <sup>124</sup>	53.25 <sup>91</sup>	6.900 <sup>132</sup>	56.45 <sup>95</sup>
Dec. 5.3	9.24 <sup>88</sup>	52.84 <sup>73</sup>	31.876 <sup>199</sup>	65.42 <sup>8</sup>	38.035 <sup>127</sup>	54.16 <sup>80</sup>	6.768 <sup>131</sup>	57.40 <sup>78</sup>
15.2	8.36 <sup>89</sup>	53.07 <sup>9</sup>	31.677 <sup>203</sup>	65.34 <sup>53</sup>	37.908 <sup>124</sup>	54.96 <sup>64</sup>	6.637 <sup>127</sup>	58.18 <sup>60</sup>
25.2	7.47 <sup>89</sup>	53.16 <sup>52</sup>	31.474 <sup>199</sup>	64.81 <sup>98</sup>	37.784 <sup>116</sup>	55.60 <sup>49</sup>	6.510 <sup>122</sup>	58.78 <sup>42</sup>
35.2	6.56 <sup>89</sup>	52.64 <sup>52</sup>	31.275 <sup>199</sup>	63.83 <sup>98</sup>	37.668 <sup>116</sup>	56.09 <sup>49</sup>	6.387 <sup>122</sup>	59.20 <sup>42</sup>
Mean Place	3.183	9.10	27.779	26.88	34.481	74.06	3.239	76.03
Sec δ, Tan δ	4.511	+4.398	1.388	+0.962	1.035	-0.268	1.056	-0.339
D <sub>γ</sub> α, D <sub>ω</sub> α	+0.049	-0.292	+0.058	-0.064	+0.062	+0.018	+0.062	+0.023
D <sub>γ</sub> δ, D <sub>ω</sub> δ	+0.40	-0.10	+0.40	-0.10	+0.40	-0.09	+0.40	-0.09

FOR THE UPPER TRANSIT AT WASHINGTON.

Washington Mean Time.	ψ Andromedæ. Mag. 5.1		41 H. Cephei. Mag. 5.0		δ Sculptoris. Mag. 4.6		φ Pegasi. Mag. 5.2	
	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.
	h m 23 42	° ' " +45 58	h m 23 44	° ' " +67 21	h m 23 44	° ' " -28 33	h m 23 48	° ' " +18 40
	s	"	s	"	s	"	s	"
Jan. 1.2	4.657	52.93	5.50	67.75	45.939	87.97	25.628	44.37
11.2	4.456 <sup>301</sup>	51.76 <sup>117</sup>	5.05 <sup>45</sup>	66.78 <sup>97</sup>	45.803 <sup>136</sup>	87.97 <sup>0</sup>	25.509 <sup>119</sup>	43.36 <sup>101</sup>
21.2	4.268 <sup>188</sup>	50.20 <sup>156</sup>	4.62 <sup>43</sup>	65.28 <sup>150</sup>	45.685 <sup>118</sup>	87.65 <sup>32</sup>	25.396 <sup>113</sup>	42.21 <sup>115</sup>
31.1	4.103 <sup>165</sup>	48.28 <sup>192</sup>	4.25 <sup>37</sup>	63.28 <sup>200</sup>	45.586 <sup>99</sup>	87.02 <sup>68</sup>	25.300 <sup>96</sup>	40.95 <sup>126</sup>
Feb. 10.1	3.968 <sup>135</sup>	46.11 <sup>217</sup>	3.93 <sup>32</sup>	60.88 <sup>240</sup>	45.507 <sup>79</sup>	86.10 <sup>92</sup>	25.221 <sup>79</sup>	39.64 <sup>131</sup>
20.1	3.872 <sup>96</sup>	43.75 <sup>236</sup>	3.69 <sup>24</sup>	58.15 <sup>273</sup>	45.456 <sup>51</sup>	84.88 <sup>122</sup>	25.168 <sup>53</sup>	38.33 <sup>131</sup>
Mar. 1.0	3.821 <sup>51</sup>	41.31 <sup>244</sup>	3.54 <sup>15</sup>	55.22 <sup>293</sup>	45.435 <sup>21</sup>	83.42 <sup>146</sup>	25.142 <sup>26</sup>	37.10 <sup>123</sup>
11.0	3.823 <sup>2</sup>	38.90 <sup>241</sup>	3.49 <sup>5</sup>	52.21 <sup>301</sup>	45.449 <sup>14</sup>	81.69 <sup>173</sup>	25.151 <sup>9</sup>	36.01 <sup>109</sup>
21.0	3.878 <sup>55</sup>	36.61 <sup>229</sup>	3.55 <sup>6</sup>	49.24 <sup>297</sup>	45.500 <sup>51</sup>	79.74 <sup>195</sup>	25.199 <sup>48</sup>	35.11 <sup>90</sup>
31.0	3.991 <sup>113</sup>	34.57 <sup>204</sup>	3.71 <sup>16</sup>	46.42 <sup>282</sup>	45.593 <sup>93</sup>	77.62 <sup>212</sup>	25.287 <sup>88</sup>	34.47 <sup>64</sup>
Apr. 9.9	4.163 <sup>172</sup>	32.83 <sup>174</sup>	3.97 <sup>26</sup>	43.89 <sup>253</sup>	45.725 <sup>132</sup>	75.36 <sup>226</sup>	25.418 <sup>131</sup>	34.12 <sup>35</sup>
19.9	4.390 <sup>227</sup>	31.47 <sup>136</sup>	4.34 <sup>37</sup>	41.72 <sup>217</sup>	45.897 <sup>172</sup>	72.98 <sup>238</sup>	25.590 <sup>172</sup>	34.10 <sup>2</sup>
29.9	4.668 <sup>278</sup>	30.55 <sup>92</sup>	4.79 <sup>45</sup>	39.99 <sup>173</sup>	46.111 <sup>214</sup>	70.55 <sup>243</sup>	25.801 <sup>211</sup>	34.43 <sup>33</sup>
May 9.9	4.988 <sup>320</sup>	30.12 <sup>43</sup>	5.31 <sup>52</sup>	38.76 <sup>123</sup>	46.360 <sup>249</sup>	68.06 <sup>246</sup>	26.047 <sup>246</sup>	35.09 <sup>66</sup>
19.8	5.345 <sup>357</sup>	30.15 <sup>3</sup>	5.89 <sup>58</sup>	38.07 <sup>69</sup>	46.642 <sup>282</sup>	65.70 <sup>239</sup>	26.322 <sup>275</sup>	36.12 <sup>103</sup>
29.8	5.728 <sup>383</sup>	30.70 <sup>55</sup>	6.51 <sup>62</sup>	37.94 <sup>13</sup>	46.948 <sup>306</sup>	63.37 <sup>233</sup>	26.621 <sup>299</sup>	37.44 <sup>132</sup>
June 8.8	6.127 <sup>399</sup>	31.73 <sup>103</sup>	7.16 <sup>65</sup>	38.41 <sup>47</sup>	47.273 <sup>325</sup>	61.23 <sup>214</sup>	26.935 <sup>314</sup>	39.05 <sup>161</sup>
18.7	6.531 <sup>404</sup>	33.20 <sup>147</sup>	7.81 <sup>66</sup>	39.40 <sup>99</sup>	47.608 <sup>335</sup>	59.31 <sup>193</sup>	27.257 <sup>322</sup>	40.89 <sup>184</sup>
28.7	6.928 <sup>397</sup>	35.08 <sup>188</sup>	8.44 <sup>68</sup>	40.91 <sup>151</sup>	47.944 <sup>336</sup>	57.65 <sup>166</sup>	27.575 <sup>318</sup>	42.93 <sup>204</sup>
July 8.7	7.308 <sup>380</sup>	37.32 <sup>224</sup>	9.05 <sup>61</sup>	42.91 <sup>200</sup>	48.271 <sup>327</sup>	56.29 <sup>136</sup>	27.884 <sup>309</sup>	45.09 <sup>216</sup>
18.7	7.662 <sup>354</sup>	39.86 <sup>254</sup>	9.62 <sup>57</sup>	45.34 <sup>243</sup>	48.581 <sup>310</sup>	55.26 <sup>103</sup>	28.175 <sup>291</sup>	47.34 <sup>225</sup>
28.6	7.981 <sup>319</sup>	42.63 <sup>277</sup>	10.12 <sup>50</sup>	48.12 <sup>278</sup>	48.865 <sup>284</sup>	54.61 <sup>65</sup>	28.441 <sup>269</sup>	49.60 <sup>226</sup>
Aug. 7.6	8.259 <sup>378</sup>	45.57 <sup>294</sup>	10.56 <sup>44</sup>	51.23 <sup>311</sup>	49.118 <sup>283</sup>	54.33 <sup>28</sup>	28.675 <sup>234</sup>	51.83 <sup>223</sup>
17.6	8.491 <sup>332</sup>	48.63 <sup>306</sup>	10.91 <sup>35</sup>	54.56 <sup>333</sup>	49.335 <sup>217</sup>	54.45 <sup>12</sup>	28.875 <sup>200</sup>	53.99 <sup>216</sup>
27.6	8.673 <sup>182</sup>	51.72 <sup>309</sup>	11.20 <sup>29</sup>	58.07 <sup>351</sup>	49.507 <sup>172</sup>	54.90 <sup>45</sup>	29.036 <sup>161</sup>	56.02 <sup>203</sup>
Sept. 6.5	8.805 <sup>132</sup>	54.79 <sup>307</sup>	11.39 <sup>19</sup>	61.65 <sup>358</sup>	49.634 <sup>127</sup>	55.70 <sup>80</sup>	29.036 <sup>120</sup>	57.88 <sup>186</sup>
16.5	8.885 <sup>80</sup>	57.77 <sup>298</sup>	11.50 <sup>11</sup>	65.26 <sup>361</sup>	49.717 <sup>83</sup>	56.80 <sup>110</sup>	29.236 <sup>80</sup>	59.56 <sup>168</sup>
26.5	8.917 <sup>82</sup>	60.63 <sup>286</sup>	11.53 <sup>3</sup>	68.80 <sup>354</sup>	49.754 <sup>37</sup>	58.09 <sup>129</sup>	29.279 <sup>43</sup>	61.03 <sup>147</sup>
Oct. 6.4	8.902 <sup>15</sup>	63.27 <sup>264</sup>	11.47 <sup>6</sup>	72.22 <sup>342</sup>	49.747 <sup>7</sup>	59.58 <sup>149</sup>	29.285 <sup>6</sup>	62.26 <sup>123</sup>
16.4	8.842 <sup>60</sup>	65.67 <sup>240</sup>	11.32 <sup>15</sup>	75.43 <sup>321</sup>	49.703 <sup>44</sup>	61.17 <sup>159</sup>	29.260 <sup>25</sup>	63.27 <sup>101</sup>
26.4	8.745 <sup>97</sup>	67.77 <sup>210</sup>	11.21 <sup>21</sup>	78.36 <sup>293</sup>	49.625 <sup>78</sup>	62.78 <sup>161</sup>	29.208 <sup>54</sup>	64.01 <sup>74</sup>
Nov. 5.4	8.615 <sup>130</sup>	67.77 <sup>175</sup>	11.11 <sup>28</sup>	78.36 <sup>258</sup>	49.625 <sup>108</sup>	62.78 <sup>157</sup>	29.208 <sup>77</sup>	64.01 <sup>49</sup>
15.3	8.455 <sup>160</sup>	69.52 <sup>137</sup>	10.83 <sup>34</sup>	80.94 <sup>215</sup>	49.522 <sup>127</sup>	64.35 <sup>146</sup>	29.129 <sup>97</sup>	64.50 <sup>25</sup>
25.3	8.455 <sup>181</sup>	70.89 <sup>94</sup>	10.49 <sup>39</sup>	83.09 <sup>168</sup>	49.395 <sup>140</sup>	65.81 <sup>127</sup>	29.032 <sup>111</sup>	64.75 <sup>0</sup>
Dec. 5.3	8.274 <sup>198</sup>	71.83 <sup>49</sup>	10.10 <sup>43</sup>	84.77 <sup>116</sup>	49.255 <sup>147</sup>	67.08 <sup>108</sup>	28.921 <sup>121</sup>	64.75 <sup>25</sup>
15.3	8.076 <sup>209</sup>	72.32 <sup>3</sup>	9.67 <sup>45</sup>	85.93 <sup>58</sup>	49.108 <sup>151</sup>	68.16 <sup>79</sup>	28.800 <sup>127</sup>	64.50 <sup>49</sup>
25.2	7.867 <sup>214</sup>	72.35 <sup>45</sup>	9.22 <sup>47</sup>	86.51 <sup>2</sup>	48.957 <sup>147</sup>	68.95 <sup>55</sup>	28.673 <sup>128</sup>	64.01 <sup>71</sup>
35.2	7.653 <sup>211</sup>	71.90 <sup>91</sup>	8.75 <sup>47</sup>	86.49 <sup>60</sup>	48.810 <sup>140</sup>	69.50 <sup>19</sup>	28.545 <sup>126</sup>	63.30 <sup>91</sup>
35.2	7.442 <sup>211</sup>	70.99 <sup>91</sup>	8.28 <sup>47</sup>	85.89 <sup>60</sup>	48.670 <sup>140</sup>	69.69 <sup>19</sup>	28.419 <sup>126</sup>	62.39 <sup>91</sup>
Mean Place	3.861	33.52	4.526	43.85	45.622	83.28	24.926	33.34
Sec δ, Tan δ	1.439	+1.035	2.599	+2.398	1.139	-0.544	1.056	+0.338
D <sub>ψ</sub> α, D <sub>α</sub> α	+0.059	-0.069	+0.057	-0.160	+0.062	+0.036	+0.061	-0.023
D <sub>ψ</sub> δ, D <sub>α</sub> δ	+0.40	-0.08	+0.40	-0.07	+0.40	-0.07	+0.40	-0.05

FOR THE UPPER TRANSIT AT WASHINGTON.

Washington Mean Time.	$\rho$ Cassiopeia. Mag. 4.8		Groombridge 4163. Mag. 6.6		$\omega$ Piscium. Mag. 4.0	
	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.
	h m	° '	h m	° '	h m	° '
	23 50	+57 3	23 50	+73 57	23 55	+ 6 25
	s	"	s	"	s	"
Jan. 1.2	23.633	37.48	56.36	79.05	12.805	20.36
11.2	23.343 <sup>290</sup>	36.48 100	55.69 67	78.31 74	12.694 111	19.53 83
21.2	23.069 <sup>274</sup>	34.99 140	55.05 64	76.96 135	12.591 103	18.68 85
31.1	22.824 <sup>245</sup>	33.08 191	54.47 58	75.07 189	12.500 91	17.85 83
Feb. 10.1	22.618 <sup>206</sup>	30.80 228	53.98 49	72.74 233	12.427 73	17.06 79
	157	255	38	271	53	70
20.1	22.461 <sup>96</sup>	28.25	53.60 25	70.08	12.374	16.36 56
Mar. 1.0	22.365 <sup>31</sup>	25.55 270	53.35 11	67.08 295	12.349 <sup>25</sup>	15.80 37
11.0	22.334 <sup>43</sup>	22.79 276	53.24 <sup>3</sup>	64.00 309	12.354 <sup>5</sup>	15.43 17
21.0	22.377 <sup>117</sup>	20.10 299	53.27 18	60.91 297	12.397 78	15.26 7
31.0	22.494 <sup>192</sup>	17.60 222	53.45 33	57.94 275	12.475 119	15.33 36
Apr. 9.9	22.686 <sup>263</sup>	15.38 188	53.78 47	55.19 240	12.594 159	15.69 66
19.9	22.949 <sup>328</sup>	13.50 142	54.25 58	52.79 200	12.753 197	16.35 89
29.9	23.277 <sup>384</sup>	12.08 94	54.83 60	50.79 149	12.950 231	17.24 120
May 9.9	23.661 <sup>429</sup>	11.14 <sup>42</sup>	55.52 77	49.30 93	13.181 269	18.44 144
19.8	24.090 <sup>462</sup>	10.72 11	56.29 83	48.37 40	13.441 285	19.88 164
29.8	24.552 <sup>482</sup>	10.83 64	57.12 35	47.97 18	13.728 299	21.52 182
June 8.8	25.034 <sup>489</sup>	11.47 115	57.97 37	48.15 74	14.025 310	23.34 195
18.7	25.523 <sup>483</sup>	12.62 163	58.84 36	48.89 131	14.335 306	25.29 203
28.7	26.006 <sup>462</sup>	14.25 206	59.70 31	50.20 179	14.643 302	27.32 203
July 8.7	26.468 <sup>432</sup>	16.31 245	60.51 76	51.99 226	14.945 283	29.35 200
18.7	26.900 <sup>392</sup>	18.76 275	61.27 69	54.25 267	15.233 263	31.35 192
28.6	27.292 <sup>344</sup>	21.51 302	61.96 60	56.92 302	15.496 233	33.27 177
Aug. 7.6	27.636 <sup>289</sup>	24.53 320	62.56 49	59.94 331	15.729 202	35.04 164
17.6	27.925 <sup>228</sup>	27.73 332	63.05 39	63.25 351	15.931 163	36.68 143
27.6	28.153 <sup>167</sup>	31.05 336	63.44 28	66.76 363	16.094 128	38.11 120
Sept. 6.5	28.320 <sup>105</sup>	34.41 336	63.72 15	70.39 370	16.222 87	39.31 97
16.5	28.425 <sup>42</sup>	37.77 326	63.87 4	74.09 369	16.309 49	40.28 75
26.5	28.467 <sup>17</sup>	41.03 310	63.91 7	77.78 355	16.358 14	41.03 51
Oct. 6.4	28.450 <sup>72</sup>	44.13 289	63.84 19	81.36 341	16.372 16	41.54 28
16.4	28.378 <sup>124</sup>	47.02 260	63.65 30	84.77 317	16.356 44	41.82 8
26.4	28.254 <sup>170</sup>	49.62 228	63.35 39	87.94 283	16.312 67	41.90 9
Nov. 5.4	28.084 <sup>210</sup>	51.87 187	62.96 48	90.77 243	16.245 87	41.81 29
15.3	27.874 <sup>243</sup>	53.74 141	62.48 56	93.20 196	16.158 100	41.52 43
25.3	27.631 <sup>270</sup>	55.15 99	61.92 63	95.16 142	16.068 110	41.09 53
Dec. 5.3	27.361 <sup>289</sup>	56.05 39	61.29 67	96.58 83	15.948 117	40.56 66
15.3	27.072 <sup>299</sup>	56.44 14	60.62 69	97.41 24	15.831 118	39.90 75
25.2	26.773 <sup>301</sup>	56.30 69	59.93 69	97.65 38	15.713 115	39.15 83
35.2	26.472	55.61	59.24	97.27	15.598	38.32
Mean Place	22.661	15.57	55.114	54.30	12.136	13.72
Sec $\delta$ , Tan $\delta$	1.839	+1.543	3.621	+3.481	1.006	+0.113
$D_{\mu\alpha}$ , $D_{\omega\alpha}$	+0.069	-0.103	+0.057	-0.232	+0.061	-0.097
$D_{\mu\delta}$ , $D_{\omega\delta}$	+0.40	-0.04	+0.40	-0.04	+0.40	-0.02

# APPARENT PLACES OF STARS, 1920.

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## FOR THE UPPER TRANSIT AT WASHINGTON.

Washington Mean Time.	ε Tucanæ. Mag. 4.7		30 Piscium. Mag. 4.7		3 Ceti. Mag. 4.6	
	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.
	h m 23 55	° ' " -86 0	h m 23 57	° ' " -6 27	h m 23 50	° ' " -17 46
	s	"	s	"	s	"
Jan. 1.2	45.52	92.04	52.040	29.12	39.075	54.91
11.2	45.10	91.00	51.927	29.72	38.955	55.27
21.2	44.72	89.43	51.825	30.21	38.844	55.40
31.1	44.40	87.36	51.734	30.55	38.747	55.29
Feb. 10.1	44.13	84.86	51.661	30.75	38.667	54.95
20.1	43.92	82.01	51.608	30.77	38.600	54.85
Mar. 1.1	43.79	78.84	51.581	30.50	38.578	53.52
11.0	43.72	75.46	51.584	30.19	38.577	52.44
21.0	43.74	71.93	51.621	29.57	38.611	51.12
31.0	43.84	68.34	51.695	28.70	38.683	49.59
Apr. 9.9	44.03	64.76	51.810	27.59	38.795	47.86
19.9	44.29	61.28	51.962	26.25	38.947	45.95
29.9	44.63	57.95	52.152	24.70	39.187	43.88
May 9.9	45.06	54.86	52.377	22.97	39.363	41.73
19.8	45.52	52.07	52.633	21.10	39.622	39.51
29.8	46.05	49.65	52.914	19.12	39.906	37.30
June 8.8	46.62	47.65	53.212	17.09	40.210	35.13
18.8	47.21	46.13	53.519	15.05	40.525	33.09
28.7	47.82	45.12	53.828	13.09	40.842	31.19
July 8.7	48.42	44.65	54.131	11.21	41.155	29.52
18.7	49.00	44.72	54.419	9.49	41.452	28.08
28.6	49.53	45.34	54.686	7.98	41.728	26.95
Aug. 7.6	50.02	46.48	54.923	6.70	41.976	26.14
17.6	50.43	48.08	55.123	5.66	42.189	25.64
27.6	50.76	50.13	55.296	4.91	42.365	25.49
Sept. 6.5	51.00	52.54	55.428	4.44	42.500	25.65
16.5	51.14	55.22	55.516	4.23	42.594	26.10
26.5	51.18	58.06	55.567	4.26	42.646	26.82
Oct. 6.5	51.13	60.97	55.583	4.53	42.660	27.75
16.4	50.98	63.83	55.565	4.90	42.638	28.84
26.4	50.74	66.51	55.520	5.59	42.588	30.03
Nov. 5.4	50.44	68.93	55.451	6.32	42.510	31.28
15.3	50.08	70.97	55.363	7.13	42.413	32.48
25.3	49.67	72.55	55.261	7.97	42.300	33.62
Dec. 5.3	49.23	73.61	55.149	8.81	42.178	34.66
15.3	48.78	74.10	55.033	9.61	42.050	35.56
25.2	48.33	74.02	54.914	10.36	41.921	36.26
35.2	47.90	73.34	54.797	11.04	41.795	36.77
Mean Place	46.152	78.92	51.445	31.18	38.564	53.12
Sec δ, Tan δ	2.469	-2.248	1.006	-0.113	1.050	-0.321
D <sub>φ</sub> α, D <sub>α</sub> α	+0.062	+0.150	+0.061	+0.007	+0.061	+0.021
D <sub>φ</sub> δ, D <sub>α</sub> δ	+0.40	-0.02	+0.40	-0.01	+0.40	0.00

FOR WASHINGTON APPARENT NOON.

Date.	Apparent Right Ascension.			Var. per Hour.	Apparent Declination.			Var. per Hour.	Equation of Time. Mean—App.		Var. per Hour.	Semi-diameter.		S. T. of Sem. Pass. Merid.		Sidereal Time of Mean Noon.
	h	m	s		°	'	"		m	s		s	'	"	m	
Jan. 1	18	43	34.02	11.049	-23	4	12.3	+11.46	+ 3	19.22	+1.189	16	17.89	1	11.07	18 40 14.26
2	18	47	59.05	11.038	22	59	22.7	12.65	3	47.61	1.176	16	17.90	1	11.03	18 44 10.82
3	18	52	23.73	11.021	22	54	5.5	13.78	4	15.65	1.161	16	17.90	1	10.99	18 48 7.38
4	18	56	48.04	11.004	22	48	21.0	14.92	4	43.32	1.144	16	17.90	1	10.94	18 52 3.93
5	19	1	11.94	10.987	22	42	9.4	16.06	5	10.59	1.127	16	17.90	1	10.88	18 56 0.49
6	19	5	35.43	10.969	-22	35	30.8	+17.17	+ 5	37.45	+1.110	16	17.88	1	10.82	18 59 57.05
7	19	9	58.47	10.951	22	28	25.3	18.29	6	3.86	1.091	16	17.85	1	10.76	19 3 53.61
8	19	14	21.05	10.933	22	20	53.2	19.39	6	29.81	1.071	16	17.82	1	10.70	19 7 50.16
9	19	18	43.13	10.909	22	12	54.7	20.48	6	55.23	1.050	16	17.79	1	10.63	19 11 46.72
10	19	23	4.70	10.887	22	4	30.0	21.57	7	20.23	1.028	16	17.75	1	10.55	19 15 43.28
11	19	27	25.74	10.865	-21	55	39.2	+22.65	+ 7	44.64	+1.006	16	17.71	1	10.47	19 19 39.84
12	19	31	46.22	10.841	21	46	22.8	23.72	8	5.50	0.982	16	17.66	1	10.39	19 23 36.39
13	19	36	6.13	10.817	21	36	40.9	24.77	8	31.77	0.958	16	17.60	1	10.31	19 27 32.95
14	19	40	25.43	10.791	21	26	34.0	25.81	8	54.45	0.932	16	17.54	1	10.22	19 31 29.51
15	19	44	44.10	10.764	21	16	2.1	26.84	9	16.51	0.905	16	17.48	1	10.13	19 35 26.06
16	19	49	2.12	10.737	-21	5	5.6	+27.86	+ 9	37.92	+0.878	16	17.41	1	10.04	19 39 22.62
17	19	53	19.47	10.709	20	53	44.9	28.86	9	58.66	0.850	16	17.33	1	9.95	19 43 19.18
18	19	57	36.14	10.680	20	42	0.3	29.85	10	13.71	0.821	16	17.25	1	9.85	19 47 15.73
19	20	1	52.10	10.650	20	29	52.1	30.83	10	38.07	0.791	16	17.16	1	9.75	19 51 12.29
20	20	6	7.35	10.619	20	17	20.7	31.79	10	56.69	0.760	16	17.08	1	9.65	19 55 8.84
21	20	10	21.84	10.588	-20	4	26.4	+32.73	+11	14.58	+0.729	16	16.99	1	9.55	19 59 5.40
22	20	14	35.57	10.556	19	51	9.6	33.66	11	31.72	0.698	16	16.90	1	9.45	20 3 1.96
23	20	18	48.54	10.524	19	37	30.7	34.57	11	48.08	0.665	16	16.80	1	9.34	20 6 58.51
24	20	23	0.71	10.491	19	23	29.8	35.47	12	3.65	0.632	16	16.70	1	9.23	20 10 55.07
25	20	27	12.07	10.457	19	9	7.7	36.36	12	18.42	0.599	16	16.60	1	9.12	20 14 51.63
26	20	31	22.63	10.423	-18	54	24.5	+37.23	+12	32.39	+0.565	16	16.49	1	9.01	20 18 48.18
27	20	35	32.36	10.389	18	39	20.8	38.08	12	45.53	0.531	16	16.38	1	8.90	20 22 44.74
28	20	39	41.27	10.354	18	23	56.8	38.92	12	57.84	0.496	16	16.26	1	8.79	20 26 41.29
29	20	43	49.34	10.319	18	8	13.0	39.73	13	9.33	0.462	16	16.14	1	8.67	20 30 37.85
30	20	47	56.57	10.284	17	52	9.7	40.53	13	19.98	0.427	16	16.01	1	8.56	20 34 34.40
31	20	52	2.95	10.249	-17	35	47.4	+41.32	+13	29.78	+0.392	16	15.88	1	8.44	20 38 30.96
Feb. 1	20	56	8.50	10.214	17	19	6.4	42.09	13	38.75	0.357	16	15.75	1	8.33	20 42 27.52
2	21	0	13.21	10.179	17	2	7.1	42.84	13	46.88	0.322	16	15.61	1	8.21	20 46 24.07
3	21	4	17.10	10.145	16	44	49.9	43.58	13	54.20	0.288	16	15.46	1	8.10	20 50 20.63
4	21	8	20.16	10.111	16	27	15.1	44.30	14	0.68	0.253	16	15.31	1	7.98	20 54 17.18
5	21	12	22.40	10.077	-16	9	23.2	+45.01	+14	6.34	+0.219	16	15.14	1	7.87	20 58 13.74
6	21	16	23.84	10.043	15	51	14.7	45.70	14	11.20	0.186	16	14.97	1	7.75	21 2 10.29
7	21	20	24.47	10.010	15	32	49.7	46.37	14	15.27	0.153	16	14.80	1	7.64	21 6 6.85
8	21	24	24.30	9.977	15	14	8.7	47.03	14	18.54	0.120	16	14.63	1	7.53	21 10 3.40
9	21	28	23.35	9.944	14	55	12.3	47.67	14	21.04	0.088	16	14.45	1	7.41	21 13 59.96
10	21	32	21.62	9.912	-14	36	0.7	+48.29	+14	22.75	+0.055	16	14.27	1	7.30	21 17 56.51
11	21	36	19.13	9.880	14	16	34.5	48.89	14	23.70	+0.023	16	14.08	1	7.19	21 21 53.06
12	21	40	15.87	9.848	13	56	53.9	49.47	14	23.89	-0.008	16	13.89	1	7.08	21 25 49.62
13	21	44	11.86	9.817	13	36	59.5	50.05	14	23.33	0.039	16	13.70	1	6.97	21 29 46.17
14	21	48	7.11	9.787	13	16	51.6	50.60	14	22.03	0.069	16	13.50	1	6.87	21 33 42.72
15	21	52	1.62	9.757	-12	56	30.7	+51.13	+14	26.00	-0.099	16	13.30	1	6.76	21 37 39.28
16	21	55	55.42	9.727	-12	35	57.1	+51.64	+14	17.23	-0.129	16	13.10	1	6.65	21 41 35.83

Note.—For mean time interval of semidiameter passing meridian, subtract 0°.19 from the sidereal interval.

FOR WASHINGTON APPARENT NOON.

Date.	Apparent Right Ascension.			Var. per Hour.	Apparent Declination.			Var. per Hour.	Equation of Time. Mean—App.		Var. per Hour.	Semi-diameter.	S. T. of Sem. Pass Merid.		Sidereal Time of Mean Noon.			
	h	m	s		"	"	"		m	s			"	"	m	s	h	m
Feb. 16	21	55	55.42	0.797	-12	35	57.1	+51.04	+14	17.28	-0.129	16	13.10	1	6.65	21	41	35.83
17	21	59	48.49	0.697	12	15	11.5	52.14	14	13.77	0.159	16	12.69	1	6.55	21	45	32.39
18	22	3	40.86	0.608	11	54	14.1	53.03	14	9.60	0.193	16	12.68	1	6.45	21	49	28.94
19	22	7	32.54	0.609	11	33	5.4	53.09	14	4.73	0.217	16	12.47	1	6.35	21	53	25.49
20	22	11	23.52	0.630	11	11	45.9	53.33	13	59.19	0.245	16	12.26	1	6.25	21	57	22.05
21	22	15	13.84	0.583	-10	50	15.9	+53.90	+13	52.96	-0.273	16	12.04	1	6.15	22	1	18.60
22	22	19	3.50	0.565	10	28	35.9	54.37	13	46.06	0.301	16	11.83	1	6.06	22	5	15.15
23	22	23	52.49	0.533	10	6	46.3	54.76	13	38.54	0.323	16	11.61	1	5.97	22	9	11.71
24	22	26	40.85	0.505	9	44	47.6	55.13	13	30.37	0.354	16	11.39	1	5.88	22	13	8.26
25	22	30	28.58	0.476	9	22	40.1	55.48	13	21.57	0.379	16	11.16	1	5.79	22	17	4.81
26	22	34	15.69	0.451	-9	0	24.4	+55.82	+13	12.16	-0.404	16	10.94	1	5.71	22	21	1.37
27	22	38	2.21	0.433	8	38	0.6	56.15	13	2.15	0.429	16	10.71	1	5.62	22	24	57.92
28	22	41	48.15	0.408	8	15	29.4	56.45	12	51.57	0.453	16	10.48	1	5.55	22	28	54.47
29	22	45	33.58	0.379	7	52	51.1	56.74	12	40.42	0.476	16	10.25	1	5.47	22	32	51.02
Mar. 1	22	49	18.37	0.355	7	30	6.0	57.01	12	28.74	0.497	16	10.02	1	5.40	22	36	47.58
2	22	53	2.69	0.337	-7	7	14.6	+57.27	+12	16.54	-0.518	16	9.78	1	5.33	22	40	44.13
3	22	56	46.50	0.316	6	44	17.2	57.51	12	3.84	0.539	16	9.54	1	5.26	22	44	40.68
4	23	0	29.84	0.297	6	21	14.0	57.74	11	50.66	0.558	16	9.29	1	5.19	22	48	37.24
5	23	4	12.74	0.278	5	58	5.6	57.95	11	37.65	0.576	16	9.04	1	5.12	22	52	33.79
6	23	7	55.21	0.261	5	34	52.2	58.15	11	23.00	0.594	16	8.78	1	5.06	22	56	30.34
7	23	11	37.26	0.245	-5	11	34.4	+58.33	+11	8.54	-0.610	16	8.52	1	5.00	23	0	26.89
8	23	15	18.94	0.229	4	48	12.5	58.49	10	53.72	0.625	16	8.26	1	4.94	23	4	23.45
9	23	19	0.26	0.214	4	24	46.7	58.65	10	38.52	0.640	16	8.00	1	4.89	23	8	20.00
10	23	22	41.24	0.201	4	1	17.3	58.79	10	22.99	0.654	16	7.73	1	4.84	23	12	16.55
11	23	26	21.90	0.188	3	37	45.1	58.90	10	7.14	0.667	16	7.47	1	4.79	23	16	13.10
12	23	30	2.27	0.177	-3	14	10.2	+59.01	+9	51.00	-0.678	16	7.20	1	4.75	23	20	9.66
13	23	33	42.37	0.165	2	50	32.9	59.10	9	34.58	0.689	16	6.92	1	4.70	23	24	6.21
14	23	37	22.20	0.155	2	26	53.8	59.16	9	17.91	0.700	16	6.65	1	4.66	23	28	2.76
15	23	41	1.79	0.145	2	3	13.2	59.23	9	1.00	0.709	16	6.38	1	4.63	23	31	59.31
16	23	44	41.18	0.137	1	39	31.2	59.26	8	43.88	0.718	16	6.11	1	4.59	23	35	55.86
17	23	48	20.37	0.130	-1	15	48.6	+59.28	+8	26.57	-0.725	16	5.83	1	4.56	23	39	52.42
18	23	51	59.38	0.123	0	52	5.7	59.29	8	9.07	0.732	16	5.56	1	4.54	23	43	48.97
19	23	55	38.23	0.116	0	28	22.7	59.29	7	51.41	0.738	16	5.29	1	4.52	23	47	45.52
20	23	59	16.93	0.110	-0	4	40.0	59.26	7	33.61	0.744	16	5.01	1	4.50	23	51	42.07
21	0	2	55.49	0.105	+0	19	1.9	59.23	7	15.68	0.749	16	4.74	1	4.48	23	55	38.62
22	0	6	33.95	0.100	+0	42	42.6	+59.17	+6	57.64	-0.754	16	4.47	1	4.47	23	59	35.18
23	0	10	12.32	0.097	1	6	21.7	59.10	6	39.50	0.756	16	4.20	1	4.46	0	3	31.73
24	0	13	50.60	0.094	1	29	59.1	59.01	6	21.27	0.760	16	3.93	1	4.45	0	7	28.28
25	0	17	28.82	0.092	1	53	34.1	58.91	6	2.99	0.762	16	3.66	1	4.44	0	11	24.83
26	0	21	6.99	0.090	2	17	6.5	58.79	5	44.66	0.764	16	3.39	1	4.44	0	15	21.38
27	0	24	45.14	0.089	+2	40	36.0	+58.64	+5	26.31	-0.765	16	3.11	1	4.44	0	19	17.93
28	0	28	23.28	0.089	3	4	2.0	58.51	5	7.95	0.765	16	2.84	1	4.44	0	23	14.49
29	0	32	1.43	0.090	3	27	24.4	58.35	4	49.61	0.764	16	2.57	1	4.45	0	27	11.04
30	0	35	39.62	0.093	3	50	42.8	58.18	4	31.30	0.761	16	2.30	1	4.46	0	31	7.59
31	0	39	17.88	0.096	4	13	56.8	57.99	4	13.05	0.758	16	2.03	1	4.47	0	35	4.14
Apr. 1	0	42	56.21	0.100	+4	37	6.2	+57.79	+3	54.88	-0.755	16	1.75	1	4.48	0	39	0.69
2	0	46	34.65	0.104	+5	0	10.6	+57.57	+3	36.81	-0.750	16	1.48	1	4.50	0	42	57.25

NOTE.—For mean time interval of semidiameter passing meridian, subtract 0.18 from the sidereal interval.

FOR WASHINGTON APPARENT NOON.

Date.	Apparent Right Ascension.			Var. per Hour.	Apparent Declination.			Var. per Hour.	Equation of Time. Mean-App.	Var. per Hour.	Semi-diameter.	S. T. of Sun, Pass. Merid.	Sidereal Time of Mean Noon.		
	h	m	s		'	"	"						m	s	h
Apr.	1	0 42	56.21	9.100	+ 4 37	6.2	+57.79	+3 54.88	-0.755	16 1.75	1 4.48	0 39	0.60		
	2	0 46	34.65	9.104	5 0	10.6	57.57	3 36.81	0.730	16 1.48	1 4.50	0 42	57.25		
	3	0 50	13.21	9.110	5 23	9.8	57.35	3 18.87	0.745	16 1.20	1 4.52	0 46	53.80		
	4	0 53	51.92	9.117	5 46	3.1	57.12	3 1.00	0.755	16 0.92	1 4.55	0 50	50.35		
	5	0 57	30.81	9.125	6 8	50.6	56.25	2 43.47	0.730	16 0.65	1 4.58	0 54	46.90		
	6	1 1	9.96	9.133	+ 6 31	31.8	+55.25	+2 26.04	-0.731	16 0.37	1 4.61	0 58	43.46		
	7	1 4	49.20	9.142	6 54	6.3	55.20	2 8.84	0.712	16 0.09	1 4.64	1 2	40.01		
	8	1 8	28.73	9.150	7 16	33.9	55.04	1 51.86	0.702	15 59.81	1 4.67	1 6	36.56		
	9	1 12	8.51	9.164	7 38	54.2	55.09	1 35.13	0.691	15 59.53	1 4.71	1 10	33.11		
	10	1 15	48.57	9.176	8 1	6.8	55.35	1 18.68	0.679	15 59.25	1 4.75	1 14	29.67		
	11	1 19	28.93	9.188	+ 8 23	11.4	+55.03	+1 2.54	-0.665	15 58.98	1 4.79	1 18	26.22		
	12	1 23	9.59	9.204	8 45	7.8	54.67	0 46.69	0.653	15 58.70	1 4.83	1 22	22.77		
	13	1 26	50.58	9.215	9 6	55.4	54.30	0 31.17	0.640	15 58.42	1 4.88	1 26	19.32		
	14	1 30	31.90	9.230	9 28	34.0	53.92	0 15.98	0.625	15 58.15	1 4.92	1 30	15.88		
	15	1 34	13.59	9.244	9 50	3.3	53.53	+0 1.16	0.610	15 57.87	1 4.97	1 34	12.43		
16	1 37	55.65	9.260	+10 11	22.9	+53.11	-0 13.30	-0.595	15 57.60	1 5.03	1 38	8.98			
17	1 41	38.08	9.276	10 32	32.5	52.68	0 27.38	0.578	15 57.34	1 5.08	1 42	5.54			
18	1 45	20.90	9.296	10 53	31.6	52.24	0 41.06	0.561	15 57.07	1 5.14	1 46	2.09			
19	1 49	4.14	9.310	11 14	20.0	51.79	0 54.35	0.545	15 56.81	1 5.20	1 49	58.64			
20	1 52	47.78	9.327	11 34	57.3	51.33	1 7.23	0.528	15 56.55	1 5.26	1 53	55.20			
21	1 56	31.84	9.345	+11 55	23.0	+50.84	-1 19.69	-0.510	15 56.30	1 5.32	1 57	51.75			
22	2 0	16.32	9.365	12 15	37.0	50.33	1 31.73	0.492	15 56.05	1 5.39	2 1	48.30			
23	2 4	1.25	9.381	12 35	38.9	49.83	1 43.33	0.474	15 55.80	1 5.45	2 5	44.86			
24	2 7	46.62	9.400	12 55	28.3	49.29	1 54.48	0.455	15 55.55	1 5.52	2 9	41.41			
25	2 11	32.44	9.419	13 15	5.0	48.75	2 5.18	0.436	15 55.31	1 5.60	2 13	37.96			
26	2 15	18.72	9.438	+13 34	28.4	+48.20	-2 15.42	-0.417	15 55.06	1 5.67	2 17	34.52			
27	2 19	5.48	9.458	13 53	36.4	47.63	2 25.18	0.397	15 54.82	1 5.74	2 21	31.07			
28	2 22	52.74	9.479	14 12	34.7	47.06	2 34.46	0.377	15 54.58	1 5.82	2 25	27.62			
29	2 26	40.56	9.501	14 31	17.0	46.46	2 43.24	0.355	15 54.34	1 5.90	2 29	24.18			
30	2 30	28.77	9.523	14 49	44.9	45.83	2 51.49	0.333	15 54.10	1 5.97	2 33	20.73			
May	1	2 34	17.56	9.544	+15 7	58.1	+45.24	-2 59.23	-0.311	15 53.87	1 6.05	2 37	17.29		
	2	2 38	6.89	9.567	15 25	56.4	44.61	3 6.45	0.290	15 53.63	1 6.13	2 41	13.84		
	3	2 41	56.76	9.590	15 43	39.4	43.97	3 13.11	0.266	15 53.40	1 6.21	2 45	10.40		
	4	2 45	47.19	9.613	16 1	6.8	43.31	3 19.22	0.243	15 53.17	1 6.29	2 49	6.95		
	5	2 49	38.17	9.636	16 18	18.3	42.64	3 24.77	0.220	15 52.94	1 6.37	2 53	3.50		
	6	2 53	29.73	9.660	+16 35	13.7	+41.95	-3 29.76	-0.196	15 52.71	1 6.45	2 57	0.06		
	7	2 57	21.87	9.684	16 51	52.6	41.27	3 34.15	0.171	15 52.48	1 6.53	3 0	56.61		
	8	3 1	14.59	9.709	17 8	14.7	40.57	3 37.98	0.147	15 52.25	1 6.61	3 4	53.17		
	9	3 5	7.90	9.733	17 24	19.7	39.84	3 41.21	0.123	15 52.03	1 6.69	3 8	49.72		
	10	3 9	1.80	9.758	17 40	7.4	39.11	3 43.85	0.098	15 51.81	1 6.78	3 12	46.28		
	11	3 12	56.30	9.783	+17 55	37.3	+38.33	-3 45.01	-0.074	15 51.59	1 6.86	3 16	42.83		
	12	3 16	51.40	9.808	18 10	49.3	37.63	3 47.37	0.049	15 51.38	1 6.94	3 20	39.39		
	13	3 20	47.08	9.832	18 25	43.0	36.96	3 48.23	-0.024	15 51.17	1 7.02	3 24	35.94		
	14	3 24	43.36	9.857	18 40	18.2	36.07	3 48.51	+0.001	15 50.96	1 7.10	3 28	32.50		
	15	3 28	40.22	9.881	18 54	34.6	35.23	3 48.19	0.025	15 50.76	1 7.18	3 32	29.06		
	16	3 32	37.68	9.906	+19 8	31.8	+34.43	-3 47.30	+0.049	15 50.56	1 7.26	3 36	25.61		
	17	3 36	35.71	9.930	+19 22	9.6	+33.65	-3 45.84	+0.073	15 50.36	1 7.34	3 40	22.16		

NOTE.—For mean time interval of semidiameter passing meridian, subtract 0.16 from the sidereal interval.



FOR WASHINGTON APPARENT NOON.

Date.	Apparent Right Ascension.			Var. per Hour.	Apparent Declination.			Var. per Hour.	Equation of Time.		Var. per Hour.	Semi-diameter.		S. T. of Sem. Pass. Merid.	Sidereal Time of Mean Noon.			
	h	m	s		"	"	"		m	s		"	"		m	s	h	m
May 17	3	36	35.71	9.980	+19	22	9.6	+33.66	-3	45.84	+0.073	15	50.36	1	7.34	3	40	22.16
18	3	40	34.80	9.983	19	35	27.8	32.84	3	43.81	0.086	15	50.17	1	7.42	3	44	18.72
19	3	44	33.45	9.976	19	48	25.9	32.00	3	41.22	0.119	15	49.99	1	7.50	3	48	15.28
20	3	48	33.13	9.983	20	1	3.8	31.18	3	38.10	0.141	15	49.80	1	7.58	3	52	11.83
21	3	52	33.85	10.000	20	13	21.2	30.29	3	34.45	0.163	15	49.63	1	7.65	3	56	8.39
22	3	56	34.09	10.041	+20	25	17.8	+29.42	-3	30.28	+0.184	15	49.46	1	7.72	4	0	4.94
23	4	0	35.84	10.062	20	36	53.5	28.54	3	25.61	0.205	15	49.29	1	7.80	4	4	1.50
24	4	4	37.07	10.062	20	48	8.0	27.66	3	20.43	0.225	15	49.13	1	7.87	4	7	58.06
25	4	8	39.29	10.102	20	59	1.0	26.76	3	14.78	0.245	15	48.97	1	7.94	4	11	54.61
26	4	12	41.99	10.162	21	9	32.3	25.85	3	8.66	0.265	15	48.82	1	8.01	4	15	51.17
27	4	16	45.16	10.141	+21	19	41.7	+24.93	-3	2.06	+0.284	15	48.66	1	8.08	4	19	47.72
28	4	20	48.79	10.160	21	29	28.9	24.00	2	55.01	0.303	15	48.51	1	8.15	4	23	44.28
29	4	24	52.87	10.179	21	38	53.9	23.07	2	47.52	0.321	15	48.37	1	8.21	4	27	40.84
30	4	28	57.37	10.167	21	47	56.4	22.13	2	39.59	0.339	15	48.22	1	8.27	4	31	37.39
31	4	33	2.80	10.204	21	56	36.1	21.18	2	31.24	0.357	15	48.08	1	8.33	4	35	33.95
June 1	4	37	7.64	10.261	+22	4	53.0	+20.23	-2	22.48	+0.373	15	47.94	1	8.39	4	39	30.51
2	4	41	13.38	10.267	22	12	46.9	19.26	2	13.33	0.389	15	47.80	1	8.44	4	43	27.06
3	4	45	19.50	10.263	22	20	17.5	18.29	2	3.79	0.405	15	47.67	1	8.49	4	47	23.62
4	4	49	26.00	10.273	22	27	24.7	17.31	1	53.87	0.420	15	47.54	1	8.54	4	51	20.18
5	4	53	32.85	10.293	22	34	8.3	16.33	1	43.60	0.435	15	47.41	1	8.59	4	55	16.73
6	4	57	40.04	10.307	+22	40	28.2	+15.34	-1	32.99	+0.449	15	47.29	1	8.64	4	59	13.29
7	5	1	47.56	10.320	22	46	24.4	14.34	1	22.06	0.462	15	47.17	1	8.68	5	3	9.85
8	5	5	55.38	10.332	22	51	56.6	13.34	1	10.83	0.474	15	47.06	1	8.72	5	7	6.40
9	5	10	3.49	10.343	22	57	4.6	12.33	0	59.30	0.485	15	46.95	1	8.75	5	11	2.96
10	5	14	11.87	10.364	23	1	48.4	11.33	0	47.52	0.496	15	46.84	1	8.79	5	14	59.52
11	5	18	20.50	10.364	+23	6	8.0	+10.31	-0	35.48	+0.506	15	46.73	1	8.82	5	18	56.08
12	5	22	29.36	10.373	23	10	3.2	9.29	0	23.21	0.516	15	46.63	1	8.84	5	22	52.63
13	5	26	38.41	10.380	23	13	33.8	8.27	-0	10.75	0.523	15	46.53	1	8.86	5	26	49.19
14	5	30	47.43	10.387	23	16	39.9	7.24	+0	1.89	0.529	15	46.45	1	8.88	5	30	45.75
15	5	34	57.01	10.393	23	19	21.4	6.21	0	14.66	0.535	15	46.36	1	8.90	5	34	42.30
16	5	39	6.51	10.393	+23	21	38.2	+5.19	+0	27.58	+0.540	15	46.29	1	8.91	5	38	38.86
17	5	43	16.09	10.401	23	23	30.3	4.16	0	40.56	0.542	15	46.22	1	8.92	5	42	35.42
18	5	47	25.74	10.402	23	24	57.6	3.14	0	53.61	0.544	15	46.15	1	8.93	5	46	31.97
19	5	51	35.42	10.403	23	26	0.1	2.09	1	6.70	0.545	15	46.09	1	8.94	5	50	28.53
20	5	55	45.10	10.403	23	26	37.9	1.06	1	19.79	0.545	15	46.03	1	8.94	5	54	25.09
21	5	59	54.75	10.401	+23	26	50.6	+0.02	+1	32.85	+0.545	15	45.98	1	8.94	5	58	21.64
22	6	4	4.36	10.398	23	26	39.0	-1.01	1	45.87	0.540	15	45.93	1	8.93	6	2	18.20
23	6	8	13.99	10.393	23	26	2.4	2.04	1	58.81	0.537	15	45.89	1	8.93	6	6	14.76
24	6	12	23.33	10.391	23	25	1.1	3.97	2	11.66	0.533	15	45.85	1	8.92	6	10	11.32
25	6	16	32.65	10.385	23	23	35.0	4.10	2	24.38	0.528	15	45.82	1	8.90	6	14	7.87
26	6	20	41.84	10.380	+23	21	44.3	-5.13	+2	36.97	+0.523	15	45.80	1	8.88	6	18	4.43
27	6	24	50.86	10.373	23	19	28.9	6.15	2	49.41	0.514	15	45.77	1	8.86	6	22	0.99
28	6	28	59.70	10.364	23	16	49.0	7.13	3	1.66	0.508	15	45.75	1	8.83	6	25	57.54
29	6	33	8.94	10.355	23	13	44.5	8.20	3	13.71	0.498	15	45.74	1	8.80	6	29	54.10
30	6	37	16.76	10.343	23	10	15.7	9.21	3	25.54	0.488	15	45.72	1	8.77	6	33	50.66
July 1	6	41	24.95	10.336	+23	6	22.6	-10.23	+3	37.14	+0.478	15	45.71	1	8.74	6	37	47.22
2	6	45	32.88	10.324	+23	2	5.2	-11.23	+3	48.48	+0.468	15	45.70	1	8.70	6	41	43.77

NOTE.—For mean time interval of semidiameter passing meridian, subtract 0.13 from the sidereal interval.

FOR WASHINGTON APPARENT NOON.

Date.	Apparent Right Ascension.			Var. per Hour.	Apparent Declination.			Var. per Hour.	Equation of Time. Mean—App.	Var. per Hour.	Semi-diameter.	S. T. of Sem. Pass Merid.	Sidereal Time of Mean Noon.		
	h	m	s		"	"	"						h	m	s
July	1	6 41	24.95	10.336	+23 6	22.6	-10.23	+3 37.14	+0.478	15 45.71	1 8.74	6 37	47.22		
	2	6 45	32.88	10.334	23 2	5.2	11.23	3 48.43	0.486	15 45.70	1 8.70	6 41	43.77		
	3	6 49	40.53	10.312	22 57	23.6	12.23	3 59.54	0.484	15 45.69	1 8.66	6 45	40.33		
	4	6 53	47.90	10.300	22 52	18.0	13.23	4 10.32	0.483	15 45.69	1 8.62	6 49	36.89		
	5	6 57	54.95	10.287	22 46	48.5	14.23	4 20.79	0.480	15 45.69	1 8.57	6 53	33.44		
	6	7 2	1.68	10.273	+22 40	55.2	-15.21	+4 30.96	+0.416	15 45.70	1 8.52	6 57	30.00		
	7	7 6	8.07	10.269	22 34	38.2	16.20	4 40.74	0.401	15 45.71	1 8.47	7 1	26.56		
	8	7 10	14.10	10.244	22 27	57.7	17.18	4 50.19	0.386	15 45.72	1 8.42	7 5	23.12		
	9	7 14	19.75	10.227	22 20	58.9	18.15	4 59.26	0.370	15 45.74	1 8.36	7 9	19.67		
	10	7 18	25.01	10.210	22 13	26.9	19.10	5 7.93	0.353	15 45.77	1 8.30	7 13	16.23		
	11	7 22	29.36	10.193	+22 5	36.9	-20.04	+5 16.21	+0.336	15 45.80	1 8.24	7 17	12.78		
	12	7 26	34.29	10.175	21 57	24.1	21.00	5 24.06	0.318	15 45.83	1 8.18	7 21	9.34		
	13	7 30	38.27	10.156	21 48	48.7	21.94	5 31.47	0.299	15 45.86	1 8.11	7 25	5.90		
	14	7 34	41.78	10.137	21 39	50.8	22.88	5 38.40	0.279	15 45.91	1 8.05	7 29	2.45		
	15	7 38	44.81	10.116	21 30	30.7	23.80	5 44.86	0.259	15 45.95	1 7.98	7 32	59.01		
	16	7 42	47.33	10.094	+21 20	48.8	-24.70	+5 50.81	+0.237	15 46.01	1 7.90	7 36	55.57		
	17	7 46	49.34	10.079	21 10	45.0	25.50	5 56.25	0.215	15 46.07	1 7.83	7 40	52.12		
	18	7 50	50.82	10.062	21 0	19.8	26.50	6 1.14	0.193	15 46.14	1 7.75	7 44	48.68		
	19	7 54	51.73	10.025	20 49	33.3	27.38	6 5.49	0.170	15 46.21	1 7.68	7 48	45.23		
	20	7 58	52.08	10.008	20 38	25.8	28.24	6 9.28	0.146	15 46.29	1 7.60	7 52	41.79		
	21	8 2	51.86	9.979	+20 26	57.5	-29.10	+6 12.49	+0.123	15 46.37	1 7.52	7 56	38.35		
	22	8 6	51.04	9.954	20 15	8.8	29.95	6 15.11	0.097	15 46.46	1 7.44	8 0	34.90		
	23	8 10	49.63	9.929	20 2	59.7	30.80	6 17.15	0.073	15 46.55	1 7.36	8 4	31.46		
	24	8 14	47.64	9.904	19 50	30.7	31.68	6 18.59	0.048	15 46.64	1 7.27	8 8	28.01		
	25	8 18	45.03	9.879	19 37	41.9	32.44	6 19.42	+0.022	15 46.74	1 7.19	8 12	24.57		
	26	8 22	41.81	9.854	+19 24	33.5	-33.23	+6 19.65	-0.003	15 46.84	1 7.11	8 16	21.12		
	27	8 26	37.99	9.828	19 11	5.9	34.04	6 19.27	0.026	15 46.95	1 7.02	8 20	17.68		
	28	8 30	33.56	9.802	18 57	19.2	34.83	6 18.23	0.054	15 47.06	1 6.94	8 24	14.24		
	29	8 34	28.50	9.777	18 43	13.9	35.60	6 16.69	0.079	15 47.18	1 6.85	8 28	10.79		
	30	8 38	22.84	9.752	18 28	50.2	36.37	6 14.48	0.104	15 47.29	1 6.76	8 32	7.35		
31	8 42	16.59	9.727	+18 14	8.2	-37.13	+6 11.67	-0.130	15 47.41	1 6.68	8 36	3.90			
Aug.	1	8 46	9.72	9.702	17 59	8.3	37.57	6 8.26	0.154	15 47.53	1 6.59	8 40	0.46		
	2	8 50	2.25	9.677	17 43	50.7	38.50	6 4.24	0.179	15 47.66	1 6.50	8 43	57.01		
	3	8 53	54.19	9.652	17 28	15.7	39.31	5 59.69	0.204	15 47.78	1 6.41	8 47	53.57		
	4	8 57	45.53	9.627	17 12	28.7	40.02	5 54.44	0.228	15 47.91	1 6.33	8 51	50.12		
	5	9 1	36.29	9.603	+16 56	14.9	-40.72	+5 48.66	-0.253	15 48.04	1 6.24	8 55	46.68		
	6	9 5	26.47	9.579	16 39	49.5	41.39	5 42.90	0.277	15 48.18	1 6.16	8 59	43.23		
	7	9 9	16.07	9.555	16 23	8.0	42.06	5 35.37	0.301	15 48.32	1 6.07	9 3	39.78		
	8	9 13	5.10	9.531	16 6	10.5	42.73	5 27.37	0.324	15 48.46	1 5.98	9 7	36.34		
	9	9 16	53.57	9.506	15 48	57.4	43.26	5 19.81	0.348	15 48.61	1 5.90	9 11	32.89		
	10	9 20	41.48	9.482	+15 31	29.0	-43.99	+5 11.18	-0.371	15 48.76	1 5.82	9 15	29.45		
	11	9 24	28.88	9.451	15 13	45.6	44.61	5 2.06	0.394	15 48.92	1 5.73	9 19	26.00		
	12	9 28	15.64	9.420	14 55	47.6	45.22	4 52.27	0.417	15 49.08	1 5.65	9 23	22.56		
	13	9 32	1.89	9.416	14 37	35.3	45.80	4 42.00	0.440	15 49.25	1 5.57	9 27	19.11		
	14	9 35	47.59	9.393	14 19	9.0	46.38	4 31.18	0.462	15 49.42	1 5.49	9 31	15.66		
	15	9 39	32.75	9.370	+14 0	29.1	-46.94	+4 19.82	-0.485	15 49.60	1 5.42	9 35	12.22		
	16	9 43	17.38	9.345	+13 41	35.8	-47.49	+4 7.93	-0.507	15 49.78	1 5.34	9 39	8.77		

NOTE.—For mean time interval of semidiameter passing meridian, subtract 0.13 from the sidereal interval.

FOR WASHINGTON APPARENT NOON.

Date.	Apparent Right Ascension.			Var. per Hour.	Apparent Declination.			Var. per Hour.	Equation of Time. Mean—App.			Var. per Hour.	Semi-diameter.		S. T. of Sem. Pass. Merid.		Sidereal Time of Mean Noon.		
	h	m	s		°	'	"		m	s	s		"	"	m	s	h	m	s
Aug. 16	9	43	17.38	9.348	+13	41	35.8	-47.49	+ 4	7.93	-0.307	15	49.78	1	5.34	9	39	8.77	
17	9	47	1.47	9.328	13	22	29.6	48.03	3	55.59	0.328	15	49.96	1	5.27	9	43	5.33	
18	9	50	45.04	9.305	13	3	10.7	48.54	3	42.56	0.350	15	50.15	1	5.19	9	47	1.88	
19	9	54	28.10	9.284	12	43	39.4	49.05	3	29.10	0.371	15	50.35	1	5.12	9	50	58.44	
20	9	58	10.65	9.263	12	23	56.2	49.54	3	15.13	0.392	15	50.55	1	5.05	9	54	54.99	
21	10	1	52.72	9.243	+12	4	1.3	-50.03	+ 3	0.68	-0.312	15	50.75	1	4.98	9	58	51.54	
22	10	5	34.30	9.223	11	43	55.0	50.50	2	45.76	0.331	15	50.95	1	4.92	10	2	48.10	
23	10	9	15.42	9.204	11	23	37.6	50.95	2	30.37	0.351	15	51.16	1	4.85	10	6	44.65	
24	10	12	56.10	9.185	11	3	9.5	51.39	2	14.52	0.369	15	51.37	1	4.79	10	10	41.20	
25	10	16	36.33	9.168	10	42	30.9	51.82	1	58.25	0.387	15	51.58	1	4.73	10	14	37.75	
26	10	20	16.15	9.151	+10	21	42.1	-52.24	+ 1	41.56	-0.703	15	51.80	1	4.67	10	18	34.31	
27	10	23	55.57	9.135	10	0	43.5	52.64	1	24.48	0.719	15	52.02	1	4.61	10	22	30.86	
28	10	27	34.00	9.119	9	89	35.4	53.03	1	7.01	0.735	15	52.24	1	4.56	10	26	27.41	
29	10	31	13.27	9.104	9	18	18.2	53.41	0	49.17	0.750	15	52.46	1	4.51	10	30	23.97	
30	10	34	51.60	9.089	8	56	51.9	53.77	0	30.99	0.764	15	52.68	1	4.46	10	34	20.52	
Sept. 1	10	38	29.60	9.077	+ 8	35	17.0	-54.12	+ 0	12.50	-0.777	15	52.90	1	4.41	10	38	17.07	
2	10	42	7.30	9.065	8	13	33.8	54.47	- 0	6.31	0.790	15	53.12	1	4.36	10	42	13.62	
3	10	45	44.71	9.054	7	51	42.5	54.89	0	25.40	0.800	15	53.35	1	4.32	10	46	10.18	
4	10	49	21.86	9.043	7	29	43.6	55.11	0	44.74	0.811	15	53.58	1	4.28	10	50	6.73	
5	10	52	58.76	9.033	7	7	37.4	55.41	1	4.33	0.821	15	53.81	1	4.24	10	54	3.28	
6	10	56	35.45	9.024	+ 6	45	24.0	-55.76	- 1	24.15	-0.830	15	54.04	1	4.20	10	57	59.83	
7	11	0	11.93	9.015	6	23	3.9	55.96	1	44.17	0.838	15	54.27	1	4.17	11	1	56.39	
8	11	3	48.22	9.009	6	0	37.3	56.23	2	4.37	0.845	15	54.51	1	4.14	11	5	52.94	
9	11	7	24.34	9.002	5	38	4.7	56.48	2	24.75	0.852	15	54.75	1	4.12	11	9	49.49	
10	11	11	0.31	9.005	5	15	26.4	56.71	2	45.28	0.858	15	54.99	1	4.10	11	13	46.04	
11	11	14	36.14	9.001	+ 4	52	42.6	-56.93	- 3	5.94	-0.863	15	55.23	1	4.08	11	17	42.60	
12	11	18	11.86	9.006	4	29	53.8	57.13	3	26.73	0.868	15	55.48	1	4.06	11	21	39.15	
13	11	21	47.46	9.001	4	7	0.3	57.33	3	47.62	0.872	15	55.74	1	4.04	11	25	35.70	
14	11	25	22.97	9.008	3	44	2.5	57.49	4	8.60	0.876	15	55.99	1	4.03	11	29	32.25	
15	11	28	58.40	9.005	3	21	0.7	57.64	4	29.67	0.879	15	56.25	1	4.02	11	33	28.80	
16	11	32	33.77	9.003	+ 2	57	55.2	-57.89	- 4	50.80	-0.881	15	56.51	1	4.01	11	37	25.36	
17	11	36	9.69	9.001	2	34	46.6	57.94	5	11.96	0.882	15	56.78	1	4.01	11	41	21.91	
18	11	39	44.39	9.001	2	11	35.0	58.04	5	33.16	0.883	15	57.04	1	4.01	11	45	18.46	
19	11	43	19.68	9.001	1	48	29.7	58.14	5	54.36	0.883	15	57.31	1	4.01	11	49	15.01	
20	11	46	54.98	9.001	1	25	4.1	58.23	6	15.56	0.883	15	57.58	1	4.01	11	53	11.56	
21	11	50	30.31	9.003	+ 1	1	46.7	-58.39	- 6	36.72	-0.881	15	57.85	1	4.02	11	57	8.12	
22	11	54	5.69	9.006	0	38	25.6	58.36	6	57.83	0.873	15	58.12	1	4.03	12	1	4.67	
23	11	57	41.15	9.009	+ 0	15	4.2	58.41	7	18.86	0.874	15	58.40	1	4.05	12	5	1.22	
24	12	1	16.70	9.004	- 0	8	18.2	58.44	7	39.81	0.870	15	58.67	1	4.07	12	8	57.77	
25	12	4	52.36	9.009	0	31	41.1	58.46	8	0.65	0.865	15	58.95	1	4.09	12	12	54.32	
26	12	8	28.16	9.005	- 0	55	4.2	-58.47	- 8	21.35	-0.860	15	59.22	1	4.12	12	16	50.88	
27	12	12	4.12	9.008	1	18	27.3	58.46	8	41.88	0.861	15	59.50	1	4.15	12	20	47.43	
28	12	15	49.26	9.011	1	41	59.1	58.43	9	2.28	0.855	15	59.77	1	4.18	12	24	43.98	
29	12	19	16.62	9.009	2	5	12.2	58.46	9	22.37	0.855	16	0.05	1	4.21	12	28	40.53	
30	12	22	53.20	9.009	2	28	33.2	58.34	9	42.29	0.854	16	0.32	1	4.24	12	32	37.08	
Oct. 1	12	26	39.65	9.013	- 2	51	52.9	-58.29	-10	1.94	-0.812	16	0.59	1	4.28	12	36	33.63	
2	12	30	7.18	9.014	- 3	15	16.9	-58.21	-10	21.31	-0.800	16	0.86	1	4.32	12	40	30.19	

NOTE.—For mean time interval of semidiameter passing meridian, subtract 0.15 from the sidereal interval.

FOR WASHINGTON APPARENT NOON.

Date.	Apparent Right Ascension.			Var. per Hour.	Apparent Declination.			Var. per Hour.	Equation of Time. Mean—App.			Var. per Hour.	Semi-diameter.	S. T. of Sem. Pass Merid.	Sidereal Time of Mean Noon.				
	h	m	s		''	''	''		m	s	s				''	m	s	h	m
Oct. 1	12	30	7.18	0.054	-	3	15	10.9	-58.21	-10	21.31	-0.300	16	0.96	1	4.32	12	40	30.19
2	12	33	44.61	0.067		3	38	26.8	58.12	10	40.37	0.787	16	1.13	1	4.37	12	44	26.74
3	12	37	22.37	0.081		4	1	40.4	58.01	10	59.11	0.776	16	1.40	1	4.41	12	48	23.29
4	12	41	0.49	0.096		4	24	51.3	57.89	11	17.49	0.768	16	1.67	1	4.46	12	52	19.84
5	12	44	38.98	0.112		4	47	59.1	57.76	11	35.59	0.742	16	1.94	1	4.52	12	56	16.39
6	12	48	17.86	0.130	-	5	11	3.4	-57.61	-11	53.13	-0.735	16	2.22	1	4.57	13	0	12.95
7	12	51	57.16	0.147		5	34	3.8	57.43	12	10.84	0.708	16	2.49	1	4.63	13	4	9.50
8	12	55	36.90	0.165		5	57	0.1	57.25	12	27.12	0.680	16	2.76	1	4.69	13	8	6.05
9	12	59	17.07	0.183		6	19	51.8	57.06	12	43.45	0.671	16	3.03	1	4.76	13	12	2.60
10	13	2	57.70	0.202		6	42	38.5	56.83	12	59.32	0.662	16	3.30	1	4.82	13	15	59.15
11	13	6	38.82	0.228	-	7	5	19.8	-56.60	-13	14.72	-0.663	16	3.58	1	4.90	13	19	55.71
12	13	10	20.43	0.244		7	27	55.4	56.34	13	29.62	0.661	16	3.85	1	4.97	13	23	52.26
13	13	14	2.54	0.266		7	50	24.8	56.09	13	44.01	0.669	16	4.13	1	5.05	13	27	48.81
14	13	17	45.18	0.288		8	12	47.7	55.81	13	57.89	0.667	16	4.41	1	5.13	13	31	45.36
15	13	21	28.36	0.310		8	35	3.7	55.51	14	11.23	0.644	16	4.69	1	5.21	13	35	41.92
16	13	25	12.08	0.334	-	8	57	12.3	-55.20	-14	24.02	-0.621	16	4.96	1	5.29	13	39	38.47
17	13	28	56.37	0.358		9	19	18.2	54.87	14	36.25	0.607	16	5.24	1	5.38	13	43	35.02
18	13	32	41.25	0.382		9	41	5.9	54.53	14	47.89	0.478	16	5.52	1	5.47	13	47	31.58
19	13	36	26.73	0.408		10	2	59.2	54.16	14	58.94	0.447	16	5.80	1	5.56	13	51	28.13
20	13	40	12.82	0.434		10	24	25.6	53.78	15	9.37	0.421	16	6.07	1	5.65	13	55	24.68
21	13	43	59.54	0.460	-	10	45	51.7	-53.34	-15	19.17	-0.395	16	6.35	1	5.75	13	59	21.23
22	13	47	46.91	0.488		11	7	8.2	52.96	15	28.33	0.368	16	6.62	1	5.84	14	3	17.79
23	13	51	34.94	0.515		11	28	14.6	52.54	15	36.83	0.340	16	6.89	1	5.94	14	7	14.34
24	13	55	23.65	0.544		11	49	10.5	52.10	15	44.65	0.311	16	7.16	1	6.04	14	11	10.89
25	13	59	13.06	0.573		12	9	55.7	51.63	15	51.77	0.282	16	7.43	1	6.15	14	15	7.45
26	14	3	3.18	0.604	-	12	30	29.6	-51.13	-15	58.19	-0.262	16	7.69	1	6.25	14	19	4.00
27	14	6	54.63	0.635		12	50	52.0	50.66	16	3.87	0.231	16	7.95	1	6.36	14	23	0.55
28	14	10	45.63	0.666		13	11	2.3	50.14	16	8.81	0.190	16	8.21	1	6.47	14	26	57.11
29	14	14	38.01	0.698		13	31	0.3	49.64	16	12.99	0.158	16	8.46	1	6.58	14	30	53.66
30	14	18	31.16	0.731		13	50	45.5	49.11	16	16.39	0.125	16	8.71	1	6.69	14	34	50.22
31	14	22	25.10	0.764	-	14	10	17.7	-48.56	-16	18.99	-0.102	16	8.96	1	6.80	14	38	46.77
Nov. 1	14	26	19.85	0.798		14	29	36.2	47.98	16	20.78	0.068	16	9.20	1	6.92	14	42	43.32
2	14	30	15.43	0.833		14	48	40.8	47.39	16	21.76	-0.024	16	9.44	1	7.03	14	46	39.88
3	14	34	11.84	0.867		15	7	31.0	46.79	16	21.99	+0.011	16	9.68	1	7.15	14	50	36.43
4	14	38	9.09	0.903		15	26	6.5	46.17	16	21.29	0.046	16	9.92	1	7.27	14	54	32.98
5	14	42	7.19	0.938	-	15	44	26.8	-45.53	-16	19.66	+0.081	16	10.16	1	7.38	14	58	29.54
6	14	46	6.14	0.974		16	2	31.5	44.90	16	17.28	0.117	16	10.39	1	7.50	15	2	26.09
7	14	50	5.95	1.010		16	20	20.2	44.18	16	14.05	0.153	16	10.62	1	7.62	15	6	22.65
8	14	54	6.60	1.045		16	37	52.4	43.49	16	9.95	0.188	16	10.85	1	7.74	15	10	19.20
9	14	58	8.11	1.081		16	55	7.8	42.73	16	5.01	0.224	16	11.08	1	7.86	15	14	15.76
10	15	2	10.48	1.116	-	17	12	5.9	-42.04	-15	59.21	+0.269	16	11.31	1	7.98	15	18	12.31
11	15	6	13.09	1.151		17	28	46.3	41.31	15	52.57	0.304	16	11.54	1	8.10	15	22	8.87
12	15	10	17.75	1.186		17	45	8.7	40.54	15	45.09	0.339	16	11.76	1	8.22	15	26	5.42
13	15	14	22.06	1.221		18	1	12.6	39.77	15	36.76	0.364	16	11.99	1	8.34	15	30	1.98
14	15	18	28.41	1.256		18	16	57.6	38.99	15	27.59	0.389	16	12.20	1	8.45	15	33	58.53
15	15	22	34.99	1.291	-	18	32	23.2	-38.16	-15	17.53	+0.434	16	12.42	1	8.57	15	37	55.09
16	15	26	42.40	1.326		18	47	29.2	-37.33	-15	6.75	+0.468	16	12.63	1	8.69	15	41	51.64

NOTE.—For mean time interval of semidiameter passing meridian, subtract 0.14 from the sidereal interval.

FOR WASHINGTON APPARENT NOON.

Date.	Apparent Right Ascension.			Var. per Hour.	Apparent Declination.			Var. per Hour.	Equation of Time. Mean-App.	Var. per Hour.	Semi-diameter.			S. T. of Sem. Pass. Merid.	Sidereal Time of Mean Noon.			
	h	m	s		°	'	"				m	s	'		"	m	s	h
Nov. 16	15	26	42.40	10.326	-18	47	29.2	-37.33	-15	6.75	+0.468	16	12.63	1	8.69	15	41	51.64
17	15	30	50.65	10.360	19	2	15.1	36.49	14	55.10	0.502	16	12.84	1	8.80	15	45	48.20
18	15	34	59.71	10.394	19	16	40.6	35.63	14	42.63	0.536	16	13.05	1	8.92	15	49	44.76
19	15	39	9.57	10.428	19	30	45.3	34.75	14	29.36	0.570	16	13.26	1	9.03	15	53	41.31
20	15	43	20.24	10.461	19	44	28.7	33.86	14	15.28	0.603	16	13.47	1	9.15	15	57	37.87
21	15	47	31.71	10.494	-19	57	50.6	-32.96	-14	0.41	+0.636	16	13.67	1	9.26	16	1	34.42
22	15	51	43.96	10.527	20	10	50.6	32.04	13	44.77	0.668	16	13.86	1	9.37	16	5	30.98
23	15	55	56.98	10.559	20	23	28.3	31.10	13	28.34	0.701	16	14.05	1	9.48	16	9	27.54
24	16	0	10.78	10.591	20	35	43.3	30.15	13	11.15	0.732	16	14.24	1	9.58	16	13	24.09
25	16	4	25.83	10.622	20	47	35.5	29.19	12	53.19	0.764	16	14.42	1	9.69	16	17	20.65
26	16	8	40.63	10.658	-20	59	4.3	-28.21	-12	34.49	+0.795	16	14.59	1	9.79	16	21	17.20
27	16	12	56.68	10.683	21	10	9.5	27.23	12	15.05	0.825	16	14.76	1	9.89	16	25	13.76
28	16	17	13.46	10.713	21	20	50.9	26.22	11	54.89	0.855	16	14.92	1	9.99	16	29	10.32
29	16	21	30.95	10.743	21	31	7.9	25.20	11	34.02	0.884	16	15.08	1	10.08	16	33	6.87
30	16	25	49.15	10.772	21	41	0.4	24.17	11	12.44	0.913	16	15.23	1	10.17	16	37	3.43
Dec. 1	16	30	8.02	10.800	-21	50	28.1	-23.14	-10	50.18	+0.941	16	15.39	1	10.26	16	40	59.99
2	16	34	27.56	10.828	21	59	30.7	22.09	10	27.26	0.969	16	15.53	1	10.35	16	44	56.54
3	16	38	47.75	10.854	22	8	7.9	21.02	10	3.69	0.994	16	15.67	1	10.43	16	48	53.10
4	16	48	8.55	10.879	22	16	19.4	19.94	9	39.52	1.019	16	15.81	1	10.51	16	52	49.66
5	16	47	29.94	10.903	22	24	5.1	18.86	9	14.75	1.044	16	15.94	1	10.58	16	56	46.21
6	16	51	51.90	10.926	-22	31	24.5	-17.76	-8	49.41	+1.067	16	16.07	1	10.65	17	0	42.77
7	16	56	14.39	10.947	22	38	17.5	16.66	8	23.55	1.088	16	16.20	1	10.72	17	4	39.33
8	17	0	37.40	10.968	22	44	43.9	15.54	7	57.19	1.108	16	16.32	1	10.78	17	8	35.88
9	17	5	0.87	10.987	22	50	43.5	14.42	7	30.35	1.128	16	16.43	1	10.84	17	12	32.44
10	17	9	24.78	11.006	22	56	16.0	13.29	7	3.07	1.145	16	16.53	1	10.90	17	16	29.00
11	17	13	49.09	11.021	-23	1	21.3	-12.15	-6	35.38	+1.161	16	16.65	1	10.96	17	20	25.56
12	17	18	13.78	11.036	23	5	59.2	11.00	6	7.33	1.176	16	16.76	1	11.01	17	24	22.11
13	17	22	38.81	11.049	23	10	9.6	9.85	5	38.94	1.189	16	16.86	1	11.05	17	28	18.67
14	17	27	4.14	11.061	23	13	52.4	8.70	5	10.24	1.201	16	16.96	1	11.09	17	32	15.23
15	17	31	29.74	11.072	23	17	7.4	7.54	4	41.28	1.212	16	17.06	1	11.13	17	36	11.79
16	17	36	55.57	11.081	-23	19	54.4	-6.38	-4	12.08	+1.220	16	17.16	1	11.16	17	40	8.34
17	17	40	21.60	11.088	23	22	13.4	5.21	3	42.70	1.227	16	17.24	1	11.18	17	44	4.90
18	17	44	47.80	11.094	23	24	4.2	4.08	3	13.14	1.234	16	17.33	1	11.20	17	48	1.46
19	17	49	14.12	11.099	23	25	26.9	2.86	2	43.46	1.239	16	17.40	1	11.22	17	51	58.02
20	17	53	40.53	11.102	23	26	21.5	1.69	2	13.68	1.242	16	17.47	1	11.24	17	55	54.57
21	17	58	7.01	11.104	-23	26	47.7	-0.51	-1	43.84	+1.244	16	17.54	1	11.25	17	59	51.13
22	18	2	33.51	11.104	23	26	45.7	+0.67	1	13.98	1.244	16	17.60	1	11.25	18	3	47.69
23	18	7	0.01	11.103	23	26	15.4	1.83	0	44.12	1.243	16	17.66	1	11.25	18	7	44.25
24	18	11	26.48	11.101	23	25	16.8	2.83	-0	14.29	1.241	16	17.71	1	11.25	18	11	40.80
25	18	15	52.88	11.098	23	23	49.9	4.21	+0	15.47	1.238	16	17.75	1	11.24	18	15	37.36
26	18	20	19.19	11.094	-23	21	54.8	+5.38	+0	45.15	+1.234	16	17.79	1	11.23	18	19	33.92
27	18	24	45.39	11.089	23	19	31.5	6.56	1	14.71	1.229	16	17.81	1	11.21	18	23	30.48
28	18	29	11.44	11.082	23	16	40.1	7.23	1	44.12	1.222	16	17.83	1	11.18	18	27	27.03
29	18	33	37.31	11.074	23	13	20.5	8.90	2	13.36	1.214	16	17.85	1	11.15	18	31	23.59
30	18	38	2.98	11.065	23	9	33.0	10.66	2	42.39	1.205	16	17.87	1	11.12	18	35	20.15
31	18	42	28.41	11.054	-23	5	17.7	+11.22	+3	11.18	+1.194	16	17.87	1	11.08	18	39	16.71

NOTE.—For mean time interval of semidiameter passing meridian, subtract 0.19 from the sidereal interval.

FOR TRANSIT OF MOON'S CENTER OVER THE MERIDIAN OF WASHINGTON.

Date.	Culmination.	Wash. Mean Time.	Var. per Hour of Long.	Right Ascension of Center.	Var. per Hour of Long.	Geocentric Declination of Center.	Var. per Hour of Long.	S. T. of Semi-d. Passing Meridian.	Geocentric Semidiameter.	Equatorial Horizontal Parallax.	Bright Limbs.
		h m	m	h m s	s	° ' "	"	"	" "	" "	
Jan. 1	U	8 16.99	2.433	2 58 35.04	156.21	+17 34 20.7	+ 447.1	71.88	16 24.5	60 7.4	I S.
1	L	20 46.62	2.505	3 30 16.05	160.54	18 54 42.8	354.3	72.88	16 29.4	60 25.4	
2	U	9 17.05	2.565	4 2 45.26	164.18	19 55 15.1	249.1	73.65	16 33.4	60 40.1	I S.
2	L	21 48.11	2.609	4 35 52.30	166.80	20 33 43.3	134.2	74.28	16 36.4	60 51.0	
3	U	10 19.57	2.631	5 9 23.25	168.13	+20 48 31.6	+ 13.2	74.51	16 38.2	60 57.6	I S.
3	L	22 51.15	2.629	5 43 1.75	168.04	20 38 53.8	-109.3	74.47	16 38.7	60 59.5	
4	U	11 22.58	2.604	6 16 30.61	166.54	20 5 0.4	228.6	74.11	16 37.9	60 56.4	I S.
4	L	23 53.57	2.558	6 49 33.62	163.78	19 7 58.8	340.0	73.46	16 35.7	60 48.4	
5	U	12 23.91	2.496	7 21 57.13	160.01	+17 49 46.1	- 439.9	72.57	16 32.2	60 35.6	II. S.
6	L	0 53.42	2.422	7 53 31.08	155.56	16 12 57.0	525.8	71.52	16 27.5	60 18.4	
6	U	13 22.01	2.342	8 24 9.37	150.78	14 20 29.8	596.2	70.39	16 21.8	59 57.4	II. S.
7	L	1 49.63	2.262	8 53 49.65	145.95	12 15 32.6	650.8	69.23	16 15.2	59 33.3	
7	U	14 16.31	2.185	9 22 32.85	141.30	+10 11 0.4	- 690.4	68.10	16 8.0	59 6.7	II. S.
8	L	2 42.09	2.113	9 50 22.35	137.02	7 40 18.3	716.1	67.06	16 0.3	58 38.5	
8	U	15 7.07	2.050	10 17 23.23	133.22	5 15 35.6	720.1	66.12	15 52.4	58 9.4	II. S.
9	L	3 31.34	1.996	10 43 41.75	129.97	2 49 23.4	731.2	65.31	15 44.4	57 40.1	
9	U	15 55.02	1.952	11 9 24.69	127.39	+ 0 23 45.1	- 735.7	64.64	15 36.5	57 11.2	II. S.
10	L	4 18.22	1.917	11 34 39.07	125.29	- 1 59 32.7	707.9	64.12	15 28.9	56 43.3	
10	U	16 41.07	1.892	11 59 31.82	123.69	4 18 57.7	685.0	63.74	15 21.7	56 16.9	II. S.
11	L	5 3.67	1.876	12 24 9.64	122.71	6 33 9.9	655.9	63.49	15 15.0	55 52.4	
11	U	17 26.12	1.868	12 48 38.75	122.33	- 8 40 58.5	- 621.2	63.38	15 9.0	55 30.1	II. S.
12	L	5 48.52	1.867	13 13 4.93	122.21	10 41 19.8	581.5	63.38	15 3.5	55 10.1	
12	U	18 10.96	1.874	13 37 33.25	122.58	12 33 15.2	587.0	63.47	14 58.7	54 52.7	II. S.
13	L	6 33.51	1.885	14 2 8.15	123.29	14 15 49.9	488.0	63.66	14 54.8	54 38.0	
13	U	18 56.23	1.902	14 26 53.19	124.26	-15 48 11.3	- 494.8	63.90	14 51.5	54 26.0	II. S.
14	L	7 19.16	1.922	14 51 51.12	125.42	17 9 29.2	377.5	64.19	14 49.0	54 16.7	
14	U	19 42.33	1.942	15 17 3.64	126.68	18 18 55.0	316.9	64.49	14 47.1	54 10.0	II. S.
15	L	8 5.76	1.963	15 42 31.50	127.96	19 15 43.3	251.2	64.79	14 46.0	54 5.8	
15	U	20 29.44	1.983	16 8 14.31	129.16	-19 59 12.2	- 183.0	65.07	14 45.5	54 4.1	II. S.
16	L	8 53.34	2.000	16 34 10.72	130.21	20 28 44.7	111.9	65.31	14 45.7	54 4.6	
16	U	21 17.43	2.014	17 0 18.48	131.04	20 43 51.0	- 38.8	65.48	14 46.4	54 7.3	II. S.
17	L	9 41.66	2.023	17 26 34.52	131.59	20 44 10.4	+ 35.3	65.58	14 47.6	54 11.9	
17	U	22 5.97	2.027	17 52 55.29	131.82	-20 29 31.4	+ 110.8	65.62	14 49.4	54 18.3	II. S.
18	L	10 30.30	2.026	18 19 17.00	131.74	19 59 54.8	185.2	65.57	14 51.6	54 26.2	
18	U	22 54.57	2.020	18 45 35.94	131.37	19 15 33.4	263.0	65.44	14 54.1	54 35.5	II. S.
19	L	11 18.75	2.009	19 11 48.77	130.74	18 16 52.4	329.3	65.26	14 57.0	54 46.0	
19	U	23 42.78	1.996	19 37 52.80	129.92	-17 4 29.6	+ 394.8	65.08	15 0.0	54 57.4	
20	L	12 6.63	1.980	20 3 46.19	128.98	15 39 13.4	487.0	64.79	15 3.4	55 9.7	
21	U	0 30.30	1.964	20 29 28.12	128.01	14 2 2.6	512.9	64.54	15 7.0	55 22.7	
21	L	12 53.77	1.949	20 54 58.80	127.12	12 14 4.5	544.8	64.32	15 10.7	55 36.3	
22	U	1 17.08	1.966	21 20 19.53	126.27	-10 16 33.4	+ 699.3	64.14	15 14.5	55 50.3	I S.
22	L	13 40.28	1.928	21 45 32.58	125.85	8 10 50.2	646.3	64.02	15 18.4	56 4.7	
23	U	2 3.37	1.924	22 10 41.20	125.65	5 58 20.1	577.0	63.98	15 22.4	56 19.5	I S.
23	L	14 26.48	1.927	22 35 49.46	125.81	3 40 33.0	609.6	64.05	15 26.5	56 34.6	
24	U	2 49.65	1.967	23 1 2.13	126.39	- 1 19 2.7	+ 714.1	64.24	15 30.7	56 50.0	I S.

FOR TRANSIT OF MOON'S CENTER OVER THE MERIDIAN OF WASHINGTON.

Date.	Culmination.	Wash. Mean Time.	Var. per Hour of Long.	Right Ascension of Center.	Var. per Hour of Long.	Geocentric Declination of Center.	Var. per Hour of Long.	S. T. of Semid. Passing Meridian.	Geocentric Semidiameter.	Equatorial Horizontal Parallax.	Bright Limbs.
		h m	m	h m s	s	° ' "	"	"	' "	' "	
Jan. 24	U	2 49.65	1.987	23 1 2.13	126.29	- 1 19 2.7	+714.1	64.24	15 30.7	56 50.0	I. S.
24	L	15 12.99	1.964	23 26 24.56	127.48	+ 1 4 32.8	726.4	64.56	15 35.0	57 5.6	
25	U	3 36.59	1.980	23 52 2.55	128.96	3 28 31.3	717.9	64.98	15 39.3	57 21.5	I. S.
25	L	16 0 55	2.014	0 18 2.15	131.04	5 51 4.9	706.1	65.54	15 49.7	57 37.7	
26	U	4 24.96	2.037	0 44 29.43	133.00	+ 8 10 20.2	+684.7	66.23	15 48.2	57 54.1	I. S.
26	L	16 49.94	2.107	1 11 30.25	135.63	10 24 16.9	683.9	67.93	15 52.7	58 10.5	
27	U	5 15.56	2.164	1 39 9.90	140.05	12 30 47.5	610.2	67.91	15 57.2	58 26.9	I. S.
27	L	17 41.89	2.226	2 7 32.67	143.79	14 27 38.5	556.3	68.85	16 1.6	58 43.1	
28	U	6 8 99	2.261	2 36 41.40	147.68	+16 12 30.9	+490.5	69.81	16 5.9	58 58.9	I. S.
28	L	18 36.87	2.255	3 6 36.90	151.54	17 43 4.0	413.1	70.75	16 10.0	59 13.9	
29	U	7 5 49	2.215	3 37 17.45	155.15	19 57 0.2	294.8	71.60	16 13.8	59 27.9	I. S.
29	L	19 34.79	2.267	4 3 38.50	158.25	19 52 12.8	226.1	72.81	16 17.2	59 40.4	
30	U	8 4 64	2.206	4 49 32.48	160.80	+20 28 53.8	+319.5	72.84	16 20.1	59 51.0	I. S.
30	L	20 34.86	2.229	5 12 49.17	162.03	20 39 43.4	+ 3.0	73.14	16 22.4	59 59.4	
31	U	9 5 26	2.234	5 45 16.36	162.23	20 29 58.7	-205.4	73.19	16 23.9	60 5.0	I. S.
31	L	21 35.62	2.281	6 17 40.64	161.56	19 57 39.0	217.1	72.97	16 24.6	60 7.6	
Feb. 1	U	10 5 71	2.291	6 49 49.74	160.76	+19 3 27.9	-323.4	72.51	16 24.4	60 6.8	I. N.S.
1	L	22 35.36	2.447	7 21 31.66	157.10	17 43 50.7	421.0	71.85	16 23.2	60 2.5	
2	U	11 4 41	2.262	7 52 37.55	153.79	16 15 48.5	597.2	71.04	16 21.0	59 54.5	I. N.S.
2	L	23 32.75	2.281	8 23 1.24	150.09	14 26 48.7	580.4	70.13	16 17.9	59 43.1	
3	U	12 0 34	2.267	8 52 39.13	146.23	+12 24 35.0	-639.5	69.13	16 13.9	59 28.3	I. S.
4	U	0 27 15	2.208	9 21 30.85	142.41	10 11 58.4	684.2	68.23	16 9.0	59 10.4	
4	L	12 53.23	2.143	9 49 37.85	138.80	7 51 48.5	715.1	67.33	16 3.4	58 50.0	II. S.
5	U	1 18 61	2.089	10 17 3.37	135.51	5 26 47.5	732.9	66.52	15 57.3	58 27.5	
5	L	13 43.38	2.041	10 43 51.87	132.04	+ 2 59 26.3	-733.7	65.81	15 50.8	58 3.5	II. S.
6	U	2 7 62	2.001	11 10 8.51	129.21	+ 0 32 2.0	733.6	65.21	15 44.0	57 38.5	
6	L	14 31.42	1.998	11 35 58.88	128.25	- 1 53 23.1	719.0	64.73	15 37.0	57 13.1	II. S.
7	U	2 54 88	1.943	12 1 28.53	126.77	4 15 1.0	696.0	64.37	15 30.2	56 47.9	
7	L	15 18.09	1.926	12 26 43.10	125.74	- 6 31 16.7	-665.5	64.13	15 23.5	56 23.5	II. S.
8	U	3 41 13	1.916	12 51 47.80	125.13	8 40 47.3	623.6	64.00	15 17.2	56 0.2	
8	L	16 4 09	1.913	13 16 47.49	124.89	10 42 20.0	586.0	63.97	15 11.3	55 38.5	II. S.
9	U	4 27 04	1.914	13 41 46.47	125.00	12 34 50.3	533.3	64.03	15 5.9	55 18.7	
9	L	16 50.04	1.921	14 6 43.45	125.33	-14 17 20.5	-486.1	64.15	15 1.1	55 1.2	II. S.
10	U	5 13 14	1.931	14 31 56.50	126.00	15 48 58.9	429.7	64.33	14 57.0	54 46.1	
10	L	17 36 38	1.943	14 57 12.89	126.76	17 8 58.7	369.7	64.55	14 53.6	54 33.6	II. S.
11	U	5 59 78	1.967	15 22 39.15	127.62	18 16 37.3	306.3	64.77	14 50.9	54 23.9	
11	L	18 23 36	1.972	15 48 15.97	128.51	-19 11 17.0	-329.3	64.99	14 49.0	54 17.0	II. S.
12	U	6 47 11	1.996	16 14 3.23	129.25	19 52 23.8	170.3	65.20	14 47.9	54 12.9	
12	L	19 11.02	1.998	16 40 0.01	130.00	20 19 29.7	99.3	65.37	14 47.5	54 11.5	II. S.
13	U	7 35 07	2.008	17 6 4.83	130.68	20 32 12.8	- 37.2	65.50	14 47.9	54 12.9	
13	L	19 59 21	2.015	17 32 15.58	131.07	-20 30 18.1	+ 46.4	65.58	14 49.0	54 16.9	II. S.
14	U	8 23 41	2.018	17 58 29.81	131.26	20 13 68.3	120.2	65.60	14 50.3	54 23.3	
14	L	20 47 62	2.017	18 24 44.96	131.22	19 42 15.6	123.4	65.55	14 53.1	54 31.9	II. N.
15	U	9 11 81	2.022	18 50 58.53	131.60	18 56 21.7	265.2	65.45	14 56.0	54 42.6	
15	L	21 35 94	2.007	19 17 8.30	130.80	-17 56 18.5	+324.3	65.31	14 59.4	54 55.2	II. N.

Feb. 1, U Defective Illumination of N. 0° 13.

Feb. 2, U Defective Illumination of N. 0° 31.

FOR TRANSIT OF MOON'S CENTER OVER THE MERIDIAN OF WASHINGTON.

Date.	Culmination.	Wash Mean Time.	Var. per Hour of Long.	Right Ascension of Center.	Var. per Hour of Long.	Geocentric Declination of Center.	Var. per Hour of Long.	S. T. of Semi-d. Passing Meridian.	Geocentric Semi-diameter.	Equatorial Horizontal Parallax.	Bright Limbs.
		h m	m	h m s	s	° ' "	"	"	' "	' "	
Feb. 15	U	21 35.94	2.037	19 17 8.30	130.60	-17 56 18.5	+324.3	65.31	14 50.4	54 55.2	II. N.
16	L	9 59.97	1.999	19 43 12.60	130.09	16 42 38.0	401.3	65.15	15 3.8	56 9.2	II. N.
16	U	22 23.90	1.999	20 9 10.33	129.53	15 16 2.9	463.3	64.97	15 7.5	55 24.5	II. N.
17	L	10 47.71	1.999	20 35 1.20	128.96	13 37 26.1	521.4	64.79	15 11.9	56 40.8	II. N.
17	U	23 11.41	1.973	21 0 45.75	128.47	-11 47 50.1	+573.5	64.64	15 16.5	55 57.7	II. N.
18	L	11 35.04	1.968	21 26 25.32	128.14	9 43 27.1	619.3	64.54	15 21.2	56 14.9	
18	U	23 58.61	1.944	21 52 2.04	128.02	7 40 37.7	657.3	64.50	15 25.9	56 32.2	
19	L	12 22.19	1.966	22 17 38.82	128.16	5 25 51.4	688.6	64.53	15 30.5	56 49.3	
20	U	0 45.83	1.974	22 43 19.21	128.02	-3 5 45.1	+711.0	64.66	15 35.1	57 6.0	
20	L	13 9 5.50	1.988	23 9 7.27	129.45	-0 42 3.3	724.4	64.89	15 39.5	57 22.0	
21	U	1 33.66	2.008	23 35 7.53	130.06	+1 43 22.8	723.3	65.22	15 43.6	57 37.2	I. S.
21	L	18 57.61	2.035	0 1 24.72	132.27	4 8 35.7	723.1	65.66	15 47.5	57 51.5	
22	U	2 22.42	2.038	0 28 3.65	134.23	+6 31 32.0	+705.5	66.20	15 51.1	58 4.8	I. S.
22	L	14 47.47	2.108	0 55 8.92	134.66	8 50 3.8	678.0	66.33	15 54.4	58 16.9	
23	U	3 13.02	2.132	1 22 44.71	139.35	11 15 8.6	639.3	67.54	15 57.4	58 27.0	I. S.
23	L	15 39.14	2.201	1 50 54.36	142.29	13 5 2.0	599.3	68.31	16 0.1	58 37.9	
24	U	4 5 8.66	2.232	2 19 40.16	145.26	+14 56 59.5	+523.4	69.10	16 2.6	58 46.8	I. S.
24	L	16 33.19	2.303	2 49 2.80	148.41	16 35 38.6	454.5	69.37	16 4.7	58 54.6	
25	U	5 1 1.11	2.320	3 19 1.13	151.28	17 58 54.0	374.5	70.59	16 6.5	59 1.4	I. S.
25	L	17 29.58	2.393	3 49 31.67	153.78	19 45 1.3	283.7	71.21	16 8.1	59 7.2	
26	U	5 58.49	2.425	4 20 29.60	155.74	+19 51 53.8	+185.6	71.99	16 9.4	59 11.8	I. S.
26	L	18 27.73	2.446	4 51 46.85	157.01	20 18 46.9	+32.5	71.98	16 10.3	59 15.3	
27	U	6 57.14	2.454	5 23 14.60	157.46	20 24 44.5	-23.1	72.08	16 10.9	59 17.5	I. S.
27	L	19 26.56	2.443	5 54 42.93	157.11	20 9 32.4	126.6	71.97	16 11.1	59 18.3	
28	U	7 55.82	2.433	6 26 1.90	155.92	+19 33 29.3	-231.1	71.67	16 11.0	59 17.7	I. N.S.
28	L	20 24.78	2.393	6 57 2.24	154.08	18 37 27.3	323.1	71.19	16 10.4	59 15.4	
29	U	8 53.29	2.335	7 27 38.23	151.55	17 22 47.6	417.1	70.56	16 9.3	59 11.3	I. N.
29	L	21 21.28	2.268	7 57 38.06	148.70	15 51 16.6	496.3	69.33	16 7.6	59 5.3	
Mar. 1	U	9 43.66	2.237	8 27 4.09	145.63	+14 45 9.4	-544.6	69.04	16 5.4	58 57.3	I. N.
1	L	22 15.43	2.205	8 55 52.75	142.50	12 6 13.9	621.0	68.24	16 2.7	58 47.3	
2	U	10 41.58	2.154	9 24 4.41	139.47	9 57 24.6	635.2	67.45	15 59.4	58 35.3	I. N.S.
2	L	23 7 15	2.108	9 51 40.97	136.66	7 40 58.0	607.3	66.72	15 55.6	58 21.4	
3	U	11 32.18	2.066	10 18 45.45	134.14	+5 19 18.7	-717.4	66.07	15 51.4	58 5.7	I. N.S.
3	L	23 56.75	2.039	10 45 21.79	131.97	2 54 45.7	726.2	65.51	15 46.7	57 48.5	
4	U	12 20.92	2.000	11 11 34.36	130.13	+0 29 30.7	724.5	65.05	15 41.6	57 30.0	I. II. S.
5	L	0 44.78	1.977	11 37 27.79	128.79	-1 54 23.6	713.0	64.69	15 36.3	57 10.5	
5	U	18 8 8.39	1.930	12 3 0 6.65	127.70	-4 15 8.9	-623.3	64.43	15 30.9	56 59.5	II. S.
6	L	1 31.83	1.949	12 28 35.41	127.09	6 30 47.3	633.6	64.28	15 25.4	56 30.3	
6	U	13 55.18	1.943	12 53 58.17	126.75	8 40 0.5	637.5	64.22	15 19.9	56 10.3	II. S.
7	L	2 18.48	1.943	13 19 18.59	126.70	10 41 19.7	634.7	64.23	15 14.6	55 59.9	
7	U	14 41.80	1.945	13 44 39.83	126.83	-12 33 30.7	-526.3	64.31	15 9.6	55 32.4	II. S.
8	L	3 5 1.18	1.941	14 10 4 39	127.34	14 15 27.7	433.3	64.44	15 4.9	55 15.2	
8	U	15 23.64	1.959	14 35 34.17	127.72	15 46 13.1	424.3	64.61	15 0.7	54 59.7	II. S.
9	L	3 52.20	1.999	15 1 10.87	128.30	17 4 56.6	332.4	64.79	14 57.0	54 46.1	
9	U	16 15.89	1.973	15 26 53.46	128.53	-18 10 56.3	-377.1	64.97	14 53.9	54 34.7	II. S.

Feb. 23, U Defective Illumination of S. O'. 62.  
Mar. 2, U Defective Illumination of S. O'. 33.

Mar. 3, U Defective Illumination of N. O'. 33.  
Mar. 4, U Defective Illumination of I. O'. 04.



# MOON-CULMINATIONS, 1920.

525

## FOR TRANSIT OF MOON'S CENTER OVER THE MERIDIAN OF WASHINGTON.

Date.	Culmination.	Wash. Mean Time.	Var. per Hour of Long.	Right Ascension of Center.	Var. per Hour of Long.	Geocentric Declination of Center.	Var. per Hour of Long.	S. T. of Semi- d. Pass- ing Mer- idian.	Geo- centric Semi- diameter.	Equa- torial Horiz- ontal Parallax.	Bright Limbs.
		h m	m	h m s	s	° ' "	" "	s	' "	' "	
Mar. 9	U	16 15.89	1.978	15 26 53.46	128.28	-18 10 56.3	-297.1	64.97	14 53.9	54 34.7	II. S.
10	L	4 39.68	1.987	15 52 43.33	129.42	19 3 36.5	229.2	65.13	14 51.4	54 25.7	
10	U	17 3.57	1.995	16 18 39.20	129.37	19 42 29.3	159.2	65.23	14 49.7	54 19.3	II. S.
11	L	5 27.55	2.000	16 44 39.83	130.20	20 7 14.0	85.9	65.33	14 48.7	54 15.6	
11	U	17 51.53	2.003	17 10 43.61	130.20	-20 17 34.7	-15.8	65.43	14 48.4	54 14.6	II. S.
12	L	6 15.62	2.004	17 36 48.73	130.42	20 13 30.8	+ 56.7	65.44	14 48.9	54 16.4	
12	U	18 39.66	2.002	18 2 53.29	130.31	19 54 57.5	123.3	65.40	14 50.2	54 21.1	II. S.
13	L	7 3.66	1.998	18 28 55.59	130.05	19 22 5.0	199.8	65.32	14 52.2	54 23.5	
13	U	19 27.60	1.992	18 54 54.21	129.70	-18 35 8.9	+209.2	65.21	14 54.9	54 33.5	II. N.
14	L	7 51.47	1.985	19 20 46.17	129.29	17 34 32.2	236.4	65.07	14 56.3	54 51.1	
14	U	20 15.24	1.978	19 46 37.06	128.87	16 20 44.9	400.9	64.94	15 2.4	55 6.0	II. N.
15	L	8 38.94	1.972	20 12 21.13	128.40	14 54 25.1	461.8	64.81	15 7.0	55 22.9	
15	U	21 2.58	1.968	20 38 1.30	128.23	-18 16 18.4	+513.5	64.70	15 12.1	55 41.7	II. N.
16	L	9 26.17	1.966	21 3 39.19	128.13	11 27 18.7	570.5	64.63	15 17.6	56 1.9	
16	U	21 49.77	1.968	21 29 17.11	128.24	9 28 28.6	616.8	64.63	15 23.4	56 23.1	II. N.
17	L	10 13.41	1.974	21 54 57.99	128.03	7 21 0.2	656.7	64.70	15 29.4	56 45.0	
17	U	22 37.17	1.986	22 20 45.34	129.33	- 5 6 15.5	+639.4	64.86	15 35.4	57 7.1	II. N.
18	L	11 1.09	2.003	22 46 43.12	130.37	2 45 47.5	713.3	65.11	15 41.4	57 29.0	
18	U	23 25.26	2.006	23 12 55.63	131.79	- 0 21 20.3	729.1	65.43	15 47.1	57 50.1	
19	L	11 49.75	2.056	23 39 27.43	133.58	+ 2 5 10.6	734.3	65.91	15 52.6	58 10.1	
20	U	0 14.64	2.092	0 6 23.03	135.75	+ 4 31 38.5	+728.5	66.46	15 57.6	58 28.6	
20	L	12 46.00	2.124	0 33 46.73	133.26	6 55 47.3	710.9	67.09	16 2.1	58 45.2	
21	U	1 5.88	2.181	1 1 42.34	141.05	9 15 11.0	680.9	67.80	16 6.0	58 59.5	
21	L	13 32.34	2.230	1 30 12.75	144.05	11 27 18.4	638.2	68.57	16 9.3	59 11.4	
22	U	1 59.41	2.281	1 59 19.68	147.12	+13 29 35.8	+632.4	69.35	16 11.8	59 20.8	I. S.
22	L	14 27.09	2.331	2 29 3.22	150.12	15 19 31.3	514.6	70.11	16 13.7	59 27.5	
23	U	2 55.35	2.377	2 59 21.49	152.36	16 54 41.7	435.2	70.81	16 14.8	59 31.7	I. S.
23	L	15 24.12	2.416	3 30 10.48	155.30	18 12 57.3	345.3	71.40	16 15.3	59 33.5	
24	U	3 53.29	2.445	4 1 23.95	156.92	+19 12 29.8	+248.4	71.85	16 15.2	59 33.0	I. S.
24	L	16 22.73	2.461	4 32 53.76	157.99	19 51 57.5	145.5	72.11	16 14.5	59 30.5	
25	U	4 52.29	2.463	5 4 30.33	158.04	20 10 30.6	+ 39.8	72.17	16 13.3	59 28.1	I. S.
25	L	17 21.79	2.451	5 36 3.44	157.23	20 7 53.6	- 65.7	72.01	16 11.7	59 20.1	
26	U	5 51.07	2.426	6 7 23.05	156.31	+19 44 25.9	-168.2	71.65	16 9.7	59 12.8	I. N.
26	L	18 19.97	2.399	6 38 20.10	153.00	19 0 58.4	265.3	71.12	16 7.3	59 4.3	
27	U	6 48.37	2.344	7 8 47.30	150.37	17 58 49.0	254.9	70.45	16 4.7	58 54.8	I. N.
27	L	19 16.19	2.263	7 38 39.40	147.78	16 39 37.6	435.4	69.68	16 1.9	58 44.5	
28	U	7 43.38	2.209	8 7 53.39	144.54	+15 5 19.1	-205.9	68.87	15 58.9	58 33.4	I. N.
28	L	20 9.92	2.135	8 36 28.42	141.31	13 17 57.9	565.3	68.04	15 55.7	58 21.6	
29	U	8 35.83	2.124	9 4 25.44	138.23	11 19 42.9	614.9	67.23	15 52.3	58 9.2	I. N.
29	L	21 1.15	2.067	9 31 46.93	135.40	9 12 43.9	653.2	66.49	15 48.8	57 56.2	
30	U	9 25.93	2.045	9 58 36.46	132.91	+ 6 59 9.3	-680.9	65.82	15 45.1	57 42.6	I. N.
30	L	21 50.26	2.010	10 24 56.36	130.31	4 41 3.7	693.4	65.24	15 41.2	57 23.5	
31	U	10 14.21	1.932	10 50 57.39	129.11	+ 2 20 27.7	706.0	64.77	15 37.2	57 18.9	I. N.
31	L	22 37.86	1.961	11 16 33.47	127.31	- 0 0 43.7	704.2	64.41	15 33.1	56 58.8	
Apr. 1	U	11 1.29	1.946	11 42 6.49	126.36	- 2 20 40.7	-693.7	64.16	15 28.9	56 43.3	I. N. S.

Apr. 1, U Defective Illumination of S. O' 40.

## FOR TRANSIT OF MOON'S CENTER OVER THE MERIDIAN OF WASHINGTON.

Date.	Culmination.	Wash. Mean Time.	Var. per Hour of Long.	Right Ascension of Center.	Var. per Hour of Long.	Geocentric Declination of Center.	Var. per Hour of Long.	S. T. of Semid. Passing Meridian.	Geocentric Semidiameter.	Equatorial Horizontal Parallax.	Bright Limb.
		h m	m	h m s	s	° ' "	"	"	' "	' "	
Apr. 1	U	11 1.29	1.946	11 42 6.49	126.93	- 2 20 40.7	-603.7	64.16	15 28.9	56 43.3	I. N.S.
	L	23 24.58	1.937	12 7 26.09	126.41	4 37 33.7	674.6	64.01	15 24.6	56 27.6	
1	U	11 47.80	1.934	12 32 41.55	126.23	6 49 59.7	647.6	63.96	15 20.3	56 11.8	I. N.S.
2	L	0 11.02	1.936	12 57 56.63	126.34	8 56 11.1	613.1	63.99	15 16.0	55 56.0	
3	U	12 34.28	1.942	13 23 14.50	126.68	-10 54 47.2	-571.3	64.08	15 11.8	55 40.5	II. S.
4	L	0 57.63	1.960	13 48 37.62	127.30	12 44 29.0	524.2	64.23	15 7.7	55 25.5	
4	U	13 21.10	1.961	14 14 7.73	127.83	14 24 4.8	470.9	64.43	15 3.8	55 11.2	II. S.
5	L	1 44.69	1.972	14 39 45.75	128.51	15 52 30.6	412.6	64.63	15 0.2	54 57.9	
5	U	14 8.42	1.983	15 5 31.78	129.16	-17 8 51.1	-350.1	64.82	14 56.9	54 45.8	II. S.
6	L	2 32.28	1.993	15 31 25.24	129.73	18 12 19.5	284.1	65.00	14 54.0	54 35.1	
6	U	14 56.23	2.000	15 57 24.78	130.16	19 2 18.9	215.4	65.15	14 51.5	54 26.1	II. S.
7	L	3 20.26	2.004	16 23 28.54	130.43	19 38 21.6	144.3	65.25	14 49.6	54 19.0	
7	U	15 44.32	2.005	16 49 34.26	130.49	-20 0 9.6	- 73.1	65.30	14 48.2	54 14.0	II. S.
8	L	4 8.37	2.003	17 15 39.52	130.35	20 7 34.5	- 1.1	65.29	14 47.5	54 11.4	
8	U	16 32.37	1.997	17 41 41.90	130.01	20 0 36.7	+ 70.5	65.24	14 47.5	54 11.2	II. N.S.
9	L	4 56.29	1.989	18 7 39.25	129.51	19 39 25.4	141.1	65.13	14 48.1	54 13.5	
9	U	17 20.10	1.979	18 33 29.82	128.90	-19 4 16.7	+210.0	64.99	14 49.5	54 18.6	II. N.
10	L	5 43.77	1.967	18 59 12.48	128.21	18 15 33.9	276.3	64.82	14 51.6	54 26.4	
10	U	18 7.31	1.966	19 24 46.80	127.51	17 18 45.9	340.3	64.64	14 54.5	54 36.9	II. N.
11	L	6 30.71	1.945	19 50 13.10	126.89	15 59 27.2	401.3	64.48	14 56.1	54 50.1	
11	U	18 54.00	1.967	20 15 32.56	126.39	-14 38 16.5	+459.3	64.33	15 2.4	55 5.9	II. N.
12	L	7 17.21	1.932	20 40 47.11	126.06	12 55 57.9	513.0	64.23	15 7.3	55 24.2	
12	U	19 40.38	1.931	21 5 59.46	126.04	11 8 20.3	562.4	64.20	15 12.9	55 44.7	II. N.
13	L	8 3.57	1.935	21 31 13.10	126.30	9 11 18.8	607.0	64.25	15 19.1	56 7.2	
13	U	20 26.85	1.946	21 56 32.05	126.98	- 7 5 55.2	+646.0	64.38	15 25.7	56 31.4	II. N.
14	L	8 50.30	1.963	22 22 0.94	127.97	4 53 20.3	678.7	64.62	15 32.6	56 56.9	
14	U	21 14.00	1.988	22 47 44.86	129.44	2 34 54.4	704.3	64.97	15 39.8	57 23.2	II. N.
15	L	9 38.03	2.020	23 13 49.25	131.37	- 0 12 9.9	721.6	65.44	15 47.0	57 49.8	
15	U	22 2.50	2.060	23 40 19.59	133.76	+ 2 13 6.8	+729.5	66.02	15 54.2	58 16.0	II. N.
16	L	10 27.49	2.107	0 7 21.40	136.61	4 38 55.0	726.7	66.72	16 1.1	58 41.2	
16	U	22 53.09	2.161	0 34 59.78	139.36	7 2 59.0	711.3	67.52	16 7.5	59 4.9	II. N.
17	L	11 19.37	2.220	1 8 19.17	143.43	9 22 47.8	683.9	68.39	16 13.4	59 26.4	
17	U	23 46.38	2.283	1 32 22.81	147.21	+11 35 38.5	+643.1	69.31	16 18.5	59 45.2	
18	L	12 14.16	2.346	2 2 12.25	151.03	13 38 40.3	585.7	70.24	16 22.7	60 0.7	
19	U	0 42.69	2.407	2 32 46.85	154.70	15 28 59.5	515.0	71.13	16 25.9	60 12.5	
19	L	13 11.91	2.462	3 4 3.35	157.97	17 3 49.3	431.1	71.93	16 28.1	60 20.4	
20	U	1 41.73	2.506	3 35 55.49	160.60	+18 20 39.0	+335.5	72.57	16 29.1	60 24.3	I. S.
20	L	14 11.98	2.585	4 8 14.21	162.36	19 17 24.1	230.3	73.01	16 29.1	60 24.2	
21	U	2 42.49	2.547	4 40 48.05	163.10	19 52 36.4	120.5	73.22	16 28.1	60 20.4	I. S.
21	L	15 13.04	2.541	5 13 24.08	162.72	20 5 29.9	+ 8.3	73.17	16 26.1	60 13.1	
22	U	3 48.40	2.516	5 45 49.00	161.25	+19 56 3.8	-303.1	72.86	16 23.0	60 2.7	I. N.
22	L	16 13.37	2.476	6 17 50.41	158.83	19 25 0.8	207.3	72.31	16 19.7	59 49.7	
23	U	4 42.78	2.423	6 49 17.95	155.65	18 33 40.6	304.6	71.57	16 15.6	59 34.6	I. N.
23	L	17 11.49	2.362	7 20 3.91	151.94	17 23 51.5	391.8	70.70	16 11.0	59 17.9	
24	U	5 39.44	2.296	7 50 3.54	147.96	+15 57 41.2	-467.9	69.75	16 6.2	59 0.0	I. N.

Apr. 1, U Defective Illumination of E. 0'.40.  
Apr. 2, U Defective Illumination of N. 0'.58.

Apr. 8, U Defective Illumination of N. 0'.04.

# MOON-CULMINATIONS, 1920.

527

FOR TRANSIT OF MOON'S CENTER OVER THE MERIDIAN OF WASHINGTON.

Date.	Culmination.	Wash. Mean Time.		Right Ascension of Center.		Var. per Hour of Long.		Geocentric Declination of Center.		Var. per Hour of Long.		S. T. of Semid. Passing Meridian.		Geocentric Semidiameter.		Equatorial Horizontal Parallax.		Bright Limbs.	
		h	m	m	s	s	"	"	"	s	"	"	"	"	"	"	"	I.	N.
Apr. 24	U	5	39.44	2.290	7 50 3.54	147.98	+15 57 41.2	-487.9	60.75	16 6.2	59 0.0	I.	N.						
24	L	18 6.59	2.220	8 19 15.01	143.95	14 17 27.2	582.4	68.76	16 1.1	58 41.4									
25	L	6 32.84	2.165	8 47 39.02	140.00	12 25 29.6	585.3	67.79	15 55.9	58 22.4	I.	N.							
25	L	18 58.55	2.105	9 15 18.30	136.52	10 24 5.9	626.8	66.88	15 50.7	58 3.4									
26	U	7 23.49	2.062	9 42 17.01	133.34	+ 8 15 27.7	-657.7	66.06	15 45.6	57 44.5	I.	N.							
26	L	19 47.85	2.007	10 8 40.40	130.68	6 1 38.9	678.7	65.34	15 40.5	57 26.0									
27	U	8 11.71	1.971	10 34 34.23	128.42	3 44 35.6	660.3	64.74	15 35.6	57 8.0	I.	N.							
27	L	20 35.18	1.942	11 0 4.53	126.72	+ 1 26 6.2	668.2	64.26	15 30.9	56 50.5									
28	U	8 58.35	1.922	11 25 17.30	125.50	- 0 52 7.4	-687.8	63.91	15 26.3	56 33.7	I.	N.							
28	L	21 21.34	1.910	11 50 18.31	124.75	3 8 29.3	674.7	63.68	15 21.9	56 17.5									
29	U	9 44.21	1.904	12 15 12.96	124.43	5 21 28.3	654.0	63.56	15 17.7	56 2.0	I.	N.							
29	L	22 7.06	1.905	12 40 6.09	124.49	7 29 37.5	626.3	63.55	15 13.6	55 47.2									
30	U	10 29.96	1.912	13 5 1.93	124.87	- 9 31 33.5	-601.9	63.63	15 9.8	55 33.1	I.	N.							
30	L	22 52.96	1.922	13 30 3.92	125.50	11 25 57.3	551.0	63.77	15 6.1	55 19.7									
May 1	U	11 16.10	1.936	13 55 14.68	126.32	13 11 33.6	504.0	63.97	15 2.7	55 7.1	I.	N.S.							
1	L	23 39.42	1.951	14 20 35.91	127.23	14 47 12.1	451.5	64.21	14 59.5	54 55.3									
2	U	12 2.93	1.967	14 46 8.35	128.17	-16 11 48.3	-368.8	64.45	14 56.5	54 44.4	I.	II. N.S.							
3	L	0 26.62	1.981	15 11 51.76	129.05	17 24 24.8	331.7	64.68	14 53.8	54 34.6									
3	U	12 50.47	1.993	15 37 44.94	129.79	18 24 12.4	265.8	64.89	14 51.4	54 25.8	II.	N.S.							
4	L	1 14.45	2.002	16 3 45.86	130.38	19 10 31.2	197.0	65.05	14 49.4	54 18.3									
4	U	13 38.51	2.007	16 29 51.82	130.62	-19 42 51.8	-126.2	65.15	14 47.7	54 12.2	II.	N.S.							
5	L	2 2.60	2.008	16 55 59.67	130.64	20 0 56.2	- 54.4	65.18	14 46.5	54 7.7									
5	U	14 26.67	2.003	17 22 6.01	130.38	20 4 37.2	+ 17.5	65.14	14 45.7	54 4.8	II.	N.S.							
6	L	2 50.66	1.994	17 48 7.57	129.85	19 53 58.7	88.7	65.04	14 45.4	54 3.8									
6	U	15 14.52	1.982	18 14 1.42	129.10	-19 29 14.7	+158.4	64.88	14 45.7	54 4.8	II.	N.							
7	L	3 38.21	1.967	18 39 45.22	128.18	18 50 48.2	225.7	64.68	14 46.6	54 8.0									
7	U	16 1.71	1.950	19 5 17.37	127.17	17 59 9.5	260.3	64.45	14 48.1	54 13.5	II.	N.							
8	L	4 25.01	1.933	19 30 37.23	126.15	16 54 55.3	351.5	64.21	14 50.3	54 21.4									
8	U	16 48.11	1.917	19 55 45.12	125.19	-15 38 46.8	+409.2	63.98	14 58.1	54 31.7	II.	N.							
9	L	5 11.03	1.904	20 20 42.31	124.38	14 11 29.1	463.0	63.78	14 56.6	54 44.6									
9	U	17 33.80	1.894	20 45 31.04	123.79	12 33 50.2	512.7	63.64	15 0.8	55 0.1	II.	N.							
10	L	5 56.49	1.880	21 10 14.49	123.50	10 46 41.0	558.0	63.57	15 5.7	55 18.0									
10	U	18 19.16	1.890	21 34 56.61	123.58	- 8 50 55.5	+508.7	63.59	15 11.2	55 38.4	II.	N.							
11	L	6 41.89	1.899	21 59 42.11	124.08	6 47 31.8	634.3	63.71	15 17.4	56 1.1									
11	U	19 4.76	1.915	22 24 36.32	125.04	4 37 33.3	664.4	63.96	15 24.2	56 25.8	II.	N.							
12	L	7 27.87	1.930	22 49 45.19	126.52	2 22 10.6	688.3	64.33	15 31.4	56 52.4									
12	U	19 51.33	1.973	23 15 15.03	128.55	- 0 2 43.4	+705.0	64.83	15 39.0	57 20.3	II.	N.							
13	L	8 15.25	2.016	23 41 12.48	131.13	+ 2 19 16.8	713.5	65.47	15 46.9	57 49.2									
13	U	20 39.74	2.068	0 7 44.22	134.26	4 42 4.5	712.7	66.25	15 54.8	58 18.4	II.	N.							
14	L	9 4.81	2.220	0 34 56.79	137.92	7 3 38.6	701.0	67.15	16 2.7	58 47.4									
14	U	21 30.86	2.297	1 2 56.12	142.04	+ 9 21 40.4	+677.1	68.15	16 10.4	59 15.5	II.	N.							
15	L	9 57.66	2.371	1 31 47.08	146.51	11 33 34.0	639.5	69.23	16 17.6	59 41.9									
15	U	22 25.38	2.348	2 1 32.87	151.15	13 36 28.9	587.2	70.34	16 24.1	60 5.8	II.	N.							
16	L	10 54.62	2.425	2 32 14.32	155.74	15 27 24.5	519.6	71.42	16 29.7	60 26.5									
16	U	23 23.55	2.466	3 3 49.17	160.00	+17 3 17.9	+437.0	72.42	16 34.3	60 43.3									

May 1, U Defective Illumination of S. 0'.24.  
 May 2, U Defective Illumination of I. 0'.01.  
 May 2, U Defective Illumination of N. 0'.17.

May 3, U Defective Illumination of N. 0'.88.  
 May 4, U Defective Illumination of N. 0'.65.  
 May 5, U Defective Illumination of N. 0'.00.

FOR TRANSIT OF MOON'S CENTER OVER THE MERIDIAN OF WASHINGTON.

Date.	Culmination.	Wash. Mean Time.	Var. per Hour of Long.	Right Ascension of Center.	Var. per Hour of Long.	Geocentric Declination of Center.	Var. per Hour of Long.	S. T. of Semi-d. Passing Meridian.	Geocentric Semi-diameter.	Equatorial Horizontal Parallax.	Bright Limbs.
		h m	m	h m s	s	" " "	"	s	" "	" "	
May 16	U	23 23.55	2.498	3 3 49.17	180.00	+17 8 17.9	+487.0	72.42	16 34.3	60 43.3	
17	L	11 53.87	2.556	3 36 11.50	163.61	18 21 15.6	340.6	73.26	16 37.7	60 55.7	
18	U	0 24.82	2.600	4 9 11.95	166.27	19 18 46.5	282.9	73.88	16 39.7	61 3.2	
18	L	12 56.18	2.634	4 42 37.26	167.73	19 59 55.5	+117.6	74.23	16 40.4	61 5.7	
19	U	1 27.70	2.633	5 16 12.00	167.83	+20 5 35.4	- 1.1	74.27	16 39.7	61 3.1	I. N.
19	L	13 59.11	2.665	5 49 39.67	166.36	19 58 33.4	118.6	74.00	16 37.7	60 55.7	
20	U	2 30.13	2.563	6 22 44.51	164.06	19 18 31.3	280.4	73.45	16 34.5	60 43.9	I. N.
20	L	15 05.55	2.505	6 55 12.88	160.54	18 21 59.7	333.0	72.66	16 30.2	60 23.1	
21	U	3 30.19	2.435	7 26 54.52	156.23	+17 6 6.5	-423.7	71.69	16 25.0	60 9.1	I. N.
21	L	15 58.95	2.358	7 57 42.94	151.73	15 33 24.1	501.0	70.61	16 19.1	59 47.5	
22	U	4 26.78	2.380	8 27 35.34	147.03	13 46 36.4	594.6	69.49	16 12.7	59 24.0	I. N.
22	L	16 53.68	2.305	8 56 32.16	142.49	11 48 23.6	614.5	68.40	16 6.0	58 59.3	
23	U	5 19.71	2.135	9 24 36.37	138.23	+ 9 41 38.7	-651.7	67.36	15 59.1	58 34.0	I. N.
23	L	17 44.94	2.072	9 51 52.78	134.54	7 28 33.8	677.3	66.41	15 52.1	58 8.6	
24	U	6 9 48	2.019	10 18 27.42	131.33	5 11 27.6	692.1	65.59	15 45.3	57 43.6	I. N.
24	L	18 33.43	1.975	10 44 26.91	128.00	2 52 20.7	697.5	64.90	15 38.7	57 19.3	
25	U	6 56.92	1.941	11 9 58.18	126.03	+ 0 33 1.3	-694.4	64.35	15 32.4	56 56.1	I. N.
25	L	19 20.05	1.916	11 35 8.10	125.11	- 1 44 52.6	683.4	63.94	15 26.4	56 34.2	
26	U	7 42.93	1.900	12 0 3.22	124.15	3 59 52.3	665.3	63.66	15 20.8	56 13.6	I. N.
26	L	20 5 67	1.882	12 24 49.71	123.67	6 10 35.4	640.7	63.50	15 15.6	55 54.5	
27	U	8 23.36	1.881	12 49 33.12	123.63	- 8 15 45.1	-609.9	63.46	15 10.8	55 37.0	I. N.
27	L	20 51.08	1.897	13 14 13.30	123.96	10 14 8.2	573.0	63.52	15 6.5	55 21.0	
28	U	9 13.90	1.867	13 39 9.32	124.59	12 4 35.3	530.5	63.66	15 2.5	55 6.4	I. N.
28	L	21 36.87	1.821	14 4 9.33	125.45	13 45 59.6	482.6	63.85	14 59.0	54 53.4	
29	U	10 0 02	1.833	14 29 20.54	126.44	-15 17 18.0	-429.6	64.06	14 55.8	54 41.8	I. N.
29	L	22 23.38	1.855	14 54 44.02	127.43	16 37 31.2	371.9	64.33	14 53.0	54 31.6	
30	U	10 46.94	1.972	15 20 19.85	128.43	17 45 45.4	300.9	64.57	14 50.6	54 22.3	I. N.
30	L	23 10.69	1.986	15 46 7.00	129.25	18 41 13.2	244.2	64.78	14 48.6	54 15.4	
31	U	11 34.59	1.997	16 12 3.44	130.01	-19 23 15.4	-175.7	64.94	14 46.9	54 9.3	I. N.S.
31	L	23 58.60	2.004	16 38 6.35	130.41	19 51 22.4	105.2	65.04	14 45.6	54 4.5	
June 1	U	12 22.66	2.006	17 4 12.29	130.33	20 5 15.6	- 33.6	65.07	14 44.7	54 1.1	II. N.S.
2	L	0 46.71	2.003	17 30 17.49	130.39	20 4 47.7	+ 38.1	65.03	14 44.2	53 59.1	
2	U	13 10.69	1.993	17 56 18.15	129.76	-19 50 3.4	+109.0	64.91	14 44.0	53 58.5	II. N.S.
3	L	1 34.53	1.980	18 22 10.75	128.96	19 21 18.3	178.1	64.72	14 44.3	53 59.5	
3	U	13 58.18	1.963	18 47 52.36	127.95	18 38 58.7	244.6	64.48	14 45.0	54 2.1	II. N.
4	L	2 21.62	1.943	19 13 29.81	126.73	17 43 39.3	308.0	64.21	14 46.2	54 6.5	
4	U	14 44.32	1.923	19 38 34.87	125.36	-16 36 2.8	+267.5	63.92	14 47.9	54 12.7	II. N.
5	L	3 7 78	1.904	20 3 34.41	124.36	15 16 56.7	423.8	63.64	14 50.1	54 20.8	
5	U	15 30.51	1.886	20 28 20.30	123.30	13 47 13.1	473.7	63.39	14 52.8	54 30.9	II. N.
6	L	3 58.05	1.871	20 52 54.48	122.43	12 7 46.7	519.9	63.19	14 56.2	54 43.2	
6	U	16 15.44	1.862	21 17 19.86	121.35	-10 19 34.5	+661.3	63.06	15 0.1	54 57.6	II. N.
7	L	4 37.75	1.853	21 41 40.27	121.03	8 29 35.5	697.7	63.02	15 4.6	55 14.2	
7	U	17 0 05	1.861	22 6 0 33	121.39	6 20 50.4	628.9	63.08	15 9.7	55 32.9	II. N.
8	L	5 22.48	1.872	22 30 25.38	122.46	4 12 23.5	654.6	63.27	15 15.4	55 53.9	
8	U	17 45.00	1.891	22 55 1.39	123.63	- 1 59 22.7	+674.5	63.59	15 21.7	56 16.9	II. N.

May 31, U Defective Illumination of S. 0'.40.  
 June 1, U Defective Illumination of S. 0'.18.

June 2, U Defective Illumination of S. 0'.76.

FOR TRANSIT OF MOON'S CENTER OVER THE MERIDIAN OF WASHINGTON.

Date.	Culmination.	Wash. Mean Time.	Var. per Hour of Long.	Right Ascension of Center.	Var. per Hour of Long.	Geocentric Declination of Center.	Var. per Hour of Long.	S. T. of Semid. Passing Meridian.	Geocentric Semidiameter.	Equatorial Horizontal Parallax.	Bright Limbs.
		h m	m	h m s	s	° ' "	"	°	' "	' "	
June 8	U	17 45.00	1.991	22 55 1.39	123.68	- 1 59 22.7	+674.4	63.59	15 21.7	56 16.9	II. N.
9	L	6 7.86	1.990	23 19 54.87	125.37	+ 0 16 57.5	637.7	64.05	15 28.5	56 41.8	
9	U	18 31.12	1.990	23 45 12.69	127.70	2 35 15.1	603.3	64.66	15 35.7	57 8.4	II. N.
10	L	6 54.91	2.007	0 11 2.01	130.62	4 53 57.1	601.8	65.41	15 43.3	57 36.3	
10	U	19 19.33	2.069	0 37 30.02	134.14	+ 7 11 18.2	+630.1	66.30	15 51.2	58 5.2	II. N.
11	L	7 44.52	2.124	1 44 3.59	138.21	9 25 17.9	657.3	67.31	15 59.2	58 34.5	
11	U	20 10.57	2.209	1 32 48.96	142.75	11 33 39.5	638.6	68.42	16 7.1	59 3.6	II. N.
12	L	8 37.56	2.290	2 1 51.01	147.68	13 33 50.3	675.9	69.59	16 14.8	59 31.9	
12	U	21 5.54	2.273	2 31 52.72	152.66	+15 23 3.2	+613.3	70.78	16 22.1	59 58.6	II. N.
13	L	9 34.51	2.455	3 2 54.28	157.56	16 58 22.8	437.0	71.93	16 27.8	60 22.8	
13	U	22 4.43	2.530	3 34 52.44	162.04	18 16 53.4	345.3	72.96	16 34.4	60 43.7	II. N.
14	L	10 35.16	2.591	4 7 39.96	165.73	19 15 50.9	241.3	73.80	16 39.0	61 0.7	
14	U	23 6.53	2.684	4 41 5.53	168.32	+19 52 58.1	+127.9	74.38	16 42.4	61 13.1	
15	L	11 38.29	2.655	5 14 54.38	169.58	20 6 38.6	+ 8.1	74.66	16 44.4	61 20.4	
16	U	0 10.15	2.651	5 48 49.53	169.37	19 56 8.7	-112.9	74.61	16 44.9	61 22.2	
16	L	12 41.82	2.624	6 22 33.43	167.73	19 21 43.2	230.3	74.24	16 43.9	61 13.5	
17	U	1 13.04	2.576	6 55 49.87	164.32	+18 24 34.5	-330.4	73.59	16 41.5	61 9.5	I. N.
17	L	13 43.58	2.512	7 28 25.50	160.97	17 6 43.7	426.3	72.71	16 37.7	60 55.6	
18	U	2 13.28	2.437	8 0 10.73	156.49	15 30 48.3	519.9	71.67	16 32.7	60 37.8	I. N.
18	L	14 42.05	2.358	8 31 0.11	151.72	13 39 46.5	587.7	70.55	16 28.7	60 15.3	
19	U	3 9.87	2.379	9 0 51.92	146.94	+11 36 43.6	-440.2	69.41	16 19.9	59 50.5	I. N.
19	L	15 36.75	2.203	9 29 47.63	142.40	9 24 40.5	673.0	68.32	16 12.6	59 23.5	
20	U	4 2.77	2.194	9 57 51.09	138.26	7 6 27.2	702.1	67.31	16 4.8	58 55.1	I. N.
20	L	16 28.01	2.074	10 25 7.75	134.62	4 44 37.5	714.2	66.41	15 56.9	58 26.2	
21	U	4 52.57	2.023	10 51 44.09	131.54	+ 2 21 28.2	-715.6	65.64	15 49.1	57 57.3	I. N.
21	L	17 16.58	1.981	11 17 47.04	129.04	- 0 1 1.0	707.7	65.01	15 41.4	57 29.0	
22	U	5 40.16	1.949	11 43 23.58	127.14	2 21 5.1	691.6	64.52	15 34.0	57 1.8	I. N.
22	L	18 3.41	1.927	12 8 40.55	125.73	4 37 12.0	668.3	64.16	15 26.9	56 35.9	
23	U	6 26.44	1.913	12 33 44.42	124.04	- 6 48 0.3	-638.7	63.93	15 20.3	56 11.8	I. N.
23	L	18 49.35	1.907	12 58 41.04	124.57	8 52 16.7	606.1	63.82	15 14.3	55 49.6	
24	U	7 12.22	1.907	13 23 35.67	124.60	10 48 54.3	562.2	63.81	15 8.8	55 29.4	I. N.
24	L	19 35.14	1.913	13 48 32.75	124.97	12 36 51.0	516.2	63.89	15 3.9	55 11.3	
25	U	7 58.16	1.924	14 13 35.87	125.59	-14 15 8.6	-465.8	64.03	14 59.5	54 55.4	I. N.
25	L	20 21.32	1.937	14 38 47.68	126.40	15 42 52.6	410.3	64.21	14 55.7	54 41.5	
26	U	8 44.65	1.932	15 4 9.80	127.20	16 59 12.1	351.3	64.41	14 52.5	54 29.7	I. N.
26	L	21 8.17	1.967	15 29 42.80	128.20	18 3 20.6	289.1	64.62	14 49.9	54 20.0	
27	U	9 31.85	1.980	15 55 26.19	129.01	-18 54 37.2	-223.2	64.80	14 47.7	54 12.1	I. N.
27	L	21 55.69	1.991	16 21 18.49	129.67	19 32 27.2	154.8	64.94	14 46.1	54 6.1	
28	U	10 19.63	1.993	16 47 17.35	130.10	19 56 24.3	84.6	65.02	14 44.9	54 1.8	I. N.
28	L	22 43.64	2.001	17 13 19.74	130.26	20 6 11.5	- 13.3	65.04	14 44.2	53 59.1	
29	U	11 7.64	1.999	17 39 22.18	130.11	-20 1 42.6	+ 58.0	64.99	14 43.9	53 58.0	I. N.S
29	L	23 31.58	1.991	18 5 21.06	129.66	19 43 2.3	128.4	64.86	14 44.0	53 53.4	
30	U	11 55.41	1.979	18 31 12.92	128.94	19 10 26.2	197.1	64.66	14 44.5	54 0.3	I. II. N.
July 1	L	0 19.07	1.933	18 56 54.71	127.99	18 24 20.6	263.3	64.42	14 45.4	54 3.6	
1	U	12 42.53	1.945	19 22 24.04	126.96	-17 25 21.8	+235.9	64.13	14 46.6	54 8.2	II. N.

June 20, U Defective Illumination of S. 0'.99.

June 30, U Defective Illumination of II. 0-03.

FOR TRANSIT OF MOON'S CENTER OVER THE MERIDIAN OF WASHINGTON.

Date.	Culmination.	Wash. Mean Time.		Right Ascension of Center.	Var. per Hour of Long.	Geocentric Declination of Center.	Var. per Hour of Long.	S. T. of Semid. Passing Meridian.	Geocentric Semidiameter.	Equatorial Horizontal Parallax.	Bright Limbs.
		h m	m								
July 1	U	12 42.53	1.945	19 22 24.04	136.88	-17 25 21.8	+325.9	64.13	14 46.6	54 8.2	II. N.
	L	1 5.75	1.925	19 47 39.41	126.68	16 14 14.4	324.6	63.33	14 48.3	54 14.3	
2	U	13 28.73	1.905	20 12 40.21	124.47	14 51 49.0	428.3	63.54	14 50.4	54 21.8	II. N.
3	L	1 51.47	1.886	20 37 26.89	123.34	13 19 2.8	426.1	63.26	14 52.8	54 30.7	
3	U	14 14.00	1.870	21 2 0.86	122.37	-11 36 56.4	+322.1	63.06	14 55.6	54 41.0	II. N.
4	L	2 36.37	1.853	21 26 24.54	121.63	9 46 33.2	370.8	62.86	14 58.8	54 52.9	
4	U	14 58.61	1.851	21 50 41.19	121.31	7 48 59.1	608.9	62.78	15 2.5	55 6.4	II. N.
5	L	3 20.81	1.850	22 14 54.91	121.15	5 45 21.9	621.4	62.79	15 6.6	55 21.5	
5	U	15 43.04	1.856	22 39 10.53	121.53	- 3 36 51.6	+423.3	62.92	15 11.2	55 38.2	II. N.
6	L	4 5.39	1.870	23 3 33.46	122.38	- 1 24 41.2	606.0	63.18	15 16.2	55 56.6	
6	U	16 27.96	1.893	23 28 9.67	123.75	+ 0 49 52.7	676.6	63.56	15 21.6	56 16.6	II. N.
7	L	4 50.85	1.925	23 53 5.60	125.66	3 5 27.9	678.1	64.08	15 27.5	56 38.1	
7	U	17 14.19	1.966	0 18 27.89	126.15	+ 5 20 35.4	+671.3	64.75	15 33.8	57 1.1	II. N.
8	L	5 38.08	2.016	0 44 23.37	131.30	7 33 37.3	666.9	65.55	15 40.4	57 25.4	
8	U	18 2.63	2.076	1 10 58.79	134.78	9 42 44.8	623.6	66.47	15 47.3	57 50.7	II. N.
9	L	6 27.94	2.144	1 36 20.06	138.36	11 45 58.2	597.7	67.50	15 54.4	58 16.7	
9	U	18 54.11	2.218	2 6 32.85	143.33	+13 41 4.4	+551.2	68.60	16 1.5	58 42.9	II. N.
10	L	7 21.20	2.297	2 35 40.81	148.03	15 25 38.7	492.3	69.74	16 8.6	59 8.9	
10	U	19 49.24	2.375	3 5 45.68	152.77	16 57 8.3	420.4	70.87	16 15.4	59 34.0	II. N.
11	L	8 18.20	2.450	3 36 46.43	157.39	18 12 57.1	335.5	71.93	16 21.9	59 57.7	
11	U	20 48.01	2.517	4 8 38.63	161.29	+19 10 34.2	+228.7	72.85	16 27.8	60 19.2	II. N.
12	L	9 18.55	2.570	4 41 14.26	164.43	19 47 45.6	131.7	73.56	16 32.8	60 37.7	
12	U	21 49.62	2.606	5 14 21.81	166.57	20 2 46.3	+ 17.5	74.01	16 36.8	60 52.6	II. N.
13	L	10 20.99	2.659	5 47 47.08	167.41	19 54 32.7	-100.0	74.18	16 39.7	61 8.2	
13	U	22 52.38	2.611	6 21 14.39	166.92	+19 22 51.2	-216.4	74.04	16 41.3	61 9.1	II. N.
14	L	11 23.56	2.583	6 54 28.19	165.16	18 28 22.5	327.1	73.63	16 41.6	61 10.0	
14	U	23 54.27	2.535	7 27 14.51	162.38	17 12 38.2	428.3	72.97	16 40.4	61 5.7	
15	L	12 24.35	2.475	7 59 22.21	158.79	15 37 53.2	516.3	72.12	16 37.8	60 56.3	
16	U	0 53.85	2.408	8 30 43.61	154.73	+13 46 53.1	-300.6	71.16	16 34.0	60 42.2	
16	L	13 22.12	2.337	9 1 14.62	150.44	11 42 41.4	648.7	70.15	16 29.0	60 23.8	
17	U	1 49.74	2.266	9 30 54.31	146.21	9 23 26.8	691.1	69.14	16 23.0	60 1.7	I. N.
17	L	14 16.53	2.200	9 59 44.46	142.21	7 7 13.3	718.6	68.17	16 16.1	59 36.6	
18	U	2 42.56	2.140	10 27 48.78	138.53	+ 4 41 53.3	-732.4	67.29	16 8.7	59 9.4	I. N.
18	L	15 7.91	2.067	10 55 12.92	135.43	+ 2 15 3.0	734.0	66.52	16 0.9	58 40.7	
19	U	3 32.68	2.043	11 22 0.92	132.76	- 0 10 59.0	724.7	65.87	15 52.9	58 11.4	I. N.
19	L	15 56.97	2.007	11 48 20.72	130.62	2 34 11.7	706.6	65.35	15 44.9	57 42.1	
20	U	4 20.89	1.980	12 14 17.93	128.39	- 4 53 50.3	-679.3	64.95	15 37.1	57 13.4	I. N.
20	L	16 44.53	1.941	12 39 58.50	127.84	7 5 24.2	645.4	64.67	15 29.6	56 45.8	
21	U	5 7.98	1.949	13 5 27.96	127.13	9 10 35.1	605.3	64.50	15 22.5	56 19.7	I. N.
21	L	17 31.34	1.944	13 30 51.27	126.31	11 7 14.6	500.3	64.42	15 15.9	55 55.5	
22	U	5 54.66	1.944	13 56 12.71	126.33	-12 54 21.2	-510.3	64.43	15 9.9	55 33.4	I. N.
22	L	18 16.01	1.948	14 21 35.81	127.07	14 31 4.0	466.1	64.49	15 4.5	55 13.6	
23	U	6 41.43	1.966	14 47 3.26	127.52	15 56 32.0	398.0	64.60	14 59.8	54 56.3	I. N.
23	L	19 4.95	1.965	15 12 36.82	128.06	17 10 2.8	326.6	64.72	14 55.7	54 41.4	
24	U	7 23.59	1.975	15 36 17.37	128.66	-18 10 53.4	-672.3	64.85	14 52.3	54 29.1	I. N.

FOR TRANSIT OF MOON'S CENTER OVER THE MERIDIAN OF WASHINGTON.

Date.	Culmination.	Wash. Mean Time.	Var. per Hour of Long.	Right Ascension of Center.	Var. per Hour of Long.	Geocentric Declination of Center.	Var. per Hour of Long.	S. T. of Semid. Passing Meridian.	Geocentric Semidiameter.	Equatorial Horizontal Parallax.	Bright Limbs.
		h m	m	h m s	s	° ' "	"	"	' "	' "	
July 24	U	7 28.59	1.975	15 38 17.37	128.68	-18 10 58.4	-372.2	64.85	14 52.8	54 29.1	I. N.
24	L	19 52.35	1.984	16 4 4.86	129.23	18 58 46.0	205.3	64.97	14 49.6	54 19.2	
25	U	8 16.20	1.991	16 29 58.39	130.67	19 32 58.9	126.5	65.06	14 47.6	54 11.7	I. N.
25	L	20 40.13	1.998	16 56 56.30	130.95	19 53 17.6	-66.4	65.10	14 46.2	54 6.5	
26	U	9 4.10	1.997	17 21 56.31	130.02	-19 59 29.8	+ 4.4	65.08	14 45.4	54 3.5	I. N.
26	L	21 28.05	1.994	17 47 55.77	129.88	19 51 32.8	75.1	65.00	14 45.1	54 2.6	
27	U	9 51.95	1.988	18 13 51.84	129.46	19 29 32.7	144.8	64.86	14 45.4	54 3.6	I. N.S.
27	L	22 15.74	1.977	18 39 41.77	128.88	18 53 45.3	212.8	64.67	14 46.1	54 6.8	
28	U	10 39.40	1.964	19 5 23.05	128.02	-18 4 36.3	+375.3	64.44	14 47.3	54 10.7	I. N.S.
28	L	23 2.87	1.948	19 30 53.76	127.08	17 2 40.2	340.6	64.17	14 48.9	54 16.6	
29	U	11 26.15	1.981	19 56 12.61	126.06	15 48 40.2	398.8	63.89	14 50.9	54 23.9	I. N.S.
29	L	23 49.22	1.914	20 21 19.09	125.08	14 23 26.9	452.6	63.61	14 53.2	54 32.4	
30	U	12 12.10	1.988	20 46 13.52	124.06	-12 47 57.6	+601.4	63.36	14 55.9	54 42.1	I. II. N.
31	L	0 34.79	1.984	21 10 57.08	123.28	11 3 15.0	544.8	63.14	14 58.8	54 52.8	
31	U	12 57.34	1.874	21 35 31.83	122.60	9 10 26.3	582.3	62.98	15 2.0	55 4.5	II. N.
Aug. 1	L	1 19.78	1.888	22 0 0.52	122.23	7 10 43.0	613.8	62.90	15 5.4	55 17.1	
1	U	13 42.19	1.867	22 24 26.69	122.19	- 5 5 19.7	+639.0	62.91	15 9.1	55 30.7	II. N.
2	L	2 4.82	1.872	22 48 54.46	122.51	2 55 34.5	657.4	63.02	15 13.1	55 45.1	
2	U	14 27.15	1.884	23 13 28.52	123.24	- 0 42 48.4	699.0	63.24	15 17.2	56 0.3	II. N.
3	L	2 49.88	1.904	23 38 14.04	124.42	+ 1 31 33.3	673.4	63.58	15 21.6	56 16.4	
3	U	15 12.88	1.932	0 3 16.51	126.08	+ 3 46 1.5	+670.0	64.05	15 26.2	56 33.4	II. N.
4	L	3 36.27	1.967	0 28 41.62	128.21	5 59 1.8	658.6	64.63	15 31.0	56 51.1	
4	U	16 0.12	2.010	0 54 35.11	130.80	8 8 54.1	688.6	65.38	15 36.1	57 9.7	II. N.
5	L	4 24.54	2.061	1 21 2.59	133.85	10 18 51.3	699.3	66.14	15 41.3	57 28.9	
5	U	16 49.61	2.118	1 48 9.16	137.31	+12 11 59.2	+570.2	67.03	15 46.7	57 48.6	II. N.
6	L	5 15.40	2.181	2 15 59.16	141.07	14 1 16.4	520.8	67.99	15 52.2	58 8.8	
6	U	17 41.97	2.247	2 44 35.65	145.03	15 39 35.5	460.5	68.98	15 57.7	58 29.1	II. N.
7	L	6 9.33	2.313	3 14 0.06	149.02	17 4 45.5	399.3	69.96	16 3.2	58 49.3	
7	U	18 37.47	2.377	3 44 11.59	152.85	+18 14 35.6	+307.4	70.88	16 8.6	59 9.0	II. N.
8	L	7 6.84	2.434	4 15 6.95	156.28	19 7 1.7	215.5	71.69	16 13.7	59 27.8	
8	U	19 35.84	2.481	4 46 40.08	160.11	19 40 13.9	115.3	72.34	16 18.5	59 45.2	II. N.
9	L	8 5.83	2.514	5 18 42.34	161.11	19 52 44.4	+ 9.1	72.78	16 22.7	60 0.6	
9	U	20 36.12	2.521	5 51 2.94	163.15	+19 43 37.6	-109.4	72.99	16 26.2	60 13.7	II. N.
10	L	9 6.51	2.521	6 23 29.84	162.16	19 12 35.6	209.6	72.96	16 29.0	60 23.7	
10	U	21 36.80	2.515	6 55 50.77	161.16	18 29 3.5	314.8	72.70	16 30.8	60 30.4	II. N.
11	L	10 6.81	2.484	7 27 54.31	159.28	17 7 8.0	412.9	72.23	16 31.6	60 33.2	
11	U	22 36.37	2.441	7 59 60.90	156.71	+15 35 34.8	-500.7	71.59	16 31.2	60 31.9	II. N.
12	L	11 5.36	2.390	8 30 33.38	153.64	13 47 40.7	576.0	70.84	16 29.7	60 26.5	
12	U	23 33.71	2.335	9 0 57.28	150.31	11 46 4.6	687.5	70.03	16 27.1	60 17.0	
13	L	12 1.38	2.278	9 30 40.69	146.33	9 33 38.8	684.3	69.20	16 23.4	60 3.4	
14	U	0 23.30	2.224	9 59 43.39	143.66	+ 7 13 18.9	-716.5	68.29	16 18.7	59 46.2	
14	L	12 54.77	2.172	10 28 9.23	140.62	4 47 57.4	784.7	67.65	16 13.2	59 25.9	
15	U	1 20.58	2.128	10 56 0.00	137.91	+ 2 20 17.8	739.8	66.99	16 7.0	59 2.9	I. N.
15	L	13 45.88	2.090	11 23 20.44	135.58	- 0 7 9.4	732.9	66.42	16 0.2	58 38.0	
16	U	2 10.75	2.058	11 50 15.31	133.65	- 2 32 8.3	-715.3	65.96	15 53.0	58 11.7	I. N.

July 29, U Defective Illumination of S. 0'.42.  
 July 29, U Defective Illumination of S. 0'.15.

July 29, U Defective Illumination of S. 0'.57.  
 July 30, U Defective Illumination of I. 0'.61.

FOR TRANSIT OF MOON'S CENTER OVER THE MERIDIAN OF WASHINGTON.

Date.	Culmination.	Wash. Mean Time.	Var. per Hour of Long.	Right Ascension of Center.	Var. per Hour of Long.	Geocentric Declination of Center.	Var. per Hour of Long.	S. T. of Geomid. Passing Meridian.	Geocentric Semidiameter.	Equatorial Horizontal Parallax.	Bright Limbs.
		h m	m	h m s	s	° ' "	"	s	' "	' "	
Aug. 16	U	2 10.75	2.058	11 50 15.31	133.65	- 2 32 8.3	-715.3	65.96	15 53.0	58 11.7	I. N.
16	L	14 35.28	2.032	12 16 49.46	132.12	4 52 38.7	683.4	65.60	15 45.7	57 44.7	I. N.
17	U	2 59.55	2.013	12 43 7.67	130.97	7 6 55.3	653.2	65.33	15 38.3	57 17.7	I. N.
17	L	15 23.62	2.000	13 9 14.30	130.19	9 13 27.1	611.1	65.15	15 31.0	56 61.1	I. N.
18	U	3 47.57	1.992	13 35 13.35	129.71	-11 10 56.2	-632.9	65.06	15 24.1	56 25.6	I. N.
18	L	16 11.45	1.988	14 1 8.22	129.48	12 58 15.8	599.5	65.03	15 17.5	56 1.5	I. N.
19	U	4 35.30	1.988	14 27 1.62	129.45	14 34 29.7	453.0	65.04	15 11.4	55 39.2	I. N.
19	L	16 59.16	1.990	14 52 55.60	129.56	15 56 49.8	396.3	65.00	15 6.0	55 19.1	I. N.
20	U	5 23.06	1.993	15 18 51.43	129.75	-17 10 36.5	-326.6	65.15	15 1.2	55 1.4	I. N.
20	L	17 46.99	1.996	15 44 49.66	129.96	18 9 17.8	269.9	65.20	14 57.0	54 46.1	I. N.
21	U	6 10.96	1.999	16 10 50.16	130.12	18 54 27.7	191.4	65.24	14 58.5	54 33.5	I. N.
21	L	18 34.96	2.000	16 36 52.15	130.20	19 25 48.1	121.3	65.25	14 50.8	54 23.5	I. N.
22	U	6 58.96	1.999	17 2 54.36	130.15	-19 43 7.4	- 51.5	65.22	14 46.8	54 16.3	I. N.
22	L	19 22.93	1.996	17 28 55.14	130.95	19 46 21.6	+ 19.0	65.15	14 47.6	54 11.6	I. N.
23	U	7 46.85	1.990	17 54 52.62	130.60	19 35 33.8	89.3	65.03	14 47.1	54 9.3	I. N.S.
23	L	20 10.69	1.982	18 20 44.93	130.10	19 10 54.6	157.5	64.87	14 47.2	54 10.3	I. N.S.
24	U	8 34.41	1.971	18 46 30.33	128.45	-18 32 42.2	+324.3	64.67	14 48.0	54 13.2	I. N.S.
24	L	20 57.99	1.959	19 12 7.36	127.71	17 41 22.6	293.7	64.44	14 49.4	54 18.2	I. N.S.
25	U	9 21.42	1.946	19 37 35.07	126.91	16 37 28.8	349.9	64.20	14 51.3	54 25.2	I. N.S.
25	L	21 44.68	1.932	20 2 53.04	126.09	15 21 40.9	407.4	63.95	14 58.7	54 34.1	I. N.S.
26	U	10 7.79	1.919	20 28 1.46	125.32	-13 54 46.4	+469.9	63.72	14 56.5	54 44.5	I. N.S.
26	L	22 30.75	1.906	20 53 1.18	124.66	12 17 38.6	506.6	63.52	14 50.8	54 56.3	I. N.S.
27	U	10 53.59	1.899	21 17 53.76	124.14	10 31 17.6	553.0	63.36	15 3.3	55 9.2	I. N.S.
27	L	23 16.35	1.894	21 42 41.37	123.33	8 36 49.4	599.6	63.26	15 7.0	55 23.0	I. N.S.
28	U	11 39.06	1.894	22 7 26.79	123.73	- 6 35 25.5	+623.1	63.24	15 11.0	55 37.5	I. N.S.
29	L	0 1.82	1.898	22 32 13.34	124.08	4 28 23.6	647.0	63.30	15 15.1	55 52.6	II. N.
29	U	12 24.64	1.907	22 57 4.85	124.61	2 17 7.1	694.6	63.46	15 19.3	56 7.9	II. N.
30	L	0 47.62	1.923	23 22 5.48	125.55	- 0 3 4.4	674.5	63.71	15 23.5	56 23.5	II. N.
30	U	13 10.82	1.945	23 47 19.71	126.38	+ 2 12 10.0	+676.4	64.07	15 27.7	56 39.0	II. N.
31	L	1 34.33	1.974	0 12 52.23	126.90	4 26 55.9	699.7	64.55	15 32.0	56 54.5	II. N.
31	U	13 58.22	2.000	0 38 47.66	130.70	6 39 27.7	654.0	65.12	15 36.2	57 9.3	II. N.
Sept. 1	L	2 22.56	2.050	1 5 10.55	133.17	8 47 54.8	623.9	65.77	15 40.2	57 24.8	II. N.
1	U	14 47.43	2.096	1 32 5.01	135.96	+10 50 21.1	+593.9	66.51	15 44.2	57 39.6	II. N.
2	L	3 12.83	2.146	1 59 34.51	139.00	12 44 47.9	543.8	67.31	15 48.2	57 54.0	II. N.
2	U	15 38.95	2.200	2 27 41.58	142.20	14 29 12.8	493.6	68.14	15 52.0	58 8.0	II. N.
3	L	4 5.67	2.254	2 56 27.44	145.44	16 1 33.8	423.3	68.97	15 55.7	58 21.6	II. N.
3	U	16 33.03	2.306	3 25 51.70	148.57	+17 19 52.2	+363.3	69.76	15 59.3	58 34.7	II. N.
4	L	5 0.99	2.333	3 55 52.11	151.44	18 22 16.7	299.4	70.47	16 2.7	58 47.2	II. N.
4	U	17 29.48	2.394	4 26 24.46	153.96	19 7 7.6	177.9	71.06	16 5.9	58 58.9	II. N.
5	L	5 58.40	2.424	4 57 22.53	155.70	19 33 4.0	+ 89.6	71.50	16 8.8	59 9.3	II. N.
5	U	18 27.61	2.442	5 28 38.50	156.33	+19 39 8.0	- 39.3	71.77	16 11.5	59 19.6	II. N.
6	L	6 56.97	2.449	6 0 3.42	157.19	19 24 50.1	123.5	71.84	16 13.8	59 28.0	II. N.
6	U	19 26.33	2.442	6 31 27.93	156.77	18 50 12.1	293.3	71.72	16 15.7	59 34.9	II. S.
7	L	7 55.53	2.433	7 2 42.99	155.63	17 55 48.3	319.3	71.42	16 17.0	59 39.9	II. S.
7	U	20 24.44	2.394	7 33 40.69	153.39	+16 42 44.0	-409.5	70.97	16 17.8	59 42.3	II. S.

Aug. 23, U Defective Illumination of S. 0°.42.  
 Aug. 24, U Defective Illumination of N. 0°.15.  
 Aug. 25, U Defective Illumination of N. 0°.94.

Aug. 26, U Defective Illumination of N. 0°.84.  
 Aug. 27, U Defective Illumination of N. 0°.08.  
 Aug. 28, U Defective Illumination of S. 0°.57.



# MOON-CULMINATIONS, 1920.

533

## FOR TRANSIT OF MOON'S CENTER OVER THE MERIDIAN OF WASHINGTON.

Date.	Culmination.	Wash. Mean Time.	Var. per Hour of Long.	Right Ascension of Center.	Var. per Hour of Long.	Geocentric Declination of Center.	Var. per Hour of Long.	S. T. of Semi- Pass- ing Meridian.	Geocen- tric Semi-di- ameter.	Equa- torial Horiz- ontal Parallax.	Bright Limbs.
		h m	m	h m s	s	" " "	"	s	" "	" "	
Sept. 7	U	20 24.44	2.204	7 33 40.60	153.89	+16 42 44.0	-406.6	70.97	16 17.8	59 42.8	II. S.
8	L	8 52.96	2.257	8 4 14.40	151.09	15 12 32.7	-460.6	70.41	16 18.0	59 48.3	
8	U	21 21.00	2.216	8 34 19.88	149.19	13 27 11.1	561.1	69.78	16 17.4	59 41.8	II. S.
9	L	9 48.58	2.272	9 3 54.51	146.57	11 28 53.5	619.3	69.11	16 16.1	59 36.5	
9	U	22 15.54	2.289	9 32 57.61	143.96	+ 9 20 6.0	-666.6	68.44	16 14.9	59 28.8	II. S.
10	L	10 42.63	2.188	10 1 30.11	141.49	7 3 20.9	699.4	67.80	16 11.1	59 18.3	
10	U	23 3.06	2.120	10 29 34.15	139.24	4 41 12.1	720.0	67.22	16 7.6	59 5.1	
11	L	11 33.66	2.117	10 57 12.81	137.27	+ 2 16 10.2	728.2	66.72	16 3.3	58 49.4	
11	U	23 58.90	2.090	11 24 29.67	135.61	- 0 9 19.7	-724.3	66.30	15 58.4	58 31.4	
12	L	12 23.84	2.068	11 51 28.60	134.29	2 33 1.6	710.4	65.97	15 53.0	58 11.5	
13	U	0 48.55	2.051	12 18 13.46	133.26	4 52 49.4	686.0	65.72	15 47.1	57 59.1	
13	L	13 13.09	2.089	12 44 47.91	132.58	7 6 49.1	652.6	65.55	15 41.0	57 27.8	
14	U	1 37.51	2.021	13 11 15.18	132.06	- 9 13 18.3	-611.1	65.45	15 34.8	57 4.9	I. N.
14	L	14 1.85	2.067	13 37 38.01	131.79	11 10 47.6	653.7	65.41	15 28.5	56 41.9	
15	U	2 26.15	2.025	14 3 58.59	131.67	12 57 59.5	593.3	65.41	15 23.4	56 19.4	I. N.
15	L	14 50.45	2.004	14 30 18.37	131.64	14 33 48.6	449.0	65.44	15 16.5	55 57.8	
16	U	3 14.74	2.025	14 56 38.15	131.66	-15 57 21.1	-325.7	65.48	15 11.0	55 37.5	I. N.
16	L	15 39.03	2.025	15 22 58.09	131.66	17 7 54.1	319.3	65.51	15 5.9	55 18.8	
17	U	4 3.32	2.024	15 49 17.71	131.60	18 4 55.4	290.6	65.52	15 1.3	55 2.0	I. N.
17	L	16 27.59	2.021	16 15 36.02	131.44	18 48 2.5	180.4	65.50	14 57.4	54 47.5	
18	U	4 51.81	2.016	16 41 51.66	131.15	-19 17 2.3	-199.5	65.45	14 54.1	54 35.5	I. N.
18	L	17 15.96	2.009	17 8 3.00	130.72	19 31 50.5	- 38.6	65.35	14 51.5	54 26.0	
19	U	5 40.02	1.999	17 34 8.86	130.15	19 32 30.7	+ 31.7	65.21	14 49.7	54 19.3	I. N.
19	L	18 3.94	1.978	18 0 6.11	129.46	19 19 13.9	100.8	65.03	14 48.6	54 15.3	
20	U	6 27.72	1.965	18 25 54.91	128.67	-18 52 18.1	+106.2	64.82	14 48.3	54 14.1	I. N.S.
20	L	18 51.33	1.961	18 51 33.78	127.81	18 12 6.7	233.3	64.58	14 48.7	54 15.7	
21	U	7 14.77	1.946	19 17 2.22	126.93	17 19 9.2	296.8	64.33	14 49.9	54 20.0	I. S.
21	L	19 38.03	1.932	19 42 20.29	126.09	16 13 59.9	355.2	64.08	14 51.7	54 26.8	
22	U	8 1.14	1.919	20 7 28.68	125.33	-14 57 18.1	+411.1	63.85	14 54.2	54 36.1	I. S.
22	L	20 24.11	1.909	20 32 28.67	124.70	13 29 47.7	463.2	63.65	14 57.4	54 47.7	
23	U	8 46.96	1.901	20 57 22.16	124.25	11 52 17.4	511.0	63.50	15 1.1	55 1.3	I. S.
23	L	21 9.75	1.898	21 22 11.60	124.03	10 5 41.4	554.2	63.41	15 5.3	55 16.6	
24	U	9 32.53	1.899	21 47 0.01	124.06	- 8 10 59.5	+592.0	63.39	15 9.9	55 33.4	I. S.
24	L	21 55.34	1.906	22 11 50.84	124.44	6 9 17.8	624.0	63.46	15 14.8	55 51.3	
25	U	10 18.26	1.915	22 36 47.99	125.14	4 1 49.6	649.6	63.62	15 19.9	56 10.1	I. S.
25	L	22 41.35	1.934	23 1 55.62	126.19	- 1 49 56.0	696.1	63.87	15 25.1	56 29.3	
26	U	11 4.69	1.968	23 27 18.18	127.63	+ 0 24 53.0	+678.7	64.23	15 30.4	56 48.6	I. N.S.
26	L	23 28.36	1.988	23 53 0.19	129.44	2 40 59.1	690.8	64.69	15 35.6	57 7.6	
27	U	11 52.42	2.024	0 19 6.14	131.61	4 56 34.7	673.4	65.24	15 40.6	57 26.1	I. II. N.S.
28	L	0 16.95	2.060	0 45 40.26	134.13	7 9 43.1	656.1	65.88	15 45.4	57 43.6	
28	U	12 42.01	2.112	1 12 46.36	136.93	+ 9 18 20.2	+628.2	66.00	15 49.8	58 0.0	II. N.
29	L	1 7.65	2.162	1 40 27.47	139.95	11 20 15.5	589.2	67.38	15 53.9	58 15.0	
29	U	13 33.91	2.214	2 8 45.63	143.09	13 13 14.7	538.8	68.19	15 57.6	58 28.4	II. N.
30	L	2 0.80	2.266	2 37 41.43	146.20	14 55 3.3	477.4	68.98	16 0.8	58 40.2	
30	U	14 28.29	2.316	3 7 13.85	149.16	+16 23 30.9	+405.5	69.73	16 3.5	58 50.3	II. N.

Sept. 20, U Defective Illumination of N. 0' 52.  
Sept. 26, U Defective Illumination of N. 0' 28.

Sept. 27, U Defective Illumination of I. 0' 00.  
Sept. 27, U Defective Illumination of S. 0' 73.

FOR TRANSIT OF MOON'S CENTER OVER THE MERIDIAN OF WASHINGTON.

Date.	Culmination.	Wash. Mean Time.	Var. per Hour of Long.	Right Ascension of Center.	Var. per Hour of Long.	Geocentric Declination of Center.	Var. per Hour of Long.	S. T. of Semid. Passing Meridian.	Geocentric Semidiameter.	Equatorial Horizontal Parallax.	Bright Limbs.
		h m	m	h m s	s	" ' "	"	s	' "	' "	
Sept. 30	U	14 28.29	2.315	3 7 13.85	140.10	+16 23 30.9	+405.5	69.73	16 3.5	58 50.3	II. N.
Oct. 1	L	2 56.35	2.330	3 37 19.95	151.73	17 36 36.5	324.0	70.40	16 5.8	58 58.6	
1	U	15 24.88	2.305	4 7 54.88	153.33	18 32 34.0	284.5	70.95	16 7.6	59 5.2	II. N.
2	L	3 53.78	2.420	4 38 51.89	155.45	19 9 58.3	188.8	71.34	16 8.9	59 10.2	
2	U	16 22.91	2.435	5 10 2.80	156.24	+19 27 50.0	+30.4	71.56	16 9.9	59 13.6	II. N.
3	L	4 52.12	2.423	5 41 18.59	156.26	19 25 39.3	-61.2	71.58	16 10.4	59 15.6	
3	U	17 21.26	2.421	6 12 29.99	155.52	19 3 27.4	100.4	71.41	16 10.6	59 16.2	II. N. S.
4	L	5 50.18	2.398	6 43 28.37	154.11	18 21 46.4	265.7	71.06	16 10.4	59 15.5	
4	U	18 18.77	2.365	7 14 6.30	152.14	+17 21 35.7	-244.9	70.69	16 9.8	59 13.5	II. S.
5	L	6 46.92	2.326	7 44 18.11	149.77	16 4 19.0	426.4	70.02	16 9.0	59 10.3	
5	U	19 14.57	2.283	8 14 0.02	147.19	14 31 38.7	468.6	69.37	16 7.8	59 5.8	II. S.
6	L	7 41.69	2.339	8 43 10.31	144.53	12 45 31.3	500.8	68.70	16 6.2	59 0.1	
6	U	20 8.29	2.195	9 11 48.96	141.93	+10 48 2.2	-612.2	68.08	16 4.3	58 53.1	II. S.
7	L	8 34.39	2.155	9 39 57.52	139.53	8 41 22.0	652.6	67.39	16 2.0	58 44.8	
7	U	21 0.04	2.120	10 7 38.74	137.39	6 27 43.6	681.9	66.82	15 59.4	58 35.1	II. S.
8	L	9 25.29	2.090	10 34 56.20	135.57	4 9 19.3	700.2	66.33	15 56.4	58 24.1	
8	U	21 50.21	2.065	11 1 53.93	134.10	+ 1 48 19.6	-707.8	65.93	15 53.0	58 11.7	II. S.
9	L	10 14.88	2.047	11 28 36.24	133.00	- 0 33 8.6	705.1	65.62	15 49.2	57 57.9	
9	U	22 39.36	2.034	11 55 7.33	132.24	2 53 3.1	692.4	65.40	15 45.1	57 42.9	II. S.
10	L	11 3.72	2.027	12 21 31.21	131.79	5 9 27.4	670.2	65.28	15 40.8	57 26.8	
10	U	23 28.02	2.024	12 47 51.46	131.62	- 7 20 31.5	-639.1	65.23	15 36.2	57 9.8	
11	L	11 52.30	2.025	13 14 10.96	131.67	9 24 33.3	599.8	65.23	15 31.3	56 52.0	
12	U	0 16.62	2.023	13 40 31.99	131.86	11 19 59.1	533.2	65.28	15 26.3	56 33.8	
12	L	12 40.98	2.023	14 6 55.97	132.14	13 5 25.2	500.1	65.37	15 21.3	56 15.5	
13	U	1 54.0	2.039	14 33 28.54	132.44	-14 39 38.6	-441.3	65.47	15 16.4	55 57.4	I. N.
13	L	13 29.88	2.042	14 59 54.45	132.69	16 1 37.2	377.8	65.56	15 11.6	55 39.8	
14	U	1 54.39	2.044	15 26 27.67	132.82	17 10 31.4	310.7	65.62	15 7.0	55 23.0	I. N.
14	L	14 18.92	2.043	15 53 1.52	132.79	18 5 43.5	241.0	65.65	15 2.7	55 7.3	
15	U	2 43.42	2.089	16 19 33.78	132.55	-18 46 48.8	-199.7	65.63	14 58.9	54 53.1	I. N.
15	L	15 7.85	2.082	16 46 1.88	132.10	19 13 33.9	97.8	65.54	14 55.5	54 40.6	
16	U	3 32.17	2.020	17 12 23.19	131.42	19 25 57.3	-26.2	65.40	14 52.6	54 30.1	I. N.
16	L	15 56.33	2.006	17 38 35.19	130.55	19 24 7.4	+44.3	65.22	14 50.4	54 21.8	
17	U	4 20.30	1.969	18 4 35.72	129.51	-19 8 21.9	+113.0	64.98	14 48.8	54 16.0	I. S.
17	L	16 44.05	1.970	18 30 23.13	128.36	18 39 5.7	179.3	64.70	14 47.9	54 12.7	
18	U	5 7.57	1.950	18 55 56.43	127.18	17 56 49.8	242.8	64.40	14 47.7	54 12.1	I. S.
18	L	17 30.85	1.930	19 21 15.41	126.00	17 2 10.1	303.2	64.10	14 48.3	54 14.3	
19	U	5 53.91	1.912	19 46 20.61	124.89	-15 55 46.1	+360.2	63.82	14 49.7	54 19.3	I. S.
19	L	18 16.75	1.896	20 11 13.38	123.93	14 38 20.0	413.5	63.56	14 51.8	54 27.1	
20	U	6 39.42	1.884	20 35 55.81	123.13	13 10 36.6	463.0	63.35	14 54.7	54 37.6	I. S.
20	L	19 1.97	1.875	21 0 30.71	122.69	11 33 23.0	508.5	63.21	14 58.3	54 50.8	
21	U	7 24.45	1.872	21 25 1.51	122.51	- 9 47 29.2	+549.7	63.13	15 2.5	55 6.5	I. S.
21	L	19 46.93	1.875	21 49 32.23	122.63	7 53 48.8	586.2	63.15	15 7.4	55 24.5	
22	U	8 9.48	1.886	22 14 7.34	123.25	5 53 20.2	617.6	63.28	15 12.9	55 44.4	I. S.
22	L	20 32.19	1.901	22 38 51.77	124.23	3 47 7.3	643.4	63.51	15 18.8	56 6.1	
23	U	8 55.14	1.925	23 3 50.71	125.66	- 1 36 22.7	+662.8	63.85	15 25.1	56 29.1	I. S.

Oct. 3, U Defective Illumination of N. 6' 30.

# MOON-CULMINATIONS, 1920.

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## FOR TRANSIT OF MOON'S CENTER OVER THE MERIDIAN OF WASHINGTON.

Date.	Culmination.	Wash. Mean Time.	Var. per Hour of Long.	Right Ascension of Center.	Var. per Hour of Long.	Geocentric Declination of Center.	Var. per Hour of Long.	S. T. of Semid. Passing Meridian.	Geocentric Semidiameter.	Equatorial Horizontal Parallax.	Bright Limbs.
		h m	m	h m s	s	" ' "	"	s	" "	" "	
Oct. 23	U	8 55.14	1.998	23 3 50.71	126.06	- 1 36 22.7	+002.8	68.85	15 25.1	56 29.1	I. S.
23	L	21 18.42	1.966	23 29 9.59	127.56	+ 0 37 32.4	675.0	64.31	15 31.6	56 53.1	
24	U	9 42.12	1.968	23 54 53.83	129.90	2 53 5.8	679.0	64.88	15 38.2	57 17.4	I. S.
24	L	22 6.34	2.041	0 21 8.91	122.03	5 3 33.1	673.8	65.57	15 44.8	57 41.7	
25	U	10 31.14	2.094	0 47 59.76	124.96	+ 7 21 57.0	+688.3	66.36	15 51.3	58 5.3	I. S.
25	L	23 56.62	2.152	1 15 30.75	126.26	9 31 7.6	631.5	67.22	15 57.4	58 27.8	
26	U	11 22.82	2.214	1 43 45.21	128.03	11 33 44.0	582.5	68.13	16 3.0	58 48.6	I. N.S.
26	L	23 49.77	2.278	2 12 45.01	126.99	13 27 16.4	540.8	69.07	16 8.1	59 7.2	
27	U	12 17.47	2.330	2 42 30.11	129.00	+15 9 11.8	+476.3	69.98	16 12.5	59 23.2	II. N.S.
28	L	0 45.89	2.390	3 12 58.18	124.01	16 36 50.7	399.7	70.81	16 16.1	59 36.3	
28	U	13 14.94	2.444	3 44 4.29	125.90	17 48 20.9	312.3	71.52	16 18.8	59 46.2	II. N.S.
29	L	1 44.50	2.480	4 15 40.92	126.06	18 41 16.0	215.3	72.06	16 20.6	59 52.9	
29	U	14 14.40	2.501	4 47 38.81	126.33	+19 14 13.9	+113.1	72.39	16 21.5	59 56.2	II. N.S.
30	L	2 44.46	2.506	5 19 45.07	126.63	19 26 19.5	+ 7.4	72.49	16 21.5	59 56.4	
30	U	15 14.48	2.464	5 51 49.17	129.90	19 17 16.4	- 97.7	72.35	16 20.8	59 53.7	II. N.S.
31	L	3 44.26	2.497	6 23 39.01	128.37	18 47 28.4	109.4	71.99	16 19.3	59 48.3	
31	U	16 18.63	2.427	6 55 4.42	125.96	+17 57 55.3	-204.3	71.45	16 17.2	59 40.6	II. S.
Nov. 1	L	4 42.46	2.373	7 25 57.42	122.99	16 50 6.8	331.7	70.76	16 14.6	59 31.0	
1	U	17 10.67	2.322	7 56 12.61	126.00	15 25 55.1	453.5	69.99	16 11.6	59 19.8	II. S.
2	L	5 38.20	2.266	8 25 47.24	124.17	13 47 26.2	534.4	69.16	16 8.2	59 7.3	
2	U	18 5.05	2.210	8 54 41.03	122.33	+11 56 53.3	-379.1	68.33	16 4.5	58 53.9	II. S.
3	L	6 31.25	2.158	9 22 55.73	120.63	9 56 31.2	622.7	67.54	16 0.6	58 39.7	
3	U	18 56.86	2.111	9 50 34.66	126.87	7 48 32.4	685.3	66.82	15 56.7	58 25.1	II. S.
4	L	7 21.95	2.071	10 17 42.27	124.47	5 35 4.8	677.5	66.19	15 52.6	58 10.2	
4	U	19 46.60	2.020	10 44 23.73	122.53	+ 3 18 10.7	-689.3	65.67	15 48.5	57 55.1	II. S.
5	L	8 10.91	2.014	11 10 44.52	121.03	+ 0 59 46.5	682.6	65.26	15 44.3	57 39.9	
5	U	20 34.96	1.997	11 36 50.16	120.99	- 1 18 17.1	696.4	64.96	15 40.2	57 24.6	II. S.
6	L	8 58.86	1.987	12 2 45.96	120.33	3 34 14.2	671.6	64.77	15 36.0	57 9.3	
6	U	21 22.67	1.968	12 28 36.83	120.16	- 5 46 24.2	-648.6	64.68	15 31.8	56 54.0	II. S.
7	L	9 46.47	1.965	12 54 27.09	120.26	7 53 10.8	617.7	64.67	15 27.6	56 38.7	
7	U	22 10.32	1.991	13 20 20.29	120.64	9 53-2.3	579.5	64.74	15 23.5	56 23.5	II. S.
8	L	10 34.26	2.000	13 46 19.14	120.29	11 44 32.5	534.4	64.87	15 19.4	56 8.4	
8	U	22 58.33	2.011	14 12 25.39	120.86	-13 26 21.6	-482.3	65.02	15 15.3	55 53.5	
9	L	11 22.53	2.022	14 38 39.74	121.53	14 57 16.5	425.5	65.18	15 11.3	55 38.9	
9	U	23 46.86	2.082	15 5 1.83	122.13	16 16 13.6	363.3	65.34	15 7.5	55 24.7	
10	L	12 11.30	2.040	15 31 30.29	122.58	17 22 18.8	297.0	65.46	15 3.8	55 11.1	
11	U	0 35.80	2.044	15 58 2.87	122.81	-18 14 50.2	-237.3	65.58	15 0.3	54 58.2	
11	L	13 0.82	2.043	16 24 36.56	122.76	18 53 17.8	156.7	65.53	14 57.0	54 46.2	
12	U	1 24.81	2.087	16 51 7.89	122.41	19 17 25.2	84.6	65.47	14 54.0	54 35.3	I. N.
12	L	13 49.19	2.026	17 17 33.22	121.79	19 27 8.5	- 12.9	65.33	14 51.4	54 25.7	
13	U	2 13.42	2.011	17 43 48.97	120.82	-19 22 36.3	+ 57.3	65.12	14 49.2	54 17.7	I. S.
13	L	14 37.43	1.991	18 9 51.99	120.65	19 4 8.6	126.3	64.85	14 47.5	54 11.4	
14	U	3 1.19	1.968	18 35 39.73	120.29	18 32 14.4	192.2	64.54	14 46.3	54 7.0	I. S.
14	L	15 24.67	1.944	19 1 10.50	126.83	17 47 30.5	254.6	64.19	14 45.7	54 4.8	
15	U	3 47.85	1.920	19 26 23.57	125.35	-16 50 39.5	+313.3	63.84	14 45.7	54 4.9	I. S.

Oct. 26, U Defective Illumination of N. 0°.26.  
 Oct. 27, U Defective Illumination of S. 0°.25.  
 Oct. 28, U Defective Illumination of S. 0°.95.

Oct. 29, U Defective Illumination of S. 0°.22.  
 Oct. 30, U Defective Illumination of N. 0°.63.

FOR TRANSIT OF MOON'S CENTER OVER THE MERIDIAN OF WASHINGTON.

Date.	Culmination.	Wash. Mean Time.	Var. per Hour of Long.	Right Ascension of Center.	Var. per Hour of Long.	Geocentric Declination of Center.	Var. per Hour of Long.	S. T. of Semi-d. Passing Meridian.	Geocentric Semi-diameter.	Equatorial Horizontal Parallax.	Bright Limbs.
		h m	m	h m s	s	" "	" "	s	" "	" "	
Nov. 15	L	16 10.74	1.896	19 51 19.14	129.93	-15 42 27.3	+308.1	68.50	14 46.4	54 7.4	
16	U	4 33.36	1.875	20 15 58.42	132.65	14 23 42.4	418.7	68.19	14 47.8	54 12.5	I. S.
16	L	16 55.75	1.867	20 40 23.57	121.50	12 55 14.8	465.3	62.98	14 49.9	54 20.2	
17	U	5 17.95	1.944	21 4 37.61	130.31	11 17 55.1	307.4	62.73	14 52.8	54 30.7	I. S.
17	L	17 40.03	1.887	21 28 44.90	120.37	- 9 32 34.7	+445.3	62.62	14 56.4	54 43.9	
18	U	6 2.06	1.886	21 52 43.08	130.34	7 49 6.0	573.5	62.61	15 0.7	54 59.8	I. S.
18	L	18 24.13	1.943	22 16 54.06	120.74	5 41 23.4	307.5	62.72	15 5.8	55 18.3	
19	U	6 46.33	1.868	22 41 7.79	121.68	3 37 25.0	681.3	62.95	15 11.5	55 39.3	I. S.
19	L	19 8.75	1.881	23 5 35.28	128.04	- 1 29 13.7	+449.6	63.30	15 17.8	56 2.6	
20	U	7 31.51	1.914	23 30 22.87	124.90	+ 0 42 0.3	661.7	63.79	15 24.7	56 27.9	I. S.
20	L	19 54.72	1.965	23 55 37.10	127.48	2 54 57.9	606.7	64.42	15 32.0	56 54.7	
21	U	8 18.47	2.006	0 21 24.57	130.52	5 8 7.7	683.6	65.13	15 39.7	57 22.7	I. S.
21	L	20 42.88	2.005	0 47 51.67	134.06	+ 7 19 45.3	+661.1	66.06	15 47.5	57 51.4	
22	U	9 8.05	2.132	1 15 4.33	133.10	9 27 51.2	629.0	67.04	15 55.3	58 20.2	I. S.
22	L	21 34.07	2.205	1 43 7.53	142.40	11 30 10.1	303.0	68.10	16 3.0	58 48.3	
23	U	10 0.93	2.281	2 12 4.85	147.00	13 24 12.4	545.1	69.21	16 10.3	59 15.1	I. S.
23	L	22 28.81	2.358	2 41 57.78	151.72	+15 7 18.0	+483.5	70.31	16 17.0	59 39.7	
24	U	10 57.55	2.431	3 12 45.19	156.13	16 36 41.5	406.3	71.35	16 23.0	60 1.6	I. S.
24	L	23 27.12	2.496	3 44 22.72	160.02	17 49 41.8	319.9	72.26	16 28.0	60 20.1	
25	U	11 57.40	2.448	4 16 42.56	163.13	18 43 53.5	220.4	72.99	16 31.9	60 34.5	I. II. N. S.
26	L	0 28.20	2.562	4 49 33.62	165.19	+19 17 18.8	+112.7	73.47	16 34.6	60 44.5	
26	U	12 59.23	2.506	5 22 42.18	166.02	19 28 39.6	+ 0.4	73.63	16 36.1	60 49.8	II. N. S.
27	L	1 30.41	2.588	5 55 53.09	165.58	19 17 25.8	-112.4	73.61	16 36.3	60 50.4	
27	U	14 1.32	2.561	6 28 51.22	163.93	18 43 57.8	321.4	73.25	16 35.2	60 46.4	II. S.
28	L	2 31.80	2.516	7 1 22.97	161.22	+17 49 24.2	-322.3	72.65	16 32.9	60 38.1	
28	U	15 1.65	2.466	7 33 17.37	157.74	16 35 33.8	412.7	71.86	16 29.6	60 26.0	II. S.
29	L	3 30.76	2.392	8 4 26.85	153.78	15 4 43.9	492.3	70.94	16 25.4	60 10.6	
29	U	15 59.05	2.338	8 34 47.23	149.63	13 19 29.8	557.7	69.96	16 20.5	59 52.6	II. S.
30	L	4 26.51	2.254	9 4 17.77	145.50	+11 22 32.4	-609.7	68.98	16 15.0	59 32.6	
30	U	16 53.17	2.190	9 33 0.06	141.61	9 16 30.5	648.6	68.04	16 9.2	59 11.2	II. S.
Dec. 1	L	5 19.09	2.122	10 0 57.95	138.11	7 3 55.1	675.4	67.18	16 3.1	58 48.9	
1	U	17 44.36	2.061	10 28 16.63	135.06	4 47 6.8	690.9	66.42	15 56.9	58 26.2	II. S.
2	L	6 9.08	2.040	10 55 2.06	132.58	+ 2 23 13.6	-606.3	65.78	15 50.8	58 3.6	
2	U	18 33.35	2.007	11 21 20.68	130.61	+ 0 9 12.2	602.4	65.27	15 44.8	57 41.4	II. S.
3	L	6 57.29	1.983	11 47 18.95	129.19	- 2 8 11.6	630.1	64.88	15 38.9	57 19.9	
3	U	19 20.99	1.968	12 13 3.07	128.26	4 22 20.9	660.2	64.62	15 33.2	56 59.2	II. S.
4	L	7 44.55	1.960	12 38 38.87	127.78	- 6 31 46.3	-633.0	64.47	15 27.9	56 39.6	
4	U	20 8.06	1.939	13 4 11.49	127.72	8 35 4.2	599.0	64.42	15 22.8	56 21.0	II. S.
5	L	8 31.59	1.933	13 29 45.26	127.99	10 30 56.7	553.7	64.46	15 18.1	56 3.5	
5	U	20 55.19	1.972	13 55 24.07	128.80	12 18 10.2	512.5	64.56	15 13.6	55 47.2	II. S.
6	L	9 18.92	1.984	14 21 10.09	129.19	-13 55 36.0	-460.8	64.71	15 9.5	55 32.0	
6	U	21 42.80	1.996	14 47 4.91	129.96	15 22 10.4	404.1	64.87	15 5.6	55 17.9	II. S.
7	L	10 6.88	2.003	15 13 8.82	130.00	16 36 56.1	342.3	65.04	15 2.1	55 4.8	
7	U	22 31.00	2.039	15 39 21.06	131.23	17 39 3.1	377.3	65.17	14 58.8	54 52.8	II. S.
8	L	10 55.27	2.086	16 5 39.78	131.76	-18 27 50.7	-606.3	65.26	14 55.8	54 41.9	

Nov. 25, U Defective Illumination of I. 0.05.  
Nov. 25, U Defective Illumination of N. 0'.76.

Nov. 26, U Defective Illumination of N. 0'.93.

FOR TRANSIT OF MOON'S CENTER OVER THE MERIDIAN OF WASHINGTON.

Date.	Culmination.	Wash. Mean Time.	Var. per Hour of Long.	Right Ascension of Center.	Var. per Hour of Long.	Geocentric Declination of Center.	Var. per Hour of Long.	S. T. of Semid. Passing Meridian.	Geocentric Semidiameter.	Equatorial Horizontal Parallax.	Bright Limbs.
		h m	m	h m s	s	" "	" "	s	" "	" "	
Dec. 8	U	23 19.61	2.029	16 32 2.21	131.93	-19 248.6	-139.6	65.29	14 53.1	54 32.0	
9	L	11 43.95	2.027	16 58 24.92	131.80	19 23 38.1	- 68.5	65.25	14 50.7	54 23.2	
10	U	0 8.23	2.019	17 24 44.05	131.33	19 30 12.9	+ 2.6	65.14	14 48.6	54 15.5	
10	L	12 32.39	2.008	17 50 55.71	130.55	19 22 39.3	72.7	64.95	14 46.9	54 9.1	
11	U	0 56.36	1.983	18 16 56.15	129.48	-19 115.4	+140.9	64.69	14 45.5	54 3.9	I. S.
11	L	13 20.09	1.966	18 42 42.18	128.17	18 26 30.1	206.2	64.37	14 44.4	54 0.1	
12	U	1 43.54	1.942	19 8 11.36	126.68	17 39 1.7	367.9	64.01	14 43.8	53 57.8	I. S.
12	L	14 6.68	1.916	19 33 22.19	125.12	16 39 35.4	325.7	63.63	14 43.7	53 57.2	
13	U	2 29.51	1.890	19 58 14.13	123.55	-15 29 2.0	+379.1	63.25	14 44.0	53 58.4	I. S.
13	L	14 52.04	1.865	20 22 47.74	122.08	14 8 15.5	437.9	62.89	14 44.8	54 1.5	
14	U	3 14.29	1.843	20 47 4.56	120.76	12 38 11.8	472.0	62.58	14 46.2	54 6.6	I. S.
14	L	15 36.30	1.826	21 11 7.08	119.70	10 59 47.9	511.2	62.33	14 48.2	54 14.0	
15	U	3 58.13	1.813	21 34 58.68	118.95	- 9 14 0.7	+545.8	62.16	14 50.9	54 23.7	I. S.
15	L	16 19.85	1.807	21 58 43.47	118.58	7 21 47.1	575.7	62.09	14 54.2	54 35.8	
16	U	4 41.53	1.808	22 22 26.30	118.63	5 24 4.4	600.7	62.12	14 58.1	54 50.3	I. S.
16	L	17 3.27	1.817	22 46 12.58	119.16	3 21 51.1	620.7	62.28	15 2.8	55 7.4	
17	U	5 25.17	1.824	23 10 8.28	120.21	- 1 16 7.9	+635.6	62.58	15 8.1	55 27.0	I. S.
17	L	17 47.33	1.861	23 34 19.76	121.80	+ 0 52 0.5	644.8	63.01	15 14.1	55 48.9	
18	U	6 9.86	1.897	23 58 53.78	123.96	3 1 23.2	647.9	63.58	15 20.7	56 13.2	I. S.
18	L	18 32.88	1.942	0 23 57.31	126.72	5 10 41.3	643.9	64.30	15 27.9	56 39.6	
19	U	6 56.51	1.998	0 49 37.36	130.05	+ 7 18 25.6	+632.0	65.15	15 35.6	57 7.7	I. S.
19	L	19 20.87	2.063	1 16 0.81	133.94	9 22 54.1	611.1	66.13	15 43.6	57 37.3	
20	U	7 46.05	2.136	1 43 13.99	138.33	11 22 10.8	579.8	67.22	15 51.9	58 7.7	I. S.
20	L	20 12.14	2.215	2 11 22.27	143.11	13 14 4.3	537.0	68.38	16 0.3	58 38.5	
21	U	8 39.22	2.298	2 40 29.44	148.11	+14 56 9.2	+481.6	69.58	16 8.6	59 9.0	I. S.
21	L	21 7.30	2.381	3 10 37.08	153.14	16 25 49.1	412.8	70.77	16 16.6	59 38.3	
22	U	9 36.36	2.461	3 41 43.84	157.92	17 40 22.9	330.6	71.87	16 24.0	60 5.6	I. S.
22	L	22 6.32	2.531	4 13 44.80	162.13	18 37 13.7	285.8	72.83	16 30.7	60 30.1	
23	U	10 37.04	2.596	4 46 31.32	165.46	+19 14 1.7	+130.5	73.59	16 36.4	60 51.0	I. S.
23	L	23 8.31	2.622	5 19 51.13	167.64	19 28 57.6	+ 17.8	74.08	16 40.9	61 7.5	
24	U	11 39.89	2.637	5 53 29.24	168.49	19 20 55.8	- 98.3	74.26	16 44.0	61 18.9	I. S.
25	L	0 11.50	2.628	6 27 9.27	167.96	18 49 42.8	213.2	74.14	16 45.7	61 24.9	
25	U	12 42.87	2.698	7 0 35.06	166.15	+17 56 1.0	-322.4	73.73	16 45.8	61 25.3	II. S.
26	L	1 13.77	2.550	7 33 32.46	163.26	16 41 25.3	421.6	73.07	16 44.4	61 20.1	
26	U	13 44.01	2.489	8 5 50.20	159.59	15 8 12.8	506.0	72.23	16 41.5	61 9.6	II. S.
27	L	2 13.47	2.420	8 37 20.76	155.45	13 19 10.5	579.7	71.27	16 37.3	60 54.3	
27	U	14 42.08	2.348	9 8 0.36	151.14	+11 17 20.9	-635.9	70.27	16 32.0	60 34.9	II. S.
28	L	3 9.84	2.278	9 37 48.50	146.91	9 5 49.7	676.3	69.27	16 25.8	60 12.1	
28	U	15 36.77	2.213	10 6 47.37	142.96	6 47 36.3	708.2	68.33	16 18.9	59 46.7	II. S.
29	L	4 2.96	2.153	10 35 1.10	139.41	4 25 27.3	716.2	67.48	16 11.5	59 19.5	
29	U	16 28.49	2.102	11 2 35.11	136.35	+ 2 1 53.0	-717.6	66.73	16 8.8	58 51.3	II. S.
30	L	4 53.45	2.060	11 29 35.57	133.81	- 0 20 53.3	708.5	66.10	15 56.0	58 22.7	
30	U	17 17.97	2.027	11 56 8.87	131.32	2 40 54.5	690.3	65.60	15 48.3	57 54.4	II. S.
31	L	5 42.14	2.003	12 22 21.35	130.36	4 56 28.4	664.9	65.23	15 40.8	57 26.8	
31	U	18 6.06	1.966	12 48 19.02	129.36	- 7 6 5.5	-631.0	64.97	15 33.6	57 0.4	II. S.

FOR TRANSIT AT WASHINGTON.

Date.	Wash. Mean Time.	Apparent Right Ascension.	Apparent Declination.	Hor. Par.	Semidiam.	S. T. of Sem. Pass. Mer.	Date.	Wash. Mean Time.	Apparent Right Ascension.	Apparent Declination.	Hor. Par.	Semidiam.	S. T. of Sem. Pass. Mer.
	h m	h m s	" " "	"	"	s		h m	h m s	" " "	"	"	s
Jan. 0	22 39	17 19 21.61	-22 27 16.6	7.2	2.7	0.20	Feb. 16	0 49	22 31 11.72	-10 48 20.4	6.8	2.6	0.18
1	22 41	17 25 19.35	22 40 46.4	7.1	2.7	0.20	17	0 52	22 37 59.07	10 0 31.7	6.9	2.6	0.18
2	22 43	17 31 22.26	22 53 22.8	7.1	2.7	0.19	18	0 55	22 44 42.60	9 11 45.5	7.0	2.6	0.18
3	22 46	17 37 29.95	23 5 2.3	7.0	2.7	0.19	19	0 58	22 51 21.54	8 22 9.5	7.1	2.7	0.18
4	22 48	17 43 42.08	23 15 42.6	6.9	2.6	0.19	20	1 02	27 54.99	7 31 52.8	7.2	2.7	0.18
5	22 50	17 49 58.32	-23 25 20.0	6.9	2.6	0.19	21	1 32	3 421.92	- 6 41 5.6	7.3	2.8	0.19
6	22 53	17 56 18.39	23 33 53.0	6.8	2.6	0.19	22	1 52	3 10 41.16	5 49 59.8	7.4	2.8	0.19
7	22 55	18 2 42.02	23 41 19.7	6.7	2.6	0.19	23	1 72	3 16 51.41	4 58 48.8	7.6	2.9	0.19
8	22 57	18 9 8.98	23 47 37.4	6.7	2.5	0.19	24	1 92	3 22 51.18	4 7 47.7	7.7	2.9	0.20
9	23 0	18 15 39.06	23 52 44.6	6.6	2.5	0.18	25	1 11	3 28 38.89	3 17 12.7	7.9	3.0	0.20
10	23 3	18 22 12.01	-23 56 39.5	6.6	2.5	0.18	26	1 13	3 34 12.83	- 2 27 21.6	8.1	3.1	0.20
11	23 5	18 28 47.67	23 59 20.7	6.6	2.5	0.18	27	1 14	3 39 31.16	1 38 33.4	8.3	3.1	0.21
12	23 8	18 35 25.85	24 0 46.6	6.5	2.5	0.18	28	1 15	3 44 31.97	0 51 8.1	8.5	3.2	0.22
13	23 11	18 42 6.37	24 0 55.8	6.5	2.5	0.18	29	1 16	3 49 13.35	- 0 5 26.4	8.7	3.3	0.22
14	23 14	18 48 49.07	23 59 47.2	6.4	2.4	0.18	Mar. 1	1 17	3 53 33.34	+ 0 38 10.8	8.9	3.4	0.23
15	23 16	18 55 33.81	-23 57 19.6	6.4	2.4	0.18	2	1 17	3 57 30.04	+ 1 19 22.4	9.2	3.5	0.23
16	23 19	19 2 20.43	23 53 31.8	6.4	2.4	0.18	3	1 16	0 1 1.65	1 57 48.1	9.5	3.6	0.24
17	23 22	19 9 8.81	23 48 22.7	6.3	2.4	0.18	4	1 15	0 4 6.55	2 33 7.7	9.8	3.7	0.25
18	23 25	19 15 58.80	23 41 51.5	6.3	2.4	0.17	5	1 14	0 6 43.27	3 5 2.2	10.1	3.8	0.26
19	23 28	19 22 50.28	23 33 57.2	6.3	2.4	0.17	6	1 12	0 8 50.58	3 33 14.3	10.4	4.0	0.26
20	23 31	19 29 43.12	-23 24 38.8	6.3	2.4	0.17	7	1 10	0 10 27.58	+ 3 57 28.1	10.7	4.1	0.27
21	23 34	19 36 37.22	23 13 55.7	6.3	2.4	0.17	8	1 7	0 11 33.71	4 17 29.5	11.1	4.2	0.28
22	23 37	19 43 32.47	23 1 47.0	6.2	2.4	0.17	9	1 4	0 12 8.78	4 33 6.9	11.4	4.3	0.29
23	23 40	19 50 28.76	22 48 12.1	6.2	2.4	0.17	10	1 0	0 12 13.05	4 44 11.6	11.8	4.5	0.30
24	23 43	19 57 25.99	22 33 10.2	6.2	2.4	0.17	11	0 55	0 11 47.25	4 50 37.7	12.1	4.6	0.31
25	23 46	20 4 24.06	-22 16 40.6	6.2	2.4	0.17	12	0 51	0 10 52.60	+ 4 52 22.9	12.5	4.7	0.32
26	23 49	20 11 22.89	21 58 42.9	6.2	2.4	0.17	13	0 45	0 9 30.84	4 49 29.0	12.8	4.9	0.33
27	23 52	20 18 22.38	21 39 16.5	6.2	2.4	0.17	14	0 40	0 7 44.24	4 42 2.4	13.1	5.0	0.33
28	23 55	20 25 22.45	21 18 21.0	6.2	2.4	0.17	15	0 34	0 5 35.57	4 30 14.2	13.4	5.1	0.34
29	23 58	20 32 23.02	20 55 55.8	6.2	2.4	0.17	16	0 27	0 3 8.02	4 14 20.3	13.7	5.2	0.35
31	0 1 20	39 24.03	-20 32 0.5	6.2	2.4	0.17	17	0 20	0 0 25.17	+ 3 54 41.5	13.9	5.3	0.35
Feb. 1	0 4 20	46 25.39	20 6 34.9	6.2	2.4	0.17	18	0 14	23 57 30.39	3 31 48.1	14.2	5.4	0.36
2	0 7 20	53 26.98	19 39 38.9	6.2	2.4	0.17	19	0 7	23 54 29.20	3 5 54.4	14.3	5.4	0.36
3	0 10 21	0 28.77	19 11 12.3	6.3	2.4	0.17	19 24	0 23	51 24.20	2 37 47.9	14.5	5.5	0.37
4	0 13 21	7 30.67	18 41 14.9	6.3	2.4	0.17	20	23 53	23 48 19.90	2 7 57.9	14.6	5.5	0.37
5	0 16 21	14 32.58	-18 9 46.9	6.3	2.4	0.17	21	23 46	23 45 20.09	+ 1 36 59.3	14.6	5.5	0.37
6	0 19 21	21 34.40	17 36 48.6	6.3	2.4	0.17	22	23 39	23 42 28.26	1 5 26.8	14.6	5.6	0.37
7	0 22 21	28 36.03	17 2 20.4	6.3	2.4	0.17	23	23 32	23 39 47.54	0 38 53.8	14.6	5.5	0.37
8	0 25 21	35 37.34	16 26 22.9	6.4	2.4	0.17	24	23 26	23 37 28.68	+ 0 2 56.9	14.6	5.5	0.37
9	0 29 21	42 38.18	15 48 57.2	6.4	2.4	0.17	25	23 20	23 35 9.74	- 0 27 14.3	14.5	5.5	0.37
10	0 32 21	49 38.38	-15 10 4.3	6.4	2.4	0.17	26	23 14	23 33 16.62	- 0 55 57.7	14.4	5.5	0.36
11	0 35 21	56 37.74	14 29 45.9	6.5	2.5	0.17	27	23 9	23 31 42.58	1 22 59.1	14.2	5.4	0.36
12	0 38 22	3 36.02	13 48 3.9	6.5	2.5	0.17	28	23 3	23 30 28.50	1 48 2.0	14.1	5.3	0.36
13	0 41 22	10 32.93	13 5 0.8	6.6	2.5	0.17	29	22 59	23 29 84.87	2 10 53.6	13.9	5.3	0.35
14	0 44 22	17 28.12	12 20 40.0	6.7	2.5	0.17	30	22 54	23 29 1.87	2 31 24.3	13.7	5.2	0.35
15	0 47 22	24 21.21	-11 35 5.0	6.7	2.5	0.17	31	22 50	23 28 49.41	- 2 49 27.4	13.5	5.1	0.34
16	0 49 22	31 11.72	-10 48 20.4	6.8	2.6	0.18	Apr. 1	22 46	23 28 57.17	- 3 4 59.0	13.3	5.0	0.34

FOR TRANSIT AT WASHINGTON.

Date.	Wash. Mean Time.	Apparent Right Ascension.	Apparent Declination.	Hor. Par.	Semidian.	S. T. of Sem. Pass. Mer.	Date.	Wash. Mean Time.	Apparent Right Ascension.	Apparent Declination.	Hor. Par.	Semidian.	S. T. of Sem. Pass. Mer.
	h m s	h m s	° ' "	"	"	s		h m s	h m s	° ' "	"	"	s
Apr. 1	22 46 23	28 57.17	- 3 450.0	13.3	5.0	0.34	May 16	23 17	2 57 32.79	+15 51 49.4	6.9	2.6	0.18
2	22 43 23	29 24.66	3 17 57.1	13.1	5.0	0.33	17	23 21 3	5 35.82	16 36 0.2	6.8	2.6	0.18
3	22 40 23	30 11.24	3 28 21.4	12.9	4.9	0.33	18	23 26 3	13 49.06	17 19 37.9	6.8	2.6	0.18
4	22 37 23	31 16.19	3 36 13.0	12.6	4.8	0.32	19	23 30 3	22 12.37	18 2 30.7	6.7	2.6	0.18
5	22 34 23	32 38.74	3 41 34.2	12.4	4.7	0.32	20	23 35 3	30 45.49	18 44 26.9	6.7	2.5	0.18
6	22 32 23	34 18.07	- 3 44 23.0	12.3	4.6	0.31	21	23 39 3	39 27.71	+19 25 14.3	6.7	2.5	0.18
7	22 30 23	36 13.36	3 44 58.0	12.0	4.5	0.30	22	23 44 3	48 18.68	20 4 49.5	6.7	2.5	0.18
8	22 28 23	38 23.77	3 48 8.2	11.8	4.5	0.30	23	23 49 3	57 17.58	20 42 33.1	6.7	2.5	0.18
9	22 27 23	40 48.51	3 39 2.8	11.5	4.4	0.29	24	23 54 4	6 23.45	21 18 39.5	6.7	2.5	0.18
10	22 25 23	43 26.81	3 32 46.2	11.3	4.3	0.29	25	24 0	15 35.21	21 52 47.9	6.7	2.5	0.18
11	22 24 23	46 17.91	- 3 24 22.9	11.1	4.2	0.28	27	0 5	4 24 51.34	+22 24 47.0	6.7	2.5	0.18
12	22 23 23	49 21.12	3 13 57.1	10.9	4.2	0.28	28	0 10	4 34 11.43	23 54 26.4	6.7	2.5	0.18
13	22 23 23	52 36.79	3 1 33.3	10.7	4.1	0.27	29	0 16	4 43 33.16	23 21 37.3	6.7	2.6	0.19
14	22 22 23	56 1.32	2 47 15.7	10.6	4.0	0.27	30	0 21	4 52 55.36	23 46 13.3	6.8	2.6	0.19
15	22 22 23	59 37.12	2 31 8.6	10.4	3.9	0.26	31	0 27	5 2 16.55	24 8 8.9	6.8	2.6	0.19
16	22 22 0	3 22.70	- 2 13 15.8	10.2	3.9	0.26	June 1	0 32	5 11 35.30	+24 27 19.3	6.9	2.6	0.19
17	22 22 0	7 17.60	1 53 41.1	10.0	3.8	0.25	2	0 37	5 20 50.22	24 43 43.3	6.9	2.6	0.19
18	22 22 0	11 21.39	1 32 28.3	9.8	3.7	0.25	3	0 42	5 29 59.98	24 57 20.6	7.0	2.7	0.20
19	22 22 0	15 33.71	1 9 40.9	9.7	3.7	0.24	4	0 48	5 39 3.34	25 8 12.5	7.1	2.7	0.20
20	22 22 0	19 54.21	0 45 22.4	9.5	3.6	0.24	5	0 53	5 47 59.21	25 16 21.9	7.1	2.7	0.20
21	22 23 0	24 22.63	- 0 19 36.0	9.4	3.6	0.24	6	0 57	5 56 46.60	+25 21 52.6	7.2	2.8	0.20
22	22 23 0	28 58.73	+ 0 7 35.1	9.2	3.5	0.23	7	1 2	6 5 24.63	25 24 49.3	7.3	2.8	0.20
23	22 24 0	33 42.30	0 36 7.9	9.1	3.4	0.23	8	1 7	6 13 52.55	25 25 19.1	7.4	2.8	0.21
24	22 25 0	38 33.20	1 5 59.5	8.9	3.4	0.23	9	1 11	6 22 9.77	25 23 26.9	7.5	2.9	0.21
25	22 26 0	43 31.30	1 37 7.0	8.8	3.3	0.22	10	1 15	6 30 15.66	25 19 20.2	7.6	2.9	0.21
26	22 27 0	48 36.51	+ 2 9 27.5	8.7	3.3	0.22	11	1 19	6 38 9.81	+25 13 6.1	7.7	2.9	0.22
27	22 29 0	53 48.30	2 42 56.3	8.5	3.2	0.22	12	1 23	6 45 51.85	25 4 51.9	7.9	3.0	0.22
28	22 30 0	59 8.16	3 17 36.8	8.4	3.2	0.21	13	1 26	6 53 21.45	24 54 45.2	8.0	3.0	0.22
29	22 31 0	1 4 34.59	3 53 20.1	8.3	3.2	0.21	14	1 30	7 0 38.36	24 42 53.3	8.1	3.1	0.23
30	22 33 0	1 10 8.15	4 30 5.5	8.2	3.1	0.21	15	1 33	7 7 42.39	24 29 23.8	8.2	3.1	0.23
May 1	22 35 0	1 15 48.93	+ 5 7 50.3	8.1	3.1	0.20	16	1 36	7 14 33.36	+24 14 23.8	8.4	3.2	0.23
2	22 37 0	1 21 37.04	5 46 31.3	8.0	3.0	0.20	17	1 38	7 21 11.12	23 58 0.7	8.5	3.2	0.24
3	22 39 0	1 27 32.61	6 26 5.8	7.9	3.0	0.20	18	1 41	7 27 35.54	23 40 21.7	8.7	3.3	0.24
4	22 41 0	1 33 35.82	7 6 30.7	7.8	2.9	0.20	19	1 43	7 33 46.52	23 21 33.5	8.8	3.4	0.24
5	22 43 0	1 39 46.86	7 47 42.6	7.7	2.9	0.20	20	1 45	7 39 43.96	23 1 43.2	9.0	3.4	0.25
6	22 45 0	1 46 5.93	+ 8 29 37.9	7.6	2.9	0.19	21	1 47	7 45 27.71	+22 40 57.4	9.1	3.5	0.25
7	22 48 0	1 52 33.26	9 12 13.2	7.5	2.8	0.19	22	1 48	7 50 57.71	22 19 22.8	9.3	3.5	0.26
8	22 51 0	1 59 9.11	9 55 24.2	7.4	2.8	0.19	23	1 50	7 56 13.83	21 57 5.7	9.5	3.6	0.26
9	22 53 0	2 5 53.74	10 39 6.6	7.3	2.8	0.19	24	1 51	8 1 15.96	21 34 12.3	9.7	3.7	0.26
10	22 56 0	2 12 47.41	11 23 15.5	7.2	2.7	0.19	25	1 52	8 6 3.92	21 10 49.2	9.9	3.7	0.27
11	22 59 0	2 19 50.39	+12 7 45.7	7.1	2.7	0.19	26	1 52	8 10 37.57	+20 47 2.6	10.1	3.8	0.27
12	23 3 0	2 27 2.92	12 52 31.3	7.1	2.7	0.18	27	1 53	8 14 56.76	20 22 53.3	10.2	3.9	0.28
13	23 6 0	2 34 25.23	13 37 25.3	7.0	2.7	0.18	28	1 53	8 19 1.26	19 58 42.7	10.4	4.0	0.28
14	23 10 0	2 41 57.56	14 22 22.2	7.0	2.6	0.18	29	1 53	8 22 50.86	19 34 22.1	10.7	4.0	0.29
15	23 13 0	2 49 40.05	15 7 12.6	6.9	2.6	0.18	30	1 52	8 26 25.30	19 10 2.4	10.9	4.1	0.29
16	23 17 0	2 57 32.79	+15 51 48.4	6.9	2.6	0.18	July 1	1 52	8 29 44.33	+18 45 49.8	11.1	4.2	0.30
17	23 21 0	3 5 35.82	+16 36 0.2	6.8	2.6	0.18	2	1 51	8 32 47.67	+18 21 51.0	11.3	4.3	0.30

FOR TRANSIT AT WASHINGTON.

Date.	Wash. Mean Time.	Apparent Right Ascension.	Apparent Declination.	Hor. Par.	Semidiam.	S. T. of Sem. Pass. Mer.	Date.	Wash. Mean Time.	Apparent Right Ascension.	Apparent Declination.	Hor. Par.	Semidiam.	S. T. of Sem. Pass. Mer.
	h m s	h m s	" " "	" " "	" " "	" "		h m s	h m s	" " "	" " "	" " "	" "
July 1	1 52	8 29 44.33	+18 45 49.8	11.1	4.2	0.30	Aug. 15	22 49	8 28 11.81	+18 26 21.9	9.3	3.5	0.25
2	1 51	8 32 47.87	18 21 51.0	11.3	4.3	0.30	16	22 50	8 33 14.20	18 24 0.8	9.1	3.4	0.24
3	1 50	8 35 34.99	17 58 11.8	11.5	4.4	0.31	17	22 52	8 38 39.93	18 19 3.7	8.8	3.3	0.24
4	1 48	8 38 5.98	17 34 58.8	11.7	4.4	0.31	18	22 54	8 44 27.39	18 11 24.4	8.6	3.3	0.23
5	1 46	8 40 20.30	17 12 18.4	12.0	4.5	0.32	19	22 56	8 50 34.83	18 0 57.3	8.4	3.2	0.22
6	1 44	8 42 17.62	+16 50 17.8	12.2	4.6	0.32	20	22 58	8 57 0.35	+17 47 39.4	8.2	3.1	0.22
7	1 42	8 43 57.57	16 29 2.2	12.4	4.7	0.33	21	23 1 9	9 3 41.91	17 31 29.0	8.0	3.0	0.21
8	1 40	8 45 19.84	16 8 39.6	12.6	4.8	0.33	22	23 4	9 10 37.41	17 12 26.8	7.8	3.0	0.21
9	1 37	8 46 24.11	15 49 16.8	12.9	4.9	0.34	23	23 7	9 17 44.68	16 50 35.2	7.6	2.9	0.20
10	1 34	8 47 10.11	15 30 59.8	13.1	5.0	0.34	24	23 11	9 25 1.59	16 25 58.5	7.5	2.8	0.20
11	1 30	8 47 37.60	+15 13 56.2	13.3	5.1	0.35	25	23 14	9 32 26.03	+15 58 48.0	7.3	2.8	0.19
12	1 26	8 47 46.44	14 58 12.4	13.5	5.1	0.35	26	23 18	9 39 56.01	15 28 56.6	7.2	2.7	0.19
13	1 22	8 47 36.56	14 43 55.0	13.8	5.2	0.36	27	23 21	9 47 29.66	14 56 48.6	7.1	2.7	0.19
14	1 18	8 47 8.00	14 31 10.3	14.0	5.3	0.36	28	23 25	9 55 5.27	14 22 29.0	7.0	2.7	0.18
15	1 13	8 46 20.95	14 20 4.3	14.2	5.4	0.37	29	23 28	10 2 41.32	13 46 8.7	6.9	2.6	0.18
16	1 8	8 45 15.77	+14 10 42.4	14.4	5.4	0.37	30	23 32	10 10 16.47	+13 7 58.8	6.8	2.6	0.18
17	1 3	8 43 53.01	14 3 9.3	14.5	5.5	0.38	31	23 36	10 17 49.59	12 28 10.5	6.7	2.6	0.17
18	0 57	8 42 13.46	13 57 28.9	14.7	5.6	0.38	Sept. 1	23 39	10 25 19.75	11 46 55.1	6.7	2.5	0.17
19	0 51	8 40 18.14	13 53 44.5	14.8	5.6	0.39	2	23 43	10 32 46.18	11 4 23.2	6.6	2.5	0.17
20	0 45	8 38 8.36	13 51 57.6	14.9	5.7	0.39	3	23 46	10 40 8.27	10 20 45.3	6.6	2.5	0.17
21	0 39	8 35 45.69	+13 52 8.9	15.0	5.7	0.39	4	23 49	10 47 25.56	+ 9 36 11.0	6.5	2.5	0.17
22	0 33	8 33 12.02	13 54 17.3	15.1	5.7	0.39	5	23 53	10 54 37.74	8 50 49.2	6.5	2.5	0.17
23	0 26	8 30 29.50	13 56 20.6	15.1	5.7	0.39	6	23 56	11 1 44.61	8 4 48.2	6.4	2.4	0.16
24	0 19	8 27 40.54	14 4 14.7	15.1	5.7	0.39	7	23 59	11 8 46.03	7 18 15.8	6.4	2.4	0.16
25	0 12	8 24 47.79	14 11 54.0	15.0	5.7	0.39	9	0 2	11 15 41.96	6 31 19.4	6.4	2.4	0.16
26	0 6	8 21 54.07	+14 21 11.6	15.0	5.7	0.39	10	0 5	11 22 32.45	+ 5 44 4.7	6.4	2.4	0.16
26	23 59	8 19 2.37	14 31 59.1	14.9	5.6	0.39	11	0 8	11 29 17.55	4 56 37.7	6.3	2.4	0.16
27	23 52	8 16 15.70	14 44 7.0	14.7	5.6	0.39	12	0 10	11 35 57.39	4 9 3.8	6.3	2.4	0.16
28	23 45	8 13 37.12	14 57 24.7	14.6	5.5	0.38	13	0 13	11 42 32.11	3 21 27.5	6.3	2.4	0.16
29	23 39	8 11 9.61	15 11 40.7	14.4	5.4	0.38	14	0 16	11 49 1.88	2 33 53.2	6.3	2.4	0.16
30	23 33	8 8 56.03	+15 26 43.1	14.1	5.4	0.37	15	0 18	11 55 26.89	+ 1 46 24.6	6.3	2.4	0.16
31	23 27	8 6 59.09	15 42 19.6	13.9	5.3	0.36	16	0 20	12 1 47.35	0 59 5.1	6.3	2.4	0.16
Aug. 1	23 22	8 5 21.24	15 58 17.6	13.6	5.2	0.36	17	0 23	12 8 3.46	+ 0 11 58.0	6.3	2.4	0.16
2	23 16	8 4 4.71	16 14 24.6	13.3	5.1	0.35	18	0 25	12 14 15.41	- 0 34 53.9	6.3	2.4	0.16
3	23 11	8 3 11.43	16 30 28.0	13.0	4.9	0.34	19	0 27	12 20 23.45	1 21 27.9	6.3	2.4	0.16
4	23 7	8 2 48.06	+16 46 15.6	12.7	4.8	0.34	20	0 29	12 26 27.75	- 2 7 41.9	6.3	2.4	0.16
5	23 3	8 2 40.93	17 1 34.9	12.4	4.7	0.33	21	0 31	12 32 28.54	2 53 33.7	6.4	2.4	0.16
6	23 0	8 3 6.13	17 16 14.1	12.1	4.6	0.32	22	0 33	12 38 26.00	3 39 1.3	6.4	2.4	0.16
7	22 57	8 3 59.45	17 30 1.1	11.7	4.5	0.31	23	0 35	12 44 20.35	4 24 2.6	6.4	2.4	0.16
8	22 54	8 5 21.40	17 42 44.6	11.4	4.3	0.30	24	0 37	12 50 11.74	5 8 36.2	6.4	2.4	0.16
9	22 52	8 7 12.27	+17 54 12.7	11.1	4.2	0.30	25	0 39	12 56 0.96	- 5 52 40.5	6.4	2.4	0.16
10	22 50	8 9 32.10	18 4 14.3	10.8	4.1	0.29	26	0 41	13 1 46.38	6 36 13.8	6.5	2.5	0.16
11	22 49	8 12 20.71	18 12 38.0	10.5	4.0	0.28	27	0 43	13 7 29.93	7 19 14.8	6.5	2.5	0.17
12	22 48	8 15 37.69	18 19 13.2	10.2	3.9	0.27	28	0 44	13 13 11.19	8 1 41.9	6.5	2.5	0.17
13	22 48	8 19 22.44	18 23 48.9	9.9	3.8	0.26	29	0 46	13 18 50.27	8 43 33.7	6.5	2.5	0.17
14	22 49	8 23 34.15	+18 26 14.9	9.6	3.6	0.26	30	0 48	13 24 27.28	- 9 24 49.2	6.6	2.5	0.17
15	22 49	8 28 11.81	+18 26 21.9	9.3	3.5	0.25	Oct. 1	0 49	13 30 2.33	-10 5 26.9	6.6	2.5	0.17



FOR TRANSIT AT WASHINGTON.

Date.	Wash. Mean Time.			Apparent Right Ascension.			Apparent Declination.			Hor. Par.	Semi-diam.	S. T. of Sem. Pass. Mer.	Date.	Wash. Mean Time.			Apparent Right Ascension.			Apparent Declination.			Hor. Par.	Semi-diam.	S. T. of Sem. Pass. Mer.
	h	m	s	h	m	s	°	'	"					°	'	"	h	m	s	h	m	s			
Oct. 1	0	49	13	30	2.33	-10	5	26.9	6.6	2.5	0.17	Nov. 15	23	41	15	22	56.76	-18	2	38.9	13.0	4.9	0.35		
2	0	51	13	35	85.51	10	45	25.5	6.7	2.5	0.17	16	23	32	15	17	57.93	17	23	28.9	12.9	4.9	0.34		
3	0	53	13	41	6.90	11	24	43.8	6.7	2.5	0.17	17	23	24	15	13	17.18	16	45	59.6	12.7	4.8	0.34		
4	0	54	13	46	36.54	12	3	20.3	6.8	2.6	0.17	18	23	15	15	9	3.10	16	11	16.1	12.5	4.8	0.33		
5	0	56	13	52	4.47	12	41	13.7	6.8	2.6	0.18	19	23	8	15	.5	22.71	15	40	14.7	12.3	4.7	0.32		
6	0	57	13	57	30.71	-13	18	22.8	6.9	2.6	0.18	20	23	1	15	2	21.17	-15	13	38.7	12.0	4.6	0.32		
7	0	59	14	2	55.26	13	54	46.1	6.9	2.6	0.18	21	22	55	15	0	1.76	14	51	57.0	11.7	4.4	0.31		
8	1	0	14	8	18.07	14	30	22.2	7.0	2.6	0.18	22	22	49	14	58	25.94	14	35	24.4	11.4	4.3	0.30		
9	1	1	14	13	39.10	15	5	9.4	7.0	2.7	0.18	23	22	44	14	57	33.68	14	24	2.1	11.1	4.2	0.29		
10	1	3	14	18	58.26	15	39	6.3	7.1	2.7	0.19	24	22	40	14	57	23.73	14	17	41.4	10.8	4.1	0.28		
11	1	4	14	24	15.42	-16	12	11.2	7.2	2.7	0.19	25	22	37	14	57	53.97	-14	16	4.7	10.5	4.0	0.27		
12	1	5	14	29	30.44	16	44	23.2	7.3	2.8	0.19	26	22	34	14	59	1.70	14	18	49.3	10.2	3.9	0.27		
13	1	7	14	34	43.12	17	15	37.8	7.3	2.8	0.19	27	22	32	15	0	43.93	14	25	29.6	9.9	3.8	0.26		
14	1	8	14	39	53.24	17	45	56.0	7.4	2.8	0.20	28	22	30	15	2	57.58	14	35	38.2	9.6	3.7	0.25		
15	1	9	14	45	0.52	18	15	14.6	7.5	2.9	0.20	29	22	29	15	5	39.55	14	48	48.0	9.4	3.6	0.25		
16	1	10	14	50	4.61	-18	43	31.5	7.6	2.9	0.20	30	22	28	15	8	46.91	-15	4	82.7	9.1	3.5	0.24		
17	1	11	14	55	5.15	19	10	44.4	7.7	2.9	0.21	Dec. 1	22	28	15	12	16.96	15	22	27.6	8.9	3.4	0.23		
18	1	12	15	0	1.67	19	36	50.9	7.8	3.0	0.21	2	22	27	15	16	7.18	15	42	9.9	8.7	3.3	0.23		
19	1	13	15	4	53.65	20	1	48.3	7.9	3.0	0.21	3	22	28	15	20	15.31	16	3	18.8	8.5	3.2	0.22		
20	1	14	15	9	40.49	20	25	33.8	8.0	3.0	0.22	4	22	28	15	24	39.38	16	25	35.9	8.3	3.2	0.22		
21	1	15	15	14	21.47	-20	48	4.3	8.2	3.1	0.22	5	22	29	15	29	17.59	-16	48	44.2	8.1	3.1	0.22		
22	1	15	15	18	55.83	21	9	16.4	8.3	3.1	0.22	6	22	30	15	34	8.36	17	12	29.1	8.0	3.0	0.21		
23	1	16	15	23	22.66	21	29	6.9	8.4	3.2	0.23	7	22	31	15	39	10.34	17	36	37.4	7.8	3.0	0.21		
24	1	16	15	27	40.91	21	47	31.5	8.6	3.3	0.23	8	22	32	15	44	22.36	18	0	57.8	7.7	2.9	0.21		
25	1	16	15	31	49.43	22	4	26.0	8.7	3.3	0.24	9	22	33	15	49	43.37	18	25	19.9	7.6	2.9	0.20		
26	1	16	15	35	46.89	-22	19	45.7	8.9	3.4	0.24	10	22	35	15	55	12.47	-18	49	34.8	7.5	2.8	0.20		
27	1	16	15	39	31.83	22	33	25.5	9.1	3.4	0.25	11	22	37	16	0	48.90	19	13	34.6	7.3	2.8	0.20		
28	1	16	15	43	2.60	22	45	19.6	9.3	3.5	0.25	12	22	38	16	6	31.98	19	37	12.3	7.2	2.8	0.20		
29	1	15	15	46	17.35	22	55	21.8	9.5	3.6	0.26	13	22	40	16	12	21.12	20	0	21.9	7.1	2.7	0.19		
30	1	14	15	49	14.06	23	3	24.9	9.7	3.7	0.27	14	22	42	16	18	15.82	20	22	57.8	7.1	2.7	0.19		
31	1	13	15	51	50.52	-23	9	20.7	9.9	3.8	0.27	15	22	44	16	24	15.65	-20	44	55.2	7.0	2.7	0.19		
Nov. 1	1	11	15	54	4.31	23	13	0.8	10.1	3.8	0.28	16	22	46	16	30	20.21	21	6	9.6	6.9	2.6	0.19		
2	1	9	15	55	52.89	23	14	15.7	10.3	3.9	0.29	17	22	49	16	36	29.18	21	26	37.4	6.8	2.6	0.19		
3	1	6	15	57	13.56	23	12	54.6	10.6	4.0	0.29	18	22	51	16	42	42.25	21	46	14.9	6.8	2.6	0.18		
4	1	3	15	58	3.61	23	8	46.0	10.9	4.1	0.30	19	22	53	16	48	59.17	22	4	58.9	6.7	2.5	0.18		
5	1	0	15	59	20.35	-23	1	37.8	11.1	4.2	0.31	20	22	56	16	55	19.72	-22	22	46.7	6.6	2.5	0.18		
6	0	55	15	58	1.28	22	51	17.6	11.4	4.3	0.31	21	22	58	17	1	43.68	22	39	35.4	6.6	2.5	0.18		
7	0	51	15	57	4.34	22	37	33.3	11.7	4.4	0.32	22	23	1	17	8	10.87	22	55	22.8	6.5	2.5	0.18		
8	0	45	15	55	28.03	22	20	14.1	11.9	4.5	0.33	23	23	3	17	14	41.12	23	10	6.6	6.5	2.5	0.18		
9	0	39	15	53	11.80	21	59	12.4	12.2	4.6	0.33	24	23	6	17	21	14.28	23	23	44.6	6.4	2.4	0.18		
10	0	32	15	50	16.24	-21	34	24.9	12.4	4.7	0.34	25	23	8	17	27	50.23	-23	36	15.0	6.4	2.4	0.18		
11	0	24	15	46	43.51	21	5	55.5	12.6	4.8	0.34	26	23	11	17	34	28.33	23	47	35.9	6.4	2.4	0.18		
12	0	16	15	42	37.43	20	33	57.3	12.8	4.8	0.34	27	23	14	17	41	9.94	23	57	45.7	6.3	2.4	0.18		
13	0	8	15	38	3.64	19	58	54.9	12.9	4.9	0.35	28	23	17	17	47	53.45	24	6	42.6	6.3	2.4	0.17		
14	23	59	15	33	9.55	19	21	25.9	13.0	4.9	0.35	29	23	19	17	54	39.25	24	14	25.2	6.3	2.4	0.17		
15	23	50	15	28	3.99	-18	42	20.4	13.0	4.9	0.35	30	23	22	18	1	27.23	-24	20	52.0	6.3	2.4	0.17		
												31	23	25	18	8	17.27	-24	26	1.6	6.3	2.4	0.17		

FOR TRANSIT AT WASHINGTON.

Date.	Wash. Mean Time.	Apparent Right Ascension.	Apparent Declination.	Hor. Par.	Semidiam.	S. T. of Sem. Pass. Mer.	Date.	Wash. Mean Time.	Apparent Right Ascension.	Apparent Declination.	Hor. Par.	Semidiam.	S. T. of Sem. Pass. Mer.
	h m s	h m s	° ' "	"	"	"		h m s	h m s	° ' "	"	"	"
Jan. 0	21 01 54 0	5 25	-16 58 45.8	9.1	8.7	0.60	Feb. 15	21 54 19 34 50.96	-21 9 39.9	6.9	6.6	0.47	
1	21 11 54 44 50.63	17 15 46.3	9.0	8.6	0.60	16	21 55 19 40 2.23	21 0 51.0	6.9	6.6	0.47		
2	21 21 54 49 37.37	17 32 25.2	9.0	8.5	0.60	17	21 56 19 45 13.85	20 51 25.0	6.9	6.5	0.47		
3	21 31 54 54 25.44	17 48 41.6	8.9	8.5	0.60	18	21 57 19 50 24.88	20 41 22.2	6.8	6.5	0.46		
4	21 41 54 59 14.84	18 4 34.9	8.8	8.4	0.59	19	21 59 19 55 35.28	20 30 43.0	6.8	6.5	0.46		
5	21 51 54 56 4 5.56	-18 20 4.1	8.8	8.4	0.59	20	22 0 20 0 45.00	-20 19 27.7	6.8	6.4	0.46		
6	21 61 54 57 59	18 35 8.6	8.7	8.3	0.58	21	22 1 20 5 54.00	20 7 36.8	6.7	6.4	0.46		
7	21 71 54 50 9.2	18 49 47.5	8.6	8.2	0.58	22	22 2 20 11 2.25	19 55 10.7	6.7	6.4	0.45		
8	21 81 54 18 45.51	19 4 0.2	8.6	8.2	0.58	23	22 3 20 16 9.71	19 42 9.7	6.7	6.4	0.45		
9	21 91 54 23 41.85	19 17 45.8	8.5	8.1	0.57	24	22 4 20 21 16.36	19 28 34.5	6.6	6.3	0.45		
10	21 101 54 28 38.42	-19 31 3.7	8.5	8.1	0.57	25	22 5 20 26 22.16	-19 14 25.3	6.6	6.3	0.45		
11	21 110 54 33 36.69	19 43 53.2	8.4	8.0	0.57	26	22 6 20 31 27.99	18 59 42.7	6.6	6.3	0.44		
12	21 120 54 38 36.14	19 56 13.5	8.4	8.0	0.57	27	22 7 20 36 31.14	18 44 27.2	6.6	6.3	0.44		
13	21 130 54 43 36.72	20 8 4.0	8.3	7.9	0.56	28	22 8 20 41 34.29	18 28 39.3	6.5	6.2	0.44		
14	21 140 54 48 38.40	20 19 24.0	8.2	7.9	0.56	29	22 9 20 46 38.50	18 12 19.5	6.5	6.2	0.44		
15	21 150 54 53 41.15	-20 30 12.9	8.2	7.8	0.56	Mar. 1	22 11 20 51 37.76	-17 55 28.3	6.5	6.2	0.43		
16	21 160 54 58 44.95	20 40 30.0	8.1	7.8	0.55	2	22 12 20 56 38.09	17 38 6.5	6.5	6.2	0.43		
17	21 170 54 3 49.74	20 50 14.7	8.1	7.7	0.55	3	22 13 21 1 37.45	17 20 14.4	6.4	6.1	0.43		
18	21 180 54 8 55.48	20 59 26.6	8.0	7.7	0.55	4	22 14 21 6 35.85	17 1 52.6	6.4	6.1	0.43		
19	21 190 54 14 2.13	21 8 5.2	8.0	7.6	0.55	5	22 15 21 11 33.27	16 43 1.7	6.4	6.1	0.42		
20	21 200 54 17 19 9.66	-21 16 9.6	7.9	7.6	0.54	6	22 16 21 16 29.71	-16 23 42.4	6.4	6.1	0.42		
21	21 210 54 22 18.02	21 23 39.7	7.9	7.5	0.54	7	22 17 21 21 25.16	16 3 55.3	6.3	6.0	0.42		
22	21 220 54 27 17.05	21 30 34.9	7.8	7.5	0.54	8	22 18 21 26 19.64	15 43 41.0	6.3	6.0	0.42		
23	21 230 54 32 17.00	21 36 54.7	7.8	7.4	0.53	9	22 19 21 31 13.14	15 23 0.2	6.3	6.0	0.42		
24	21 240 54 37 17.53	21 42 38.6	7.8	7.4	0.53	10	22 20 21 36 5.64	15 1 53.5	6.3	6.0	0.41		
25	21 250 54 42 18.70	-21 47 46.4	7.7	7.4	0.53	11	22 21 21 40 57.17	-14 40 21.5	6.2	5.9	0.41		
26	21 260 54 47 10.46	21 52 17.7	7.7	7.3	0.53	12	22 22 21 45 47.73	14 18 25.0	6.2	5.9	0.41		
27	21 270 54 52 22.75	21 56 12.1	7.6	7.3	0.52	13	22 23 21 50 37.32	13 56 4.7	6.2	5.9	0.41		
28	21 280 54 57 35.53	21 59 29.3	7.6	7.2	0.52	14	22 24 21 55 25.96	13 33 21.1	6.2	5.9	0.40		
29	21 290 54 52 48.75	22 2 9.0	7.5	7.2	0.52	15	22 25 22 0 13.65	13 10 15.1	6.1	5.9	0.40		
30	21 300 54 18 11 2.34	-22 4 11.0	7.5	7.2	0.52	16	22 26 22 5 0.40	-12 46 47.2	6.1	5.8	0.40		
31	21 310 54 18 16 16.27	22 5 35.1	7.5	7.1	0.51	17	22 26 22 9 46.23	12 22 58.3	6.1	5.8	0.40		
Feb. 1	21 320 54 23 18 44.95	22 6 20.9	7.4	7.1	0.51	18	22 27 22 14 31.15	11 58 48.9	6.1	5.8	0.40		
2	21 330 54 28 18 44.95	22 6 28.6	7.4	7.0	0.51	19	22 28 22 19 15.17	11 34 19.3	6.1	5.8	0.39		
3	21 340 54 33 18 59.59	22 5 57.5	7.3	7.0	0.51	20	22 29 22 23 58.32	11 9 31.7	6.0	5.8	0.39		
4	21 350 54 38 17 14.35	-22 4 48.1	7.3	7.0	0.50	21	22 29 22 28 40.61	-10 44 25.2	6.0	5.7	0.39		
5	21 410 54 43 29.19	22 2 59.9	7.3	6.9	0.50	22	22 30 22 33 22.06	10 19 1.2	6.0	5.7	0.39		
6	21 420 54 48 44.07	22 0 33.1	7.2	6.9	0.50	23	22 31 22 38 2.70	9 53 20.4	6.0	5.7	0.39		
7	21 430 54 53 58.91	21 57 27.5	7.2	6.9	0.49	24	22 32 22 42 42.54	9 27 23.3	6.0	5.7	0.38		
8	21 440 54 59 13.67	21 53 43.4	7.2	6.8	0.49	25	22 32 22 47 21.62	9 1 10.7	5.9	5.7	0.38		
9	21 460 54 3 28.29	-21 49 20.6	7.1	6.8	0.49	26	22 33 22 51 59.35	-8 34 43.3	5.9	5.6	0.38		
10	21 470 54 8 42.71	21 44 19.3	7.1	6.8	0.49	27	22 34 22 56 37.56	8 8 1.7	5.9	5.6	0.38		
11	21 480 54 13 56.88	21 38 39.6	7.1	6.7	0.48	28	22 34 23 1 14.54	7 41 6.8	5.9	5.6	0.38		
12	21 500 54 19 19 10.75	21 32 21.6	7.0	6.7	0.48	29	22 35 23 5 50.36	7 13 59.1	5.9	5.6	0.38		
13	21 510 54 24 24.27	21 25 25.4	7.0	6.7	0.48	30	22 36 23 10 26.55	6 46 39.3	5.8	5.6	0.37		
14	21 520 54 29 37.39	-21 17 51.5	7.0	6.6	0.48	31	22 36 23 15 1.67	-6 19 8.2	5.8	5.6	0.37		
15	21 540 54 34 50.06	-21 9 39.9	6.9	6.6	0.47	Apr. 1	22 37 23 19 36.25	-5 51 26.3	5.8	5.6	0.37		

FOR TRANSIT AT WASHINGTON.

Date.	Wash. Mean Time.	Apparent Right Ascension.	Apparent Declination.	Hor. Par.	Semidiam.	S. T. of Sem. Pass. Mer.	Date.	Wash. Mean Time.	Apparent Right Ascension.	Apparent Declination.	Hor. Par.	Semidiam.	S. T. of Sem. Pass. Mer.
	h m	h m s	" "	" "	" "	" "		h m	h m s	" "	" "	" "	" "
Apr. 1	22 37	23 19 36.25	- 5 51 28.3	5.8	5.6	0.37	May 17	23 7	2 51 1.44	+15 15 21.2	5.2	5.0	0.35
2	22 38	23 24 10.32	5 23 34.3	5.8	5.5	0.37	18	23 8	2 55 51.76	15 38 19.5	5.2	5.0	0.35
3	22 38	23 28 43.92	4 55 33.1	5.8	5.5	0.37	19	23 9	3 0 43.14	16 0 54.7	5.2	5.0	0.35
4	22 39	23 33 17.09	4 27 23.2	5.8	5.5	0.37	20	23 10	3 5 35.59	16 23 6.0	5.2	5.0	0.35
5	22 39	23 37 49.87	3 59 5.3	5.7	5.5	0.37	21	23 11	3 10 29.12	16 44 52.7	5.2	5.0	0.35
6	22 40	23 42 22.29	- 3 30 40.2	5.7	5.5	0.37	22	23 12	3 15 23.75	+17 6 13.9	5.2	5.0	0.35
7	22 41	23 46 54.38	3 2 8.5	5.7	5.5	0.36	23	23 13	3 20 19.49	17 27 9.2	5.2	5.0	0.35
8	22 41	23 51 26.19	2 33 30.9	5.7	5.4	0.36	24	23 14	3 25 16.33	17 47 37.7	5.2	4.9	0.35
9	22 42	23 55 57.75	2 4 48.0	5.7	5.4	0.36	25	23 15	3 30 14.29	18 7 38.9	5.2	4.9	0.35
10	22 42	0 0 29.10	1 36 0.7	5.7	5.4	0.36	26	23 16	3 35 13.37	18 27 11.8	5.2	4.9	0.35
11	22 43	0 5 0.29	- 1 7 9.6	5.6	5.4	0.36	27	23 17	3 40 13.56	+18 46 16.0	5.2	4.9	0.35
12	22 43	0 9 31.34	0 38 15.4	5.6	5.4	0.36	28	23 18	3 45 14.88	19 4 50.6	5.2	4.9	0.35
13	22 44	0 14 2.29	- 0 9 18.8	5.6	5.4	0.36	29	23 19	3 50 17.30	19 22 55.1	5.2	4.9	0.35
14	22 45	0 18 33.18	+ 0 19 39.6	5.6	5.3	0.36	30	23 20	3 55 20.84	19 40 28.7	5.2	4.9	0.35
15	22 45	0 23 4.05	0 48 39.0	5.6	5.3	0.36	31	23 21	4 0 25.50	19 57 30.7	5.2	4.9	0.35
16	22 46	0 27 34.93	+ 1 17 38.6	5.6	5.3	0.36	June 1	23 22	4 5 31.25	+20 14 0.7	5.1	4.9	0.35
17	22 46	0 32 5.86	1 46 37.8	5.6	5.3	0.35	2	23 23	4 10 38.06	20 29 57.8	5.1	4.9	0.35
18	22 47	0 36 36.88	2 15 35.9	5.5	5.3	0.35	3	23 25	4 15 45.95	20 45 21.6	5.1	4.9	0.35
19	22 47	0 41 8.02	2 44 32.3	5.5	5.3	0.35	4	23 26	4 20 54.89	21 0 11.3	5.1	4.9	0.35
20	22 48	0 45 39.32	3 13 26.1	5.5	5.3	0.35	5	23 27	4 26 4.86	21 14 26.3	5.1	4.9	0.35
21	22 49	0 50 10.83	+ 3 42 16.8	5.5	5.3	0.35	6	23 28	4 31 15.83	+21 28 6.1	5.1	4.9	0.35
22	22 49	0 54 42.57	4 11 3.5	5.5	5.2	0.35	7	23 29	4 36 27.79	21 41 10.2	5.1	4.9	0.35
23	22 50	0 59 14.58	4 39 45.6	5.5	5.2	0.35	8	23 31	4 41 40.71	21 53 37.9	5.1	4.9	0.35
24	22 50	1 3 46.90	5 8 22.4	5.5	5.2	0.35	9	23 32	4 46 54.55	22 5 28.7	5.1	4.9	0.35
25	22 51	1 8 19.57	5 36 53.3	5.5	5.2	0.35	10	23 33	4 52 9.29	22 16 42.1	5.1	4.9	0.35
26	22 52	1 12 52.63	+ 6 5 17.5	5.4	5.2	0.35	11	23 35	4 57 24.87	+22 27 17.6	5.1	4.9	0.35
27	22 52	1 17 26.13	6 33 34.4	5.4	5.2	0.35	12	23 36	5 2 41.27	22 37 14.8	5.1	4.9	0.35
28	22 53	1 22 0.09	7 1 43.2	5.4	5.2	0.35	13	23 37	5 7 58.45	22 46 33.1	5.1	4.9	0.35
29	22 53	1 26 34.56	7 29 43.3	5.4	5.2	0.35	14	23 39	5 13 16.34	22 55 12.2	5.1	4.9	0.35
30	22 54	1 31 9.58	7 57 33.9	5.4	5.2	0.35	15	23 40	5 18 34.92	23 3 11.6	5.1	4.9	0.35
May 1	22 55	1 35 45.18	+ 8 25 14.3	5.4	5.1	0.35	16	23 41	5 23 54.13	+23 10 31.0	5.1	4.9	0.35
2	22 55	1 40 21.39	8 52 43.9	5.4	5.1	0.35	17	23 43	5 29 13.92	23 17 10.0	5.1	4.9	0.35
3	22 56	1 44 58.27	9 20 2.1	5.4	5.1	0.35	18	23 44	5 34 34.24	23 23 8.4	5.1	4.8	0.35
4	22 57	1 49 35.84	9 47 8.0	5.4	5.1	0.35	19	23 46	5 39 55.02	23 28 25.8	5.1	4.8	0.35
5	22 57	1 54 14.14	10 14 0.8	5.3	5.1	0.35	20	23 47	5 45 16.22	23 33 1.8	5.1	4.8	0.35
6	22 58	1 58 53.20	+10 40 40.0	5.3	5.1	0.35	21	23 48	5 50 37.80	+23 36 56.4	5.1	4.8	0.35
7	22 59	2 3 33.06	11 7 4.8	5.3	5.1	0.35	22	23 50	5 55 59.68	23 40 9.3	5.1	4.8	0.35
8	23 0	2 8 13.74	11 33 14.5	5.3	5.1	0.35	23	23 51	6 1 21.81	23 42 40.2	5.1	4.8	0.35
9	23 0	2 12 55.28	11 59 8.4	5.3	5.1	0.35	24	23 53	6 6 44.14	23 44 29.1	5.1	4.8	0.35
10	23 1	2 17 37.70	12 24 45.7	5.3	5.1	0.35	25	23 54	6 12 6.81	23 45 35.8	5.1	4.8	0.35
11	23 2	2 22 21.03	+12 30 5.6	5.3	5.1	0.35	26	23 56	6 17 29.16	+23 46 0.3	5.1	4.8	0.35
12	23 3	2 27 5.30	13 15 7.6	5.3	5.0	0.35	27	23 57	6 22 51.74	23 45 42.3	5.1	4.8	0.35
13	23 3	2 31 50.53	13 39 59.8	5.3	5.0	0.35	28	23 58	6 28 14.30	23 44 42.1	5.1	4.8	0.35
14	23 4	2 36 36.73	14 4 14.4	5.3	5.0	0.35	30	0 0	6 38 36.76	23 42 59.6	5.1	4.8	0.35
15	23 5	2 41 23.95	14 28 17.9	5.3	5.0	0.35	July 1	0 1	6 38 59.07	23 40 34.7	5.1	4.8	0.35
16	23 6	2 46 12.18	+14 52 0.4	5.2	5.0	0.35	2	0 3	6 44 21.20	+23 37 27.4	5.1	4.8	0.35
17	23 7	2 51 1.44	+15 15 21.2	5.2	5.0	0.35	3	0 4	6 49 43.06	+23 33 38.0	5.1	4.8	0.35

FOR TRANSIT AT WASHINGTON.

Date.	Wash. Mean Time.	Apparent Right Ascension.	Apparent Declination.	Hor. Par.	Semidiam.	S. T. of Sem. Pass. Mer.	Date.	Wash. Mean Time.	Apparent Right Ascension.	Apparent Declination.	Hor. Par.	Semidiam.	S. T. of Sem. Pass. Mer.
	h m	h m s	" " "	"	" "	s		h m	h m s	" " "	"	" "	s
July 1	0 1	6 38 59.07	+23 40 34.7	5.1	4.8	0.35	Aug. 16	0 53	10 31 53.98	+10 47 37.4	5.2	5.0	0.34
2	0 3	6 44 21.20	23 37 27.4	5.1	4.8	0.35	17	0 53	10 36 33.67	10 20 0.6	5.3	5.0	0.34
3	0 4	6 49 43.06	23 33 38.0	5.1	4.8	0.35	18	0 54	10 41 12.49	9 52 7.4	5.3	5.0	0.34
4	0 5	6 55 4.62	23 29 6.6	5.1	4.8	0.35	19	0 55	10 45 50.47	9 23 58.3	5.3	5.0	0.34
5	0 7	7 0 25.81	23 23 63.2	5.1	4.8	0.35	20	0 55	10 50 27.66	8 55 34.1	5.3	5.0	0.34
6	0 8	7 5 46.53	+23 17 58.1	5.1	4.8	0.35	21	0 55	10 55 4.08	+ 8 28 55.6	5.3	5.1	0.34
7	0 10	7 11 6.88	23 11 21.4	5.1	4.8	0.35	22	0 56	10 59 39.78	7 58 3.6	5.3	5.1	0.34
8	0 11	7 16 26.66	23 4 3.5	5.1	4.8	0.35	23	0 57	11 4 14.77	7 28 58.8	5.3	5.1	0.34
9	0 12	7 21 45.87	22 56 4.5	5.1	4.8	0.35	24	0 57	11 8 49.11	6 59 41.9	5.3	5.1	0.34
10	0 14	7 27 4.46	22 47 24.8	5.1	4.8	0.35	25	0 58	11 13 22.82	6 30 13.7	5.3	5.1	0.34
11	0 15	7 32 22.38	+22 38 4.8	5.1	4.8	0.35	26	0 59	11 17 55.94	+ 6 0 34.7	5.3	5.1	0.34
12	0 16	7 37 39.58	22 28 4.8	5.1	4.8	0.35	27	1 0	11 22 28.50	5 30 45.8	5.3	5.1	0.34
13	0 18	7 42 56.01	22 17 25.2	5.1	4.8	0.35	28	1 0	11 27 0.57	5 0 47.7	5.4	5.1	0.34
14	0 19	7 48 11.65	22 6 6.3	5.1	4.8	0.35	29	1 1	11 31 32.18	4 30 41.1	5.4	5.1	0.34
15	0 20	7 53 26.44	21 54 8.5	5.1	4.9	0.35	30	1 2	11 36 3.36	4 0 26.6	5.4	5.1	0.34
16	0 22	7 58 40.34	+21 41 32.5	5.1	4.9	0.35	31	1 2	11 40 34.15	+ 3 30 5.0	5.4	5.2	0.34
17	0 23	8 3 53.31	21 28 18.6	5.1	4.9	0.35	Sept. 1	1 3	11 45 4.61	2 59 37.1	5.4	5.2	0.34
18	0 24	8 9 5.32	21 14 27.3	5.1	4.9	0.35	2	1 3	11 49 34.77	2 29 3.4	5.4	5.2	0.34
19	0 25	8 14 16.33	20 59 59.3	5.1	4.9	0.35	3	1 4	11 54 4.68	1 58 24.8	5.4	5.2	0.34
20	0 27	8 19 26.33	20 44 55.0	5.1	4.9	0.35	4	1 4	11 58 34.39	1 27 42.1	5.4	5.2	0.35
21	0 28	8 24 35.27	+20 29 14.9	5.1	4.9	0.35	5	1 5	12 3 3.94	+ 0 56 55.7	5.4	5.2	0.35
22	0 29	8 29 43.13	20 12 59.6	5.1	4.9	0.35	6	1 5	12 7 33.37	+ 0 26 6.5	5.5	5.2	0.35
23	0 30	8 34 49.90	19 56 9.8	5.1	4.9	0.35	7	1 6	12 12 2.72	- 0 4 44.9	5.5	5.2	0.35
24	0 31	8 39 55.55	19 38 46.0	5.1	4.9	0.35	8	1 7	12 16 32.04	0 35 37.5	5.5	5.2	0.35
25	0 33	8 45 0.77	19 20 48.8	5.1	4.9	0.35	9	1 7	12 21 1.37	1 6 30.9	5.5	5.2	0.35
26	0 34	8 50 3.45	+19 2 18.9	5.1	4.9	0.35	10	1 8	12 25 30.75	- 1 37 24.1	5.5	5.3	0.35
27	0 35	8 55 5.68	18 43 16.8	5.1	4.9	0.34	11	1 8	12 30 0.23	2 8 16.4	5.5	5.3	0.35
28	0 36	9 0 6.75	18 23 43.3	5.1	4.9	0.34	12	1 9	12 34 29.84	2 89 7.2	5.5	5.3	0.35
29	0 37	9 5 6.65	18 3 38.9	5.1	4.9	0.34	13	1 9	12 38 59.63	3 9 55.8	5.5	5.3	0.35
30	0 38	9 10 5.39	17 43 4.5	5.1	4.9	0.34	14	1 10	12 43 29.63	3 40 41.4	5.6	5.3	0.35
31	0 39	9 15 2.96	+17 22 0.5	5.1	4.9	0.34	15	1 10	12 47 59.89	- 4 11 23.2	5.6	5.3	0.36
Aug. 1	0 40	9 19 59.37	17 0 27.7	5.1	4.9	0.34	16	1 11	12 52 30.44	4 42 0.5	5.6	5.3	0.36
2	0 41	9 24 54.62	16 38 26.7	5.2	4.9	0.34	17	1 12	12 57 1.33	5 12 32.5	5.6	5.4	0.36
3	0 42	9 29 48.72	16 15 58.4	5.2	4.9	0.34	18	1 12	13 1 32.60	5 42 58.6	5.6	5.4	0.36
4	0 43	9 34 41.70	15 53 3.2	5.2	4.9	0.34	19	1 13	13 6 4.29	6 13 17.9	5.6	5.4	0.36
5	0 44	9 39 33.54	+15 29 42.0	5.2	4.9	0.34	20	1 13	13 10 36.44	- 6 49 29.6	5.6	5.4	0.36
6	0 45	9 44 24.26	15 5 55.5	5.2	4.9	0.34	21	1 14	13 15 9.08	7 13 33.0	5.7	5.4	0.36
7	0 45	9 49 13.89	14 41 44.4	5.2	4.9	0.34	22	1 15	13 19 42.26	7 43 27.5	5.7	5.4	0.36
8	0 46	9 54 2.42	14 17 9.4	5.2	5.0	0.34	23	1 15	13 24 16.02	8 13 12.3	5.7	5.4	0.36
9	0 47	9 58 49.89	13 52 11.2	5.2	5.0	0.34	24	1 16	13 28 50.39	8 42 46.7	5.7	5.4	0.37
10	0 48	10 3 36.32	+13 36 50.6	5.2	5.0	0.34	25	1 16	13 33 35.42	- 9 12 9.8	5.7	5.5	0.37
11	0 49	10 8 21.71	13 1 8.3	5.2	5.0	0.34	26	1 17	13 38 1.15	9 41 21.0	5.7	5.5	0.37
12	0 50	10 13 6.09	12 85 5.0	5.2	5.0	0.34	27	1 18	13 42 37.61	10 10 19.6	5.8	5.5	0.37
13	0 50	10 17 49.49	12 8 41.6	5.2	5.0	0.34	28	1 18	13 47 14.34	10 30 4.6	5.8	5.5	0.37
14	0 51	10 22 31.92	11 41 58.2	5.2	5.0	0.34	29	1 19	13 51 52.80	11 7 35.4	5.8	5.5	0.37
15	0 52	10 27 13.40	+11 14 57.0	5.2	5.0	0.34	30	1 20	13 56 31.78	- 11 35 51.2	5.8	5.5	0.38
16	0 53	10 31 58.98	+10 47 37.4	5.2	5.0	0.34	Oct. 1	1 20	14 1 11.56	- 12 3 51.3	5.8	5.6	0.38

FOR TRANSIT AT WASHINGTON.

Date.	Wash. Mean Time.	Apparent Right Ascension.	Apparent Declination.	Hor. Par.	Semidiam.	S. T. of Sem. Pass. Mer.	Date.	Wash. Mean Time.	Apparent Right Ascension.	Apparent Declination.	Hor. Par.	Semidiam.	S. T. of Sem. Pass. Mer.
	h m	h m s l	" " "	"	" "	" s		h m	h m s	" " "	"	" "	" s
Oct. 1	1 20	14 111.56	-12 3 51.3	5.8	5.6	0.33	Nov. 15	2 11	17 49 38.32	-25 7 59.3	6.9	6.6	0.48
2	1 21	14 552.25	12 31 35.0	5.8	5.6	0.33	16	2 13	17 55 1.92	25 10 53.6	6.9	6.6	0.49
3	1 22	14 10 33.90	12 59 1.3	5.9	5.8	0.33	17	2 14	18 0 25.62	25 13 3.1	6.9	6.6	0.49
4	1 23	14 15 16.54	13 26 9.8	5.9	5.6	0.33	18	2 15	18 5 49.32	25 14 27.7	7.0	6.7	0.49
5	1 24	14 20 0.19	13 52 59.0	5.9	5.6	0.39	19	2 17	18 11 12.96	25 15 7.5	7.0	6.7	0.49
6	1 24	14 24 44.88	-14 19 29.0	5.9	5.6	0.39	20	2 19	18 16 36.48	-25 15 2.2	7.0	6.7	0.49
7	1 25	14 29 30.65	14 45 38.4	5.9	5.7	0.39	21	2 20	18 21 59.78	25 14 12.0	7.1	6.8	0.50
8	1 26	14 34 17.51	15 11 26.7	5.9	5.7	0.39	22	2 21	18 27 22.80	25 12 36.8	7.1	6.8	0.50
9	1 27	14 39 5.49	15 36 53.1	6.0	5.7	0.39	23	2 23	18 32 45.46	25 10 16.8	7.1	6.8	0.50
10	1 28	14 43 54.62	16 1 56.6	6.0	5.7	0.40	24	2 24	18 38 7.70	25 7 12.0	7.2	6.8	0.50
11	1 29	14 48 44.90	-16 26 36.7	6.0	5.7	0.40	25	2 26	18 43 29.46	-25 3 22.5	7.2	6.9	0.51
12	1 29	14 53 36.35	16 50 52.4	6.0	5.8	0.40	26	2 27	18 48 50.65	24 58 48.6	7.2	6.9	0.51
13	1 30	14 58 28.97	17 14 43.0	6.0	5.8	0.40	27	2 29	18 54 11.21	24 53 30.5	7.3	7.0	0.51
14	1 31	15 3 22.80	17 38 7.7	6.1	5.8	0.40	28	2 30	18 59 31.09	24 47 28.4	7.3	7.0	0.51
15	1 32	15 8 17.83	18 1 5.6	6.1	5.8	0.41	29	2 31	19 4 50.22	24 40 42.6	7.4	7.0	0.52
16	1 33	15 13 14.07	-18 23 36.0	6.1	5.8	0.41	30	2 33	19 10 8.54	-24 33 13.3	7.4	7.1	0.52
17	1 34	15 18 11.51	18 45 38.2	6.1	5.8	0.41	Dec. 1	2 34	19 15 25.98	24 25 1.0	7.4	7.1	0.52
18	1 35	15 23 10.17	19 7 11.5	6.1	5.9	0.41	2	2 35	19 20 42.49	24 16 6.0	7.5	7.1	0.52
19	1 36	15 28 10.05	19 28 14.8	6.2	5.9	0.42	3	2 37	19 25 58.02	24 6 28.7	7.5	7.2	0.52
20	1 38	15 33 11.14	19 48 47.6	6.2	5.9	0.42	4	2 38	19 31 12.50	23 56 9.6	7.6	7.2	0.53
21	1 39	15 38 13.43	-20 8 49.2	6.2	5.9	0.42	5	2 39	19 36 25.89	-23 45 9.0	7.6	7.2	0.53
22	1 40	15 43 16.93	20 28 17.7	6.2	6.0	0.42	6	2 40	19 41 38.13	23 33 27.5	7.6	7.3	0.53
23	1 41	15 48 21.62	20 47 15.3	6.3	6.0	0.43	7	2 42	19 46 49.17	23 21 5.7	7.7	7.3	0.53
24	1 42	15 53 27.49	21 5 38.5	6.3	6.0	0.43	8	2 43	19 51 58.97	23 8 4.1	7.7	7.4	0.53
25	1 43	15 58 34.52	21 23 27.5	6.3	6.0	0.43	9	2 44	19 57 7.47	22 54 23.2	7.8	7.4	0.54
26	1 44	16 3 42.70	-21 40 41.6	6.3	6.0	0.43	10	2 45	20 2 14.63	-22 40 3.6	7.8	7.5	0.54
27	1 46	16 8 52.01	21 57 20.0	6.4	6.1	0.44	11	2 46	20 7 20.41	22 25 6.0	7.9	7.5	0.54
28	1 47	16 14 2.42	22 13 22.3	6.4	6.1	0.44	12	2 48	20 12 24.76	22 9 30.9	7.9	7.5	0.54
29	1 48	16 19 13.93	22 28 47.7	6.4	6.1	0.44	13	2 49	20 17 27.67	21 53 19.1	8.0	7.6	0.55
30	1 49	16 24 26.50	22 43 35.5	6.4	6.1	0.44	14	2 50	20 22 29.06	21 36 31.2	8.0	7.6	0.55
31	1 51	16 29 40.09	-22 57 45.0	6.5	6.2	0.45	15	2 51	20 27 28.94	-21 19 8.0	8.0	7.7	0.55
Nov. 1	1 52	16 34 54.68	23 11 15.9	6.5	6.2	0.45	16	2 52	20 32 27.26	21 1 10.1	8.1	7.7	0.55
2	1 53	16 40 10.24	23 24 7.4	6.5	6.2	0.45	17	2 53	20 37 23.98	20 42 38.3	8.1	7.8	0.55
3	1 55	16 45 26.72	23 36 19.1	6.5	6.2	0.45	18	2 54	20 42 19.10	20 23 33.2	8.2	7.8	0.56
4	1 56	16 50 44.08	23 47 50.4	6.6	6.3	0.46	19	2 55	20 47 12.59	20 3 55.7	8.2	7.9	0.56
5	1 57	16 56 2.29	-23 58 40.7	6.6	6.3	0.46	20	2 56	20 52 4.43	-19 43 46.5	8.3	7.9	0.56
6	1 59	17 1 21.29	24 8 49.6	6.6	6.3	0.46	21	2 57	20 56 54.60	19 23 6.4	8.3	8.0	0.56
7	2 0	17 6 41.03	24 18 16.6	6.6	6.3	0.46	22	2 57	21 1 43.09	19 156.1	8.4	8.0	0.57
8	2 1	17 12 1.45	24 27 1.3	6.7	6.4	0.47	23	2 58	21 6 29.88	18 40 16.3	8.5	8.1	0.57
9	2 3	17 17 22.50	24 35 3.8	6.7	6.4	0.47	24	2 59	21 11 14.98	18 18 8.1	8.5	8.1	0.57
10	2 4	17 22 44.11	-24 42 22.1	6.7	6.4	0.47	25	3 0	21 15 58.38	-17 55 31.9	8.6	8.2	0.57
11	2 6	17 28 6.21	24 48 57.6	6.8	6.5	0.47	26	3 1	21 20 40.08	17 32 28.6	8.6	8.2	0.57
12	2 7	17 33 28.76	24 54 49.3	6.8	6.5	0.48	27	3 1	21 25 30.08	17 8 59.1	8.7	8.3	0.58
13	2 8	17 38 51.67	24 59 57.0	6.8	6.5	0.48	28	3 2	21 29 58.37	16 45 4.0	8.7	8.3	0.58
14	2 10	17 44 14.68	25 4 20.4	6.8	6.5	0.48	29	3 3	21 34 34.97	16 20 44.1	8.8	8.4	0.58
15	2 11	17 49 38.32	-25 7 59.3	6.9	6.6	0.48	30	3 3	21 39 9.89	-15 56 0.3	8.9	8.5	0.59
16	2 13	17 55 1.92	25 10 53.6	6.9	6.6	0.49	31	3 4	21 43 43.13	-15 30 53.4	8.9	8.5	0.59



FOR TRANSIT AT WASHINGTON.

Date.	Wash. Mean Time.	Apparent Right Ascension.	Apparent Declination.	Hor. Par.	Semidiam.	S. T. of Sam. Pass. Mer.	Date.	Wash. Mean Time.	Apparent Right Ascension.	Apparent Declination.	Hor. Par.	Semidiam.	S. T. of Sam. Pass. Mer.
	h m s	h m s	" " "	" "	" "	" "		h m s	h m s	" " "	" "	" "	" "
Apr. 1	18 40	14 21 27.31	-11 53 11.9	18.5	7.2	0.49	May 17	9 42	13 23 57.38	- 8 23 35.3	14.2	7.6	0.51
2	18 35	14 20 51.68	11 49 49.0	18.6	7.3	0.50	18	9 37	13 23 13.16	8 21 57.7	14.2	7.5	0.51
3	18 30	14 19 33.36	11 46 3.1	13.7	7.3	0.50	19	9 33	13 22 31.94	8 20 36.2	14.1	7.5	0.50
4	18 25	14 18 32.40	11 42 12.4	13.8	7.4	0.50	20	9 28	13 21 53.78	8 19 31.0	14.0	7.4	0.50
5	18 21	14 17 28.86	11 38 11.4	13.9	7.4	0.50	21	9 24	13 21 18.69	8 18 42.3	13.9	7.4	0.50
6	18 16	14 16 22.83	-11 34 0.2	14.0	7.5	0.51	22	9 19	13 20 46.69	- 8 18 10.1	13.8	7.3	0.50
7	18 10	14 15 14.39	11 29 39.2	14.1	7.5	0.51	23	9 15	13 20 17.80	8 17 54.6	13.7	7.3	0.49
8	18 5	14 14 3.63	11 25 8.8	14.2	7.6	0.51	24	9 10	13 19 52.01	8 17 55.6	13.7	7.3	0.49
9	18 0	14 12 59.67	11 20 29.4	14.3	7.6	0.52	25	9 6	13 19 29.32	8 18 13.1	13.6	7.2	0.49
10	12 55	14 11 35.59	11 15 41.4	14.4	7.6	0.52	26	9 2	13 19 9.74	8 18 47.2	13.5	7.2	0.48
11	12 50	14 10 18.52	-11 10 45.3	14.5	7.7	0.52	27	8 58	13 18 53.24	- 8 19 37.7	13.4	7.1	0.48
12	12 45	14 8 59.59	11 5 41.6	14.5	7.7	0.52	28	8 53	13 18 39.81	8 20 44.5	13.3	7.1	0.48
13	12 39	14 7 38.93	11 0 30.8	14.6	7.8	0.53	29	8 49	13 18 29.42	8 22 7.4	13.2	7.0	0.47
14	12 34	14 6 16.67	10 55 13.6	14.7	7.8	0.53	30	8 45	13 18 22.06	8 23 46.6	13.1	7.0	0.47
15	12 29	14 4 52.98	10 49 50.6	14.7	7.8	0.53	31	8 41	13 18 17.69	8 25 41.6	13.0	6.9	0.47
16	12 23	14 3 28.01	-10 44 22.6	14.8	7.9	0.53	June 1	8 37	13 18 16.30	- 8 27 52.4	12.9	6.9	0.46
17	12 18	14 2 1.93	10 38 50.3	14.8	7.9	0.53	2	8 33	13 18 17.86	8 30 18.8	12.8	6.8	0.46
18	12 13	14 0 34.89	10 33 14.4	14.9	7.9	0.53	3	8 30	13 18 22.33	8 33 0.6	12.7	6.8	0.46
19	12 7	13 59 7.08	10 27 35.7	14.9	7.9	0.54	4	8 26	13 18 29.70	8 35 57.6	12.6	6.7	0.45
20	12 2	13 57 38.70	10 21 55.1	15.0	8.0	0.54	5	8 22	13 18 39.92	8 39 9.7	12.6	6.7	0.45
21	11 56	13 56 9.30	-10 16 13.3	15.0	8.0	0.54	6	8 18	13 18 52.96	- 8 42 36.5	12.5	6.6	0.45
22	11 51	13 54 40.86	10 10 31.1	15.0	8.0	0.54	7	8 15	13 19 8.80	8 46 17.9	12.4	6.6	0.44
23	11 46	13 53 11.79	10 4 49.4	15.0	8.0	0.54	8	8 11	13 19 27.40	8 50 13.7	12.3	6.5	0.44
24	11 40	13 51 42.84	9 59 9.1	15.1	8.0	0.54	9	8 7	13 19 48.72	8 54 23.6	12.2	6.5	0.44
25	11 35	13 50 14.21	9 53 31.0	15.1	8.0	0.54	10	8 4	13 20 12.76	8 58 47.6	12.1	6.4	0.43
26	11 29	13 48 46.05	- 9 47 55.8	15.1	8.0	0.54	11	8 0	13 20 39.46	- 9 3 25.3	12.0	6.4	0.43
27	11 24	13 47 18.53	9 42 24.5	15.1	8.0	0.54	12	7 57	13 21 3.80	9 8 16.4	11.9	6.3	0.43
28	11 19	13 45 51.81	9 36 57.9	15.1	8.0	0.54	13	7 54	13 21 40.75	9 13 20.9	11.8	6.3	0.42
29	11 13	13 44 26.07	9 31 36.6	15.1	8.0	0.54	14	7 50	13 22 15.28	9 18 38.4	11.7	6.2	0.42
30	11 8	13 43 1.43	9 26 21.4	15.1	8.0	0.54	15	7 47	13 22 52.36	9 24 8.7	11.7	6.2	0.42
May 1	11 3	13 41 38.07	- 9 21 13.3	15.1	8.0	0.54	16	7 44	13 23 31.95	- 9 29 51.4	11.6	6.1	0.42
2	10 57	13 40 16.10	9 16 12.8	15.0	8.0	0.54	17	7 40	13 24 14.02	9 35 46.6	11.5	6.1	0.41
3	10 52	13 38 55.68	9 11 20.7	15.0	8.0	0.54	18	7 37	13 24 58.53	9 41 53.8	11.4	6.1	0.41
4	10 47	13 37 36.94	9 6 37.6	15.0	8.0	0.54	19	7 34	13 25 45.44	9 48 12.7	11.3	6.0	0.41
5	10 42	13 36 20.01	9 2 4.3	14.9	7.9	0.54	20	7 31	13 26 34.70	9 54 43.0	11.2	6.0	0.40
6	10 36	13 35 5.02	- 8 57 41.5	14.9	7.9	0.54	21	7 28	13 27 26.90	- 10 1 24.6	11.1	5.9	0.40
7	10 31	13 33 52.09	8 53 29.6	14.9	7.9	0.53	22	7 25	13 28 20.16	10 8 17.0	11.0	5.9	0.40
8	10 26	13 32 41.31	8 49 29.5	14.8	7.9	0.53	23	7 22	13 29 16.26	10 15 19.8	11.0	5.8	0.39
9	10 21	13 31 32.80	8 45 41.6	14.8	7.9	0.53	24	7 19	13 30 14.55	10 22 33.0	10.9	5.8	0.39
10	10 16	13 30 26.67	8 42 6.3	14.7	7.8	0.53	25	7 16	13 31 15.00	10 29 56.0	10.8	5.7	0.39
11	10 11	13 29 23.00	- 8 38 44.4	14.6	7.8	0.53	26	7 13	13 32 17.55	- 10 37 28.5	10.7	5.7	0.39
12	10 6	13 28 21.89	8 35 36.2	14.6	7.8	0.53	27	7 10	13 33 22.18	10 45 10.6	10.6	5.7	0.38
13	10 1	13 27 23.41	8 32 42.1	14.5	7.7	0.52	28	7 7	13 34 28.85	10 53 1.7	10.6	5.6	0.38
14	9 56	13 26 27.66	8 30 2.6	14.5	7.7	0.52	29	7 5	13 35 37.53	11 1 1.5	10.5	5.6	0.38
15	9 51	13 25 34.69	8 27 38.1	14.4	7.7	0.52	30	7 2	13 36 48.17	11 9 8.10	10.4	5.5	0.38
16	9 47	13 24 44.58	- 8 25 33.9	14.3	7.6	0.51	July 1	6 50	13 38 0.74	- 11 17 26.4	10.3	5.5	0.37
17	9 42	13 23 57.38	8 23 35.3	14.2	7.6	0.51	2	6 56	13 39 15.21	- 11 25 51.0	10.3	5.5	0.37

Stellar magnitude at opposition in April, 1920, -1.4.

## FOR TRANSIT AT WASHINGTON.

Date.	Wash. Mean Time.	Apparent Right Ascension.	Apparent Declination.	Hor. Par.	Polar Semidiam.	S. T. of Sem. P. Mer.	Date.	Wash. Mean Time.	Apparent Right Ascension.	Apparent Declination.	Hor. Par.	Polar Semidiam.	S. T. of Sem. P. Mer.
	h m	h m s	" " "	"	"	s		h m	h m s	" " "	"	"	s
Jan. 0	14 40	9 18 42.89	+1630 38.9	2.0	20.5	1.52	Feb. 15	11 17	8 56 43.98	+18 13 14.9	2.0	21.1	1.58
1	14 36	9 18 22.82	16 32 24.0	2.0	20.5	1.53	16	11 13	8 56 13.92	18 15 22.1	2.0	21.1	1.58
2	14 31	9 18 2.12	16 34 11.7	2.0	20.5	1.53	17	11 8	8 55 44.18	18 17 27.4	2.0	21.0	1.58
3	14 27	9 17 40.80	16 36 2.1	2.0	20.6	1.53	18	11 4	8 55 14.76	18 19 30.6	2.0	21.0	1.58
4	14 23	9 17 18.88	16 37 55.0	2.0	20.6	1.54	19	11 0	8 54 45.69	18 21 32.0	2.0	21.0	1.58
5	14 19	9 16 56.35	+16 39 50.3	2.0	20.7	1.54	20	10 55	8 54 16.98	+18 23 31.4	2.0	21.0	1.58
6	14 14	9 16 33.24	16 41 47.9	2.0	20.7	1.54	21	10 51	8 53 48.66	18 25 28.6	2.0	21.0	1.58
7	14 10	9 16 9.56	16 43 47.7	2.0	20.7	1.55	22	10 46	8 53 20.76	18 27 23.5	2.0	20.9	1.58
8	14 6	9 15 45.34	16 45 49.7	2.0	20.8	1.55	23	10 42	8 52 53.31	18 29 16.2	2.0	20.9	1.57
9	14 1	9 15 20.56	16 47 53.8	2.0	20.8	1.55	24	10 38	8 52 26.30	18 31 6.2	2.0	20.9	1.57
10	13 57	9 14 55.25	+16 50 0.0	2.0	20.8	1.56	25	10 33	8 51 59.76	+18 32 54.6	2.0	20.8	1.57
11	13 53	9 14 29.44	16 52 8.1	2.0	20.9	1.56	26	10 29	8 51 33.70	18 34 40.2	2.0	20.8	1.56
12	13 48	9 14 3.13	16 54 17.9	2.0	20.9	1.56	27	10 24	8 51 8.15	18 36 23.4	2.0	20.8	1.56
13	13 44	9 13 36.35	16 56 29.5	2.0	20.9	1.56	28	10 20	8 50 43.13	18 38 3.9	2.0	20.7	1.56
14	13 39	9 13 9.10	16 58 42.7	2.0	21.0	1.57	29	10 16	8 50 18.63	18 39 41.9	2.0	20.7	1.56
15	13 35	9 12 41.41	+17 0 57.3	2.0	21.0	1.57	Mar. 1	10 11	8 49 54.69	+18 41 17.3	2.0	20.7	1.56
16	13 31	9 12 13.30	17 3 13.5	2.0	21.0	1.57	2	10 7	8 49 31.33	18 42 50.0	2.0	20.6	1.55
17	13 26	9 11 44.79	17 5 30.9	2.0	21.0	1.57	3	10 3	8 49 8.54	18 44 20.1	2.0	20.6	1.55
18	13 22	9 11 15.90	17 7 49.5	2.0	21.0	1.57	4	9 58	8 48 46.34	18 45 47.5	2.0	20.5	1.55
19	13 17	9 10 46.65	17 10 9.3	2.0	21.1	1.58	5	9 54	8 48 24.75	18 47 12.1	2.0	20.5	1.55
20	13 13	9 10 17.06	+17 12 30.0	2.0	21.1	1.58	6	9 50	8 48 3.77	+18 48 33.9	2.0	20.4	1.54
21	13 9	9 9 47.15	17 14 51.6	2.0	21.1	1.58	7	9 46	8 47 43.43	18 49 52.9	2.0	20.4	1.54
22	13 4	9 9 16.95	17 17 13.8	2.0	21.1	1.58	8	9 41	8 47 23.73	18 51 9.1	1.9	20.3	1.54
23	13 0	9 8 46.46	17 19 36.8	2.0	21.2	1.58	9	9 37	8 47 4.67	18 52 22.3	1.9	20.3	1.53
24	12 55	9 8 15.74	17 22 0.3	2.0	21.2	1.58	10	9 33	8 46 46.27	18 53 32.7	1.9	20.2	1.53
25	12 51	9 7 44.79	+17 24 24.1	2.0	21.2	1.58	11	9 29	8 46 28.56	+18 54 40.3	1.9	20.2	1.53
26	12 46	9 7 13.64	17 26 48.3	2.0	21.2	1.59	12	9 25	8 46 11.52	18 55 44.9	1.9	20.2	1.52
27	12 42	9 6 42.30	17 29 12.6	2.0	21.2	1.59	13	9 20	8 45 55.18	18 56 46.6	1.9	20.1	1.52
28	12 37	9 6 10.82	17 31 37.0	2.0	21.2	1.59	14	9 16	8 45 39.55	18 57 45.2	1.9	20.1	1.51
29	12 33	9 5 39.20	17 34 1.4	2.0	21.2	1.59	15	9 12	8 45 24.63	18 58 40.8	1.9	20.0	1.51
30	12 28	9 5 7 49	+17 36 25.7	2.0	21.2	1.59	16	9 8	8 45 10.43	+18 59 33.4	1.9	20.0	1.51
31	12 24	9 4 35.69	17 38 49.7	2.0	21.2	1.59	17	9 4	8 44 56.97	19 0 23.1	1.9	19.9	1.50
Feb. 1	12 20	9 4 3.82	17 41 13.3	2.0	21.2	1.59	18	8 59	8 44 44.24	19 1 9.6	1.9	19.8	1.50
2	12 15	9 3 31.92	17 43 36.5	2.0	21.2	1.59	19	8 55	8 44 32.24	19 1 53.2	1.9	19.8	1.50
3	12 11	9 3 0.01	17 45 59.2	2.0	21.2	1.59	20	8 51	8 44 21.00	19 2 33.6	1.9	19.7	1.49
4	12 6	9 2 28.09	+17 48 21.3	2.0	21.2	1.59	21	8 47	8 44 10.51	+19 3 10.9	1.9	19.7	1.49
5	12 2	9 1 56.21	17 50 42.6	2.0	21.2	1.59	22	8 43	8 44 0.79	19 3 45.2	1.9	19.6	1.48
6	11 57	9 1 24.88	17 53 3.1	2.0	21.2	1.59	23	8 39	8 43 51.83	19 4 16.3	1.9	19.6	1.48
7	11 53	9 0 52.62	17 55 22.7	2.0	21.2	1.59	24	8 35	8 43 43.64	19 4 44.5	1.9	19.5	1.48
8	11 48	9 0 20.95	17 57 41.3	2.0	21.2	1.59	25	8 31	8 43 36.23	19 5 9.5	1.9	19.5	1.47
9	11 44	8 59 49.41	+17 59 58.7	2.0	21.2	1.59	26	8 27	8 43 29.59	+19 5 51.5	1.9	19.4	1.47
10	11 39	8 59 18.01	18 2 15.0	2.0	21.2	1.59	27	8 23	8 43 23.72	19 5 50.4	1.9	19.4	1.46
11	11 35	8 58 46.78	18 4 30.0	2.0	21.2	1.59	28	8 19	8 43 18.61	19 6 6.3	1.9	19.3	1.46
12	11 30	8 58 15.74	18 6 43.6	2.0	21.1	1.59	29	8 15	8 43 14.29	19 6 19.2	1.8	19.2	1.45
13	11 26	8 57 44.91	18 8 55.7	2.0	21.1	1.59	30	8 11	8 43 10.74	19 6 29.0	1.8	19.2	1.45
14	11 22	8 57 14.31	+18 11 6.2	2.0	21.1	1.59	31	8 7	8 43 7.96	+19 6 35.8	1.8	19.1	1.45
15	11 17	8 56 43.98	+18 13 14.9	2.0	21.1	1.58	Apr. 1	8 3	8 43 5.95	+19 6 39.5	1.8	19.1	1.44



FOR TRANSIT AT WASHINGTON.

Date.	Wash. Mean Time.	Apparent Right Ascension.	Apparent Declination.	Hor. Par.	Polar Scintillam.	S. T. of Sun. Pass. Mer.	Date.	Wash. Mean Time.	Apparent Right Ascension.	Apparent Declination.	Hor. Par.	Polar Scintillam.	S. T. of Sun. Pass. Mer.
	h m s	h m s	" " "	"	"	s		h m s	h m s	" " "	"	"	s
Apr. 1	8 3	8 43 5.95	+19 639.5	1.8	19.1	1.44	Nov. 15	19 27	11 7 58.51	+6 41 36.1	1.6	16.2	1.16
2	7 59	8 43 4.71	19 640.3	1.8	19.0	1.44	16	19 23	11 8 28.49	6 38 42.5	1.6	16.2	1.17
3	7 55	8 43 4.24	19 638.2	1.8	19.0	1.43	17	19 20	11 8 57.97	6 35 52.0	1.6	16.3	1.17
4	7 51	8 43 4.54	19 633.1	1.8	18.9	1.43	18	19 17	11 9 26.98	6 33 4.5	1.6	16.3	1.17
5	7 47	8 43 5.60	19 624.9	1.8	18.8	1.42	19	19 13	11 9 55.49	6 30 20.1	1.6	16.3	1.18
6	7 43	8 43 7.43	+19 613.8	1.8	18.8	1.42	20	19 10	11 10 23.50	+6 27 38.8	1.6	16.4	1.18
7	7 39	8 43 10.02	19 559.7	1.8	18.7	1.41	21	19 6	11 10 51.02	6 25 0.7	1.6	16.4	1.18
8	7 35	8 43 13.37	19 542.7	1.8	18.7	1.41	22	19 3	11 11 18.02	6 22 25.9	1.6	16.5	1.18
9	7 31	8 43 17.48	19 522.7	1.8	18.6	1.41	23	18 59	11 11 44.51	6 19 54.3	1.6	16.5	1.19
10	7 28	8 43 22.34	19 469.7	1.8	18.6	1.40	24	18 56	11 12 10.46	6 17 26.1	1.6	16.6	1.19
11	7 24	8 43 27.95	+19 433.9	1.8	18.5	1.40	25	18 52	11 12 35.89	+6 15 2.3	1.6	16.6	1.19
12	7 20	8 43 34.31	19 4 5.1	1.8	18.4	1.39	26	18 49	11 13 0.80	6 12 39.7	1.6	16.7	1.20
13	7 16	8 43 41.42	19 333.5	1.8	18.4	1.39	27	18 45	11 13 25.16	6 10 21.6	1.6	16.7	1.20
14	7 12	8 43 49.27	19 259.0	1.8	18.3	1.38	28	18 42	11 13 48.08	6 8 7.1	1.6	16.8	1.20
15	7 9	8 43 57.86	19 221.5	1.8	18.3	1.38	29	18 38	11 14 12.84	6 5 56.1	1.6	16.8	1.21
16	7 5	8 44 7.19	+19 141.2	1.8	18.2	1.38	30	18 34	11 14 34.04	+6 3 48.7	1.6	16.9	1.21
17	7 1	8 44 17.25	19 058.0	1.7	18.2	1.37	Dec. 1	18 31	11 14 57.07	6 1 45.0	1.6	16.9	1.21
18	6 57	8 44 28.04	19 012.0	1.7	18.1	1.37	2	18 27	11 15 18.63	5 59 45.0	1.6	17.0	1.22
19	6 54	8 44 39.55	18 59 23.2	1.7	18.0	1.36	3	18 24	11 15 39.60	5 57 48.7	1.6	17.0	1.22
20	6 50	8 44 51.79	18 58 31.5	1.7	18.0	1.36	4	18 20	11 15 59.99	5 55 56.1	1.6	17.1	1.22
21	6 46	8 45 4.73	+18 57 37.1	1.7	17.9	1.35	5	18 17	11 16 19.79	+5 54 7.4	1.6	17.1	1.23
22	6 42	8 45 18.37	18 56 39.8	1.7	17.9	1.35	6	18 13	11 16 38.98	5 52 22.6	1.6	17.2	1.23
23	6 39	8 45 32.72	18 55 39.8	1.7	17.8	1.35	7	18 9	11 16 57.57	5 50 41.7	1.6	17.2	1.24
24	6 35	8 45 47.76	18 54 37.0	1.7	17.8	1.34	8	18 6	11 17 15.54	5 49 4.8	1.7	17.3	1.24
25	6 31	8 46 3.47	18 53 31.6	1.7	17.7	1.34	9	18 2	11 17 32.89	5 47 31.8	1.7	17.3	1.24
26	6 28	8 46 19.86	+18 52 23.4	1.7	17.7	1.33	10	17 58	11 17 49.61	+5 46 2.9	1.7	17.4	1.25
27	6 24	8 46 36.93	18 51 12.5	1.7	17.6	1.33	11	17 55	11 18 5.69	5 44 38.1	1.7	17.4	1.25
28	6 20	8 46 54.66	18 49 59.0	1.7	17.6	1.32	12	17 51	11 18 21.34	5 43 21.4	1.7	17.5	1.25
29	6 17	8 47 13.04	18 48 42.9	1.7	17.5	1.32	13	17 47	11 18 36.06	5 42 0.7	1.7	17.5	1.26
30	6 13	8 47 32.07	18 47 24.1	1.7	17.4	1.32	14	17 44	11 18 50.12	5 40 48.2	1.7	17.6	1.26
May 1	6 10	8 47 51.73	+18 46 2.6	1.7	17.4	1.31	15	17 40	11 19 3.63	+5 39 39.9	1.7	17.6	1.26
2	6 6	8 48 12.03	18 44 36.6	1.7	17.3	1.31	16	17 36	11 19 16.49	5 38 36.0	1.7	17.7	1.27
3	6 2	8 48 32.96	18 43 12.1	1.7	17.3	1.30	17	17 33	11 19 28.68	5 37 36.2	1.7	17.7	1.27
4	5 59	8 48 54.50	18 41 42.9	1.6	17.2	1.30	18	17 29	11 19 49.21	5 36 40.7	1.7	17.8	1.28
5	5 55	8 49 16.65	18 40 11.1	1.6	17.2	1.30	19	17 25	11 19 51.07	5 35 49.4	1.7	17.8	1.28
6	5 52	8 49 39.42	+18 38 36.8	1.6	17.1	1.29	20	17 21	11 20 1.98	+5 35 2.5	1.7	17.9	1.28
7	5 48	8 50 2.78	18 37 0.0	1.6	17.1	1.29	21	17 17	11 20 19.77	5 34 20.0	1.7	18.0	1.29
8	5 45	8 50 26.74	18 35 20.6	1.6	17.0	1.28	22	17 14	11 20 29.60	5 33 41.8	1.7	18.0	1.29
.....	.....	.....	.....	.....	.....	.....	23	17 10	11 20 27.76	5 33 7.9	1.7	18.1	1.30
.....	.....	.....	.....	.....	.....	.....	24	17 6	11 20 35.23	5 32 38.5	1.7	18.1	1.30
Nov. 9	19 47	11 4 48.89	+ 6 59 58.4	1.5	15.9	1.15	25	17 2	11 20 43.01	+5 32 13.5	1.7	18.2	1.30
10	19 44	11 5 21.62	6 56 47.7	1.5	16.0	1.15	26	16 58	11 20 48.10	5 31 52.9	1.7	18.2	1.31
11	19 40	11 5 53.91	6 53 39.7	1.5	16.0	1.15	27	16 55	11 20 53.50	5 31 36.7	1.8	18.3	1.31
12	19 37	11 6 25.75	6 50 34.5	1.5	16.1	1.16	28	16 51	11 20 58.20	5 31 25.1	1.8	18.3	1.31
13	19 34	11 6 57.13	6 47 32.1	1.5	16.1	1.16	29	16 47	11 21 2.18	5 31 17.9	1.8	18.4	1.32
14	19 30	11 7 28.05	+ 6 44 32.6	1.6	16.1	1.16	30	16 43	11 21 5.47	+5 31 15.2	1.8	18.4	1.32
15	19 27	11 7 58.51	+ 6 41 36.1	1.6	16.2	1.16	31	16 39	11 21 8.96	+5 31 17.1	1.8	18.5	1.33

Stellar magnitude at opposition in February, 1920, -2.1.

FOR TRANSIT AT WASHINGTON.

Date.	Wash. Mean Time.	Apparent Right Ascension.	Apparent Declination.	Hor. Par.	Polar Semidiam.	S. T. of Sem. Pass. Mer.	Date.	Wash. Mean Time.	Apparent Right Ascension.	Apparent Declination.	Hor. Par.	Polar Semidiam.	S. T. of Sem. Pass. Mer.
	h m	h m s	" "	" "	" "	s		h m	h m s	" "	" "	" "	s
Jan. 0	16 16	10 54 54.72	+8 52 50.1	1.0	8.5	0.64	Feb. 15	13 6	10 46 14.81	+ 9 55 37.9	1.1	8.9	0.68
1	16 12	10 54 51.18	8 53 28.3	1.0	8.5	0.64	16	13 2	10 45 57.61	9 57 29.8	1.1	8.9	0.68
2	16 8	10 54 47.22	8 54 8.8	1.0	8.5	0.64	17	12 58	10 45 40.29	9 59 21.8	1.1	8.9	0.68
3	16 4	10 54 42.87	8 54 51.6	1.0	8.5	0.64	18	12 54	10 45 22.86	10 1 14.2	1.1	8.9	0.68
4	16 0	10 54 38.13	8 55 36.8	1.0	8.5	0.64	19	12 50	10 45 5.34	10 3 6.9	1.1	8.9	0.68
5	15 56	10 54 33.00	+8 56 24.4	1.0	8.6	0.64	20	12 45	10 44 47.72	+10 4 59.8	1.1	9.0	0.68
6	15 52	10 54 27.46	8 57 14.3	1.0	8.6	0.65	21	12 41	10 44 30.63	10 6 52.7	1.1	9.0	0.68
7	15 48	10 54 21.54	8 58 6.5	1.0	8.6	0.65	22	12 37	10 44 12.26	10 8 45.8	1.1	9.0	0.68
8	15 44	10 54 15.22	8 59 1.1	1.0	8.6	0.65	23	12 33	10 43 54.43	10 10 38.9	1.1	9.0	0.68
9	15 40	10 54 8.52	8 59 57.8	1.0	8.6	0.65	24	12 28	10 43 36.56	10 12 32.0	1.1	9.0	0.68
10	15 36	10 54 1.44	+9 0 56.8	1.0	8.6	0.65	25	12 24	10 43 18.65	+10 14 25.0	1.1	9.0	0.68
11	15 32	10 53 53.97	9 1 58.0	1.0	8.6	0.65	26	12 20	10 43 0.72	10 16 17.7	1.1	9.0	0.68
12	15 28	10 53 46.13	9 3 1.3	1.0	8.6	0.65	27	12 16	10 42 42.76	10 18 10.1	1.1	9.0	0.68
13	15 24	10 53 37.91	9 4 6.8	1.0	8.6	0.65	28	12 12	10 42 24.79	10 20 2.3	1.1	9.0	0.68
14	15 20	10 53 29.82	9 5 14.5	1.0	8.7	0.65	29	12 7	10 42 6.83	10 21 54.0	1.1	9.0	0.68
15	15 15	10 53 20.87	+9 6 24.2	1.0	8.7	0.65	Mar. 1	12 3	10 41 48.88	+10 23 45.3	1.1	9.0	0.68
16	15 11	10 53 11.06	9 7 35.9	1.0	8.7	0.65	2	11 59	10 41 30.96	10 25 36.2	1.1	9.0	0.68
17	15 7	10 53 1.89	9 8 49.8	1.0	8.7	0.66	3	11 55	10 41 13.06	10 27 26.5	1.1	8.9	0.68
18	15 3	10 52 51.87	9 10 5.6	1.0	8.7	0.66	4	11 50	10 40 55.21	10 29 16.2	1.1	8.9	0.68
19	14 59	10 52 41.00	9 11 28.4	1.0	8.7	0.66	5	11 46	10 40 37.41	10 31 5.3	1.1	8.9	0.68
20	14 55	10 52 30.99	+9 12 48.0	1.0	8.7	0.66	6	11 42	10 40 19.68	+10 32 53.5	1.1	8.9	0.68
21	14 51	10 52 20.25	9 14 4.5	1.0	8.7	0.66	7	11 38	10 40 2.00	10 34 41.0	1.1	8.9	0.68
22	14 47	10 52 7.68	9 16 27.3	1.0	8.8	0.66	8	11 33	10 39 44.41	10 36 27.8	1.1	8.9	0.68
23	14 43	10 51 56.48	9 18 52.8	1.0	8.8	0.66	9	11 29	10 39 26.90	10 38 13.7	1.1	8.9	0.68
24	14 38	10 51 44.16	9 18 19.6	1.0	8.8	0.66	10	11 25	10 39 9.48	10 39 58.6	1.1	8.9	0.68
25	14 34	10 51 31.65	+9 19 48.0	1.0	8.8	0.66	11	11 21	10 38 52.19	+10 41 42.6	1.1	8.9	0.68
26	14 30	10 51 19.22	9 21 18.0	1.0	8.8	0.66	12	11 17	10 38 35.00	10 43 25.5	1.1	8.9	0.68
27	14 26	10 51 6.29	9 22 49.7	1.0	8.8	0.66	13	11 12	10 38 17.95	10 45 7.3	1.1	8.9	0.68
28	14 22	10 50 53.08	9 24 22.9	1.0	8.8	0.67	14	11 8	10 38 1.03	10 46 47.9	1.1	8.9	0.68
29	14 18	10 50 39.59	9 26 57.5	1.0	8.8	0.67	15	11 4	10 37 44.25	10 48 27.4	1.1	8.9	0.67
30	14 14	10 50 25.82	+9 27 33.4	1.0	8.8	0.67	16	11 0	10 37 27.62	+10 50 5.6	1.0	8.9	0.67
31	14 9	10 50 11.80	9 29 10.7	1.0	8.8	0.67	17	10 56	10 37 11.16	10 51 42.5	1.0	8.9	0.67
Feb. 1	14 5	10 49 57.51	9 30 49.3	1.0	8.8	0.67	18	10 51	10 36 54.88	10 53 18.0	1.0	8.9	0.67
2	14 1	10 49 42.98	9 32 29.2	1.0	8.9	0.67	19	10 47	10 36 38.77	10 54 52.1	1.0	8.9	0.67
3	13 57	10 49 28.21	9 34 10.3	1.0	8.9	0.67	20	10 43	10 36 22.86	10 56 24.8	1.0	8.9	0.67
4	13 53	10 49 18.20	+9 35 52.6	1.0	8.9	0.67	21	10 39	10 36 7.16	+10 57 56.0	1.0	8.9	0.67
5	13 49	10 48 57.95	9 37 35.9	1.0	8.9	0.67	22	10 35	10 35 51.66	10 59 25.6	1.0	8.9	0.67
6	13 44	10 48 42.46	9 39 20.3	1.0	8.9	0.67	23	10 30	10 35 36.38	11 0 53.6	1.0	8.9	0.67
7	13 40	10 48 26.82	9 41 5.6	1.0	8.9	0.67	24	10 26	10 35 21.32	11 2 20.1	1.0	8.9	0.67
8	13 36	10 48 10.94	9 43 52.0	1.0	8.9	0.67	25	10 22	10 35 6.50	11 3 44.8	1.0	8.8	0.67
9	13 32	10 47 54.96	+9 44 39.3	1.0	8.9	0.67	26	10 18	10 34 51.93	+11 5 7.7	1.0	8.8	0.67
10	13 28	10 47 38.69	9 46 27.5	1.0	8.9	0.67	27	10 14	10 34 37.81	11 6 23.9	1.0	8.8	0.67
11	13 23	10 47 22.16	9 48 16.3	1.0	8.9	0.67	28	10 10	10 34 23.54	11 7 48.5	1.0	8.8	0.67
12	13 19	10 47 5.55	9 50 5.8	1.0	8.9	0.67	29	10 5	10 34 9.74	11 9 6.1	1.0	8.8	0.67
13	13 15	10 46 48.79	9 51 55.9	1.0	8.9	0.67	30	10 1	10 33 56.21	11 10 21.9	1.0	8.8	0.67
14	13 11	10 46 31.88	+9 53 46.7	1.0	8.9	0.68	Apr. 1	9 53	10 33 29.97	+11 11 35.9	1.0	8.8	0.67
15	13 6	10 46 14.81	+9 55 37.9	1.1	8.9	0.68							

Stellar magnitude at opposition in February, 1920, 0.5.

FOR TRANSIT AT WASHINGTON.

Date.	Wash. Mean Time.	Apparent Right Ascension.	Apparent Declination.	Hor. Par.	Polar Semidiam.	S. T. of Sun. Pass. Mer.	Date.	Wash. Mean Time.	Apparent Right Ascension.	Apparent Declination.	Hor. Par.	Polar Semidiam.	S. T. of Sun. Pass. Mer.
	h m s	h m s	" " "	"	" "	"		h m s	h m s	" " "	"	" "	"
Apr. 1	9 53	10 32 29.97	+11 12 47.9	1.0	8.8	0.67	May 17	6 48	10 29 52.65	+11 28 15.0	0.9	8.2	0.62
2	9 49	10 33 17.28	11 13 47.9	1.0	8.8	0.67	18	6 45	10 29 56.99	11 27 41.8	0.9	8.2	0.62
3	9 45	10 33 4.87	11 15 6.0	1.0	8.8	0.66	19	6 41	10 30 1.73	11 27 5.3	0.9	8.1	0.62
4	9 40	10 32 52.73	11 16 12.2	1.0	8.7	0.66	20	6 37	10 30 6.85	11 26 26.6	0.9	8.1	0.62
5	9 36	10 32 40.98	11 17 16.2	1.0	8.7	0.66	21	6 33	10 30 12.86	11 25 45.6	0.9	8.1	0.62
6	9 32	10 32 29.50	+11 18 18.3	1.0	8.7	0.66	22	6 29	10 30 18.97	+11 25 2.5	0.9	8.1	0.61
7	9 28	10 32 18.35	11 19 18.4	1.0	8.7	0.66							
8	9 24	10 32 7.31	11 20 16.3	1.0	8.7	0.66							
9	9 20	10 31 56.99	11 21 12.2	1.0	8.7	0.66	Nov. 23	19 26	11 38 35.63	+ 4 27 29.6	0.9	7.7	0.57
10	9 16	10 31 46.80	11 22 5.8	1.0	8.7	0.66	24	19 22	11 38 50.71	4 26 4.8	0.9	7.7	0.58
11	9 12	10 31 36.95	+11 22 57.2	1.0	8.7	0.66	25	19 19	11 39 5.97	+ 4 24 42.2	0.9	7.7	0.58
12	9 8	10 31 27.45	11 23 45.6	1.0	8.6	0.66	26	19 15	11 39 20.90	4 23 21.8	0.9	7.7	0.58
13	9 4	10 31 18.29	11 24 33.7	1.0	8.6	0.66	27	19 11	11 39 35.61	4 22 8.5	0.9	7.7	0.58
14	8 59	10 31 9.47	11 25 19.5	1.0	8.6	0.65	28	19 8	11 39 49.79	4 20 47.5	0.9	7.7	0.58
15	8 55	10 31 1.02	11 26 1.1	1.0	8.6	0.65	29	19 6	11 40 3.74	4 19 33.8	0.9	7.8	0.58
16	8 51	10 30 52.93	+11 26 41.6	1.0	8.6	0.65	30	19 0	11 40 17.36	+ 4 18 22.3	0.9	7.8	0.58
17	8 47	10 30 45.20	11 27 19.7	1.0	8.6	0.65	Dec. 1	18 56	11 40 30.63	4 17 13.1	0.9	7.8	0.58
18	8 43	10 30 37.84	11 27 55.5	1.0	8.6	0.65	2	18 53	11 40 43.57	4 16 6.2	0.9	7.8	0.58
19	8 39	10 30 30.85	11 28 29.9	1.0	8.6	0.65	3	18 49	11 40 56.15	4 15 1.6	0.9	7.8	0.58
20	8 35	10 30 24.24	11 29 0.1	1.0	8.6	0.65	4	18 45	11 41 8.39	4 13 59.5	0.9	7.8	0.58
21	8 31	10 30 18.00	+11 29 29.0	1.0	8.5	0.65	5	18 41	11 41 20.23	+ 4 12 59.7	0.9	7.8	0.59
22	8 27	10 30 12.14	11 29 55.5	1.0	8.5	0.65	6	18 38	11 41 31.81	4 12 2.3	0.9	7.8	0.59
23	8 23	10 30 6.67	11 30 19.7	1.0	8.5	0.65	7	18 34	11 41 42.97	4 11 7.3	0.9	7.9	0.59
24	8 19	10 30 1.58	11 30 41.5	1.0	8.5	0.65	8	18 30	11 41 53.77	4 10 14.8	0.9	7.9	0.59
25	8 15	10 29 56.88	11 31 1.0	1.0	8.5	0.64	9	18 26	11 42 4.20	4 9 24.7	0.9	7.9	0.59
26	8 11	10 29 52.56	+11 31 18.1	1.0	8.5	0.64	10	18 23	11 42 14.27	+ 4 8 37.0	0.9	7.9	0.59
27	8 7	10 29 48.62	11 31 32.9	0.9	8.4	0.64	11	18 19	11 42 23.96	4 7 51.9	0.9	7.9	0.59
28	8 3	10 29 45.09	11 31 45.4	0.9	8.4	0.64	12	18 15	11 42 33.28	4 7 9.3	0.9	7.9	0.59
29	7 59	10 29 41.94	11 31 55.4	0.9	8.4	0.64	13	18 11	11 42 42.22	4 6 29.1	0.9	7.9	0.59
30	7 55	10 29 39.18	11 32 3.1	0.9	8.4	0.64	14	18 8	11 42 50.78	4 5 51.5	0.9	8.0	0.59
May 1	7 51	10 29 36.82	+11 32 8.5	0.9	8.4	0.64	15	18 4	11 42 58.98	+ 4 5 16.4	0.9	8.0	0.60
2	7 47	10 29 34.85	11 32 11.5	0.9	8.4	0.64	16	18 0	11 43 6.76	4 4 43.9	0.9	8.0	0.60
3	7 43	10 29 33.28	11 32 12.2	0.9	8.4	0.64	17	17 56	11 43 14.17	4 4 13.9	0.9	8.0	0.60
4	7 39	10 29 32.09	11 32 10.5	0.9	8.4	0.63	18	17 52	11 43 21.30	4 3 46.4	0.9	8.0	0.60
5	7 35	10 29 31.29	11 32 8.5	0.9	8.3	0.63	19	17 49	11 43 27.84	4 3 21.6	0.9	8.0	0.60
6	7 31	10 29 30.89	+11 32 0.2	0.9	8.3	0.63	20	17 45	11 43 34.07	+ 4 2 59.2	0.9	8.0	0.60
7	7 27	10 29 30.90	11 31 51.5	0.9	8.3	0.63	21	17 41	11 43 39.93	4 2 39.5	0.9	8.1	0.60
8	7 23	10 29 31.30	11 31 40.4	0.9	8.3	0.63	22	17 37	11 43 45.88	4 2 22.3	0.9	8.1	0.60
9	7 19	10 29 32.09	11 31 27.0	0.9	8.3	0.63	23	17 33	11 43 50.45	4 2 7.7	0.9	8.1	0.60
10	7 16	10 29 33.28	11 31 11.3	0.9	8.3	0.63	24	17 29	11 43 55.13	4 1 55.8	1.0	8.1	0.60
11	7 12	10 29 34.86	+11 30 59.2	0.9	8.2	0.63	25	17 25	11 43 59.41	+ 4 1 46.3	1.0	8.1	0.61
12	7 8	10 29 36.85	11 30 32.8	0.9	8.2	0.63	26	17 22	11 44 3.29	4 1 39.4	1.0	8.1	0.61
13	7 4	10 29 39.22	11 30 10.6	0.9	8.2	0.63	27	17 18	11 44 6.77	4 1 35.2	1.0	8.1	0.61
14	7 0	10 29 41.99	11 29 44.9	0.9	8.2	0.62	28	17 14	11 44 9.86	4 1 33.6	1.0	8.2	0.61
15	6 56	10 29 45.15	11 29 17.8	0.9	8.2	0.62	29	17 10	11 44 12.54	4 1 34.6	1.0	8.2	0.61
16	6 52	10 29 48.70	+11 28 43.0	0.9	8.2	0.62	30	17 6	11 44 14.81	+ 4 1 38.2	1.0	8.2	0.61
17	6 48	10 29 52.65	+11 28 16.0	0.9	8.2	0.62	31	17 2	11 44 16.69	+ 4 1 44.3	1.0	8.2	0.61

Stellar magnitude at opposition in February, 1920, 0.5.

FOR TRANSIT AT WASHINGTON.

Date.	Wash. Mean Time.	Apparent Right Ascension.	Apparent Declination.	Hor. Par.	Semidiam.	S. P. of Sem. Pass. Mer.	Date.	Wash. Mean Time.	Apparent Right Ascension.	Apparent Declination.	Hor. Par.	Semidiam.	S. P. of Sem. Pass. Mer.
	h m	h m s	° ' "	" "	" "	s		h m	h m s	° ' "	" "	" "	s
June 18	16 42	22 30 55.60	-10 9 59.9	0.4	1.7	0.12	Aug. 3	13 37	22 26 56.68	-10 34 39.0	0.5	1.8	0.12
	19 16 38	22 30 53.90	10 10 12.4	0.4	1.8	0.12		4 13 33	22 26 48.59	10 35 27.0	0.5	1.8	0.12
	20 16 34	22 30 52.02	10 10 25.8	0.4	1.8	0.12		5 13 28	22 26 40.43	10 36 15.4	0.5	1.8	0.12
	21 16 30	22 30 49.96	10 10 40.3	0.4	1.8	0.12		6 13 25	22 26 32.18	10 37 4.1	0.5	1.8	0.12
	22 16 26	22 30 47.73	10 10 55.8	0.4	1.8	0.12		7 13 21	22 26 23.86	10 37 53.3	0.5	1.8	0.12
	23 16 22	22 30 45.32	-10 11 12.2	0.4	1.8	0.12		8 13 17	22 26 15.47	-10 38 42.8	0.5	1.8	0.12
	24 16 18	22 30 42.75	10 11 29.7	0.4	1.8	0.12		9 13 12	22 26 7.00	10 39 32.6	0.5	1.8	0.12
	25 16 14	22 30 40.00	10 11 48.1	0.5	1.8	0.12		10 13 8	22 25 56.47	10 40 22.8	0.5	1.8	0.12
	26 16 10	22 30 37.09	10 12 7.5	0.5	1.8	0.12		11 13 4	22 25 49.89	10 41 13.2	0.5	1.8	0.12
	27 16 6	22 30 34.00	10 12 27.9	0.5	1.8	0.12		12 13 0	22 25 41.24	10 42 4.0	0.5	1.8	0.12
	28 16 2	22 30 30.74	-10 12 49.2	0.5	1.8	0.12		13 12 56	22 25 32.53	-10 42 54.9	0.5	1.8	0.12
	29 15 58	22 30 27.31	10 13 11.5	0.5	1.8	0.12		14 12 52	22 25 23.78	10 43 46.1	0.5	1.8	0.12
	30 15 54	22 30 23.72	10 13 34.8	0.5	1.8	0.12		15 12 48	22 25 14.99	10 44 37.4	0.5	1.8	0.12
July 1	15 50	22 30 19.97	10 13 58.9	0.5	1.8	0.12		16 12 44	22 25 6.15	10 45 28.9	0.5	1.8	0.12
	2 15 46	22 30 16.06	10 14 23.9	0.5	1.8	0.12		17 12 40	22 24 57.27	10 46 20.6	0.5	1.8	0.12
	3 15 42	22 30 11.99	-10 14 49.9	0.5	1.8	0.12		18 12 36	22 24 48.35	-10 47 12.4	0.5	1.8	0.12
	4 15 38	22 30 7.76	10 15 16.8	0.5	1.8	0.12		19 12 32	22 24 39.41	10 48 4.3	0.5	1.8	0.12
	5 15 34	22 30 3.38	10 15 44.6	0.5	1.8	0.12		20 12 28	22 24 30.43	10 48 56.4	0.5	1.8	0.12
	6 15 30	22 29 58.84	10 16 13.3	0.5	1.8	0.12		21 12 24	22 24 21.43	10 49 48.6	0.5	1.8	0.12
	7 15 26	22 29 54.14	10 16 42.8	0.5	1.8	0.12		22 12 19	22 24 12.42	10 50 40.8	0.5	1.8	0.12
	8 15 22	22 29 49.30	-10 17 13.2	0.5	1.8	0.12		23 12 15	22 24 3.39	-10 51 32.9	0.5	1.8	0.12
	9 15 18	22 29 44.30	10 17 44.4	0.5	1.8	0.12		24 12 11	22 23 54.34	10 52 25.1	0.5	1.8	0.12
	10 15 14	22 29 39.14	10 18 16.5	0.5	1.8	0.12		25 12 7	22 23 45.29	10 53 17.3	0.5	1.8	0.12
	11 15 10	22 29 33.83	10 18 49.5	0.5	1.8	0.12		26 12 3	22 23 36.23	10 54 9.4	0.5	1.8	0.12
	12 15 6	22 29 28.38	10 19 23.2	0.5	1.8	0.12		27 11 59	22 23 27.17	10 55 1.5	0.5	1.8	0.12
	13 15 2	22 29 22.79	-10 19 57.7	0.5	1.8	0.12		28 11 55	22 23 18.10	-10 55 53.5	0.5	1.8	0.12
	14 14 58	22 29 17.05	10 20 38.0	0.5	1.8	0.12		29 11 51	22 23 9.04	10 56 45.5	0.5	1.8	0.12
	15 14 54	22 29 11.17	10 21 9.1	0.5	1.8	0.12		30 11 47	22 23 0.00	10 57 37.3	0.5	1.8	0.12
	16 14 50	22 29 5.16	10 21 45.9	0.5	1.8	0.12		31 11 43	22 22 50.96	10 58 28.9	0.5	1.8	0.12
	17 14 46	22 28 59.01	10 22 28.5	0.5	1.8	0.12	Sept. 1	11 39	22 22 41.95	10 59 20.4	0.5	1.8	0.12
	18 14 42	22 28 52.74	-10 23 1.8	0.5	1.8	0.12		2 11 35	22 22 32.95	-11 0 11.8	0.5	1.8	0.12
	19 14 38	22 28 46.33	10 23 40.8	0.5	1.8	0.12		3 11 30	22 22 23.97	11 1 2.9	0.5	1.8	0.12
	20 14 34	22 28 39.80	10 24 20.5	0.5	1.8	0.12		4 11 26	22 22 15.02	11 1 53.3	0.5	1.8	0.12
	21 14 30	22 28 33.16	10 25 0.9	0.5	1.8	0.12		5 11 22	22 22 6.09	11 2 44.5	0.5	1.8	0.12
	22 14 25	22 28 26.39	10 25 41.9	0.5	1.8	0.12		6 11 18	22 21 57.21	11 3 34.9	0.5	1.8	0.12
	23 14 21	22 28 19.49	-10 26 23.6	0.5	1.8	0.12		7 11 14	22 21 48.36	-11 4 25.0	0.5	1.8	0.12
	24 14 17	22 28 12.49	10 27 5.9	0.5	1.8	0.12		8 11 10	22 21 39.56	11 5 14.8	0.5	1.8	0.12
	25 14 13	22 28 5.37	10 27 48.8	0.5	1.8	0.12		9 11 6	22 21 30.79	11 6 4.2	0.5	1.8	0.12
	26 14 9	22 27 58.14	10 28 32.3	0.5	1.8	0.12		10 11 2	22 21 22.06	11 6 53.4	0.5	1.8	0.12
	27 14 5	22 27 50.81	10 29 16.3	0.5	1.8	0.12		11 10 58	22 21 13.42	11 7 42.1	0.5	1.8	0.12
	28 14 1	22 27 43.37	-10 30 0.9	0.5	1.8	0.12		12 10 54	22 21 4.81	-11 8 30.5	0.5	1.8	0.12
	29 13 57	22 27 35.82	10 30 45.9	0.5	1.8	0.12		13 10 50	22 20 56.28	11 9 18.4	0.5	1.8	0.12
	30 13 53	22 27 28.18	10 31 31.5	0.5	1.8	0.12		14 10 46	22 20 47.81	11 10 6.0	0.5	1.8	0.12
	31 13 49	22 27 20.44	10 32 17.7	0.5	1.8	0.12		15 10 42	22 20 39.41	11 10 53.0	0.5	1.8	0.12
Aug. 1	13 45	22 27 12.61	10 33 4.3	0.5	1.8	0.12		16 10 37	22 20 31.07	11 11 39.6	0.5	1.8	0.12
	2 13 41	22 27 4.69	-10 33 51.4	0.5	1.8	0.12		17 10 33	22 20 22.81	-11 12 25.7	0.5	1.8	0.12
	3 13 37	22 26 56.68	-10 34 39.0	0.5	1.8	0.12		18 10 29	22 20 14.63	-11 13 11.3	0.5	1.8	0.12

Stellar magnitude at opposition in August, 1920, 6.1.

FOR TRANSIT AT WASHINGTON.

Date.	Wash. Mean Time.	Apparent Right Ascension.	Apparent Declination.	Hor. Par.	Semidiam.	S. T. of Sem. Pass. Mer.	Date.	Wash. Mean Time.	Apparent Right Ascension.	Apparent Declination.	Hor. Par.	Semidiam.	S. T. of Sem. Pass. Mer.
	h m	h m s	° ' "	"	"	s		h m	h m s	° ' "	"	"	s
Sept. 18	10 20	22 20 14.63	-11 13 11.3	0.5	1.8	0.12	Nov. 3	7 24	22 16 15.00	-11 34 24.6	0.5	1.7	0.12
19	10 25	22 20 6.53	11 13 56.8	0.5	1.8	0.12	4	7 20	22 16 13.64	11 34 29.9	0.5	1.7	0.12
20	10 21	22 19 58.51	11 14 40.8	0.5	1.8	0.12	5	7 17	22 16 12.47	11 34 34.1	0.5	1.7	0.12
21	10 17	22 19 50.60	11 15 24.7	0.5	1.8	0.12	6	7 13	22 16 11.48	11 34 37.3	0.5	1.7	0.12
22	10 13	22 19 42.77	11 16 8.0	0.5	1.8	0.12	7	7 9	22 16 10.69	11 34 39.3	0.5	1.7	0.12
23	10 9	22 19 35.05	-11 16 50.8	0.5	1.8	0.12	8	7 5	22 16 10.09	-11 34 40.3	0.5	1.7	0.12
24	10 5	22 19 27.42	11 17 33.0	0.5	1.8	0.12	9	7 1	22 16 9.68	11 34 40.2	0.4	1.7	0.12
25	10 1	22 19 19.89	11 18 14.4	0.5	1.8	0.12	10	6 57	22 16 9.46	11 34 38.9	0.4	1.7	0.12
26	9 57	22 19 12.46	11 18 55.2	0.5	1.8	0.12	11	6 53	22 16 9.44	11 34 36.6	0.4	1.7	0.12
27	9 53	22 19 5.14	11 19 35.8	0.5	1.8	0.12	12	6 49	22 16 9.62	11 34 33.2	0.4	1.7	0.12
28	9 49	22 18 57.94	-11 20 14.9	0.5	1.8	0.12	13	6 45	22 16 10.00	-11 34 28.6	0.4	1.7	0.12
29	9 45	22 18 50.85	11 20 53.7	0.5	1.8	0.12	14	6 41	22 16 10.56	11 34 23.0	0.4	1.7	0.12
30	9 41	22 18 43.88	11 21 31.8	0.5	1.8	0.12	15	6 37	22 16 11.32	11 34 16.3	0.4	1.7	0.12
Oct. 1	9 37	22 18 37.02	11 22 9.1	0.5	1.8	0.12	16	6 33	22 16 12.27	11 34 8.4	0.4	1.7	0.12
2	9 33	22 18 30.29	11 22 45.8	0.5	1.8	0.12	17	6 29	22 16 13.42	11 33 59.5	0.4	1.7	0.12
3	9 28	22 18 23.68	-11 23 21.6	0.5	1.8	0.12	18	6 25	22 16 14.78	-11 33 49.4	0.4	1.7	0.12
4	9 24	22 18 17.20	11 23 56.6	0.5	1.8	0.12	19	6 22	22 16 16.32	11 33 38.2	0.4	1.7	0.12
5	9 20	22 18 10.85	11 24 30.9	0.5	1.8	0.12	20	6 18	22 16 18.05	11 33 26.0	0.4	1.7	0.12
6	9 16	22 18 4.64	11 25 4.4	0.5	1.8	0.12	21	6 14	22 16 19.98	11 33 12.7	0.4	1.7	0.12
7	9 12	22 17 58.57	11 25 37.9	0.5	1.8	0.12	22	6 10	22 16 22.10	11 32 58.2	0.4	1.7	0.12
8	9 8	22 17 52.63	-11 26 8.8	0.5	1.8	0.12	23	6 6	22 16 24.42	-11 32 42.7	0.4	1.7	0.12
9	9 4	22 17 46.84	11 26 39.7	0.5	1.8	0.12	24	6 2	22 16 26.93	11 32 26.1	0.4	1.7	0.12
10	9 0	22 17 41.19	11 27 9.9	0.5	1.8	0.12	25	5 58	22 16 29.63	11 32 8.4	0.4	1.7	0.12
11	8 56	22 17 35.70	11 27 39.1	0.5	1.8	0.12	26	5 54	22 16 32.53	11 31 49.7	0.4	1.7	0.12
12	8 52	22 17 30.35	11 28 7.4	0.5	1.8	0.12	27	5 50	22 16 35.62	11 31 29.9	0.4	1.7	0.12
13	8 48	22 17 26.16	-11 28 34.8	0.5	1.8	0.12	28	5 46	22 16 38.90	-11 31 9.0	0.4	1.7	0.12
14	8 44	22 17 20.13	11 29 1.8	0.5	1.8	0.12	29	5 43	22 16 42.36	11 30 47.0	0.4	1.7	0.12
15	8 40	22 17 15.25	11 29 26.8	0.5	1.8	0.12	30	5 39	22 16 46.01	11 30 24.0	0.4	1.7	0.12
16	8 36	22 17 10.53	11 29 51.4	0.5	1.8	0.12	Dec. 1	5 35	22 16 49.85	11 29 59.9	0.4	1.7	0.12
17	8 32	22 17 5.98	11 30 15.1	0.5	1.8	0.12	2	5 31	22 16 53.87	11 29 34.7	0.4	1.7	0.12
18	8 28	22 17 1.59	-11 30 37.8	0.5	1.8	0.12	3	5 27	22 16 58.09	-11 29 8.6	0.4	1.7	0.12
19	8 24	22 16 57.36	11 30 59.6	0.5	1.8	0.12	4	5 23	22 17 2.50	11 28 41.4	0.4	1.7	0.12
20	8 20	22 16 53.30	11 31 20.4	0.5	1.8	0.12	5	5 19	22 17 7.09	11 28 13.2	0.4	1.7	0.12
21	8 16	22 16 49.41	11 31 40.2	0.5	1.8	0.12	6	5 16	22 17 11.87	11 27 43.8	0.4	1.7	0.12
22	8 12	22 16 45.69	11 31 59.0	0.5	1.8	0.12	7	5 12	22 17 16.84	11 27 13.5	0.4	1.7	0.12
23	8 8	22 16 42.15	-11 32 16.8	0.5	1.8	0.12	8	5 8	22 17 21.98	-11 26 42.1	0.4	1.7	0.12
24	8 4	22 16 38.78	11 32 33.6	0.5	1.8	0.12	9	5 4	22 17 27.30	11 26 9.7	0.4	1.7	0.12
25	8 0	22 16 35.59	11 32 49.4	0.5	1.8	0.12	10	5 0	22 17 32.80	11 25 36.3	0.4	1.7	0.11
26	7 56	22 16 32.58	11 33 4.2	0.5	1.8	0.12	11	4 56	22 17 38.49	11 25 1.8	0.4	1.7	0.11
27	7 52	22 16 29.75	11 33 17.8	0.5	1.8	0.12	12	4 53	22 17 44.36	11 24 26.3	0.4	1.7	0.11
28	7 48	22 16 27.10	-11 33 36.5	0.5	1.8	0.12	13	4 49	22 17 50.40	-11 23 49.9	0.4	1.7	0.11
29	7 44	22 16 24.63	11 33 42.9	0.5	1.8	0.12	14	4 45	22 17 56.62	11 23 12.5	0.4	1.7	0.11
30	7 40	22 16 22.34	11 33 52.8	0.5	1.8	0.12	15	4 41	22 18 3.01	11 22 34.1	0.4	1.7	0.11
31	7 36	22 16 20.22	11 34 2.9	0.5	1.8	0.12	16	4 37	22 18 9.58	11 21 54.8	0.4	1.7	0.11
Nov. 1	7 32	22 16 18.29	11 34 10.7	0.5	1.7	0.12	17	4 33	22 18 16.31	11 21 14.5	0.4	1.7	0.11
2	7 28	22 16 16.56	-11 34 18.2	0.5	1.7	0.12	18	4 30	22 18 23.21	-11 20 33.2	0.4	1.7	0.11
3	7 24	22 16 15.00	11 34 24.6	0.5	1.7	0.12	19	4 26	22 18 30.27	-11 19 51.0	0.4	1.7	0.11

Stellar magnitude at opposition in August, 1920, 4.1.

FOR TRANSIT AT WASHINGTON.

Date.	Wash. Mean Time.	Apparent Right Ascension.	Apparent Declination.	Hor. Par.	Semidiam.	S. T. of Sem. Pass. Mer.	Date.	Wash. Mean Time.	Apparent Right Ascension.	Apparent Declination.	Hor. Par.	Semidiam.	S. T. of Sem. Pass. Mer.
	h m s	° ' "	° ' "	" "	" "	s		h m s	° ' "	° ' "	" "	" "	s
Jan. 0	14 15	8 53 36.62	+17 27 37.3	0.3	1.3	0.09	Feb. 15	11 9 8 48 38.46	+17 48 6.7	0.3	1.3	0.09	
1	14 11	8 53 31.04	17 28 0.8	0.3	1.3	0.09	16	11 5 8 48 32.01	17 48 33.0	0.3	1.3	0.09	
2	14 7	8 53 25.37	17 28 24.5	0.3	1.3	0.09	17	11 1 8 48 25.60	17 48 59.1	0.3	1.3	0.09	
3	14 3	8 53 19.63	17 28 48.6	0.3	1.3	0.09	18	10 57 8 48 19.24	17 49 25.0	0.3	1.3	0.09	
4	13 59	8 53 13.82	17 29 12.8	0.3	1.3	0.09	19	10 50 8 48 12.93	17 49 50.7	0.3	1.3	0.09	
5	13 55	8 53 7.95	+17 29 37.3	0.3	1.3	0.09	20	10 40 8 48 6.67	+17 50 16.1	0.3	1.3	0.09	
6	13 51	8 53 2.00	17 30 2.1	0.3	1.3	0.09	21	10 45 8 48 0.47	17 50 41.3	0.3	1.2	0.09	
7	13 47	8 52 55.99	17 30 27.2	0.3	1.3	0.09	22	10 41 8 47 54.32	17 51 6.3	0.3	1.2	0.09	
8	13 43	8 52 49.92	17 30 52.4	0.3	1.3	0.09	23	10 37 8 47 48.23	17 51 31.1	0.3	1.2	0.09	
9	13 39	8 52 43.78	17 31 18.0	0.3	1.3	0.09	24	10 33 8 47 42.21	17 51 55.5	0.3	1.2	0.09	
10	13 35	8 52 37.59	+17 31 43.8	0.3	1.3	0.09	25	10 29 8 47 36.25	+17 52 19.7	0.3	1.2	0.09	
11	13 31	8 52 31.35	17 32 9.8	0.3	1.3	0.09	26	10 25 8 47 30.36	17 52 43.6	0.3	1.2	0.09	
12	13 27	8 52 25.05	17 32 35.9	0.3	1.3	0.09	27	10 21 8 47 24.54	17 53 7.2	0.3	1.2	0.09	
13	13 23	8 52 18.69	17 33 2.3	0.3	1.3	0.09	28	10 17 8 47 18.80	17 53 30.5	0.3	1.2	0.09	
14	13 19	8 52 12.29	17 33 28.9	0.3	1.3	0.09	29	10 13 8 47 13.12	17 53 53.6	0.3	1.2	0.09	
15	13 15	8 52 5.84	+17 33 55.6	0.3	1.3	0.09	Mar. 1	10 9 8 47 7.52	+17 54 16.3	0.3	1.2	0.09	
16	13 10	8 51 59.35	17 34 22.5	0.3	1.3	0.09	2	10 5 8 47 2.00	17 54 38.7	0.3	1.2	0.09	
17	13 6	8 51 52.82	17 34 49.5	0.3	1.3	0.09	3	10 1 8 46 56.55	17 55 0.8	0.3	1.2	0.09	
18	13 2	8 51 46.26	17 35 16.7	0.3	1.3	0.09	4	9 57 8 46 51.19	17 55 22.4	0.3	1.2	0.09	
19	12 58	8 51 39.67	17 35 44.0	0.3	1.3	0.09	5	9 53 8 46 45.92	17 55 43.8	0.3	1.2	0.09	
20	12 54	8 51 33.03	+17 36 11.4	0.3	1.3	0.09	6	9 49 8 46 40.74	+17 56 4.9	0.3	1.2	0.09	
21	12 50	8 51 26.36	17 36 38.9	0.3	1.3	0.09	7	9 45 8 46 35.64	17 56 25.6	0.3	1.2	0.09	
22	12 46	8 51 19.67	17 37 6.5	0.3	1.3	0.09	8	9 41 8 46 30.63	17 56 45.9	0.3	1.2	0.09	
23	12 42	8 51 12.95	17 37 34.2	0.3	1.3	0.09	9	9 36 8 46 25.70	17 57 5.9	0.3	1.2	0.09	
24	12 38	8 51 6.22	17 38 1.9	0.3	1.3	0.09	10	9 32 8 46 20.87	17 57 25.6	0.3	1.2	0.09	
25	12 34	8 50 59.46	+17 38 29.7	0.3	1.3	0.09	11	9 28 8 46 16.15	+17 57 44.8	0.3	1.2	0.09	
26	12 30	8 50 52.69	17 38 57.6	0.3	1.3	0.09	12	9 24 8 46 11.52	17 58 3.6	0.3	1.2	0.09	
27	12 26	8 50 45.92	17 39 25.5	0.3	1.3	0.09	13	9 20 8 46 6.99	17 58 22.0	0.3	1.2	0.09	
28	12 22	8 50 39.14	17 39 53.3	0.3	1.3	0.09	14	9 16 8 46 2.66	17 58 40.0	0.3	1.2	0.09	
29	12 18	8 50 32.34	17 40 21.3	0.3	1.3	0.09	15	9 12 8 45 58.23	17 58 57.6	0.3	1.2	0.09	
30	12 14	8 50 25.54	+17 40 49.2	0.3	1.3	0.09	16	9 8 8 45 54.01	+17 59 14.8	0.3	1.2	0.09	
31	12 10	8 50 18.75	17 41 17.0	0.3	1.3	0.09	17	9 4 8 45 49.69	17 59 31.5	0.3	1.2	0.09	
Feb. 1	12 6 8 50 11.95	17 41 44.8	0.3	1.3	0.09		18	9 0 8 45 45.87	17 59 47.8	0.3	1.2	0.09	
2	12 2 8 50 5.16	17 42 12.6	0.3	1.3	0.09		19	8 56 8 45 41.96	18 0 8.8	0.3	1.2	0.09	
3	11 58 8 49 58.37	17 42 40.4	0.3	1.3	0.09		20	8 52 8 45 38.19	18 0 19.3	0.3	1.2	0.09	
4	11 54 8 49 51.60	+17 43 8.1	0.3	1.3	0.09		21	8 48 8 45 34.57	+18 0 34.3	0.3	1.2	0.09	
5	11 50 8 49 44.84	17 43 35.8	0.3	1.3	0.09		22	8 44 8 45 30.95	18 0 48.9	0.3	1.2	0.09	
6	11 46 8 49 38.09	17 44 3.4	0.3	1.3	0.09		23	8 40 8 45 27.50	18 1 3.0	0.3	1.2	0.09	
7	11 41 8 49 31.36	17 44 31.0	0.3	1.3	0.09		24	8 37 8 45 24.18	18 1 16.7	0.3	1.2	0.09	
8	11 37 8 49 24.65	17 44 58.3	0.3	1.3	0.09		25	8 33 8 45 20.97	18 1 29.9	0.3	1.2	0.09	
9	11 33 8 49 17.96	+17 45 25.6	0.3	1.3	0.09		26	8 29 8 45 17.88	+18 1 42.6	0.3	1.2	0.09	
10	11 29 8 49 11.80	17 45 52.9	0.3	1.3	0.09		27	8 25 8 45 14.91	18 1 54.8	0.3	1.2	0.09	
11	11 25 8 49 4.66	17 46 20.0	0.3	1.3	0.09		28	8 21 8 45 12.06	18 2 6.6	0.3	1.2	0.09	
12	11 21 8 48 58.06	17 46 46.9	0.3	1.3	0.09		29	8 17 8 45 9.83	18 2 17.9	0.3	1.2	0.09	
13	11 17 8 48 51.50	17 47 13.7	0.3	1.3	0.09		30	8 13 8 45 6.72	18 2 28.8	0.3	1.2	0.09	
14	11 13 8 48 44.96	+17 47 40.3	0.3	1.3	0.09		31	8 9 8 45 4.24	+18 2 39.1	0.3	1.2	0.09	
15	11 9 8 48 38.46	+17 48 6.7	0.3	1.3	0.09		Apr. 1	8 5 8 45 1.89	+18 2 49.0	0.3	1.2	0.09	

Stellar magnitude at opposition in February, 1920, 7.7.

FOR TRANSIT AT WASHINGTON.

Date.	Wash. Mean Time.	Apparent Right Ascension.	Apparent Declination.	Hor. Par.	Semidiam.	S. T. of Sem. Pass. Mer.	Date.	Wash. Mean Time.	Apparent Right Ascension.	Apparent Declination.	Hor. Par.	Semidiam.	S. T. of Sem. Pass. Mer.
	h m s	h m s	° ' "	"	"	s		h m s	h m s	° ' "	"	"	s
Apr. 1	8 5 8	45 1.89	+18 249.0	0.3	1.2	0.09	Nov. 15	17 24	9 4 57.56	+16 43 50.8	0.3	1.2	0.08
2	8 1 8	44 59.66	18 258.3	0.3	1.2	0.09	16	17 20	9 4 57.49	16 43 51.8	0.3	1.2	0.09
3	7 57 8	44 57.56	18 3 7.0	0.3	1.2	0.09	17	17 16	9 4 57.29	16 43 53.4	0.3	1.2	0.09
4	7 53 8	44 55.59	18 3 15.4	0.3	1.2	0.09	18	17 12	9 4 56.95	16 43 55.6	0.3	1.2	0.09
5	7 49 8	44 53.74	18 3 23.3	0.3	1.2	0.09	19	17 8	9 4 56.47	16 43 58.4	0.3	1.2	0.09
6	7 45 8	44 52.02	+18 330.7	0.3	1.2	0.09	20	17 5	9 4 55.86	+16 44 1.8	0.3	1.2	0.09
7	7 41 8	44 50.43	18 337.6	0.3	1.2	0.09	21	17 1	9 4 55.11	16 44 5.8	0.3	1.2	0.09
8	7 37 8	44 48.97	18 344.0	0.3	1.2	0.09	22	16 57	9 4 54.24	16 44 10.3	0.3	1.2	0.09
9	7 33 8	44 47.65	18 349.8	0.3	1.2	0.09	23	16 53	9 4 53.22	16 44 15.5	0.3	1.2	0.09
10	7 29 8	44 46.44	18 355.2	0.3	1.2	0.09	24	16 49	9 4 52.07	16 44 21.2	0.3	1.2	0.09
11	7 25 8	44 45.37	+18 4 0.0	0.3	1.2	0.09	25	16 45	9 4 50.80	+16 44 27.4	0.3	1.2	0.09
12	7 21 8	44 44.44	18 4 4.3	0.3	1.2	0.09	26	16 41	9 4 49.39	16 44 34.3	0.3	1.2	0.09
13	7 17 8	44 43.64	18 4 8.0	0.3	1.2	0.09	27	16 37	9 4 47.84	16 44 41.7	0.3	1.2	0.09
14	7 13 8	44 42.97	18 4 11.4	0.3	1.2	0.09	28	16 33	9 4 46.17	16 44 49.6	0.3	1.2	0.09
15	7 9 8	44 42.44	18 4 14.2	0.3	1.2	0.09	29	16 29	9 4 44.37	16 44 58.1	0.3	1.2	0.09
16	7 5 8	44 42.04	+18 4 16.4	0.3	1.2	0.09	30	16 25	9 4 42.43	+16 45 7.2	0.3	1.2	0.09
17	7 1 8	44 41.78	18 4 18.2	0.3	1.2	0.09	Dec. 1	16 21	9 4 40.35	16 45 16.9	0.3	1.2	0.09
18	6 57 8	44 41.64	18 4 19.4	0.3	1.2	0.09	2	16 17	9 4 38.16	16 45 27.1	0.3	1.2	0.09
19	6 54 8	44 41.64	18 4 20.1	0.3	1.2	0.09	3	16 13	9 4 35.84	16 45 37.8	0.3	1.2	0.09
20	6 50 8	44 41.78	18 4 20.3	0.3	1.2	0.09	4	16 9	9 4 33.39	16 45 49.1	0.3	1.2	0.09
21	6 46 8	44 42.05	+18 4 20.0	0.3	1.2	0.09	5	16 5	9 4 30.82	+16 46 1.0	0.3	1.2	0.09
22	6 42 8	44 42.46	18 4 19.1	0.3	1.2	0.09	6	16 1	9 4 28.11	16 46 13.4	0.3	1.2	0.09
23	6 38 8	44 43.01	18 4 17.6	0.3	1.2	0.09	7	15 57	9 4 25.28	16 46 26.3	0.3	1.2	0.09
24	6 34 8	44 43.68	18 4 15.6	0.3	1.2	0.09	8	15 53	9 4 22.33	16 46 39.8	0.3	1.2	0.09
25	6 30 8	44 44.49	18 4 13.1	0.3	1.2	0.09	9	15 49	9 4 19.27	16 46 53.7	0.3	1.2	0.09
.....	.....	.....	.....	.....	.....	.....	10	15 45	9 4 16.08	+16 47 8.2	0.3	1.2	0.09
.....	.....	.....	.....	.....	.....	.....	11	15 41	9 4 12.76	16 47 23.2	0.3	1.2	0.09
Oct. 27	18 38 9	4 32.93	+16 45 22.7	0.3	1.2	0.08	12	15 37	9 4 9.33	16 47 38.7	0.3	1.2	0.09
28	18 35 9	4 35.43	16 45 12.6	0.3	1.2	0.08	13	15 33	9 4 5.79	16 47 54.7	0.3	1.2	0.09
29	18 31 9	4 37.81	16 45 3.1	0.3	1.2	0.08	14	15 29	9 4 2.13	16 48 11.1	0.3	1.2	0.09
30	18 27 9	4 40.05	+16 44 54.2	0.3	1.2	0.08	15	15 25	9 3 58.35	+16 48 28.1	0.3	1.2	0.09
31	18 23 9	4 42.16	16 44 45.9	0.3	1.2	0.08	16	15 21	9 3 54.47	16 48 45.5	0.3	1.2	0.09
Nov. 1	18 19 9	4 44.14	16 44 38.1	0.3	1.2	0.08	17	15 17	9 3 50.47	16 49 3.4	0.3	1.2	0.09
2	18 15 9	4 45.98	16 44 30.9	0.3	1.2	0.08	18	15 13	9 3 46.38	16 49 21.7	0.3	1.2	0.09
3	18 11 9	4 47.69	16 44 24.3	0.3	1.2	0.08	19	15 9	9 3 42.15	16 49 40.4	0.3	1.2	0.09
4	18 7 9	4 49.26	+16 44 18.2	0.3	1.2	0.08	20	15 5	9 3 37.84	+16 49 59.7	0.3	1.2	0.09
5	18 3 9	4 50.70	16 44 12.7	0.3	1.2	0.08	21	15 1	9 3 33.42	16 50 19.4	0.3	1.2	0.09
6	17 59 9	4 52.00	16 44 7.9	0.3	1.2	0.08	22	14 57	9 3 28.90	16 50 39.5	0.3	1.2	0.09
7	17 56 9	4 53.17	16 44 3.7	0.3	1.2	0.08	23	14 53	9 3 24.28	16 51 0.1	0.3	1.2	0.09
8	17 52 9	4 54.20	16 44 0.0	0.3	1.2	0.08	24	14 49	9 3 19.57	16 51 21.0	0.3	1.2	0.09
9	17 48 9	4 55.09	+16 43 56.9	0.3	1.2	0.08	25	14 45	9 3 14.76	+16 51 42.4	0.3	1.2	0.09
10	17 44 9	4 55.85	16 43 54.4	0.3	1.2	0.08	26	14 41	9 3 9.85	16 52 4.2	0.3	1.2	0.09
11	17 40 9	4 56.46	16 43 52.5	0.3	1.2	0.08	27	14 37	9 3 4.85	16 52 26.3	0.3	1.2	0.09
12	17 36 9	4 56.95	16 43 51.2	0.3	1.2	0.08	28	14 33	9 2 59.76	16 52 48.7	0.3	1.2	0.09
13	17 32 9	4 57.29	16 43 50.4	0.3	1.2	0.08	29	14 29	9 2 54.59	16 53 11.5	0.3	1.2	0.09
14	17 28 9	4 57.49	+16 43 50.3	0.3	1.2	0.08	30	14 25	9 2 49.33	+16 53 34.8	0.3	1.2	0.09
15	17 24 9	4 57.56	+16 43 50.8	0.3	1.2	0.08	31	14 21	9 2 43.98	+16 53 58.4	0.3	1.2	0.09

Stellar magnitude at opposition in February, 1920, 7.7.





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**PART III.**

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**PHENOMENA.**

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In the year 1920 there will be four eclipses, two of the Sun and two of the Moon.

I.—*A Total Eclipse of the Moon, May 2, 1920, visible at Washington; the beginning visible generally in Europe, western Asia, Africa, the Indian Ocean except the eastern portion, the Atlantic Ocean, eastern North America, and South America; the ending visible generally in western Europe, western Africa, the Atlantic Ocean, North America except the extreme northwestern portion, South America, and the eastern portion of the Pacific Ocean.*

ELEMENTS OF THE ECLIPSE.

Greenwich mean time of $\delta$ in right ascension, May 2				d	h	m	s
				2	13	59	14.0
Sun's right ascension		h	m	s	Hourly motion		s
		2	39	32.08			9.58
Moon's right ascension		14	39	32.08	Hourly motion		123.88
				"			"
Sun's declination		+15	32	32.5	Hourly motion		+ 0 44.4
Moon's declination		-15	51	6.0	Hourly motion		- 6 36.1
Sun's equa. hor. parallax				8.7	Sun's true semidiameter		15 51.7
Moon's equa. hor. parallax		54	47.6		Moon's true semidiameter		14 55.1

CIRCUMSTANCES OF THE ECLIPSE.

Moon enters penumbra	May 2	d	h	m	} Greenwich Mean Time.
Moon enters umbra	2	12	0.8		
Total eclipse begins	2	13	14.7		
Middle of the eclipse	2	13	50.9		
Total eclipse ends	2	14	27.1		
Moon leaves umbra	2	15	41.3		
Moon leaves penumbra	2	16	53.2		

Contacts of Umbra with Moon's Limb.	Angles of Position from the North Point.	The Moon Being in the Zenith in Longitude from Greenwich, and in Latitude.	
First	83 to E.	+ 1 56	-15 38
Last	59 to W.	+55 18	-16 2

Magnitude of the eclipse—1.224 (Moon's diameter—1.0).

II.—*A Partial Eclipse of the Sun, May 17, 1920, invisible at Washington.*

ELEMENTS OF THE ECLIPSE.

Greenwich mean time of $\delta$ in right ascension, May 17				d	h	m	s
				17	18	0	14.4
Sun and Moon's R. A.		h	m	s	Hourly motions		s
		3	38	44.17			9.94 and 157.15
				"			"
Sun's declination		+19	29	22.0	Hourly motion		+0 33.2
Moon's declination		+18	26	31.5	Hourly motion		+5 19.0
Sun's equa. hor. parallax				8.7	Sun's true semidiameter		15 48.4
Moon's equa. hor. parallax		60	56.9		Moon's true semidiameter		16 35.6

CIRCUMSTANCES OF THE ECLIPSE.

	Greenwich Mean Time.	Longitude from Greenwich.	Latitude.
Eclipse begins	May 17 16 16.9	- 46 28	-46 11
Greatest eclipse	17 18 14.7	-107 32	-69 5
Eclipse ends	17 20 12.6	-133 3	-32 7

Magnitude of greatest eclipse—0.973 (Sun's diameter—1.0).

III.—A *Total Eclipse of the Moon*, October 26–27, 1920, invisible at Washington; the beginning visible generally in western North America, the Pacific Ocean, Australia, Asia except the western portion, and the eastern portion of the Indian Ocean; the ending visible generally in the western portion of the Pacific Ocean, Asia, Australia, the Indian Ocean, eastern Africa, and Europe except the western portion.

ELEMENTS OF THE ECLIPSE.

	Greenwich mean time of $\delta$ in right ascension, October 27				d	h	m	s	
					2	18	11	3	
Sun's right ascension	h	m	s	Hourly motion					s
	14	6	29.31						9.63
Moon's right ascension	2	6	29.31	Hourly motion					140.76
			"						"
Sun's declination	-12	48	41.8	Hourly motion					- 0 50.7
Moon's declination	+13	3	56.4	Hourly motion					+ 8 52.8
Sun's equa. hor. parallax			8.9	Sun's true semidiameter					16 6.0
Moon's equa. hor. parallax	59	3.9		Moon's true semidiameter					16 4.0

CIRCUMSTANCES OF THE ECLIPSE.

		d	h	m	
Moon enters penumbra	Oct.	26	23	24.5	} Greenwich Mean Time.
Moon enters umbra		27	0	25.6	
Total eclipse begins		27	1	28.6	
Middle of the eclipse		27	2	11.4	
Total eclipse ends		27	2	54.3	
Moon leaves umbra		27	3	57.5	
Moon leaves penumbra		27	4	58.7	

Contacts of Umbra with Moon's Limb.	Angles of Position from the North Point.	The Moon being in the Zenith in Longitude from Greenwich, and in Latitude.	
First	90 to E.	-168 34	+12 47
Last	118 to W.	-117 30	+13 19

Magnitude of the eclipse—1.404 (Moon's diameter—1.0).

IV.—A *Partial Eclipse of the Sun*, November 10, 1920, visible at Washington.

ELEMENTS OF THE ECLIPSE.

	Greenwich mean time of $\delta$ in right ascension, Nov. 10				d	h	m	s	
					3	27	48.1		
Sun and Moon's R. A.	h	m	s	Hourly motions	10.11	and	127.74		
	15	1	56.24						"
Sun's declination	-17	11	6.7	Hourly motion					+ 0 42.1
Moon's declination	-16	7	37.8	Hourly motion					+ 5 58.7
Sun's equa. hor. parallax			8.9	Sun's true semidiameter					16 9.4
Moon's equa. hor. parallax	55	26.8		Moon's true semidiameter					15 5.8

CIRCUMSTANCES OF THE ECLIPSE.

		Greenwich Mean Time.	Longitude from Greenwich.	Latitude.
Eclipse begins	Nov.	10 1 47.3	+ 96 25	+58 12
Greatest eclipse		10 3 52.0	+ 80 0	+69 57
Eclipse ends		10 5 57.1	+ 15 20	+34 0

Magnitude of greatest eclipse—0.742 (Sun's diameter—1.0).

BESSELIAN ELEMENTS OF THE PARTIAL ECLIPSE OF THE SUN,  
MAY 17, 1920.

Greenwich Mean Time.	Coordinates of Center of Shadow on Fundamental Plane.		Direction of Axis of Shadow.			Radius of Penumbra on Fundamental Plane.
	<i>z</i>	<i>y</i>	Log sin <i>d</i>	Log cos <i>d</i>	<i>μ</i>	<i>l</i>
<b>h m</b>						
16 10	-1.05486	-1.17807	+9.52297	+9.97441	243 26.1	+0.53291
20	0.95919	1.16494	9.52300	9.97441	245 56.1	0.53291
30	0.86352	1.15181	9.52303	9.97440	248 26.1	0.53291
40	0.76784	1.13869	9.52306	9.97440	250 56.1	0.53290
50	0.67216	1.12557	9.52309	9.97440	253 26.1	0.53290
<b>17 0</b>	-0.57047	-1.11245	+9.52313	+9.97439	255 56.1	+0.53290
10	0.48078	1.09934	9.52316	9.97439	258 26.1	0.53289
20	0.38509	1.08623	9.52319	9.97439	260 56.2	0.53289
30	0.28940	1.07312	9.52322	9.97438	263 26.2	0.53288
40	0.19370	1.06002	9.52326	9.97438	265 56.2	0.53288
50	0.09800	1.04692	9.52329	9.97437	268 26.2	0.53287
<b>18 0</b>	-0.00230	-1.03383	+9.52332	+9.97437	270 56.2	+0.53286
10	+0.09340	1.02074	9.52335	9.97436	273 26.2	0.53285
20	0.18911	1.00766	9.52339	9.97436	275 56.2	0.53284
30	0.28481	0.99458	9.52342	9.97436	278 26.2	0.53283
40	0.38052	0.98150	9.52345	9.97435	280 56.2	0.53282
50	0.47622	0.96843	9.52348	9.97435	283 26.3	0.53281
<b>19 0</b>	+0.57193	-0.95536	+9.52351	+9.97434	285 56.3	+0.53280
10	0.66764	0.94230	9.52355	9.97434	288 26.3	0.53278
20	0.76334	0.92924	9.52358	9.97434	290 56.3	0.53277
30	0.85905	0.91618	9.52361	9.97433	293 26.3	0.53276
40	0.95476	0.90313	9.52364	9.97433	295 56.3	0.53274
50	1.05046	0.89009	9.52367	9.97432	298 26.3	0.53273
<b>20 0</b>	+1.14616	-0.87705	+9.52371	+9.97432	300 56.3	+0.53271
10	1.24186	0.86401	9.52374	9.97432	303 26.3	0.53269
20	+1.33756	-0.85098	+9.52377	+9.97431	305 56.4	+0.53267

Greenwich Mean Time.	Log <i>z'</i> for 1 Minute.	Log <i>y'</i> for 1 Minute.	Log <i>μ'</i> for 1 Minute.	Log Tangent of Angle of Cone.
				Penumbra.
<b>h m</b>				
16 0	+7.9808	+7.1185	+1.1761	+7.66470
17 0	7.9809	7.1178	1.1761	7.66469
18 0	7.9809	7.1170	1.1761	7.66469
19 0	7.9809	7.1161	1.1761	7.66469
20 0	7.9809	7.1152	1.1761	7.66468
21 0	+7.9808	+7.1142	+1.1761	+7.66468

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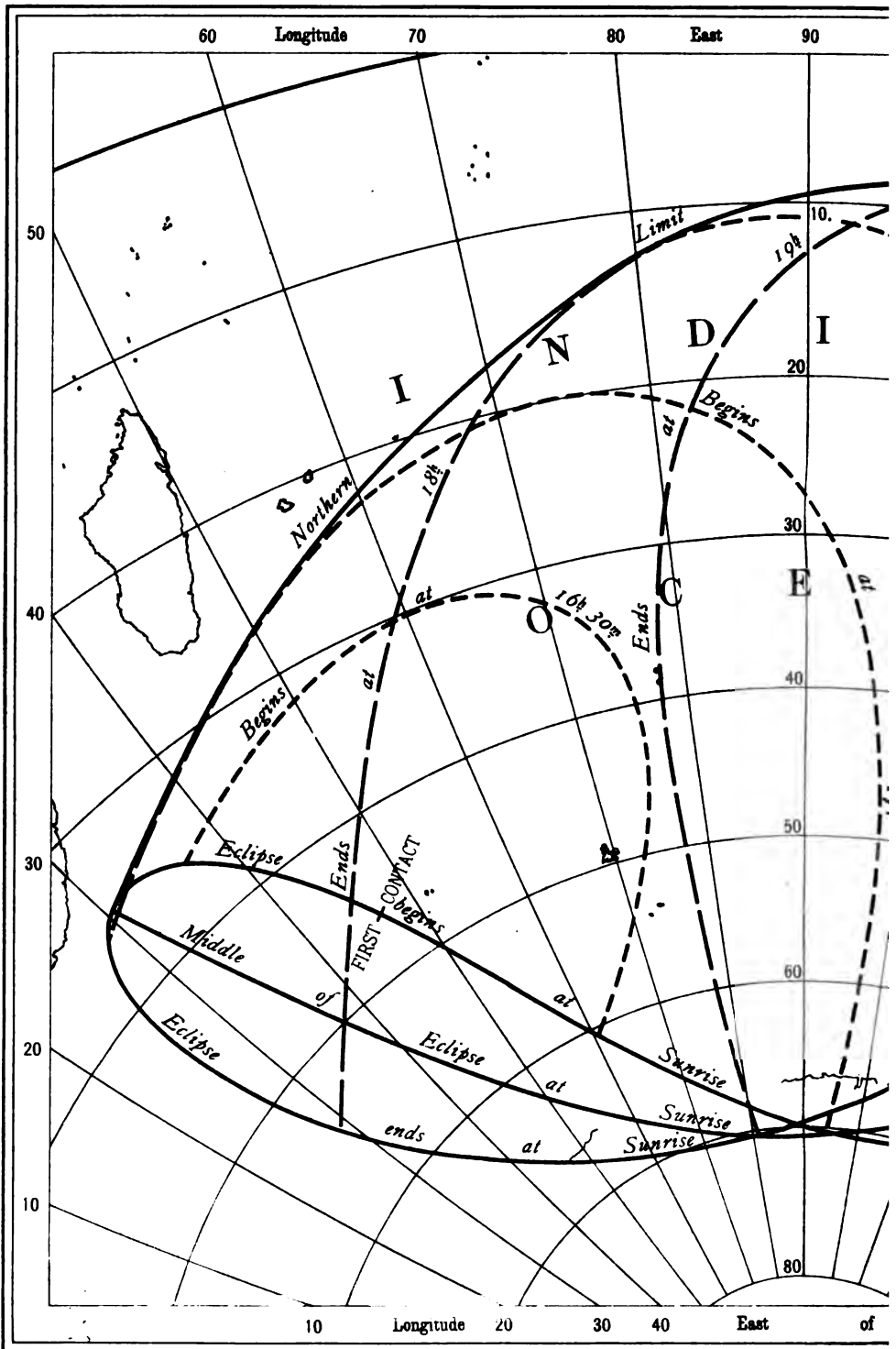
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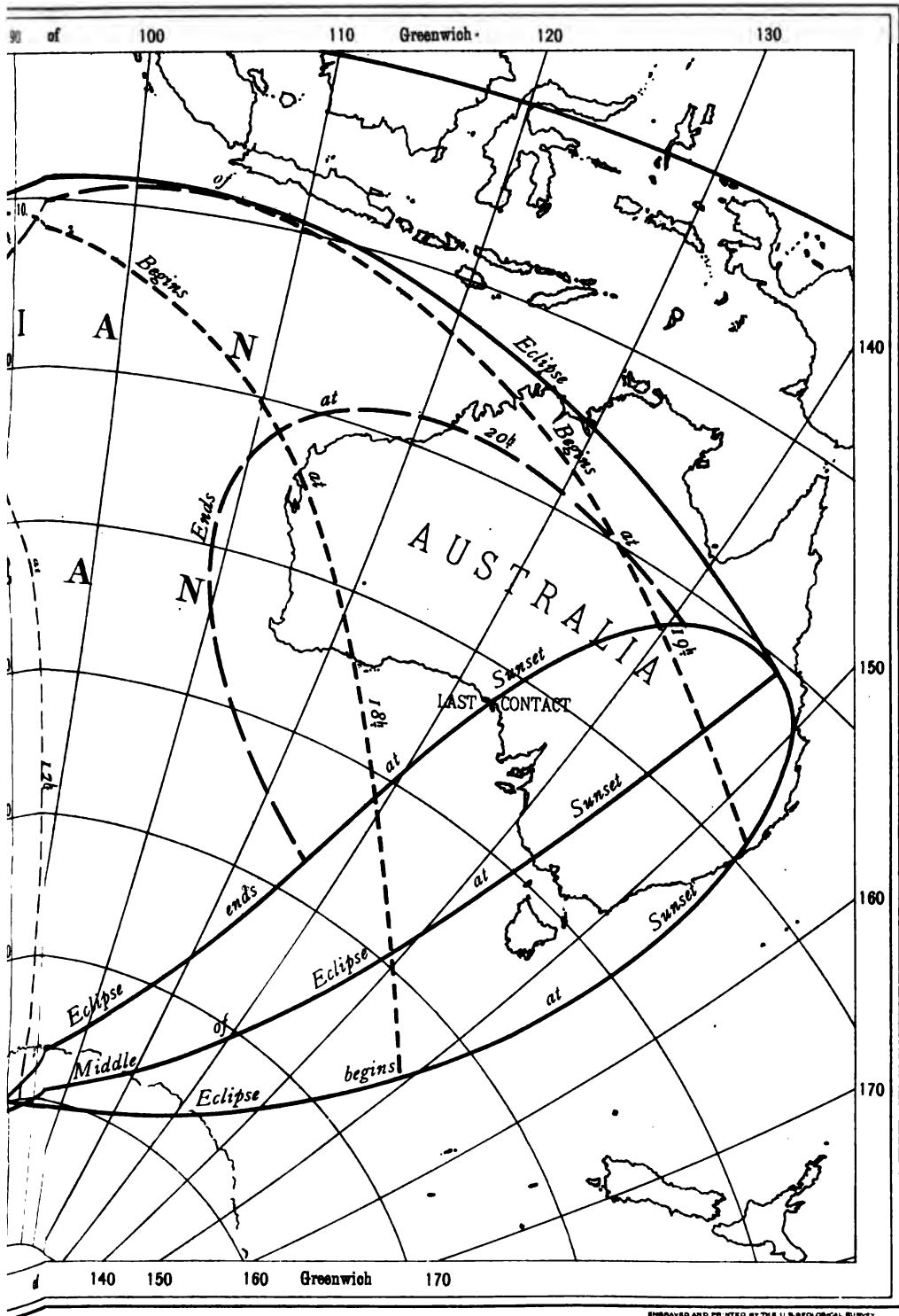
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# PARTIAL ECLIPSE



Note:- The hours of beginning and ending

# PSE OF MAY 17, 1920.

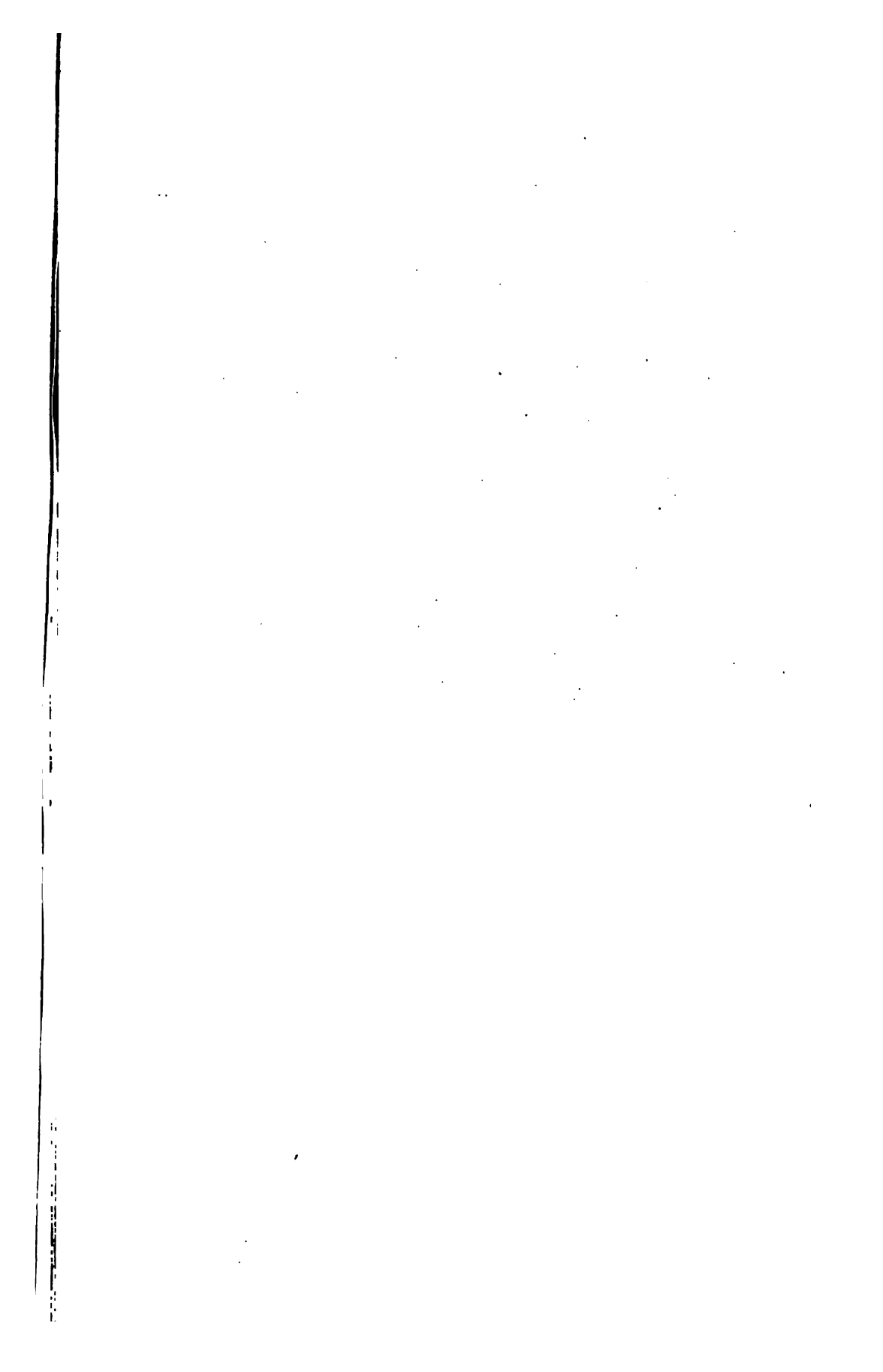


ENGRAVED AND PRINTED BY THE U.S. GEOLOGICAL SURVEY

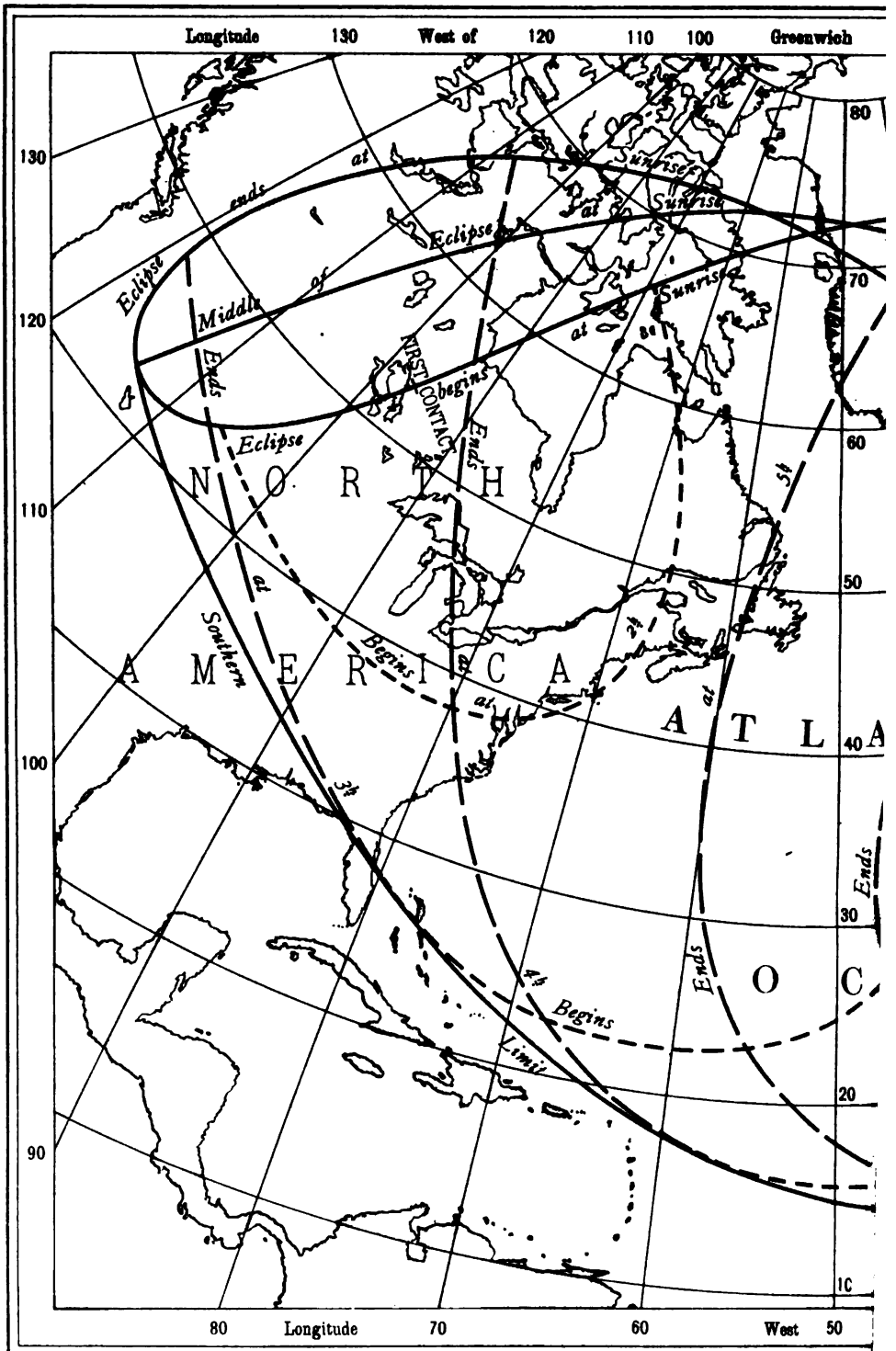
*ending are expressed in Greenwich Mean Time.*





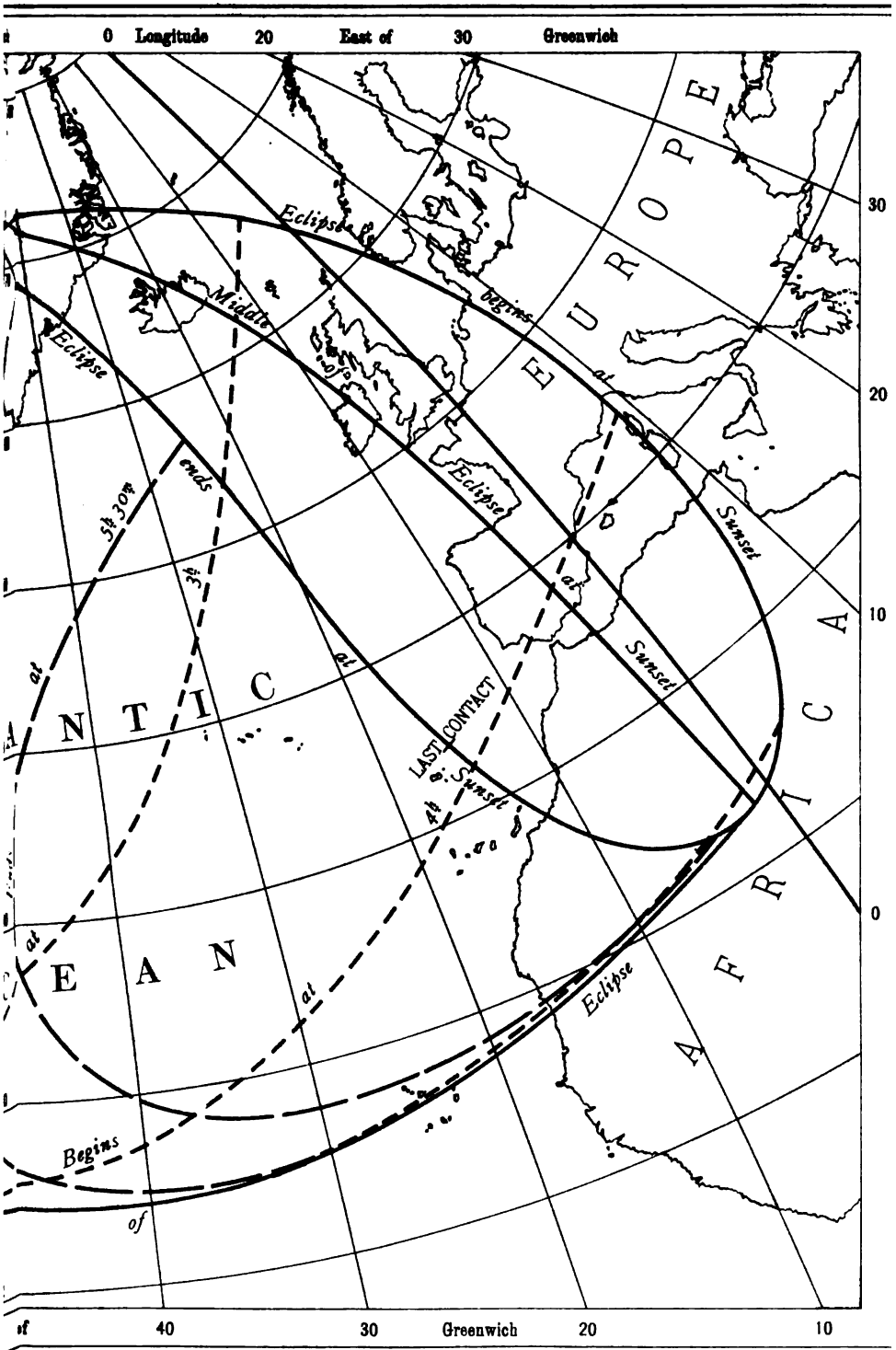


# PARTIAL ECLIPSE OF



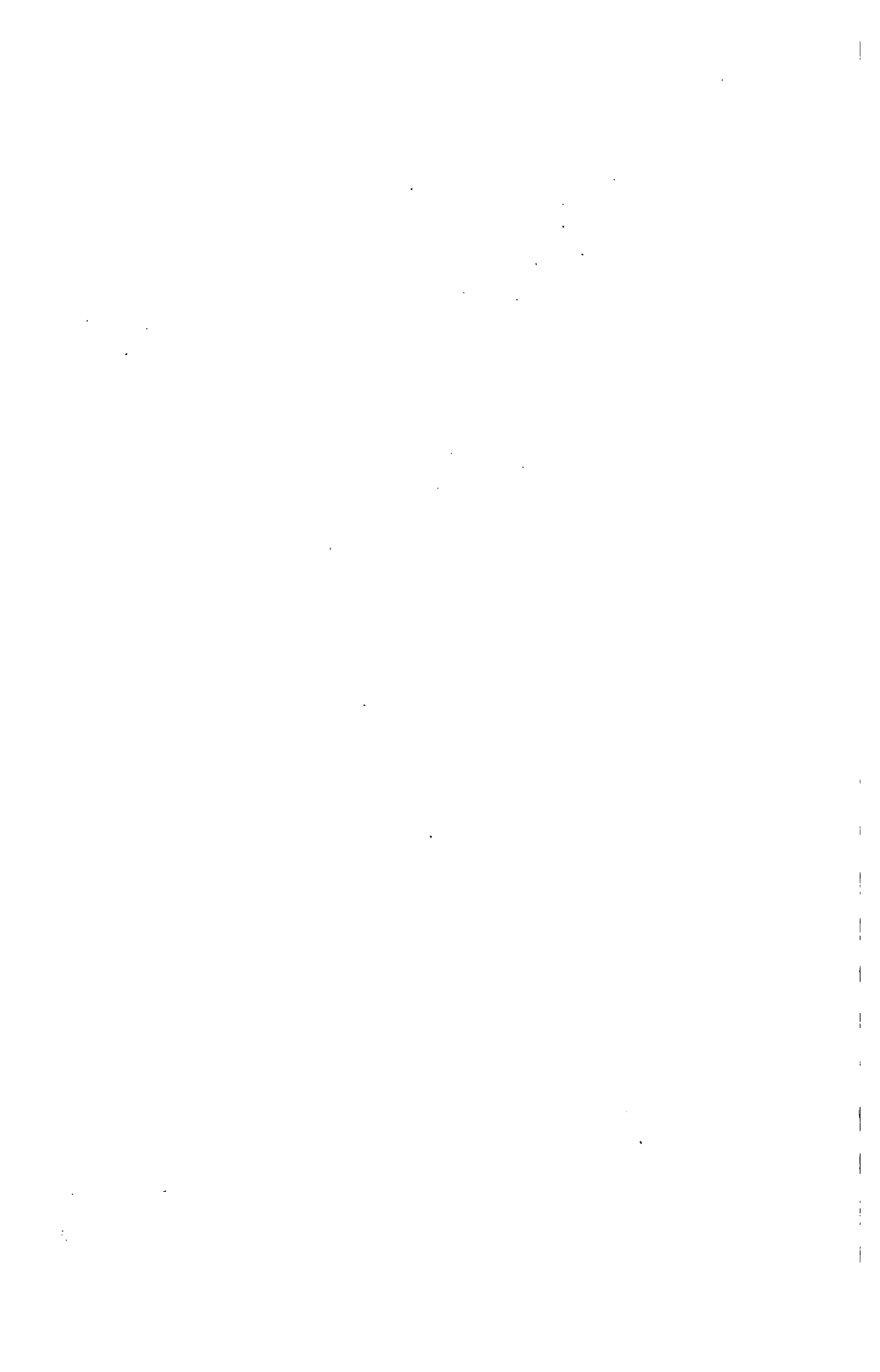
Note:- The hours of beginning and ending

# NOVEMBER 10, 1920.



ENGRAVED AND PRINTED BY THE U.S. GEOLOGICAL SURVEY

are expressed in Greenwich Mean Time.



BESSELIAN ELEMENTS OF THE PARTIAL ECLIPSE OF THE SUN,  
NOVEMBER 10, 1920.

Greenwich Mean Time.	Coordinates of Center of Shadow on Fundamental Plane.		Direction of Axis of Shadow.			Radius of Penumbra on Fundamental Plane.
	<i>x</i>	<i>y</i>	Log sin <i>d</i>	Log cos <i>d</i>	<i>μ</i>	<i>l</i>
<b>h m</b>						
1 40	-0.91790	+1.31885	-9.47006	+9.98020	28 59.9	+0.56491
50	0.83276	1.30298	9.47011	9.98020	31 29.9	0.56494
<b>2 0</b>	-0.74761	+1.28711	-9.47016	+9.98020	33 59.9	+0.56496
10	0.66247	1.27125	9.47020	9.98020	36 29.9	0.56498
20	0.57733	1.25539	9.47025	9.98019	38 59.9	0.56501
30	0.49218	1.23953	9.47030	9.98019	41 29.9	0.56503
40	0.40703	1.22368	9.47034	9.98018	43 59.9	0.56505
50	0.32188	1.20783	9.47039	9.98018	46 29.9	0.56507
<b>3 0</b>	-0.23673	+1.19199	-9.47044	+9.98017	48 59.9	+0.56509
10	0.15158	1.17614	9.47048	9.98017	51 29.9	0.56511
20	-0.06643	1.16030	9.47053	9.98016	53 59.9	0.56513
30	+0.01871	1.14447	9.47058	9.98016	56 29.9	0.56515
40	0.10386	1.12864	9.47062	9.98015	58 59.9	0.56517
50	0.18901	1.11281	9.47067	9.98015	61 29.9	0.56519
<b>4 0</b>	+0.27416	+1.09698	-9.47072	+9.98014	63 59.9	+0.56520
10	0.35931	1.08116	9.47076	9.98014	66 29.9	0.56522
20	0.44446	1.06534	9.47081	9.98014	68 59.9	0.56523
30	0.52961	1.04953	9.47086	9.98013	71 29.9	0.56525
40	0.61476	1.03372	9.47090	9.98013	73 59.9	0.56526
50	0.69990	1.01791	9.47095	9.98013	76 29.9	0.56528
<b>5 0</b>	+0.78505	+1.00211	-9.47100	+9.98012	78 59.9	+0.56529
10	0.87019	0.98631	9.47104	9.98012	81 29.9	0.56530
20	0.95533	0.97052	9.47109	9.98011	83 59.9	0.56532
30	1.04047	0.95473	9.47114	9.98011	86 29.9	0.56533
40	1.12561	0.93894	9.47118	9.98010	88 59.9	0.56534
50	1.21074	0.92316	9.47123	9.98010	91 29.9	0.56535
<b>6 0</b>	+1.29587	+0.90738	-9.47128	+9.98009	93 59.9	+0.56536

Greenwich Mean Time.	Log <i>x'</i> for 1 Minute.	Log <i>y'</i> for 1 Minute.	Log <i>μ'</i> for 1 minute.	Log Tangent of Angle of Cona.
				Penumbra.
<b>h m</b>				
1 0	+7.9301	-7.2009	+1.1761	+7.67432
2 0	7.9301	7.2004	1.1761	7.67432
3 0	7.9302	7.1999	1.1761	7.67433
4 0	7.9302	7.1993	1.1761	7.67433
5 0	7.9301	7.1987	1.1761	7.67434
6 0	+7.9301	-7.1980	+1.1761	+7.67434

## LOCAL CIRCUMSTANCES OF THE ECLIPSE OF THE SUN, NOV. 10, 1920.

Place.	Beginning.			Middle.		Ending.		
	Greenwich Mean Time.	Angle from North Point.	Angle from Vertex.	Greenwich Mean Time.	Magnituda.	Greenwich Mean Time.	Angle from North Point.	Angle from Vertex.
Albany, N. Y. . . . .	h m	°	°	h m		h m	°	°
Allegheeny, Pa. . . . .	1 57	329	359	3 8	0.96	4 24	69	73
Amherst, Mass. . . . .	1 57	337	18	2 58	0.26	4 8	63	76
Ann Arbor, Mich. . . . .	1 58	328	358	3 10	0.37	4 27	70	71
Appleton, Wis. . . . .	1 54	337	14	2 52	0.26	3 56	63	80
Atlanta, Ga. . . . .	1 52	337	14	2 47	0.25	3 47	62	83
Augusta, Me. . . . .	2 16	359	40	2 51	0.07	3 23	42	70
Bismarck, N. Dak. . . . .	1 59	324	350	3 15	0.42	4 36	73	70
Buffalo, N. Y. . . . .	1 51	341	21	2 37	0.20	3 26	56	86
Cambridge, Mass. . . . .	1 55	332	6	3 0	0.32	4 10	67	77
Charleston, W. Va. . . . .	1 59	327	356	3 13	0.38	4 31	70	70
Charlottesville, Va. . . . .	2 1	343	21	2 55	0.20	3 53	58	76
Cheyenne, Wyo. . . . .	2 2	341	17	3 0	0.23	4 3	60	73
Cincinnati, Ohio . . . . .	2 10	4	49	2 30	0.08	2 49	34	75
Cleveland, Ohio . . . . .	1 59	344	23	2 51	0.19	3 46	57	78
Columbia, Md. . . . .	1 55	337	13	2 55	0.26	4 0	63	78
Columbia, S. C. . . . .	2 3	353	35	2 40	0.10	3 18	46	79
Columbus, Ohio . . . . .	2 13	354	33	2 56	0.12	3 41	49	71
Des Moines, Iowa . . . . .	1 58	341	18	2 59	0.22	3 58	59	78
Dover, Del. . . . .	1 57	348	29	2 40	0.15	3 27	53	83
Evanston, Ill. . . . .	2 0	386	10	3 5	0.28	4 15	64	71
Geneva, N. Y. . . . .	1 54	341	19	2 47	0.21	3 44	59	82
Greencastle, Ind. . . . .	1 56	381	3	3 3	0.33	4 15	68	76
Hanover, N. H. . . . .	1 59	345	25	2 47	0.17	3 40	55	79
Harrisburg, Pa. . . . .	1 58	326	355	3 11	0.39	4 29	71	72
Helena, Mont. . . . .	1 58	385	9	3 3	0.29	4 12	65	73
Iowa City, Iowa . . . . .	...	...	...	2 30	0.10	3 3	44	84
Ithaca, N. Y. . . . .	1 56	345	26	2 42	0.17	3 33	55	82
Kansas City, Mo. . . . .	1 56	331	3	3 4	0.38	4 16	68	75
Louisville, Ky. . . . .	2 5	356	39	2 38	0.08	3 12	44	78
Madison, Wis. . . . .	2 2	348	28	2 49	0.16	3 38	53	78
Minneapolis, Minn. . . . .	1 58	340	16	2 45	0.22	3 42	59	83
Montgomery, Ala. . . . .	1 51	339	18	2 42	0.22	3 37	59	85
Nashville, Tenn. . . . .	2 21	5	47	2 48	0.02	3 6	34	68
New Haven, Conn. . . . .	2 8	356	37	2 47	0.10	3 28	47	76
New York, N. Y. . . . .	1 59	330	1	3 10	0.34	4 25	68	71
Omaha, Nebr. . . . .	1 59	332	3	3 8	0.33	4 22	67	71
Orono, Me. . . . .	1 59	351	33	2 37	0.12	3 18	48	81
Oxford, Miss. . . . .	2 0	322	348	3 17	0.44	4 38	74	70
Philadelphia, Pa. . . . .	2 22	8	50	2 43	0.03	3 4	35	70
Pierre, S. Dak. . . . .	1 59	334	7	3 6	0.30	4 17	65	72
Poughkeepsie, N. Y. . . . .	1 55	347	28	2 35	0.15	3 18	51	84
Raleigh, N. C. . . . .	1 58	330	1	3 8	0.34	4 23	68	72
Richmond, Va. . . . .	2 6	346	23	3 0	0.18	3 58	56	71
Springfield, Ill. . . . .	2 3	341	16	3 2	0.23	4 6	60	72
St. Louis, Mo. . . . .	1 59	348	28	2 44	0.15	3 32	53	80
	2 3	351	33	2 43	0.12	3 25	49	78

LOCAL CIRCUMSTANCES OF THE ECLIPSE OF THE SUN, NOV. 10, 1920.

Place.	Beginning.			Middle.		Ending.		
	Greenwich Mean Time.	Angle from North Point.	Angle from Vertex.	Greenwich Mean Time.	Magnitude.	Greenwich Mean Time.	Angle from North Point.	Angle from Vertex.
Syracuse, N. Y. . . . .	h m .	°	°	h m		h m .	°	°
Topeka, Kans. . . . .	1 56	330	2	3 4	0.34	4 18	68	75
Tuscaloosa, Ala. . . . .	2 6	358	41	2 37	0.07	3 8	42	78
Urbana, Ill. . . . .	2 26	9	51	2 43	0.02	3 5	34	69
Washington, D. C. . . . .	1 58	346	26	2 46	0.17	3 37	55	80
Williamis Bay, Wis. . . . .	2 0	338	12	3 2	0.26	4 9	63	72
Williamis Bay, Wis. . . . .	1 54	341	19	2 46	0.22	3 42	56	82

564 STARS OCCULTED BY THE MOON, 1920.

MEAN PLACES FOR 1920.0. (January 1<sup>d</sup>.157, Greenwich.)

Name of Star.		Magni- tude.	Right Ascension.	Annual Proper Motion.	Declination.	Annual Proper Motion.
			h m s	s	° ' "	"
51	Piscium . . . . .	5.6	0 28 16.037	+0.0021	+ 6 30 49.88	+0.009
60	Piscium . . . . .	6.2	0 43 15.285	+0.0010	6 18 16.78	-0.006
62	Piscium . . . . .	6.1	0 44 8.262	+0.0070	6 51 48.27	+0.008
δ	Piscium . . . . .	4.6	0 44 31.803	+0.0055	7 8 59.86	-0.044
ε	Piscium . . . . .	4.4	0 58 47.365	-0.0054	7 27 34.99	+0.026
π	Piscium . . . . .	5.6	1 32 51.282	-0.0049	+11 43 57.72	+0.004
54	Ceti . . . . .	6.0	1 46 37.111	-0.0048	10 38 51.77	-0.027
26 B.	Arietis . . . . .	6.0	1 55 8.714	-0.0003	11 54 26.81	-0.029
12 H <sup>1</sup> .	Arietis . . . . .	6.3	1 58. 16.530	-0.0006	13 5 29.22	-0.006
19	Arietis . . . . .	5.8	2 8 41.903	+0.0071	14 54 19.92	-0.022
29	Arietis . . . . .	6.1	2 28. 31.039	-0.0013	+14 40 51.37	+0.004
36	Arietis . . . . .	6.5	2 39 51.082	+0.0036	17 25 33.39	-0.040
ο	Arietis . . . . .	5.8	2 40 8.269	-0.0002	14 59 25.06	-0.026
40	Arietis . . . . .	6.0	2 44 2.763	+0.0030	17 57 5.01	-0.030
π	Arietis . . . . .	5.2	2 44 49.496	+0.0004	17 7 56.42	-0.011
σ	Arietis . . . . .	5.5	2 47 4.353	+0.0016	+14 45 11.07	-0.024
124 B.	Arietis . . . . .	6.4	2 48 43.979	+0.0012	16 9 27.57	-0.063
45	Arietis . . . . .	6.0	2 51 18.532	-0.0011	18 0 30.21	-0.006
ρ	Arietis . . . . .	5.6	2 51 54.992	+0.0196	17 42 17.82	-0.308
145 B.	Arietis . . . . .	6.5	3 0 13.304	-0.0021	15 32 44.92	-0.141
53	Arietis . . . . .	6.0	3 2 55.216	-0.0019	+17 34 19.15	+0.004
54	Arietis . . . . .	6.5	3 3 48.775	+0.0013	18 29 19.93	-0.014
175 B.	Arietis . . . . .	6.4	3 22 29.010	+0.0026	18 28 37.69	-0.011
26 B.	Tauri . . . . .	6.4	3 29 34.725	+0.0060	17 34 16.34	-0.323
33 B.	Tauri . . . . .	6.3	3 34 54.091	+0.0023	16 16 39.04	-0.026
13	Tauri . . . . .	5.6	3 37 41.933	+0.0008	+19 26 41.73	-0.019
14	Tauri . . . . .	6.2	3 39 9.484	+0.0084	19 24 47.22	-0.049
148 B.	Tauri . . . . .	5.9	3 48 35.345	+0.0085	17 5 23.30	-0.036
162 B.	Tauri . . . . .	6.3	3 56 2.504	-0.0003	17 4 17.45	-0.061
163 B.	Tauri . . . . .	5.8	3 56 12.063	+0.0005	17 58 9.04	-0.040
180 B.	Tauri . . . . .	6.1	4 3 24.499	+0.0032	+17 7 37.06	-0.022
43	Tauri . . . . .	5.5	4 4 30.176	+0.0079	19 23 54.94	-0.044
ω	Tauri . . . . .	4.8	4 12 34.257	-0.0022	20 22 58.24	-0.065
51	Tauri . . . . .	5.6	4 13 38.977	+0.0071	21 23 5.21	-0.041
53	Tauri . . . . .	5.3	4 14 43.063	+0.0023	20 56 59.37	-0.061
85 H <sup>1</sup> .	Tauri . . . . .	6.0	4 15 45.926	+0.0055	+18 33 8.11	.....
224 B.	Tauri . . . . .	6.1	4 17 40.224	-0.0002	20 38 0.11	-0.001
227 B.	Tauri . . . . .	5.9	4 18 49.389	+0.0019	20 47 47.91	-0.081
234 B.	Tauri . . . . .	6.0	4 20 17.226	+0.0072	18 51 31.90	-0.680
68	Tauri . . . . .	4.3	4 20 51.503	+0.0073	17 44 45.49	-0.061
247 B.	Tauri . . . . .	5.8	4 23 15.727	+0.0072	+21 26 31.89	-0.076
ε	Tauri . . . . .	3.6	4 23 56.589	+0.0082	19 0 14.82	-0.084
119 H <sup>1</sup> .	Tauri . . . . .	6.2	4 28 55.026	+0.0025	17 50 55.81	-0.081
282 B.	Tauri . . . . .	6.4	4 31 1.008	-0.0028	19 43 4.47	+0.013
129 H <sup>1</sup> .	Tauri . . . . .	5.8	4 33 32.630	+0.0013	20 31 30.14	-0.010
302 B.	Tauri . . . . .	6.1	4 41 36.444	+0.0053	+18 35 23.15	-0.067
ι	Tauri . . . . .	5.1	4 46 41.534	+0.0059	18 42 17.44	-0.035
312 B.	Tauri . . . . .	6.2	4 50 16.250	+0.0073	19 21 24.32	-0.048
κ	Tauri . . . . .	4.7	4 58 18.762	+0.0056	21 28 36.30	-0.049
330 B.	Tauri . . . . .	6.3	4 59 35.548	+0.0023	21 10 0.12	-0.034
333 B.	Tauri . . . . .	6.3	5 0 48.964	-0.0036	+19 41 51.71	-0.013
μ	Tauri . . . . .	5.0	5 2 43.213	+0.0080	18 32 20.06	+0.025
λ	Tauri . . . . .	5.2	5 3 4.261	-0.0033	20 18 49.48	-0.054
105	Tauri . . . . .	6.0	5 3 8.325	+0.0004	21 36 0.18	-0.007
107	Tauri . . . . .	6.5	5 4 7.035	+0.0002	19 45 25.82	-0.015
η	Tauri . . . . .	5.1	5 14 28.168	+0.0021	+22 0 53.81	-0.063
351 B.	Tauri . . . . .	6.2	5 14 30.639	-0.0014	20 3 6.87	-0.029
353 B.	Tauri . . . . .	6.5	5 16 13.081	+0.0025	+19 44 4.25	-0.034



STARS OCCULTED BY THE MOON, 1920. 565

MEAN PLACES FOR 1920.0. (January 1<sup>d</sup>.157, Greenwich.)

Name of Star.		Magni- tude.	Right Ascension.			Annual Proper Motion.	Declination.	Annual Proper Motion.
			h	m	s	"	"	"
o	Tauri	4.8	5	22	49.736	+0.0006	+21 52 11.30	-0.010
119	Tauri	4.9	5	27	31.322	+0.0007	18 32 9.31	-0.004
120	Tauri	5.6	5	28	50.310	+0.0011	18 29 3.79	+0.001
372 B.	Tauri	6.1	5	28	53.458	-0.0001	20 25 6.92	-0.013
γ	Tauri	3.0	5	32	51.775	+0.0006	21 5 41.43	-0.033
	B. D. +19°1110	6.0	5	47	38.991	-0.0008	+19 50 53.59	-0.031
x <sup>1</sup>	Orionis	4.5	5	49	38.713	-0.0126	20 15 45.10	-0.063
57	Orionis	5.8	5	50	12.500	+0.0003	19 44 6.48	-0.013
64	Orionis	5.1	5	58	43.250	+0.0014	19 41 34.89	-0.021
x <sup>2</sup>	Orionis	4.7	5	59	10.145	+0.0011	20 8 29.49	-0.008
68	Orionis	5.7	6	7	17.083	+0.0013	+19 48 34.35	-0.013
19 B.	Geminorum	6.2	6	8	51.301	+0.0037	18 42 8.31	-0.042
124 H.	Orionis	5.7	6	9	48.268	+0.0010	17 55 47.68	-0.045
71	Orionis	5.1	6	10	8.475	-0.0062	19 11 5.00	-0.104
292 B.	Orionis	6.5	6	16	45.760	+0.0006	17 48 7.28	.....
15	Geminorum	6.5	6	23	0.559	-0.0015	+20 50 22.54	-0.054
16	Geminorum	6.2	6	23	11.237	-0.0019	20 32 43.34	-0.006
γ	Geminorum	4.1	6	24	12.793	-0.0005	20 15 50.39	-0.016
26	Geminorum	5.2	6	37	44.893	+0.0010	17 43 28.61	-0.092
74 B.	Geminorum	6.2	6	42	43.009	+0.0002	18 16 52.35	-0.056
110 B.	Geminorum	6.2	6	57	46.358	.....	+17 52 12.30	.....
41 H.	Geminorum	6.0	6	57	56.328	-0.0063	16 47 26.34	+0.006
51	Geminorum	5.3	7	8	46.761	+0.0019	16 17 45.10	-0.042
λ	Geminorum	3.6	7	13	29.822	-0.0039	16 41 8.74	-0.045
162 B.	Geminorum	5.7	7	27	11.695	+0.0018	17 15 27.67	-0.064
68	Geminorum	5.2	7	29	2.650	-0.0007	+15 59 58.57	-0.024
f	Geminorum	5.3	7	34	51.471	-0.0002	17 51 28.49	+0.004
1	Cancri	6.0	7	52	27.022	-0.0021	16 0 17.97	-0.044
2 B.	Cancri	6.0	7	53	57.766	+0.0003	16 44 7.16	+0.004
5	Cancri	5.9	7	56	56.835	+0.0004	16 40 37.07	0.000
12	Cancri	6.2	8	4	14.306	+0.0001	+13 52 28.54	-0.026
30 B.	Cancri	6.1	8	6	29.343	-0.0007	14 52 1.09	-0.013
27	Cancri	5.8	8	22	18.558	-0.0019	12 55 10.17	-0.111
29	Cancri	5.9	8	24	9.577	-0.0017	14 28 35.26	-0.022
84 B.	Cancri	6.4	8	29	19.270	-0.0023	13 31 52.86	-0.095
A <sup>1</sup>	Cancri	5.5	8	38	47.974	-0.0002	+12 58 7.21	-0.002
A <sup>2</sup>	Cancri	5.7	8	42	33.010	-0.0049	12 24 15.62	-0.057
60	Cancri	5.7	8	51	33.603	-0.0009	11 55 56.70	-0.019
α	Cancri	4.3	8	54	6.846	+0.0024	12 10 5.40	-0.042
κ	Cancri	5.1	9	3	24.981	-0.0012	10 59 27.31	-0.013
209 B.	Cancri	6.5	9	5	25.751	-0.0008	+11 53 27.37	-0.079
222 B.	Cancri	6.3	9	13	31.591	+0.0046	11 50 12.76	-0.007
ω	Leonis	5.5	9	24	10.527	+0.0038	9 24 20.92	-0.012
3	Leonis	5.8	9	24	13.679	-0.0023	8 32 17.54	-0.025
h	Leonis	5.2	9	27	40.444	+0.0001	10 4 9.42	-0.013
o	Leonis	3.8	9	36	52.984	-0.0006	+10 15 25.38	-0.033
10 B.	Sextantis	6.0	9	41	56.976	+0.0009	7 4 42.15	-0.034
89 B.	Leonis	6.2	9	53	53.468	+0.0010	8 41 47.12	-0.029
π	Leonis	4.9	9	55	59.235	-0.0029	8 25 43.08	-0.027
14	Sextantis	6.3	10	2	36.517	-0.0022	6 0 8.57	-0.002
19	Sextantis	5.9	10	8	38.643	-0.0037	+ 5 0 38.08	-0.006
43	Leonis	6.3	10	18	49.354	-0.0017	6 56 57.60	-0.101
155 B.	Leonis	6.5	10	19	5.360	-0.0167	6 6 1.82	-0.071
35	Sextantis	6.1	10	39	11.864	+0.0013	5 10 4.74	-0.019
237 B.	Leonis	6.3	10	48	7.145	+0.0002	1 26 57.66	-0.065
55	Leonis	6.1	10	51	35.519	+0.0073	+ 1 9 49.18	-0.013
p <sup>2</sup>	Leonis	6.1	10	59	30.931	-0.0045	0 25 49.03	+0.006
p <sup>4</sup>	Leonis	5.7	11	2	49.429	-0.0263	+ 2 23 24.75	-0.080

MEAN PLACES FOR 1920.0. (January 1<sup>d</sup>.157, Greenwich.)

Name of Star.	Magni- tude.	Right Ascension.			Annual Proper Motion.	Declination.	Annual Proper Motion.
		h	m	s			
$\rho^{\delta}$ Leonis	5.3	11	9	39.880	-0.0020	+ 0 21 57.49	-0.003
76 Leonis	6.0	11	14	48.617	-0.0038	2 5 21.51	-0.053
359 B. Leonis	6.3	11	19	12.190	-0.0024	+ 0 34 16.98	-0.015
388 B. Leonis	6.3	11	23	48.450	-0.0025	- 1 15 33.79	+0.007
$\nu$ Leonis	4.5	11	32	51.156	0.0000	0 22 54.93	+0.039
431 B. Leonis	6.2	11	34	18.775	-0.0028	- 1 59 36.64	+0.047
78 B. Virginis	6.5	12	10	9.539	-0.0051	5 16 27.36	+0.114
162 B. Virginis	6.2	12	23	45.229	-0.0062	4 10 21.84	-0.008
200 B. Virginis	6.3	12	27	31.873	-0.0022	4 36 40.85	+0.035
$f$ Virginis	6.0	12	32	40.037	-0.0021	5 23 28.16	-0.027
$\chi$ Virginis	4.8	12	35	6.918	-0.0066	- 7 33 19.86	-0.031
319 B. Virginis	6.3	12	43	25.250	-0.0033	5 51 50.89	-0.053
$\psi$ Virginis	5.0	12	50	11.420	-0.0024	9 6 17.22	-0.028
49 Virginis	5.2	13	3	42.198	+0.0007	10 18 46.75	-0.014
$\eta$ Virginis	5.6	13	4	22.110	-0.0011	8 33 22.07	-0.074
50 Virginis	6.2	13	5	33.976	+0.0003	- 9 54 10.54	-0.017
$\alpha$ Virginis ( <i>Spica</i> )	1.2	13	20	58.562	-0.0028	10 44 38.72	-0.032
$\iota$ Virginis	5.7	13	22	29.404	-0.0006	12 17 30.02	-0.023
$\delta$ Virginis	5.4	13	28	45.104	-0.0025	9 45 11.47	-0.042
550 B. Virginis	6.0	13	30	25.092	-0.0040	12 48 16.03	-0.014
86 Virginis	5.6	13	41	40.377	-0.0014	-12 1 33.28	+0.012
621 B. Virginis	6.4	14	0	6.930	-0.0030	14 35 15.40	-0.019
$\lambda$ Virginis	4.6	14	14	46.636	-0.0024	13 0 12.69	+0.021
8 Libræ	5.3	14	46	15.503	-0.0073	15 39 55.27	-0.074
$\alpha$ Libræ	2.9	14	46	26.951	-0.0073	15 42 36.41	-0.076
$\nu$ Libræ	5.3	15	2	9.625	-0.0035	-15 56 51.15	-0.037
22 Libræ	6.5	15	2	20.904	-0.0050	16 10 31.61	-0.030
26 Libræ	6.3	15	10	2.663	-0.0022	17 28 13.71	-0.016
28 Libræ	6.2	15	16	21.288	-0.0015	17 52 7.71	-0.061
32 Libræ	5.9	15	23	44.491	+0.0006	16 28 18.74	-0.043
34 Libræ	6.0	15	26	9.408	+0.0012	-16 20 8.86	-0.007
11 H. Libræ	5.4	15	28	0.816	-0.0012	19 23 55.51	-0.036
$\zeta$ Libræ	5.6	15	28	23.846	-0.0012	16 34 57.65	-0.033
41 Libræ	5.3	15	34	18.095	+0.0009	19 2 20.55	-0.058
$\kappa$ Libræ	5.0	15	37	20.008	-0.0035	19 25 12.86	-0.106
$\lambda$ Libræ	5.1	15	48	41.184	-0.0017	-19 55 44.77	-0.046
47 Libræ	5.8	15	50	22.809	-0.0010	19 8 51.41	-0.020
$\beta$ Scorpii	2.9	16	0	46.892	-0.0011	19 35 14.99	-0.026
56 B. Scorpii	5.0	16	0	47.361	-0.0010	19 35 1.19	-0.005
$\omega^1$ Scorpii	4.3	16	2	7.424	-0.0015	20 27 13.22	-0.039
$\omega^2$ Scorpii	4.6	16	2	42.657	+0.0030	-20 39 13.71	-0.061
73 B. Scorpii	6.4	16	5	18.675	-0.0056	18 7 42.68	-0.007
$\nu$ Scorpii	3.9	16	7	20.517	-0.0017	19 15 14.42	-0.041
84 B. Scorpii	6.3	16	9	46.489	-0.0013	20 54 18.96	-0.043
88 B. Scorpii	6.4	16	10	2.001	-0.0095	18 19 52.78	-0.132
51 G. Scorpii	6.5	16	12	15.761	-0.0011	-21 6 21.09	-0.029
58 G. Scorpii	6.2	16	14	26.451	+0.0002	20 1 25.23	-0.005
$\psi$ Ophiuchi	4.6	16	19	25.179	-0.0014	19 51 4.53	-0.060
$\chi$ Ophiuchi	4.9	16	22	23.089	-0.0006	18 16 32.56	-0.022
$\omega$ Ophiuchi	4.5	16	27	23.504	+0.0014	21 17 46.63	+0.026
123 B. Scorpii	6.5	16	35	51.412	+0.0008	-20 15 12.51	+0.037
131 B. Scorpii	5.5	16	37	11.402	+0.0021	19 46 19.26	+0.045
68 B. Ophiuchi	5.9	16	48	41.706	-0.0023	20 16 58.13	-0.040
81 B. Ophiuchi	6.1	16	52	21.828	-0.0004	19 24 51.36	-0.015
29 Ophiuchi	6.4	16	57	10.349	-0.0024	18 46 7.99	-0.030
109 B. Ophiuchi	6.2	17	0	0.886	+0.0002	-20 22 59.07	-0.013
116 B. Ophiuchi	6.3	17	1	25.052	-0.0023	21 27 17.40	-0.063
$\xi$ Ophiuchi	4.4	17	16	12.495	+0.0173	21 1 40.51	-0.197
190 B. Ophiuchi	5.9	17	19	54.904	-0.0008	-21 22 5.65	-0.045

MEAN PLACES FOR 1920.0. (January 1<sup>st</sup> 1920, Greenwich.)

Name of Star.	Magni- tude.	Right Ascension.			Annual Proper Motion.	Declination.	Annual Proper Motion.
		h	m	s	s	"	"
192 B. Ophiuchi	6.3	17	19	55.969	+0.0016	-18 22 20.27	+0.009
58 Ophiuchi	4.8	17	38	38.146	-0.0062	21 38 43.70	-0.052
305 B. Ophiuchi	6.3	17	51	12.665	+0.0019	18 47 20.21	-0.003
16 G. Sagittarii	6.4	17	55	14.594	+0.0016	20 20 4.25	-0.025
30 G. Sagittarii	6.2	18	2	23.492	+0.0006	21 27 11.22	-0.008
39 G. Sagittarii	6.3	18	6	30.200	-0.0027	-19 51 31.41	-0.040
μ Sagittarii	4.0	18	8	58.704	-0.0004	21 4 51.52	-0.002
15 Sagittarii	5.3	18	10	26.549	+0.0003	20 45 10.92	+0.006
16 Sagittarii	5.9	18	10	27.384	+0.0005	20 24 46.50	-0.002
64 B. Sagittarii	6.1	18	10	48.790	.....	18 41 13.52	.....
52 G. Sagittarii	6.4	18	12	47.081	+0.0004	-18 29 35.80	-0.036
17 H. Sagittarii	6.4	18	14	1.335	.....	18 39 5.01	.....
γ Sagittarii (var.)	5.4	18	16	40.600	.....	18 53 47.91	-0.001
21 Sagittarii	5.0	18	20	35.144	0.0000	20 35 8.03	-0.024
85 B. Sagittarii	6.0	18	23	16.897	-0.0006	17 50 59.54	+0.006
95 B. Sagittarii	5.7	18	25	39.612	+0.0041	-18 46 49.38	-0.072
100 B. Sagittarii	5.0	18	26	45.028	-0.0012	18 27 30.97	-0.026
171 B. Sagittarii	6.1	18	58	21.703	0.0000	19 21 45.35	-0.035
173 B. Sagittarii	6.4	18	58	25.217	+0.0020	19 13 9.91	.....
187 B. Sagittarii	6.4	19	2	27.585	+0.0036	18 51 45.34	-0.056
190 B. Sagittarii	5.4	19	3	34.736	+0.0001	-19 25 0.08	-0.003
d Sagittarii	5.0	19	12	57.290	-0.0015	19 5 47.13	-0.017
ρ Sagittarii	4.0	19	17	2.039	-0.0020	17 59 56.25	+0.015
ν Sagittarii	4.4	19	17	8.821	+0.0002	16 6 22.75	-0.009
45 Sagittarii	6.0	19	17	10.950	+0.0064	18 27 27.13	-0.082
267 B. Sagittarii	5.8	19	32	24.946	+0.0011	-18 24 35.08	-0.002
54 Sagittarii	5.4	19	36	8.482	+0.0046	16 28 39.98	-0.047
e Sagittarii	5.2	19	37	56.649	+0.0040	16 18 45.22	-0.015
283 B. Sagittarii	5.5	19	38	59.894	+0.0118	15 39 23.16	-0.102
g Sagittarii	5.1	19	53	24.882	+0.0004	15 42 16.23	-0.091
16 B. Capricorni	6.2	20	16	16.985	+0.0025	-15 2 16.67	+0.004
β Capricorni	3.2	20	16	31.119	+0.0030	15 2 5.75	+0.007
45 B. Capricorni	6.1	20	29	44.545	+0.0035	13 59 49.78	+0.060
84 B. Capricorni	6.0	20	46	17.390	+0.0106	12 50 29.65	-0.034
16 B. Aquarii	6.4	20	48	43.110	+0.0021	11 52 35.64	+0.065
ν Aquarii	4.5	21	5	14.255	+0.0057	-11 41 46.57	-0.006
51 G. Aquarii	6.5	21	9	57.062	-0.0010	10 56 12.98	-0.051
17 Aquarii	6.3	21	18	39.007	-0.0022	9 39 39.75	-0.021
19 Aquarii	5.6	21	20	55.288	+0.0012	10 5 23.39	-0.164
ξ Aquarii	4.8	21	33	29.676	+0.0075	8 12 49.11	-0.023
c <sup>1</sup> Capricorni	5.3	21	40	44.416	+0.0004	- 9 27 1.25	+0.006
c <sup>2</sup> Capricorni	6.3	21	42	0.279	+0.0008	9 38 44.77	+0.001
30 Aquarii	5.6	21	59	3.960	+0.0011	6 54 33.83	+0.016
138 B. Aquarii	6.4	22	8	33.936	-0.0043	5 6 56.40	-0.028
44 Aquarii	5.7	22	12	55.982	-0.0003	5 47 13.58	+0.029
51 Aquarii	5.8	22	19	56.882	+0.0011	- 5 14 32.22	-0.011
187 B. Aquarii	6.3	22	27	10.302	-0.0061	3 19 16.17	-0.004
κ Aquarii	5.2	22	33	36.855	-0.0049	4 38 27.72	-0.113
207 B. Aquarii	6.3	22	36	39.642	.....	3 58 13.87	.....
6 G. Piscium	6.2	22	54	8.404	+0.0002	2 49 26.82	-0.062
22 B. Piscium	6.4	23	19	25.698	+0.0043	- 0 8 52.31	+0.068
κ Piscium	4.9	23	22	49.884	+0.0056	+ 0 49 3.13	-0.093
9 Piscium	6.4	23	23	8.917	+0.0032	0 40 59.05	-0.029
16 Piscium	5.7	23	32	18.325	-0.0074	1 39 29.30	+0.057
λ Piscium	4.6	23	37	57.841	-0.0092	1 20 22.73	-0.154
19 Piscium	5.4	23	42	18.161	-0.0084	+ 3 2 34.58	-0.020
21 Piscium	5.6	23	45	21.707	+0.0002	0 37 54.62	-0.083
22 Piscium	5.8	23	47	52.073	+0.0009	2 29 8.35	-0.011
25 Piscium	6.2	23	48	58.867	+0.0008	+ 1 38 45.08	-0.064

ELEMENTS FOR THE PREDICTION OF OCCULTATIONS.

JANUARY.

THE STAR'S				AT CONJUNCTION IN R. A.					Limiting Parallels.		
Name.	Mag.	Red'ns from 1920.0.		Apparent Declination.	Greenwich Mean Time.	Hour Angle, H	Y	z'	y'	N.	S.
		Δα	Δδ								
36 Arietis	6.5	+1.77+	4.3	+17 25.6	d 1 5 52.8	2 6.7	-0.8067	0.5897	+0.1328	-	9-73
40 Arietis	6.0	1.80	4.3	17 57.2	7 35.0	0 28.5	-1.1083	0.5910	0.1298	-	32-73
τ Arietis	5.2	1.80	4.0	17 8.0	7 53.9	0 10.3	-0.2478	0.5912	0.1298	-	+23-41
124 B. Arietis	6.4	1.80	3.5	16 9.5	9 28.7	+ 1 20.9	+0.9287	0.5923	0.1264	-	+90+26
45 Arietis	6.0	1.84	3.9	18 0.6	10 31.0	+ 2 20.7	-0.7909	0.5930	0.1245	-	8-72
ρ Arietis	5.6	+1.84+	3.8	+17 42.4	16 45.6	+ 2 84.9	-0.4572	0.5932	+0.1241	-	+12-54
53 Arietis	6.0	1.89	3.2	17 34.4	15 9.8	+ 6 48.7	+0.2041	0.5963	0.1158	-	+49-15
54 Arietis	6.5	1.91	3.4	18 29.4	15 31.1	+ 7 9.2	-0.6691	0.5965	0.1151	-	1-69
175 B. Arietis	6.4	2.00	2.4	18 28.7	22 53.3	+ 9 46.0	+0.1377	0.6013	0.1002	-	+45-17
13 Arietis	5.6	2.06	1.8	19 26.7	3 4 48.8	+ 4 4.8	-0.2665	0.6050	0.0675	-	+22-38
14 Tauri	6.2	+2.06+	1.7	+19 24.8	5 22.7	- 3 32.3	-0.1858	0.6052	+0.0863	-	+26-34
43 Tauri	5.5	2.19+	0.2	19 23.9	15 6.1	+ 5 47.4	+0.5604	0.6103	0.0640	-	+77+9
ω Tauri	4.8	2.23	0.1	20 23.0	18 10.0	+ 8 43.7	-0.2273	0.6116	0.0567	-	+24-33
51 Tauri	5.6	2.25+	0.1	21 23.1	18 34.6	+ 9 7.3	-1.1942	0.6118	0.0557	-	+44-69
58 Tauri	5.3	2.25	0.1	20 57.0	18 58.8	+ 9 30.4	-0.7420	0.6120	0.0548	-	6-70
224 B. Tauri	6.1	+2.26	0.3	+20 38.0	20 5.9	+10 34.8	-0.3695	0.6124	+0.0521	-	+16-40
227 B. Tauri	5.9	2.26	0.4	20 47.8	20 32.0	+10 59.3	-0.5082	0.6126	0.0510	-	+8-51
247 B. Tauri	5.8	2.29	0.5	21 26.5	22 12.6	-11 23.8	-1.0631	0.6133	0.0469	-	+30-69
282 B. Tauri	6.4	2.28	1.3	19 43.1	3 1 7.8	+ 8 35.8	+0.7651	0.6144	0.0397	-	+90+24
129 H. Tauri	5.8	2.30	1.3	20 31.5	2 4.8	- 7 41.2	+0.0056	0.6146	0.0374	-	+37-18
• Tauri	4.7	+2.39	2.6	+21 28.6	11 21.0	+ 1 11.8	-0.6929	0.6169	+0.0140	-	3-65
390 B. Tauri	6.3	2.39	2.8	21 10.0	11 49.7	+ 1 39.3	-0.3812	0.6170	0.0128	-	+15-39
333 B. Tauri	6.3	2.36	3.1	19 41.8	12 17.0	+ 2 5.4	+1.0708	0.6170	0.0116	-	+90+47
! Tauri	5.2	2.38	3.1	20 18.8	13 7.5	+ 2 53.9	+0.4731	0.6172	0.0094	-	+69+10
105 Tauri	6.0	2.40	2.9	21 36.0	13 9.0	+ 2 55.3	-0.7930	0.6172	0.0094	-	9-69
107 Tauri	6.5	+2.37	3.2	+19 45.4	13 30.9	+ 3 16.2	+1.0245	0.6172	+0.0084	-	+90+44
η Tauri	5.1	2.43	3.5	22 0.8	17 22.3	+ 6 58.0	-1.1841	0.6176	-0.0014	-	43-68
351 B. Tauri	6.2	2.40	3.8	20 3.1	17 23.2	+ 6 58.8	+0.7478	0.6176	0.0015	-	+90+27
353 B. Tauri	6.5	2.40	4.0	19 44.0	18 1.3	+ 7 35.3	+1.0586	0.6177	0.0031	-	+90+47
ο Tauri	4.8	2.45	4.1	21 52.1	20 29.0	+ 9 56.8	-1.0578	0.6178	0.0094	-	29-69
372 B. Tauri	6.1	+2.43	4.6	+20 25.0	22 44.4	-11 53.5	+0.3423	0.6178	-0.0152	-	+59+2
ζ Tauri	3.0	2.45	4.8	21 5.6	4 0 13.1	-16 28.6	-0.3482	0.6177	0.0190	-	+17-37
B. D. +19° 1110	6.0	2.45	5.8	19 50.8	5 43.7	- 5 11.9	+0.7350	0.6173	0.0330	-	+90+22
χ <sup>1</sup> Orionis	4.5	2.46	5.8	20 15.7	6 28.4	- 4 29.1	+0.3022	0.6172	0.0349	-	+56-2
57 Orionis	5.8	2.45	5.9	19 44.0	6 41.0	- 4 16.9	+0.8137	0.6172	0.0355	-	+90+27
64 Orionis	5.1	+2.46	6.4	+19 41.5	9 51.7	- 1 14.3	+0.7300	0.6166	-0.0435	-	+90+21
χ <sup>2</sup> Orionis	4.7	2.46	6.4	20 8.4	10 1.8	- 1 4.6	+0.2813	0.6166	0.0439	-	+54-4
68 Orionis	5.7	2.46	6.8	19 48.5	13 4.0	+ 1 50.0	+0.4634	0.6159	0.0615	-	+68+5
71 Orionis	5.1	2.46	7.0	19 11.0	14 8.3	+ 2 51.6	+1.0220	0.6156	0.0541	-	+90+40
15 Geminorum	6.5	2.48	7.6	20 50.2	18 58.6	+ 7 29.7	-0.8976	0.6142	0.0659	-	+16-70
16 Geminorum	6.2	+2.48	7.7	+20 32.6	19 2.6	+ 7 33.7	-0.6122	0.6142	-0.0661	-	+2-61
ν Geminorum	4.1	2.48	7.7	20 15.7	19 25.8	+ 7 55.9	-0.3608	0.6140	0.0670	-	+17-42
74 B. Geminorum	6.2	2.45	8.7	18 16.7	2 26.2	- 9 21.0	+1.0666	0.6113	0.0835	-	+90+41
110 B. Geminorum	6.2	2.43	9.5	17 52.0	3 11.5	- 3 49.8	+0.9559	0.6086	0.0964	-	+90+31
162 B. Geminorum	5.7	2.40	10.8	17 15.3	19 36.2	+ 7 7.4	+0.3250	0.6021	0.1203	-	+59-9
ζ Geminorum	5.3	+2.39	11.1	+17 51.3	22 37.1	+10 1.1	-0.6417	0.6002	-0.1261	-	+1-68
1 Cancri	6.0	2.34	11.7	16 0.1	6 53.9	- 7 15.6	+0.2704	0.5955	0.1389	-	+53-14
2 B. Cancri	6.0	2.34	11.8	16 43.9	6 13.3	- 6 40.6	-0.5408	0.5951	0.1400	-	+7-62
5 Cancri	5.9	2.34	11.9	16 40.4	7 25.3	- 5 31.4	-0.6522	0.5942	0.1421	-	+1-70
30 B. Cancri	6.1	2.30	12.0	14 51.8	11 18.8	- 1 48.7	+0.5907	0.5915	0.1485	-	+79+3
29 Cancri	5.9	+2.26	12.5	+14 28.4	18 31.3	+ 5 9.2	-0.1342	0.5862	-0.1595	-	+30-38

ELEMENTS FOR THE PREDICTION OF OCCULTATIONS.

JANUARY.

THE STAR'S				AT CONJUNCTION IN R. A.					Limiting Parallels.		
Name.	Mag.	Red'ns from 1920.0.		Apparent Declination.	Greenwich Mean Time.	Hour Angle, <i>H</i>	<i>Y</i>	<i>x'</i>	<i>y'</i>	N.	S.
		<i>Δα</i>	<i>Δδ</i>								
84 B. Cancri	6.4	+2.28	-12.6	+13 31.7	d 20 39.7	+ 7 12.8	+0.4678	0.5846	-0.1625	+67	- 6
A <sup>1</sup> Cancri	5.5	2.21	12.7	12 57.9	7 0 37.2	+11 1.5	+0.3788	0.5816	0.1678	+61	-11
A <sup>2</sup> Cancri	5.7	2.19	12.7	12 24.0	2 11.9	-11 27.3	+0.6798	0.5905	0.1698	+88	+ 5
60 Cancri	5.7	2.16	12.8	11 55.7	6 0.8	- 7 46.8	+0.4988	0.5776	0.1744	+70	- 5
α Cancri	4.3	2.16	12.9	12 9.9	7 6.2	- 6 43.8	+0.0710	0.5768	0.1757	+41	-28
κ Cancri	5.1	+2.12	-12.9	+10 59.2	11 5.5	- 2 53.2	+0.5496	0.5739	-0.1800	+74	- 3
209 B. Cancri	6.5	2.12	13.1	11 53.2	11 57.6	- 2 2.9	-0.5162	0.5732	0.1809	+ 9	-65
222 B. Cancri	6.3	2.09	13.2	11 50.0	15 28.4	+ 1 20.3	-1.1048	0.5707	0.1843	-29	-79
ω Leonis	5.5	2.05	12.9	9 24.1	20 8.5	+ 5 50.6	+0.4891	0.5673	0.1884	+69	- 8
λ Leonis	5.2	2.04	13.0	10 3.9	21 41.2	+ 7 20.1	-0.4771	0.5662	0.1897	+11	-64
τ Leonis	4.9	-1.93	-12.9	+ 8 25.5	8 10 24.4	- 4 22.9	-1.2790	0.5575	-0.1980	-47	-82
14 Sextantis	6.3	1.90	12.3	5 59.9	13 26.2	- 1 27.2	+0.6074	0.5556	0.1994	+79	- 3
19 Sextantis	5.9	1.88	12.1	5 0.4	16 12.9	+ 1 13.9	+1.0725	0.5539	0.2006	+90	+27
155 B. Leonis	6.5	1.84	12.3	6 5.8	21 3.8	+ 5 55.2	-1.0276	0.5509	0.2023	-22	-84
237 B. Leonis	6.3	1.73	10.8	1 26.8	9 10 47.3	- 4 48.1	+0.9989	0.5436	0.2047	+90	+20
55 Leonis	6.1	+1.71	-10.7	+ 1 9.6	12 27.2	- 3 11.5	+0.9570	0.5428	-0.2047	+90	+17
p <sup>2</sup> Leonis	6.1	1.68	10.4	0 25.6	16 16.2	+ 0 30.3	+0.9441	0.5410	0.2047	+90	+17
p <sup>1</sup> Leonis	5.3	1.64	10.2	0 21.8	21 11.5	+ 5 16.2	+0.0064	0.5389	0.2043	+37	-37
359 B. Leonis	6.3	1.59	10.1	0 34.1	10 1 51.0	+ 9 47.0	-1.1612	0.5370	0.2035	-33	-80
388 B. Leonis	6.3	1.58	9.4	-1 15.7	4 6.5	+11 58.3	+0.3073	0.5362	0.2030	+55	-20
431 B. Leonis	6.2	+1.54	-9.0	-1 59.8	9 17.2	- 7 0.7	+0.0350	0.5345	-0.2016	+39	-35
78 B. Virginis	6.5	1.39	7.1	5 16.6	11 3 9.8	+10 18.9	-0.0179	0.5300	0.1939	+35	-38
χ Virginis	4.8	1.28	5.6	7 33.4	15 44.4	- 1 29.3	+0.0390	0.5283	0.1900	+37	-35
ψ Virginis	5.0	1.22	4.6	9 6.4	23 21.9	+ 5 54.3	+0.3145	0.5278	0.1903	+53	-20
49 Virginis	5.2	1.17	3.8	10 18.8	12 6 12.4	-11 27.5	+0.4100	0.5277	0.1746	+59	-15
50 Virginis	6.2	+1.15	-3.9	-9 54.2	7 9.0	-10 32.6	-0.1994	0.5276	-0.1738	+23	-49
α Virginis ( <i>Spica</i> )	1.2	1.08	3.1	10 44.7	14 57.0	- 2 58.7	-0.6142	0.5279	0.1666	0	-90
ι Virginis	5.7	1.09	2.5	12 17.5	15 43.0	- 2 14.1	+0.9448	0.5280	0.1658	+78	+17
550 B. Virginis	6.0	1.06	2.1	12 48.3	19 43.5	+ 1 39.1	+0.8487	0.5282	0.1619	+78	+11
86 Virginis	5.6	0.99	2.1	12 1.6	13 1 24.4	+ 7 9.6	-0.9053	0.5288	0.1559	-19	-90
621 B. Virginis	6.4	+0.92	-0.6	-14 35.3	10 41.4	- 7 50.2	+0.5015	0.5300	-0.1455	+61	- 9
26 Libræ	6.3	0.60	+ 2.4	17 28.2	14 21 24.8	+ 1 48.8	-0.6040	0.5369	0.0994	- 7	-81
28 Libræ	6.2	0.57	+ 2.6	17 52.1	15 0 30.2	+ 4 48.5	-0.4632	0.5376	0.0948	0	-68
11 H. Libræ	5.4	0.52	3.4	19 23.9	6 11.5	+10 19.1	+0.7174	0.5389	0.0860	+71	+ 4
41 Libræ	5.3	0.49	3.4	19 2.3	9 15.0	-10 43.2	+0.0680	0.5396	0.0813	+27	-33
κ Libræ	5.0	+0.48	+ 3.6	-19 25.2	10 43.3	- 9 17.6	+0.3677	0.5400	-0.0790	+45	-16
λ Libræ	5.1	0.43	4.0	19 55.7	16 13.0	- 3 58.3	+0.5223	0.5412	0.0702	+55	- 7
47 Libræ	5.8	0.42	3.8	19 8.8	17 2.1	- 3 10.9	-0.4015	0.5414	0.0688	0	-63
β Scorpii	2.9	0.37	4.1	19 35.2	22 2.9	+ 1 40.3	-0.2380	0.5425	0.0606	+ 8	-52
56 B. Scorpii	5.0	0.37	4.1	19 35.0	22 3.1	+ 1 40.5	-0.2425	0.5425	0.0606	+ 8	-52
ω <sup>1</sup> Scorpii	4.3	+0.37	+ 4.4	-20 27.1	22 41.6	+ 2 17.8	+0.6842	0.5426	-0.0595	+67	+ 2
ω <sup>2</sup> Scorpii	4.6	0.37	4.5	20 39.2	22 58.6	+ 2 34.3	+0.8896	0.5427	0.0591	+70	+16
ν Scorpii	3.9	0.34	4.2	19 15.2	1 12.0	+ 4 43.5	-0.7909	0.5432	0.0553	-23	-90
84 B. Scorpii	6.3	0.34	4.7	20 54.2	2 22.1	+ 5 51.2	+0.9779	0.5434	0.0534	+70	+22
51 G. Scorpii	6.5	0.33	4.8	21 6.3	3 33.7	+ 7 0.5	+1.1381	0.5437	0.0514	+69	+37
58 G. Scorpii	6.2	+0.31	+ 4.5	-20 1.3	4 36.3	+ 8 1.2	-0.1155	0.5439	-0.0496	+14	-44
ψ Ophiuchi	4.6	0.29	4.5	19 51.0	6 59.2	+10 19.4	-0.4201	0.5444	0.0455	- 3	-65
ω Ophiuchi	4.5	0.26	5.0	21 17.7	10 47.6	- 9 59.4	+1.0223	0.5451	0.0390	+69	+26
123 B. Scorpii	6.5	0.22	4.9	20 15.1	14 49.6	- 6 5.4	-0.2780	0.5459	0.0320	+ 3	-54
131 B. Scorpii	5.5	0.21	4.8	19 46.2	15 27.7	- 5 28.5	-0.8321	0.5460	0.0309	-28	-90
68 B. Ophiuchi	5.9	+0.17	+ 5.0	-20 16.9	20 55.6	- 0 11.2	-0.4080	0.5469	-0.0213	- 5	-64

ELEMENTS FOR THE PREDICTION OF OCCULTATIONS.

JANUARY.

THE STAR'S				AT CONJUNCTION IN R. A.						Limiting Parallels.		
Name.	Mag.	Red'ns from 1920.0.		Apparent Declination.	Greenwich Mean Time.		Hour Angle, <i>H</i> .	<i>Y</i>	<i>x'</i>	<i>y'</i>	N.	S.
		$\Delta\alpha$	$\Delta\delta$		d	m						
VENUS	-3.6	...	...	-20 40.2	17	1 36.7	+ 4 20.9	-0.9531	0.4941	-0.0053	+13	-40
109 B. Ophiuchi	6.2	+0.12	+ 5.2	20 22.9		2 17.4	+ 5 0.4	-0.3855	0.5477	0.0118	- 4	-62
116 B. Ophiuchi	6.3	0.12	5.4	21 27.2		2 57.3	+ 5 38.9	+0.7951	0.5478	-0.0106	+69	+10
ξ Ophiuchi	4.4	0.07	5.5	21 1.6		9 56.6	-11 35.5	+0.2909	0.5486	+0.0019	+32	-20
190 B. Ophiuchi	5.9	+0.05	5.6	21 22.0		11 41.5	- 9 54.0	+0.6737	0.5488	0.0050	+62	+ 2
58 Ophiuchi	4.8	-0.01	+ 5.7	-21 38.6		20 30.8	- 1 21.9	+1.0633	0.5495	+0.0206	+69	+33
16 G. Sagittarii	6.4	0.06	5.5	20 20.0	18	4 19.8	+ 6 11.6	-0.1388	0.5499	0.0348	+11	-45
30 G. Sagittarii	6.2	0.08	5.7	21 27.1		7 41.5	+ 9 26.8	+1.2233	0.5500	0.0408	+69	+49
39 G. Sagittarii	6.3	0.10	5.5	19 51.4		9 37.6	+11 19.1	-0.4543	0.5500	0.0443	- 5	-67
μ Sagittarii	4.0	0.10	5.7	21 4.8		10 47.5	-11 33.3	+0.9470	0.5500	0.0463	+69	+20
15 Sagittarii	5.3	-0.11	+ 5.6	-20 45.1		11 28.8	-10 53.3	+0.6174	0.5500	+0.0475	+60	- 2
16 Sagittarii	5.9	0.11	5.6	20 24.7		11 29.2	-10 53.0	+0.2425	0.5500	0.0475	+34	-23
21 Sagittarii	5.0	0.13	5.6	20 35.0		16 15.3	- 6 16.2	+0.6791	0.5500	0.0559	+66	+ 2
NEW MOON.												
30 Aquarii	5.6	-0.09	+ 3.6	- 6 54.5	23	1 28.0	- 0 24.8	-0.1041	0.5376	+0.1907	+30	-43
138 B. Aquarii	6.4	0.06	3.8	5 6.9		6 8.9	+ 4 7.4	-1.1167	0.5374	0.1935	-31	-90
44 Aquarii	5.7	0.05	3.6	5 47.2		8 18.0	+ 6 12.6	+0.0169	0.5374	0.1947	+37	-36
51 Aquarii	5.8	-0.02	3.6	5 14.5		11 45.5	+ 9 33.6	+0.1132	0.5373	0.1964	+43	-31
187 B. Aquarii	6.3	+0.01	3.8	3 19.2		15 19.0	-10 59.6	-1.2261	0.5374	0.1980	-41	-90
κ Aquarii	5.2	+0.02	+ 3.5	- 4 38.4		18 29.5	- 7 55.0	+0.8059	0.5374	+0.1933	+86	+ 8
207 B. Aquarii	6.3	0.04	3.5	3 58.2		19 59.5	- 6 27.8	+0.3937	0.5375	0.1938	+61	-16
6 G. Piscium	6.2	0.10	3.4	2 49.4	24	4 35.0	+ 1 51.9	+0.9063	0.5381	0.2022	+38	+14
22 B. Piscium	6.4	0.22	3.6	0 8.8		16 57.5	-10 9.0	+0.5942	0.5397	0.2037	+77	- 5
κ Piscium	4.9	0.24	3.7	+ 0 49.1		18 36.9	- 8 32.7	-0.0833	0.5400	0.2037	+32	-42
9 Piscium	6.4	+0.24	+ 3.7	+ 0 41.0		18 46.2	- 8 23.8	+0.0891	0.5400	+0.2037	+42	-32
16 Piscium	5.7	0.28	3.8	1 39.6		23 13.2	- 4 5.2	-0.0294	0.5409	0.2035	+35	-33
λ Piscium	4.6	0.31	3.5	1 20.4	25	1 57.7	+ 1 26.0	+0.8618	0.5415	0.2032	+90	+11
19 Piscium	5.4	0.34	3.9	3 2.6		4 3.5	+ 0 36.0	-0.4981	0.5420	0.2029	+10	-68
22 Piscium	5.8	0.36	3.6	2 29.2		6 44.5	+ 3 11.7	+0.6294	0.5427	0.2024	+31	- 2
51 Piscium	5.6	+0.58	+ 3.8	+ 6 30.9	26	1 58.6	- 2 11.4	+0.2583	0.5439	+0.1952	+52	-22
62 Piscium	6.1	0.67	3.5	6 51.9		9 23.7	+ 4 59.1	+1.3252	0.5520	0.1907	+32	+58
δ Piscium	4.6	0.67	3.6	7 9.1		9 34.6	+ 5 9.7	+1.0629	0.5520	0.1906	+90	+27
τ Piscium	5.6	0.98	3.6	11 44.0	27	7 35.7	+ 2 25.9	+0.3258	0.5629	0.1711	+57	-15
12 H <sup>1</sup> . Arietis	6.3	1.15	3.2	13 5.5		18 49.0	-10 44.3	+0.7769	0.5692	0.1576	+90	+12
19 Arietis	5.8	+1.22	+ 3.4	+14 54.4		23 20.4	- 6 22.6	-0.3790	0.5719	+0.1515	+16	-52
29 Arietis	6.1	1.34	2.5	14 40.9	28	7 50.3	+ 1 48.9	+1.0848	0.5769	0.1390	+90	+36
36 Arietis	6.5	1.44	3.0	17 25.6		12 37.8	+ 6 25.8	-1.0610	0.5798	0.1313	-28	-73
τ Arietis	5.2	1.46	2.7	17 8.0		14 43.0	+ 8 26.4	-0.4914	0.5810	0.1278	+ 9	-58
124 B. Arietis	6.4	1.48	2.2	16 9.5		16 21.1	+10 0.8	+0.7054	0.5820	0.1250	+90	+12
45 Arietis	6.0	+1.51	+ 2.7	+18 0.5		17 25.6	+11 3.0	-1.0404	0.5826	+0.1232	-26	-72
ρ Arietis	5.6	1.52	2.6	17 42.3		17 40.7	+11 17.5	-0.7012	0.5828	0.1223	- 3	-72
53 Arietis	6.0	1.58	2.0	17 34.4		22 14.4	- 8 19.0	-0.0241	0.5854	0.1146	+36	-27
54 Arietis	6.5	1.59	2.3	18 29.4		22 36.5	- 7 57.8	-0.9112	0.5856	0.1140	-17	-72
175 B. Arietis	6.4	1.70	1.4	18 28.7	29	6 15.2	- 0 36.5	-0.0815	0.5899	0.0995	+32	-29
26 B. Tauri	6.4	+1.73	+ 0.7	+17 34.3		9 7.8	+ 2 9.5	+1.1115	0.5915	+0.0637	+90	+43
13 Tauri	5.6	1.80	1.0	19 26.7		12 24.3	+ 5 18.4	-0.4842	0.5932	0.0871	+10	-53
14 Tauri	6.2	1.81	+ 0.9	19 24.8		12 59.5	+ 5 52.2	-0.4013	0.5934	0.0859	+14	-47
43 Tauri	5.5	1.85	- 0.4	19 23.9		23 5.7	- 8 25.2	+0.3732	0.5932	0.0642	+61	- 1
ω Tauri	4.8	2.00	0.6	20 23.0	30	2 16.8	- 5 21.7	-0.4230	0.5995	0.0572	+13	-46
53 Tauri	5.3	+2.02	- 0.5	+20 57.0		3 7.5	- 4 33.1	-0.9452	0.5999	+0.0552	-30	-70

ELEMENTS FOR THE PREDICTION OF OCCULTATIONS.

JANUARY.

THE STAR'S				AT CONJUNCTION IN R. A.					Limiting Parallels.			
Name.	Mag.	Red'ns from 1920.0.		Apparent Declination.	Greenwich Mean Time.		Hour Angle, H	Y'	x'	y'	N.	S.
		$\Delta\alpha$	$\Delta\delta$		d	m						
224 B. Tauri	6.1	+2.03	0.7	+20 38.0	30	4 17.2	-3 26.1	-0.5644	0.6003	+0.0526	+5	-56
227 B. Tauri	5.9	2.04	0.8	20 47.8		4 44.4	-3 0.0	-0.7047	0.6005	0.0516	-4	-68
234 B. Tauri	6.0	2.02	1.4	18 51.5		5 18.8	-2 26.9	+1.2710	0.6007	0.0503	+77	+68
247 B. Tauri	5.8	2.07	0.8	21 26.5		6 28.9	-1 19.6	-1.2662	0.6011	0.0476	-59	-69
c Tauri	3.6	2.04	1.6	19 0.2		6 44.9	-1 4.3	+1.1945	0.6012	0.0470	+90	+56
282 B. Tauri	6.4	+2.08	-1.8	+19 43.0		9 30.9	+1 35.1	+0.5989	0.6022	+0.0406	+81	+14
129 H. Tauri	5.8	2.11	1.7	20 31.5		10 30.1	+2 31.9	-0.1720	0.6025	0.0383	+27	-28
312 B. Tauri	6.2	2.17	3.0	19 21.4		17 0.6	+8 46.8	+1.1985	0.6044	0.0230	+90	+59
Tauri	4.7	2.24	2.8	21 28.6		20 7.6	+11 46.2	-0.8645	0.6052	0.0156	-14	-69
330 B. Tauri	6.3	2.24	2.9	21 10.0		20 37.3	-11 45.2	-0.5465	0.6052	0.0144	+6	-52
333 B. Tauri	6.3	+2.22	-3.4	+19 41.8		21 5.7	-11 18.0	+0.9306	0.6054	+0.0132	+90	+37
l Tauri	5.2	2.24	3.4	20 18.8		21 58.0	-10 27.8	+0.3246	0.6055	0.0112	+57	+1
105 Tauri	6.0	2.26	3.0	21 36.0		21 59.6	-10 26.3	-0.9626	0.6056	0.0111	-22	-69
107 Tauri	6.5	2.24	3.6	19 45.4		22 22.3	-10 4.5	+0.8859	0.6056	0.0102	+90	+34
351 B. Tauri	6.2	2.28	4.1	20 3.0	31	2 23.2	-6 13.2	-0.6122	0.6063	+0.0005	+83	+18
353 B. Tauri	6.5	+2.28	-4.3	+19 44.0		3 2.7	-5 35.4	+0.9294	0.6064	-0.0011	+90	+38
o Tauri	4.8	2.35	4.1	21 52.1		5 35.7	-3 8.6	-1.2160	0.6066	0.0072	-48	-69
372 B. Tauri	6.1	2.34	4.8	20 25.0		7 55.8	-0 54.1	+0.2113	0.6068	0.0129	+50	-5
Tauri	3.0	2.37	4.9	21 5.6		9 27.6	+0 34.1	-0.4869	0.6069	0.0166	+9	-47
B. D. +19° 1110	6.0	2.40	6.1	19 50.8		15 9.4	+6 1.9	+0.6250	0.6070	0.0303	+84	+16
$\chi^1$ Orionis	4.5	+2.42	-6.1	+20 15.6		15 55.5	+6 46.1	+0.1873	0.6070	-0.0322	+48	-8
57 Orionis	5.8	2.41	6.2	19 44.0		16 8.6	+6 58.8	+0.7068	0.6070	0.0327	+90	+21
64 Orionis	5.1	2.44	6.7	19 41.5		19 25.4	+10 7.5	+0.6287	0.6068	0.0405	+85	+15
$\chi^2$ Orionis	4.7	2.44	6.6	20 8.4		19 35.8	+10 17.5	+0.1739	0.6068	0.0409	+48	-9
68 Orionis	5.7	2.46	7.2	19 48.5		22 43.7	-10 42.2	+0.3655	0.6065	0.0484	+60	0
71 Orionis	5.1	+2.46	-7.5	+19 11.0		23 49.9	-9 38.7	+0.9343	0.6064	-0.0510	+90	+34

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15 Geminorum	6.5	+2.52	-7.8	+20 50.2	1	4 48.7	-4 52.0	-0.9999	0.6056	-0.0626	-25	-69
16 Geminorum	6.2	+2.52	-7.9	+20 32.6		4 52.8	-4 48.0	-0.7106	0.6056	-0.0628	-4	-69
v Geminorum	4.1	2.52	8.0	20 15.7		5 16.7	-4 25.1	-0.4549	0.6055	0.0637	+11	-48
74 B. Geminorum	6.2	2.53	9.4	18 16.7		12 28.3	+2 29.1	+1.0069	0.6038	0.0800	+90	+37
110 B. Geminorum	6.2	2.55	10.2	17 52.0		18 21.7	+8 8.5	+0.9083	0.6019	0.0929	+90	+28
162 B. Geminorum	5.7	2.59	11.8	17 15.3	2	6 0.0	-4 40.6	+0.2990	0.5974	0.1168	+55	-9
f Geminorum	5.3	+2.60	-12.0	+17 51.3		9 3.9	-1 43.9	-0.6681	0.5960	-0.1227	-1	-69
1 Cancri	6.0	2.59	13.0	16 0.1		16 9.4	+5 5.8	+0.2698	0.5925	0.1356	+53	-13
2 B. Cancri	6.0	2.60	13.0	16 43.9		16 46.3	+5 40.7	-0.5453	0.5922	0.1367	+6	-61
5 Cancri	5.9	2.60	13.1	16 40.4		17 59.1	+6 50.7	-0.6541	0.5916	0.1388	0	-70
30 B. Cancri	6.1	2.59	13.6	14 51.8		21 52.9	+10 35.6	+0.6066	0.5895	0.1453	+80	+4
29 Cancri	5.9	+2.58	-14.3	+14 28.4	3	5 10.5	-6 23.3	-0.1026	0.5854	-0.1566	+31	-35
84 B. Cancri	6.4	2.58	14.5	13 31.6		7 19.5	-4 19.2	+0.5074	0.5842	0.1598	+70	-3
A <sup>1</sup> Cancri	5.5	2.57	14.8	12 57.9		11 17.9	-0 29.5	+0.4285	0.5819	0.1653	+64	-8
A <sup>2</sup> Cancri	5.7	2.56	15.0	12 24.0		12 52.7	+1 1.7	+0.7344	0.5810	0.1674	+90	+9
60 Cancri	5.7	2.55	15.2	11 55.7		16 41.8	+4 42.4	+0.5627	0.5788	0.1721	+75	-1
$\alpha$ Cancri	4.3	+2.56	-15.3	+12 9.8		17 47.1	+5 45.8	+0.1371	0.5782	-0.1735	+44	-24
$\kappa$ Cancri	5.1	2.54	15.5	10 59.2		21 46.0	+9 35.6	+0.6267	0.5758	0.1780	+81	+2
209 B. Cancri	6.5	2.54	15.6	11 53.2		22 38.0	+10 25.7	-0.4376	0.5752	0.1789	+12	-59
222 B. Cancri	6.3	2.54	15.7	11 50.0	4	2 7.9	-10 11.9	-1.0164	0.5732	0.1826	-23	-78
$\omega$ Leonis	5.5	2.51	15.9	9 24.1		6 46.3	-5 43.4	+0.5893	0.5705	0.1870	+77	-2
h Leonis	5.2	+2.51	-16.0	+10 3.9		8 18.4	-4 14.5	-0.3718	0.5696	-0.1883	+16	-56

ELEMENTS FOR THE PREDICTION OF OCCULTATIONS.

FEBRUARY.

THE STAR'S				AT CONJUNCTION IN R. A.					Limiting Parallel.		
Name.	Mag.	Red'ns from 1920.0.		Apparent Declination.	Greenwich Mean Time.	Hour Angle, H	Y	x'	y'	N.	S.
		$\Delta\alpha$	$\Delta\delta$								
o Leonis	3.8	+2.50	-16.1	+10 15.2	d h m	h m					
89 B. Leonis	6.2	2.47	16.2	8 41.5	4 12 22.0	0 19.5	-1.3357	0.5673	-0.1916	-62	-74
$\tau$ Leonis	4.9	2.46	16.2	8 25.4	19 57.3	+ 7 0.1	-1.2245	0.5630	0.1968	-41	-81
14 Sextantis	6.3	2.44	16.1	5 59.9	20 53.8	+ 7 54.6	-1.1374	0.5625	0.1974	-32	-82
19 Sextantis	5.9	2.43	16.0	5 0.4	23 53.2	+10 47.9	+0.7496	0.5609	0.1990	+90	+ 6
					5 2 37.5	-10 33.4	+1.2192	0.5595	0.2003	+90	+41
155 B. Leonis	6.5	+2.41	-16.2	+ 6 5.8	7 23.9	- 5 56.6	-0.8562	0.5570	-0.2023	-12	-84
237 B. Leonis	6.3	2.35	15.4	1 26.7	20 52.3	+ 7 4.9	+1.1861	0.5507	0.2053	+90	+37
55 Leonis	6.1	2.35	15.3	1 9.6	22 30.2	+ 8 39.7	+1.1478	0.5500	0.2054	+90	+33
$p^a$ Leonis	6.1	2.33	15.1	0 25.6	6 2 14.4	-11 43.5	+1.1426	0.5485	0.2055	+90	+32
$p^d$ Leonis	5.7	2.31	15.4	2 23.2	3 48.4	-10 12.6	-1.2143	0.5479	0.2055	-39	-88
$p^5$ Leonis	5.3	+2.30	-15.0	+ 0 21.7	7 3.4	- 7 3.9	+0.2220	0.5466	-0.2053	+49	-24
359 B. Leonis	6.3	2.28	14.9	+ 0 34.0	11 36.6	- 2 39.4	-0.9267	0.5449	0.2047	-16	-89
388 B. Leonis	6.3	2.27	14.4	- 1 15.8	13 49.0	- 0 31.2	+0.5383	0.5442	0.2043	+71	- 8
$\nu$ Leonis	4.5	2.24	14.4	0 23.2	18 10.2	+ 3 41.6	-1.2727	0.5427	0.2032	-46	-90
431 B. Leonis	6.2	2.24	14.1	1 59.8	18 52.4	+ 4 22.4	+0.2726	0.5425	0.2030	+52	-22
78 B. Virginis	6.5	+2.15	-12.4	- 5 16.7	7 12 19.2	- 2 43.7	+0.2476	0.5381	-0.1956	+50	-23
$\chi$ Virginis	4.8	2.08	11.0	7 33.5	8 0 35.8	+ 9 9.9	+0.3191	0.5360	0.1877	+54	-19
$\psi$ Virginis	5.0	2.04	10.0	9 6.5	8 2 7.7	+ 7 37.0	+0.5994	0.5351	0.1819	+73	- 4
49 Virginis	5.2	2.00	9.2	10 18.9	14 44.1	- 1 8.0	+0.6994	0.5346	0.1762	+79	+ 2
$\eta$ Virginis	5.6	1.98	9.7	8 33.5	15 3.9	- 0 48.8	-1.2468	0.5346	0.1759	-47	-90
50 Virginis	6.2	+1.98	- 9.2	- 9 54.3	15 39.5	- 0 14.3	+0.0967	0.5346	-0.1753	+39	-31
$\alpha$ Virginis( <i>Spica</i> )	1.2	1.93	8.4	10 44.8	23 17.8	+ 7 9.8	-0.3095	0.5343	0.1680	+16	-55
$\iota$ Virginis	5.7	1.94	7.8	12 17.6	9 0 2.8	+ 7 53.5	+1.2355	0.5343	0.1673	+78	+44
550 B. Virginis	6.0	1.91	7.3	12 48.4	3 58.6	+11 42.1	+1.1424	0.5343	0.1632	+77	+34
86 Virginis	5.6	1.86	7.1	12 1.7	9 33.2	- 6 53.7	-0.5941	0.5344	0.1572	- 1	-78
621 B. Virginis	6.4	+1.80	- 5.5	-14 35.3	18 40.8	+ 1 57.0	+0.8028	0.5348	-0.1467	+75	+ 9
8 Libræ	5.3	1.59	3.2	15 40.0	10 17 23.8	- 0 2.5	-1.0238	0.5369	0.1170	-33	-80
$\alpha$ Libræ	2.9	1.59	3.1	15 42.7	17 29.4	+ 0 2.9	-0.9856	0.5369	0.1169	-30	-90
26 Libræ	6.3	1.50	1.5	17 28.3	11 5 0.9	+11 12.6	-0.3038	0.5385	0.1001	+ 9	-55
28 Libræ	6.2	1.47	1.1	17 52.1	8 5 2.2	- 9 48.9	-0.1657	0.5389	0.0955	+15	-46
11 H. Libræ	5.4	+1.43	- 0.1	-19 23.9	13 44.8	- 4 19.9	+1.0058	0.5397	-0.0868	+71	+25
41 Libræ	5.3	1.39	0.0	19 2.3	16 47.5	- 1 23.0	+0.3518	0.5402	0.0821	+44	-16
$\kappa$ Libræ	5.0	1.38	+ 0.2	19 25.2	18 15.5	+ 0 2.1	+0.6542	0.5404	0.0797	+66	+ 1
$\lambda$ Libræ	5.1	1.33	0.9	19 55.7	23 44.4	+ 5 20.6	+0.8037	0.5412	0.0709	+70	+10
47 Libræ	5.8	1.31	0.7	19 8.8	12 0 33.4	+ 6 8.1	-0.1175	0.5413	0.0696	+15	-43
$\beta$ Scorpii	2.9	+1.26	+ 1.2	-19 35.2	5 33.8	+10 58.9	+0.0406	0.5421	-0.0614	+23	-34
56 B. Scorpii	5.0	1.26	1.2	19 35.0	5 34.0	+10 59.1	+0.0362	0.5421	0.0614	+23	-34
$\omega^1$ Scorpii	4.3	1.26	1.6	20 27.2	6 12.5	+11 36.4	+0.9594	0.5422	0.0604	+70	+22
$\omega^2$ Scorpii	4.6	1.26	1.7	20 39.2	6 29.4	+11 52.8	+1.1638	0.5422	0.0599	+69	+41
$\nu$ Scorpii	3.9	1.22	1.4	19 15.2	8 42.8	- 9 58.2	-0.5138	0.5425	0.0562	- 7	-72
84 B. Scorpii	6.3	+1.22	+ 2.0	-20 54.3	9 52.9	- 8 50.3	+1.2486	0.5427	-0.0543	+69	+54
58 G. Scorpii	6.2	1.19	1.9	20 1.4	12 7.1	- 6 40.4	+0.1560	0.5430	0.0505	+29	-27
$\psi$ Ophiuchi	4.6	1.16	2.0	19 51.0	14 30.1	- 4 21.9	-0.1505	0.5433	0.0465	+11	-46
123 B. Scorpii	6.5	1.08	2.7	20 15.2	22 21.3	+ 3 14.1	-0.0182	0.5444	0.0331	+17	-38
131 B. Scorpii	5.5	1.06	2.6	19 46.3	22 59.4	+ 3 51.0	-0.5719	0.5445	0.0320	-13	-78
68 B. Ophiuchi	5.9	+1.01	+ 3.1	-20 16.9	13 4 28.2	+ 9 9.1	-0.1559	0.5451	-0.0225	+ 9	-46
81 B. Ophiuchi	6.1	0.98	2.9	19 24.8	6 12.9	+10 50.4	-1.1539	0.5453	0.0195	-55	-90
109 B. Ophiuchi	6.2	0.95	3.4	20 22.9	9 51.0	- 9 38.5	-0.1409	0.5458	0.0131	+ 8	-45
116 B. Ophiuchi	6.3	0.95	3.8	21 27.2	10 31.0	- 8 59.8	+1.0370	0.5458	-0.0120	+69	+28
$\xi$ Ophiuchi	4.4	0.87	4.0	21 1.6	17 31.9	- 2 12.5	+0.5235	0.5465	+0.0004	+43	- 6
190 B. Ophiuchi	5.9	+0.85	+ 4.3	-21 22.0	19 17.2	- 0 30.5	+0.9081	0.5466	+0.0035	+69	+18



ELEMENTS FOR THE PREDICTION OF OCCULTATIONS.

FEBRUARY.

THE STAR'S					AT CONJUNCTION IN R. A.					Limiting Parallels.			
Name.	Mag.	Red'm from 1920.0.		Apparent Declination.	Greenwich Mean Time.			Hour Angle, H	Y'	z'	y'	N.	S.
		$\Delta\alpha$	$\Delta\delta$		d	h	m						
16 G. Sagittarii	6.4	+0.67	+4.7	20 20.0	14	11	59.7	- 8 20.7	+0.0643	0.5477	+0.0330	+22	-33
39 G. Sagittarii	6.3	0.61	4.8	19 51.4			17 18.9	- 3 11.9	-0.2603	0.5478	0.0423	+ 5	-52
$\mu$ Sagittarii	4.0	0.60	5.2	21 4.8			18 29.1	- 2 4.0	+1.1373	0.5479	0.0443	+69	+38
15 Sagittarii	5.3	0.60	5.1	20 45.1			19 10.6	- 1 23.8	+0.8068	0.5479	0.0455	+69	+11
16 Sagittarii	5.9	0.60	5.0	20 24.7			19 11.0	- 1 23.4	+0.4324	0.5479	0.0455	+45	-12
Y Sagittarii (var.)	5.4	+0.56	+4.7	-18 53.7			22 7.3	+ 1 27.1	-1.0965	0.5480	+0.0506	-46	-90
21 Sagittarii	5.0	0.55	5.2	20 35.0			23 58.1	+ 3 14.3	+0.8594	0.5480	0.0538	+69	+14
95 B. Sagittarii	5.7	0.52	4.8	18 46.7	15	2	17.9	+ 5 29.0	-0.9974	0.5480	0.0578	-38	-90
171 B. Sagittarii	6.1	0.38	5.3	19 21.7			17 50.1	- 3 28.6	+0.7457	0.5477	0.0840	+71	+ 6
173 B. Sagittarii	6.4	0.38	5.3	19 13.1			17 51.8	- 3 26.9	+0.5912	0.5477	0.0840	+61	- 3
187 B. Sagittarii	6.4	+0.36	+5.2	-18 51.7			19 46.6	- 1 35.9	+0.3639	0.5476	+0.0871	+45	-16
190 B. Sagittarii	5.4	0.36	5.4	19 24.9			20 18.4	- 1 5.0	+1.0169	0.5476	0.0880	+71	+26
d Sagittarii	5.0	0.32	5.3	19 5.7	16	0	45.2	+ 3 13.1	+1.0724	0.5474	0.0952	+71	+30
$\rho$ Sagittarii	4.0	0.30	5.1	17 59.9			2 41.4	+ 5 5.6	+0.0599	0.5473	0.0982	+28	-33
45 Sagittarii	6.0	0.30	5.2	18 27.4			2 45.6	+ 5 9.7	+0.5678	0.5473	0.0984	+60	- 4
267 B. Sagittarii	5.8	+0.25	+5.2	-18 24.5			10 0.0	-11 50.0	+1.2665	0.5469	+0.1096	+72	+54
54 Sagittarii	5.4	0.24	4.8	16 28.6			11 46.3	-10 7.1	-0.6417	0.5468	0.1123	- 9	-84
e Sagittarii	5.2	0.23	4.8	16 18.7			12 37.8	- 9 17.2	-0.7244	0.5468	0.1136	-14	-90
g Sagittarii	5.1	0.18	4.7	15 42.2			20 0.4	- 2 9.0	-0.5057	0.5462	0.1245	0	-70
16 B. Capricorni	6.2	0.12	4.6	15 2.2	17	6	56.5	+ 8 26.0	+0.2179	0.5454	0.1396	+41	-24
$\beta$ Capricorni	3.2	+0.12	+4.6	-15 2.0			7 3.3	+ 8 32.7	+0.2304	0.5454	+0.1396	+42	-24
NEW MOON.													
19 Piscium	5.4	+0.18	+2.3	+ 3 2.6	21	10	6.0	+ 8 25.9	-0.6810	0.5491	+0.2084	- 1	-85
22 Piscium	5.8	0.19	2.1	2 29.2			12 43.8	+10 56.5	+0.4328	0.5497	0.2029	+63	-13
51 Piscium	5.6	+0.34	+2.0	+ 6 30.9	22	7	36.6	+ 5 14.0	+0.0907	0.5552	+0.1956	+36	-33
62 Piscium	6.1	0.40	1.6	6 51.8			14 54.6	-11 42.7	+1.0811	0.5577	0.1910	+90	+30
$\delta$ Piscium	4.6	0.40	1.7	7 9.0			15 5.4	-11 32.3	+0.8199	0.5578	0.1909	+90	+11
$\tau$ Piscium	5.6	0.63	1.6	11 44.0	23	12	51.1	+ 9 28.7	+0.0623	0.5665	0.1711	+40	-28
12 H <sup>1</sup> . Arietis	6.3	0.76	1.3	13 5.5	24	0	0.5	- 3 45.5	+0.5062	0.5715	0.1574	+70	- 3
19 Arietis	5.8	+0.83	+1.5	+14 54.4			4 31.2	+ 0 35.5	-0.6526	0.5735	+0.1512	0	-72
29 Arietis	6.1	0.93	0.8	14 40.9			13 1.2	+ 8 47.1	+0.8094	0.5774	0.1386	+90	+17
o Arietis	5.8	0.99	0.4	14 58.4			17 56.3	-10 28.2	+1.1737	0.5796	0.1307	+90	+46
$\pi$ Arietis	5.2	1.04	1.0	17 8.0			19 55.4	- 8 33.8	-0.7712	0.5805	0.1274	- 8	-73
124 B. Arietis	6.4	1.05	0.5	16 9.5			21 34.0	- 6 59.0	+0.4238	0.5812	0.1246	+64	- 4
$\rho$ Arietis	5.6	+1.08	+0.9	+17 42.3			22 54.1	- 5 41.7	-0.9821	0.5817	+0.1223	-22	-72
53 Arietis	6.0	1.14	0.5	17 34.3	25	3	29.8	- 1 16.3	-0.3028	0.5837	0.1141	+19	-43
54 Arietis	6.5	1.16	+0.7	18 29.3			3 52.1	- 0 54.9	-1.1936	0.5839	0.1135	-43	-72
175 B. Arietis	6.4	1.26	0.0	18 28.6			11 35.5	+ 6 31.1	-0.3595	0.5870	0.0990	+16	-45
26 B. Tauri	6.4	1.29	-0.6	17 34.3			14 30.3	+ 9 19.3	+0.8413	0.5881	0.0933	+90	+24
13 Tauri	5.6	+1.36	-0.2	+19 26.7			17 49.5	-11 29.1	-0.7629	0.5894	+0.0867	- 8	-71
14 Tauri	6.2	1.36	0.3	19 24.8			18 25.2	-10 54.3	-0.6793	0.5896	0.0855	- 2	-68
43 Tauri	5.5	1.50	1.4	19 23.9	26	4	41.7	- 1 1.8	+0.1060	0.5923	0.0641	+42	-15
$\omega$ Tauri	4.8	1.58	1.4	20 22.9			7 56.6	+ 2 5.5	-0.6950	0.5933	0.0571	- 4	-67
53 Tauri	5.3	1.58	1.3	20 57.0			8 48.4	+ 2 55.3	-1.2212	0.5940	0.0553	-49	-69
85 H <sup>1</sup> . Tauri	6.0	+1.56	-2.2	+18 33.1			9 13.6	+ 8 19.5	+1.2327	0.5941	+0.0544	+88	+61
224 B. Tauri	6.1	1.59	1.6	20 38.0			9 59.5	+ 4 3.6	-0.8362	0.5942	0.0527	-13	-69
227 B. Tauri	5.9	1.60	1.6	20 47.8			10 27.2	+ 4 30.3	-0.9776	0.5944	0.0517	-23	-69
234 B. Tauri	6.0	1.58	2.3	18 51.5			11 2.4	+ 5 4.1	-1.0168	0.5945	0.0504	+90	+40
e Tauri	3.6	1.60	2.4	19 0.2			12 30.3	+ 6 28.6	+0.9409	0.5949	0.0472	+90	+35
282 B. Tauri	6.4	+1.65	-2.5	+19 43.0			15 20.1	+ 9 11.8	+0.8421	0.5955	+0.0409	+58	0

ELEMENTS FOR THE PREDICTION OF OCCULTATIONS.

FEBRUARY.

THE STAR'S					AT CONJUNCTION BY R. A.					Limiting Parallels.	
Name.	Mag.	Red'ns from 1920.0.		Apparent Declination.	Greenwich Mean Time.	Hour Angle, H	Y	x'	y'	N.	S.
		$\Delta\alpha$	$\Delta\delta$								
129 H <sup>1</sup> Tauri	5.8	+1.67	-2.3	+20 31.5	26 16 20.7	+10 10.0	-0.4355	0.5957	+0.0387	+12	-45
312 B. Tauri	6.2	1.75	3.6	19 21.3	23 0.6	7 25.7	+0.9558	0.5968	0.0237	+90	+38
Tauri	4.7	1.82	3.2	21 28.6	27 2 12.5	4 21.3	-1.1268	0.5972	0.0164	-37	-69
330 B. Tauri	6.3	1.82	3.4	21 9.9	2 43.0	3 52.1	-0.8048	0.5973	0.0152	-11	-69
333 B. Tauri	6.3	1.80	3.9	19 41.8	3 12.2	3 24.0	+0.6896	0.5973	0.0141	+90	+22
l Tauri	5.2	+1.82	-3.8	+20 18.8	4 5.9	2 32.4	+0.0777	0.5974	+0.0121	+41	-12
105 Tauri	6.0	1.84	3.4	21 35.9	4 7.5	2 30.9	-1.2243	0.5974	0.0120	-50	-68
107 Tauri	6.5	1.82	4.1	19 45.4	4 30.8	2 8.5	+0.6460	0.5975	0.0111	+86	+19
351 B. Tauri	6.2	1.88	4.5	20 3.0	8 38.4	+1 49.3	+0.3740	0.5977	0.0017	+60	+ 5
353 B. Tauri	6.5	1.89	4.7	19 44.0	9 19.0	+2 28.4	+0.6959	0.5978	+0.0601	+90	+23
372 B. Tauri	6.1	+1.96	-5.1	+20 25.0	14 20.6	+7 18.2	-0.0248	0.5979	-0.0114	+35	-17
f Tauri	3.0	1.99	5.0	21 5.6	15 55.1	+8 48.9	-0.7298	0.5978	0.0150	- 6	-69
B. D.+19°1110	6.0	2.04	6.2	19 50.8	21 47.2	+9 32.8	+0.4044	0.5976	0.0284	+63	+ 5
X <sup>1</sup> Orionis	4.5	2.05	6.2	20 15.6	22 34.8	+8 47.1	-0.0381	0.5975	0.0302	+34	-20
57 Orionis	5.8	2.05	6.3	19 44.0	22 48.2	-8 34.2	+0.4888	0.5975	0.0307	+70	+ 9
64 Orionis	5.1	+2.09	-6.8	+19 41.5	23 2 11.2	-5 19.1	+0.4146	0.5972	-0.0384	+64	+ 4
X <sup>2</sup> Orionis	4.7	2.10	6.6	20 8.4	2 21.9	-5 8.8	-0.0460	0.5971	0.0388	+34	-21
68 Orionis	5.7	2.13	7.2	19 48.5	5 35.8	-2 2.5	+0.1531	0.5967	0.0460	+46	-11
19 B. Geminorum	6.2	2.12	7.6	18 42.0	6 13.3	-1 26.5	+1.2442	0.5966	0.0474	+85	+64
71 Orionis	5.1	2.13	7.5	19 11.0	6 44.1	-0 56.9	+0.7315	0.5966	0.0485	+90	+21
15 Geminorum	6.5	+2.21	-7.6	+20 50.2	11 52.4	+3 59.5	-1.2215	0.5956	-0.0509	-49	-69
16 Geminorum	6.2	2.21	7.7	20 32.6	11 56.7	+4 3.6	-0.9280	0.5956	0.0600	-19	-69
v Geminorum	4.1	2.21	7.9	20 15.7	12 21.3	+4 27.2	-0.6680	0.5955	0.0609	- 2	-65
74 B. Geminorum	6.2	2.26	9.4	18 16.7	19 46.9	+11 35.4	+0.8274	0.5938	0.0768	+90	+25
110 B. Geminorum	6.2	2.31	10.2	17 52.0	20 1 51.8	+6 33.6	+0.7386	0.5921	0.0694	+90	+18
162 B. Geminorum	5.7	+2.40	-11.7	+17 15.8	13 52.4	+4 59.6	+0.1443	0.5879	-0.1127	+45	-18
f Geminorum	5.3	+2.44	-11.9	+17 51.3	17 2.0	+8 1.9	-0.8296	0.5867	-0.1185	-12	-72

MARCH.

1 Cancrī	6.0	+2.46	-13.1	+16 0.1	1 0 20.4	-8 56.1	+0.1372	0.5837	-0.1312	+45	-21
2 B. Cancrī	6.0	2.48	13.0	16 43.9	0 58.4	-8 19.5	-0.6875	0.5834	0.1323	- 2	-73
5 Cancrī	5.9	2.48	13.1	16 40.4	2 13.3	-7 7.4	-0.7949	0.5829	0.1344	- 9	-74
30 B. Cancrī	6.1	2.49	13.9	14 51.8	6 13.9	-3 15.7	+0.4919	0.5811	0.1408	+69	- 2
29 Cancrī	5.9	2.53	14.6	14 28.3	13 43.5	+3 57.5	-0.2088	0.5778	0.1521	+25	-43
84 B. Cancrī	6.4	+2.53	-15.0	+13 31.6	15 55.8	+6 4.9	+0.4142	0.5768	-0.1552	+63	- 8
A <sup>1</sup> Cancrī	5.5	2.55	15.4	12 57.9	20 0.2	+10 0.6	+0.3443	0.5749	0.1607	+58	-13
A <sup>2</sup> Cancrī	5.7	2.55	15.6	12 24.0	21 37.4	+11 34.3	+0.6577	0.5742	0.1628	+85	+ 4
60 Cancrī	5.7	2.56	15.9	11 55.7	2 1 31.9	-8 39.5	+0.4938	0.5724	0.1676	+69	- 5
α Cancrī	4.9	2.57	16.0	12 9.8	2 38.6	-7 35.3	+0.0662	0.5718	0.1689	+40	-29
κ Cancrī	5.1	+2.58	-16.4	+10 59.2	6 42.8	-3 39.8	+0.5715	0.5700	-0.1785	+75	- 1
209 B. Cancrī	6.5	2.59	16.4	11 53.2	7 35.8	-2 48.6	-0.5018	0.5696	0.1745	+ 9	-64
222 B. Cancrī	6.3	2.60	16.6	11 49.9	11 10.0	+0 38.1	-1.0769	0.5680	0.1782	-28	-79
ω Leonis	5.5	2.60	17.1	9 24.1	15 58.7	+5 12.0	+0.5874	0.5658	0.1827	+74	- 3
h Leonis	5.2	2.61	17.1	10 3.9	17 27.4	+6 42.5	-0.4086	0.5651	0.1844	+14	-59
89 B. Leonis	6.2	+2.63	-17.7	+8 41.5	3 5 16.9	-5 52.3	-1.2349	0.5601	-0.1960	-42	-82
π Leonis	4.9	2.62	17.7	8 25.4	6 14.2	-4 57.0	-1.1444	0.5597	0.1936	-33	-82
14 Sextantis	6.3	2.63	18.0	5 59.8	9 15.7	-2 1.7	+0.7646	0.5585	0.1954	+90	+ 7
19 Sextantis	5.9	2.63	18.1	5 0.3	12 1.8	+0 38.9	+1.2446	0.5574	0.1968	+90	+44
155 B. Leonis	6.5	2.63	18.1	6 5.7	16 50.9	+5 18.4	-0.8337	0.5556	0.1990	-10	-84
237 B. Leonis	6.3	+2.64	-18.2	+1 26.7	4 6 24.0	-5 35.3	+1.2579	0.5509	-0.2027	+90	+44

ELEMENTS FOR THE PREDICTION OF OCCULTATIONS.

MARCH.

THE STAR'S					AT CONJUNCTION IN R. A.					Limiting Parallels.		
Name.	Mag.	Red'ns from 1920.0.		Apparent Declination.	Greenwich Mean Time.	Hour Angle, <i>H</i>	<i>Y'</i>	<i>z'</i>	<i>y'</i>	N.	S.	
		$\Delta\alpha$	$\Delta\delta$									
55	Leonis	6.1	+2.64	-18.1	1 9.5	4 8 2.2	-4 0.3	+1.2236	0.5504	-0.2030	+90	+40
<i>p</i> <sup>a</sup>	Leonis	6.1	2.64	18.0	0 25.5	11 46.8	0 23.0	+1.2277	0.5493	0.2033	+90	+41
<i>p</i> <sup>b</sup>	Leonis	5.7	2.63	18.0	2 23.1	13 21.0	+1 7.9	-1.1317	0.5489	0.2033	-31	-88
<i>p</i> <sup>c</sup>	Leonis	5.3	2.64	17.9	0 21.7	16 35.9	+4 16.7	+0.3169	0.5480	0.2033	+55	-19
359 B.	Leonis	6.3	2.64	17.8	0 34.0	21 8.9	+8 41.0	-0.8221	0.5468	0.2029	-9	-90
388 B.	Leonis	6.3	+2.64	-17.6	1 15.9	23 21.0	+10 46.7	+0.6457	0.5463	-0.2026	+82	-1
<i>v</i>	Leonis	4.5	2.64	17.5	0 23.2	3 41.3	-8 59.3	-1.1511	0.5453	0.2018	-33	-90
431 B.	Leonis	6.2	2.64	17.4	1 59.9	4 23.4	-8 18.6	+0.3970	0.5451	0.2016	+61	-15
78 B.	Virginis	6.5	2.63	16.1	5 16.7	21 43.2	+8 28.3	+0.4122	0.5422	0.1949	+62	-14
<i>x</i>	Virginis	4.8	2.62	15.0	7 33.6	6 9 52.3	-3 45.6	+0.5087	0.5408	0.1874	+68	-9
<i>y</i>	Virginis	5.0	+2.61	-14.2	9 6.5	17 13.9	+3 22.2	+0.8020	0.5403	-0.1818	+81	+8
49	Virginis	5.2	2.60	13.4	10 19.0	23 50.2	+9 46.1	+0.9133	0.5400	0.1762	+80	+15
<i>g</i>	Virginis	5.6	2.58	13.7	8 33.6	7 0 9.7	+10 5.0	-1.0248	0.5400	0.1759	-26	-90
50	Virginis	6.2	2.59	13.3	9 54.4	0 44.8	+10 38.9	+0.3144	0.5399	0.1754	+53	-19
$\alpha$	Virginis ( <i>Spica</i> )	1.2	2.57	12.5	10 44.9	8 16.9	-6 3.1	-0.0778	0.5398	0.1682	+29	-41
86	Virginis	5.6	+2.53	-11.2	12 1.7	18 23.7	+3 44.6	-0.3462	0.5399	-0.1575	+13	-58
621 B.	Virginis	6.4	2.52	9.6	14 35.4	3 23.6	-11 32.5	+1.0553	0.5402	0.1470	+76	+27
8	Librae	5.3	2.37	6.8	15 40.0	1 48.9	+10 10.4	-0.7418	0.5415	0.1172	-13	-90
$\alpha$	Librae	2.9	2.37	6.8	15 42.7	1 54.4	+10 15.7	-0.7037	0.5415	0.1171	-11	-90
22	Librae	6.5	2.32	5.8	16 10.6	9 35.6	-6 17.7	-1.0544	0.5421	0.1059	-36	-90
26	Librae	6.3	+2.31	-4.9	17 28.3	13 18.5	-2 41.9	-0.0184	0.5424	-0.1003	+25	-38
28	Librae	6.2	2.29	4.4	17 52.2	16 21.0	+0 14.8	+0.1206	0.5426	0.0957	+32	-30
41	Librae	5.3	2.23	3.1	19 24.3	0 58.9	+8 36.2	+0.6392	0.5432	0.0822	+66	0
$\kappa$	Librae	5.0	2.22	2.8	19 25.3	2 26.3	+10 0.7	+0.9409	0.5433	0.0799	+71	+20
$\lambda$	Librae	5.1	2.18	2.0	19 55.8	7 53.0	-8 43.0	+1.0913	0.5437	0.0711	+71	+32
47	Librae	5.8	+2.16	-2.1	19 8.9	8 41.7	-7 56.9	+0.1731	0.5438	-0.0697	+32	-27
$\beta$	Scorpii	2.9	2.12	1.4	19 35.3	13 40.4	-3 6.7	+0.3312	0.5441	0.0616	+41	-18
56 B.	Scorpii	5.0	2.12	1.4	19 35.0	13 40.7	-3 6.5	+0.3267	0.5441	0.0616	+41	-18
$\omega$ <sup>1</sup>	Scorpii	4.3	2.12	1.0	20 27.2	14 19.0	-2 29.4	+1.2475	0.5442	0.0605	+70	+53
<i>v</i>	Scorpii	3.9	2.08	1.2	19 15.3	16 43.7	-0 4.5	-0.2218	0.5443	0.0563	+9	-50
58 G.	Scorpii	6.2	+2.06	-0.5	20 1.4	20 12.2	+3 12.4	+0.4462	0.5445	-0.0506	+48	-11
<i>v</i>	Ophiuchi	4.6	2.03	-0.3	19 51.1	22 34.8	+5 30.4	+0.1402	0.5446	0.0467	+29	-28
123 B.	Scorpii	6.5	1.95	+0.7	20 15.2	11 6 25.0	-10 54.4	+0.2710	0.5450	0.0333	+35	-21
131 B.	Scorpii	5.5	1.93	0.6	19 46.3	7 3.1	-10 17.5	-0.2820	0.5450	0.0322	+3	-54
68 B.	Ophiuchi	5.9	1.88	1.3	20 16.9	12 31.9	-4 59.3	+0.1317	0.5452	0.0228	+26	-29
51 B.	Ophiuchi	6.1	+1.84	-1.2	19 24.8	14 16.6	-3 18.1	-0.8661	0.5453	-0.0198	-31	-90
109 B.	Ophiuchi	6.2	1.82	1.9	20 23.0	17 55.0	+0 13.3	+0.1447	0.5454	0.0135	+25	-28
$\xi$	Ophiuchi	4.4	1.74	2.9	21 1.6	1 37.0	+7 40.4	+0.8051	0.5455	-0.0001	+69	+11
190 B.	Ophiuchi	5.9	1.72	3.2	21 22.0	3 22.8	+9 22.8	+1.1839	0.5455	+0.0029	+69	+44
16 G.	Sagittarii	6.4	1.50	-4.3	20 20.0	20 10.4	+1 37.7	+0.3337	0.5454	0.0320	+39	-18
39 G.	Sagittarii	6.3	+1.43	-4.5	19 51.4	13 1 31.8	+6 48.9	+0.0041	0.5453	+0.0411	+20	-36
15	Sagittarii	5.3	1.42	5.0	20 45.1	3 24.3	+8 37.7	+1.0708	0.5452	0.0444	+70	+31
16	Sagittarii	5.9	1.42	4.8	20 24.7	3 24.7	+8 38.1	+0.6959	0.5452	0.0444	+68	+4
64 B.	Sagittarii	6.1	1.40	4.2	18 41.2	3 34.9	+8 48.0	-1.2004	0.5452	0.0446	-57	-90
17 H.	Sagittarii	6.4	1.38	4.4	18 39.0	5 6.6	+10 16.7	-1.1693	0.5452	0.0472	-53	-90
$\Upsilon$	Sagittarii ( <i>var.</i> )	5.4	+1.37	-4.5	18 53.7	6 22.4	+11 30.0	-0.8376	0.5452	+0.0494	-26	-90
21	Sagittarii	5.0	1.36	5.2	20 35.0	8 14.1	-10 41.8	+1.1191	0.5451	0.0525	+70	+35
95 B.	Sagittarii	5.7	1.32	4.8	18 46.7	10 34.5	-8 26.0	-0.7429	0.5450	0.0564	-20	-90
100 B.	Sagittarii	5.0	1.30	4.7	18 27.4	11 10.3	-7 51.4	-1.0632	0.5450	0.0575	-42	-90
171 B.	Sagittarii	6.1	1.19	5.9	19 21.7	14 2 15.6	+6 44.8	+0.9650	0.5443	0.0822	+71	+23
173 B.	Sagittarii	6.4	+1.13	-5.8	19 13.1	2 17.3	+6 46.5	+0.8302	0.5443	+0.0822	+71	+12

ELEMENTS FOR THE PREDICTION OF OCCULTATIONS.

MARCH.

THE STAR'S				AT CONJUNCTION OF R. A.					Limiting Parallels.			
Name.	Mag.	Red'ns from 1920.0.		Apparent Declination.	Greenwich Mean Time.			Y	z'	y'	N.	S.
		Δα	Δδ		d	h	m					
187 B. Sagittarii	6.4	+1.11	+ 5.8	-18 51.7	14	4 13.2	+ 8 38.6	+0.8001	0.5442	+0.0853	+63	- 3
190 B. Sagittarii	5.4	1.11	6.0	19 24.9		4 45.3	+ 9 9.7	+1.2535	0.5442	0.0661	+71	+53
ρ Sagittarii	4.0	1.02	5.9	17 59.8		11 11.8	- 8 36.3	+0.2861	0.5438	0.0962	+42	-20
45 Sagittarii	6.0	1.03	6.0	18 27.4		11 16.1	- 8 32.0	+0.7948	0.5438	0.0963	+72	+ 9
54 Sagittarii	5.4	0.91	5.7	16 28.6		20 21.8	+ 0 16.1	-0.4302	0.5434	0.1100	+ 3	-64
e Sagittarii	5.2	+0.91	+ 5.7	-16 18.7		21 13.8	+ 1 6.5	-0.5144	0.5434	+0.1113	- 1	-71
283 B. Sagittarii	5.5	0.90	5.5	15 39.3		21 44.2	+ 1 36.0	-1.1732	0.5433	0.1121	-46	-90
g Sagittarii	5.1	0.82	5.8	15 42.2	15	4 40.1	+ 8 18.6	-0.3070	0.5430	0.1221	+12	-55
16 B. Capricorni	6.2	0.71	5.8	15 2.2		15 41.3	- 5 1.3	+0.3982	0.5428	0.1371	+54	-15
β Capricorni	3.2	0.71	5.8	15 2.0		15 48.1	- 4 54.7	+0.4105	0.5428	0.1372	+54	-14
45 B. Capricorni	6.1	+0.65	+ 5.6	-13 59.7		22 11.1	+ 1 16.0	+0.1901	0.5424	+0.1454	+42	-26
84 B. Capricorni	6.0	0.58	5.4	12 50.4	16	6 10.9	+ 9 0.7	+0.1460	0.5424	0.1550	+39	-28
16 B. Aquarii	6.4	0.56	5.2	11 52.5		7 21.4	+10 9.0	-0.7084	0.5424	0.1563	- 7	-90
ν Aquarii	4.5	0.50	5.2	11 41.7		15 20.7	- 6 6.9	+0.3834	0.5426	0.1651	+56	-16
51 G. Aquarii	6.5	0.48	5.0	10 56.1		17 37.4	- 3 54.6	-0.0500	0.5426	0.1675	+31	-39
17 Aquarii	6.3	+0.46	+ 4.7	- 9 39.6		21 49.8	+ 0 9.8	-0.6963	0.5428	+0.1717	- 5	-90
19 Aquarii	5.8	0.45	4.7	10 5.3		22 55.6	+ 1 13.6	-0.0517	0.5428	0.1728	+31	-39
ξ Aquarii	4.8	0.41	4.3	8 12.7	17	5 0.3	+ 7 6.6	-0.9804	0.5432	0.1784	-22	-90
c <sup>1</sup> Capricorni	5.3	0.38	4.6	9 26.9		8 30.2	+10 29.9	+0.9623	0.5434	0.1814	+81	+19
c <sup>2</sup> Capricorni	6.3	0.38	4.6	9 38.7		9 6.8	+11 5.3	+1.2801	0.5435	0.1819	+81	+49
30 Aquarii	5.6	+0.34	+ 4.0	- 6 54.5		17 20.3	+ 4 57.0	-0.0961	0.5443	+0.1882	+30	-42
138 B. Aquarii	6.4	0.32	3.6	- 5 6.9		21 54.5	- 0 31.5	-1.1197	0.5449	0.1912	-31	-90
<b>NEW MOON.</b>												
12 H <sup>1</sup> . Arietis	6.3	-0.49	- 0.3	+13 5.5	23	6 41.1	+ 4 42.6	+0.3365	0.5804	+0.1582	+57	-13
19 Arietis	5.8	+0.54	+ 0.2	+14 54.3		11 4.9	+ 8 56.7	-0.8148	0.5823	+0.1820	-10	-76
29 Arietis	6.1	0.60	0.8	14 40.8		19 22.2	- 7 4.4	+0.6202	0.5859	0.1322	+81	+ 5
ο Arietis	5.8	0.64	1.1	14 58.4	23	0 19.8	- 2 26.6	+0.9751	0.5878	0.1312	+99	+29
π Arietis	5.2	0.68	0.8	17 7.9		2 6.7	- 0 35.1	-0.9519	0.5886	0.1279	-20	-73
124 B. Arietis	6.4	0.68	1.1	16 9.4		3 43.0	+ 0 57.6	+0.2341	0.5893	0.1251	+51	-15
ρ Arietis	5.6	+0.71	+ 0.9	+17 48.3		5 1.4	+ 2 13.0	-1.1641	0.5897	+0.1227	-38	-73
53 Arietis	6.0	0.75	1.2	17 34.3		9 31.0	+ 6 32.4	-0.4964	0.5913	0.1145	+ 9	-57
175 B. Arietis	6.4	0.84	1.5	18 28.6		17 26.8	- 9 50.1	-0.5601	0.5940	0.0992	+ 5	-61
26 B. Tauri	6.4	0.86	2.1	17 34.2		20 18.3	- 7 5.3	+0.6283	0.5948	0.0935	+84	+10
13 Tauri	5.6	0.91	1.8	19 26.7		23 34.0	- 3 57.1	-0.9653	0.5957	0.0669	-21	-71
14 Tauri	6.2	+0.92	+ 1.8	+19 24.8	24	0 9.1	- 3 23.5	-0.8928	0.5958	+0.0956	-15	-71
163 B. Tauri	5.8	0.98	2.8	17 58.1		6 57.8	+ 3 9.3	+1.1067	0.5974	0.0718	+90	+45
ω Tauri	5.5	1.03	2.7	19 23.9		10 16.0	+ 6 19.8	-0.1098	0.5980	0.0641	+30	-23
43 Tauri	4.8	1.08	2.7	20 22.9		13 28.3	+ 9 24.5	-0.9074	0.5985	0.0571	-13	-70
85 H <sup>1</sup> . Tauri	6.0	1.07	3.3	18 33.1		14 44.4	+10 37.6	+1.0082	0.5987	0.0543	+90	+38
224 B. Tauri	6.1	+1.10	+ 2.7	+20 38.0		15 29.7	+11 21.1	-1.0490	0.5989	+0.0526	-29	-70
227 B. Tauri	5.9	1.11	2.8	20 47.8		15 57.1	+11 47.5	-1.1898	0.5988	0.0616	-44	-70
234 B. Tauri	6.0	1.10	3.4	18 51.5		16 31.9	-11 39.1	+0.7931	0.5988	0.0608	+90	+24
e Tauri	3.6	1.12	3.5	19 0.2		17 58.8	-10 15.6	+0.7172	0.5990	0.0471	+99	+30
282 B. Tauri	6.4	1.16	3.5	19 43.0		20 46.8	- 7 34.2	+0.1208	0.5993	0.0406	+44	-13
129 H <sup>1</sup> . Tauri	5.8	+1.18	+ 3.4	+20 31.4		21 46.8	- 6 36.6	-0.6533	0.5993	+0.0325	- 1	-63
312 B. Tauri	6.2	1.24	4.4	19 21.3	25	4 23.6	- 0 15.4	+0.7306	0.5995	0.0235	+90	+23
330 B. Tauri	6.3	1.31	4.1	21 9.9		8 4.6	+ 3 16.9	-1.0246	0.5995	0.0153	-27	-69
333 B. Tauri	6.3	1.30	4.6	19 41.8		8 33.6	+ 3 44.8	+0.4653	0.5995	0.0140	+68	+ 8
ι Tauri	5.2	1.32	4.5	20 13.8		9 27.1	+ 4 36.2	-0.1450	0.5994	0.0129	+28	-25
107 Tauri	6.5	+1.32	+ 4.7	+19 45.4		9 51.9	+ 5 0.0	+0.4217	0.5994	+0.0111	+64	+ 6

# OCULTATIONS, 1920.

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## ELEMENTS FOR THE PREDICTION OF OCULTATIONS.

### MARCH.

THE STAR'S					AT CONJUNCTION IN R. A.						Limiting Parallels.	
Name.	Mag.	Red'ns from 1900.A.		Apparent Declination.	Greenwich Mean Time.	Hour Angle, <i>H</i>	<i>Y'</i>	<i>x'</i>	<i>y'</i>	N.	S.	
		$\Delta\alpha$	$\Delta\delta$									d
351 B. Tauri	6.2	+1.37	-5.0	+20 3.0	25	13 58.4	+ 8 56.8	+0.1504	0.5991	+0.0017	+46 - 8	
353 B. Tauri	6.5	1.38	5.2	19 44.0		14 39.0	+ 9 35.8	+0.4717	0.5990	+0.0001	+68 +10	
372 B. Tauri	6.1	1.44	5.5	20 25.0		19 40.1	- 9 35.0	-0.2474	0.5984	-0.0113	+22 -31	
f Tauri	3.0	1.47	5.4	21 5.6		21 14.6	- 8 4.2	-0.9518	0.5982	0.0149	-21 -69	
B. D. +19° 1110	6.0	1.53	6.4	19 50.8	26	3 7.1	- 2 25.6	+0.1826	0.5970	0.0231	+48 - 8	
<i>x</i> <sup>1</sup> Orionis	4.5	+1.54	-6.4	+20 15.6		3 54.8	- 1 39.8	-0.2597	0.5989	-0.0299	+22 -33	
57 Orionis	5.8	1.54	6.6	19 44.0		4 8.3	- 1 26.7	+0.2674	0.5968	0.0304	+53 - 4	
64 Orionis	5.1	1.58	6.9	19 41.5		7 32.0	+ 1 49.0	+0.1941	0.5960	0.0379	+48 - 9	
<i>x</i> <sup>2</sup> Orionis	4.7	1.59	6.8	20 8.4		7 42.8	+ 1 59.4	-0.2669	0.5960	0.0383	+21 -35	
68 Orionis	5.7	1.62	7.2	19 48.5		10 57.6	+ 5 6.6	-0.0666	0.5951	0.0454	+33 -24	
19 B. Geminorum	6.2	+1.62	-7.7	+18 42.0		11 35.4	+ 5 42.9	+1.0266	0.5949	-0.0468	+90 +41	
71 Orionis	5.1	1.63	7.6	19 11.0		12 6.9	+ 6 12.6	+0.5133	0.5948	0.0479	+72 + 8	
16 Geminorum	6.2	1.71	7.6	20 32.6		17 21.1	+11 15.8	-1.1479	0.5932	0.0592	-39 -70	
Geminorum	4.1	1.71	7.7	20 15.7		17 46.0	+11 39.2	-0.8872	0.5930	0.0601	-16 -70	
74 B. Geminorum	6.2	1.78	9.2	18 16.7	27	1 15.9	- 5 8.1	+0.6170	0.5904	0.0756	+83 +11	
110 B. Geminorum	6.2	+1.84	-9.9	+17 52.0		7 25.2	+ 0 47.1	+0.5822	0.5879	-0.0679	+73 + 5	
$\lambda$ Geminorum	3.6	1.90	10.9	16 41.0		13 54.4	+ 7 1.7	+1.1288	0.5852	0.1003	+90 +44	
162 B. Geminorum	5.7	1.97	11.2	17 15.3		19 36.6	-11 28.9	-0.0653	0.5828	0.1107	+33 -29	
68 Geminorum	5.2	1.96	11.7	15 59.8		20 23.0	-10 44.3	+1.1425	0.5822	0.1120	+90 +44	
f Geminorum	5.3	2.01	11.3	17 51.3		22 49.4	- 8 23.3	-1.0330	0.5811	0.1163	-26 -73	
1 Cancr	6.0	+2.07	-12.5	+16 0.1	28	6 15.9	- 1 13.2	-0.0621	0.5776	-0.1286	+34 -31	
2 B. Cancr	6.0	2.08	12.3	16 43.9		6 54.6	- 0 35.9	-0.8825	0.5773	0.1297	-15 -74	
5 Cancr	5.9	2.09	12.4	16 40.4		8 11.0	+ 0 37.7	-0.9895	0.5767	0.1317	-22 -74	
30 B. Cancr	6.1	2.11	13.3	14 51.8		12 16.4	+ 4 34.9	+0.3122	0.5747	0.1379	+56 -12	
29 Cancr	5.9	2.18	14.0	14 28.4		19 55.5	+11 57.0	-0.3852	0.5710	0.1489	+15 -53	
84 B. Cancr	6.4	+2.20	-14.5	+13 31.6		22 10.8	- 9 52.6	+0.2444	0.5699	-0.1519	+51 -17	
A <sup>1</sup> Cancr	5.5	2.23	14.9	12 57.9	29	2 20.6	- 5 51.5	+0.1814	0.5680	0.1572	+47 -21	
A <sup>2</sup> Cancr	5.7	2.24	15.2	12 24.0		4 0.0	+ 4 15.6	+0.5001	0.5671	0.1592	+69 - 4	
60 Cancr	5.7	2.27	15.5	11 55.7		7 59.8	- 0 24.2	-0.3405	0.5652	0.1639	+57 -13	
$\alpha$ Cancr	4.3	2.28	15.5	12 9.8		9 8.1	+ 0 41.7	-0.0897	0.5647	0.1662	+31 -37	
$\kappa$ Cancr	5.1	+2.31	-16.0	+10 50.2		13 18.0	+ 4 43.0	+0.4269	0.5628	-0.1697	+64 - 9	
209 B. Cancr	6.5	2.32	15.8	11 53.2		14 12.2	+ 5 35.3	-0.6557	0.5624	0.1707	0 -75	
222 B. Cancr	6.3	2.35	16.0	11 49.9		17 51.4	+ 9 7.0	-1.2310	0.5608	0.1743	-43 -79	
$\omega$ Leonis	5.5	2.37	16.8	9 24.1		22 41.8	-10 12.4	+0.4276	0.5588	0.1787	+83 -10	
3 Leonis	5.8	2.37	17.1	8 32.0		22 43.2	-10 11.1	+1.3209	0.5588	0.1787	+80 +61	
$\lambda$ Leonis	5.2	+2.38	-16.7	+10 3.9	30	0 17.6	- 8 39.8	-0.5456	0.5581	-0.1800	+ 7 -69	
$\pi$ Leonis	4.9	2.47	17.6	8 25.4		13 22.0	+ 3 58.5	-1.2660	0.5531	0.1894	-46 -82	
14 Sextantis	6.3	2.48	18.2	5 59.8		16 27.6	+ 6 58.0	+0.6680	0.5520	0.1912	+85 + 1	
19 Sextantis	5.9	2.50	18.4	5 0.3		19 17.4	+ 9 42.2	+1.1580	0.5511	0.1927	+90 +35	
155 B. Leonis	6.5	2.53	18.6	6 5.7	31	0 12.6	- 9 32.3	-0.9316	0.5495	0.1949	-16 -84	
237 B. Leonis	6.3	+2.61	-19.0	+ 1 26.6		14 2.0	+ 3 50.3	+1.2065	0.5458	-0.1988	+90 +39	
55 Leonis	6.1	2.62	19.0	1 9.5		15 42.0	+ 5 27.2	+1.1751	0.5454	0.1991	+90 +35	
p <sup>3</sup> Leonis	6.1	2.64	19.0	0 25.5		19 30.7	+ 9 8.5	+1.1864	0.5446	0.1995	+90 +37	
p <sup>4</sup> Leonis	5.7	+2.64	-18.7	+ 2 23.1		21 6.4	+10 41.2	-1.1902	0.5442	-0.1996	-37 -88	

### APRIL.

p <sup>5</sup> Leonis	5.3	+2.67	-18.9	+ 0 21.6	1	0 24.7	-10 6.7	+0.2774	0.5436	-0.1996	+52 -21
359 B. Leonis	6.3	2.69	18.8	+ 0 34.0		5 2.0	- 5 38.2	-0.8615	0.5429	0.1994	-12 -89
388 B. Leonis	6.3	2.70	18.9	+ 1 15.9		7 16.1	- 3 28.4	+0.6224	0.5425	0.1992	+79 - 2
v Leonis	4.5	+2.72	-18.6	+ 0 23.2		11 40.1	+ 0 47.3	-1.1790	0.5419	-0.1985	-36 -90

ELEMENTS FOR THE PREDICTION OF OCCULTATIONS.

APRIL.

THE STAR'S				AT CONJUNCTION IN R. A.					Limiting Parallels.		
Name.	Mag.	Red'ns from 1920.9.		Apparent Declination.	Greenwich Mean Time.	Hour Angle, <i>H</i>	<i>Y</i>	<i>z'</i>	<i>y'</i>	<i>N.</i>	<i>S.</i>
		$\Delta\alpha$	$\Delta\delta$								
431 B. Leonis	6.2	+2.73	-18.8	1 59.9	1 12 22.8	+ 1 28.6	+0.3820	0.5418	-0.1983	+59	-15
78 B. Virginis	6.5	2.81	18.0	5 16.8	2 5 54.3	- 5 32.8	+0.4315	0.5404	0.1923	+62	-13
<i>x</i> Virginis	4.8	2.87	17.2	7 33.6	18 8.8	+ 6 18.7	+0.5515	0.5401	0.1853	+70	- 6
$\psi$ Virginis	5.0	2.90	16.5	9 6.6	3 1 32.6	-10 31.2	+0.8592	0.5403	0.1800	+81	+12
49 Virginis	5.2	2.92	15.8	10 19.0	8 10.1	- 4 6.3	+0.9822	0.5405	0.1746	+80	+21
<i>g</i> Virginis	5.6	+2.90	-15.9	8 33.6	8 29.6	- 3 47.3	-0.9613	0.5405	-0.1743	-22	- 90
50 Virginis	6.2	2.92	15.8	9 54.4	9 4.9	- 3 13.1	+0.3830	0.5405	0.1738	+56	-15
$\alpha$ Virginis ( <i>Spica</i> )	1.2	2.93	14.9	10 44.9	16 37.5	+ 4 5.3	+0.0027	0.5410	0.1669	+33	-36
86 Virginis	5.8	2.95	13.7	12 1.8	4 2 44.0	-10 7.3	-0.2497	0.5417	0.1564	+18	-51
621 B. Virginis	6.4	2.99	12.4	14 35.5	11 42.7	- 1 25.6	+1.1667	0.5425	0.1461	+75	+38
8 Libræ	5.3	+2.95	- 9.2	15 40.1	5 10 2.2	- 3 48.6	-0.6017	0.5446	-0.1167	- 6	-79
$\alpha$ Libræ	2.9	2.95	9.2	15 42.8	10 7.7	- 3 43.2	-0.5636	0.5446	0.1166	- 4	-75
$\nu$ Libræ	5.3	2.93	8.1	15 57.0	17 41.0	+ 3 35.6	-1.1454	0.5452	0.1055	-45	- 90
22 Libræ	6.5	2.93	8.0	16 10.7	17 46.5	+ 3 40.9	-0.9053	0.5453	0.1054	-26	- 90
26 Libræ	6.3	2.94	7.2	17 28.4	21 28.0	+ 7 15.3	+0.1341	0.5456	0.0998	-32	-28
28 Libræ	6.2	+2.94	- 6.7	17 52.2	6 0 29.5	+10 11.1	+0.2759	0.5458	-0.0952	+40	-20
41 Libræ	5.3	2.92	5.2	19 2.4	9 4.5	- 5 30.5	+0.8023	0.5464	0.0817	+71	+11
$\kappa$ Libræ	5.0	2.91	4.9	19 25.3	10 31.4	- 4 6.4	+1.1051	0.5464	0.0794	+71	+34
$\lambda$ Libræ	5.1	2.89	4.0	19 55.8	15 56.4	+ 1 8.2	+1.2599	0.5467	0.0706	+70	+57
47 Libræ	5.8	2.87	4.0	19 8.9	16 44.8	+ 1 55.1	+0.3428	0.5468	0.0693	+42	-17
$\beta$ Scorpii	2.9	+2.85	- 3.2	19 35.3	21 42.1	+ 6 42.8	+0.5046	0.5470	-0.0611	+52	- 7
56 B. Scorpii	5.0	2.84	3.2	19 35.1	21 42.3	+ 6 43.0	+0.5001	0.5470	0.0611	+52	- 8
73 B. Scorpii	6.4	2.80	3.2	18 7.8	23 51.5	+ 8 47.9	-1.2325	0.5470	0.0575	-61	- 88
$\nu$ Scorpii	3.9	2.82	2.8	19 15.3	7 0 49.5	+ 9 44.0	-0.0460	0.5470	0.0559	+18	-39
88 B. Scorpii	6.4	2.78	2.9	18 19.9	2 6.3	+10 58.3	-1.1843	0.5470	0.0538	-50	- 90
58 G. Scorpii	6.2	+2.81	- 2.1	20 1.5	4 12.1	-10 59.9	+0.6241	0.5470	-0.0502	+61	0
$\psi$ Ophiuchi	4.6	2.78	1.8	19 51.1	6 34.1	- 8 42.4	+0.3196	0.5471	0.0462	+38	-18
123 B. Scorpii	6.5	2.73	0.5	20 15.2	14 22.9	- 1 8.8	+0.4548	0.5470	0.0329	+46	-10
131 B. Scorpii	5.5	2.71	- 0.6	19 46.3	15 0.9	- 0 32.0	-0.0979	0.5471	0.0318	+13	-42
68 B. Ophiuchi	5.9	2.67	+ 0.3	20 17.0	20 28.9	+ 4 45.4	+0.3185	0.5469	0.0224	+36	-18
81 B. Ophiuchi	6.1	+2.64	+ 0.3	19 24.8	22 13.5	+ 6 26.6	-0.6789	0.5469	-0.0194	-21	- 90
109 B. Ophiuchi	6.2	2.62	1.1	20 23.0	8 1 51.6	+ 9 57.6	+0.3338	0.5468	-0.0131	+36	-17
$\xi$ Ophiuchi	4.4	2.56	2.3	21 1.6	9 33.5	- 6 35.4	+0.9976	0.5464	+0.0002	+69	+26
305 B. Ophiuchi	6.3	2.34	3.8	18 47.3	9 2 14.1	+ 9 32.9	-1.2398	0.5451	0.0288	-64	- 86
16 G. Sagittarii	6.4	2.34	4.5	20 20.0	4 9.6	+11 24.7	+0.5295	0.5449	0.0320	+52	- 6
39 G. Sagittarii	6.3	+2.27	+ 5.0	19 51.4	9 32.6	- 7 22.6	+0.1995	0.5444	+0.0411	+30	-25
15 Sagittarii	5.3	2.27	5.5	20 45.1	11 25.7	- 5 33.2	+1.2692	0.5441	0.0442	+69	+62
16 Sagittarii	5.9	2.26	5.4	20 24.7	11 26.1	- 5 32.8	+0.8932	0.5441	0.0443	+70	+17
64 B. Sagittarii	6.1	2.23	4.8	18 41.1	11 36.3	- 5 22.9	-1.0084	0.5441	0.0445	+40	- 90
52 G. Sagittarii	6.4	2.22	4.8	18 29.5	12 33.0	- 4 28.0	-1.1799	0.5440	0.0461	-55	- 90
17 H <sup>1</sup> Sagittarii	6.4	+2.21	+ 5.0	18 39.0	13 8.6	- 3 53.6	-0.9774	0.5440	+0.0471	-37	- 90
<i>Y</i> Sagittarii ( <i>var.</i> )	5.4	2.20	5.2	18 53.7	14 24.9	- 2 39.7	-0.6448	0.5438	0.0492	-16	- 86
95 B. Sagittarii	5.7	2.15	5.6	18 46.7	18 38.8	+ 1 26.1	-0.5502	0.5433	0.0562	-10	-75
100 B. Sagittarii	5.0	2.14	5.5	18 27.4	19 14.9	+ 2 1.0	-0.8718	0.5432	0.0571	-29	- 90
171 B. Sagittarii	6.1	1.96	7.3	19 21.6	10 28.4	- 7 14.6	+1.1815	0.5414	0.0814	+71	+42
173 B. Sagittarii	6.4	+1.96	+ 7.3	19 13.0	10 30.1	- 7 13.0	+1.0261	0.5414	+0.0815	+71	+27
187 B. Sagittarii	6.4	1.94	7.3	18 51.6	12 27.3	- 5 19.5	+0.7945	0.5412	0.0845	+71	+10
$\rho$ Sagittarii	4.0	1.84	7.6	17 59.8	19 30.8	+ 1 30.6	+0.4769	0.5403	0.0952	+54	- 9
45 Sagittarii	6.0	1.84	7.7	18 27.3	19 35.2	+ 1 34.9	+0.9880	0.5403	0.0953	+72	+23
54 Sagittarii	5.4	1.71	7.7	16 28.5	11 4 48.0	+10 36.2	-0.2469	0.5393	0.1087	+13	-51
<i>e</i> Sagittarii	5.2	+1.70	+ 7.7	16 18.6	5 40.7	+11 21.2	-0.3820	0.5392	+0.1100	+ 8	-57

ELEMENTS FOR THE PREDICTION OF OCCULTATIONS.

APRIL.

THE STAR'S					AT CONJUNCTION IN R. A.					Limiting Parallels.	
Name.	Mag.	Red'ns from 1920.0.		Apparent Declination.	Greenwich Mean Time.	Hour Angle, <i>H</i> .	<i>Y</i>	<i>x'</i>	<i>y'</i>	N.	S.
		$\Delta\alpha$	$\Delta\delta$								
283 B. Sagittarii	5.5	+1.69	+ 7.5	-15 39.3	11 6 11.5	+11 51.1	-0.9946	0.5392	+0.1107	-32	-90
<i>q</i> Sagittarii	5.1	1.60	7.9	15 42.1	13 13.4	- 5 20.2	-0.1278	0.5385	0.1204	+20	-44
16 B. Capricorni	6.2	1.46	8.3	15 2.1	12 0 24.8	+ 5 30.1	+0.5743	0.5377	0.1361	+65	- 4
$\beta$ Capricorni	3.2	1.46	8.3	15 2.0	0 31.7	+ 5 36.8	+0.5666	0.5376	0.1362	+66	- 3
45 B. Capricorni	6.1	1.88	8.2	13 59.7	7 0.8	+11 53.7	+0.3600	0.5373	0.1432	+51	-16
84 B. Capricorni	6.0	+1.23	+ 8.0	-12 50.4	15 8.4	- 4 13.9	+0.3088	0.5372	+0.1526	+49	-19
16 B. Aquarii	6.4	1.26	7.8	11 52.5	16 20.0	- 3 4.5	-0.5515	0.5372	0.1689	+ 1	-73
$\nu$ Aquarii	4.5	1.17	7.9	11 41.6	18 0 27.0	+ 4 47.3	+0.5389	0.5373	0.1625	+66	- 6
51 G. Aquarii	6.5	1.14	7.7	10 56.1	2 45.9	+ 7 1.9	+0.1007	0.5373	0.1649	+38	-30
17 Aquarii	6.3	1.09	7.3	9 39.5	7 2.3	+11 10.3	-0.5556	0.5376	0.1690	+ 3	-73
19 Aquarii	5.6	+1.08	+ 7.4	-10 5.3	8 9.2	-11 44.9	+0.0933	0.5376	+0.1701	+38	-31
$\xi$ Aquarii	4.8	1.02	6.9	8 12.7	14 19.3	- 5 46.3	-0.8469	0.5381	0.1756	-14	-90
<i>c</i> Capricorni	5.3	0.98	7.4	9 26.9	17 52.3	- 2 20.1	+1.1014	0.5385	0.1786	+81	+30
30 Aquarii	5.6	0.90	6.6	6 54.5	14 2 49.7	+ 6 20.5	+0.0270	0.5398	0.1854	+36	-34
138 B. Aquarii	6.4	0.86	6.0	5 6.8	7 27.3	+10 49.3	-1.0065	0.5406	0.1885	-23	-90
44 Aquarii	5.7	+0.84	+ 6.2	- 5 47.1	9 34.6	-11 7.3	+0.1053	0.5410	+0.1898	+41	-30
51 Aquarii	5.8	0.81	6.0	5 14.4	12 58.8	- 7 49.6	+0.1795	0.5417	0.1918	+46	-26
187 B. Aquarii	6.3	0.78	5.4	3 19.2	16 28.6	- 4 26.5	-1.1687	0.5425	0.1937	-36	-90
$\kappa$ Aquarii	5.2	0.75	5.7	4 38.4	19 35.2	- 1 25.8	+0.8234	0.5433	0.1952	+85	+10
207 B. Aquarii	6.3	0.74	5.5	3 58.1	21 3.2	- 0 0.6	+0.4061	0.5437	0.1958	+60	-14
6 G. Piscium	6.2	+0.68	+ 5.0	- 2 49.4	15 5 26.0	+ 8 6.1	+0.8588	0.5462	+0.1990	+87	+12
22 B. Piscium	6.4	0.61	4.1	0 8.8	17 25.2	- 4 18.0	+0.4747	0.5504	0.2015	+66	-10
$\eta$ Piscium	4.9	0.61	3.8	+ 0 49.1	19 1.1	- 2 45.2	-0.2024	0.5511	0.2017	+25	-48
$\theta$ Piscium	6.4	0.60	3.9	+ 0 41.0	19 10.0	- 2 36.7	-0.0332	0.5511	0.2017	+34	-38
16 Piscium	5.7	0.58	3.6	1 39.5	23 27.1	+ 1 32.1	-0.1758	0.5528	0.2019	+26	-46
$\lambda$ Piscium	4.6	+0.56	+ 3.5	+ 1 20.4	16 2 5.2	+ 4 4.8	+0.6841	0.5540	+0.2018	+86	+ 2
19 Piscium	5.4	0.56	3.2	3 2.6	4 6.0	+ 6 1.7	-0.6637	0.5549	0.2017	0	-83
22 Piscium	5.8	0.55	+ 3.1	2 29.2	6 40.4	+ 8 30.9	+0.4282	0.5561	0.2014	+62	-12
NEW MOON.											
163 B. Tauri	5.8	+0.70	- 3.7	+17 58.1	20 14 42.0	-11 18.7	+1.0051	0.6077	+0.0716	+90	+38
43 Tauri	5.5	0.74	3.7	19 23.9	17 54.2	- 8 14.3	-0.1968	0.6083	0.0644	+25	-32
$\omega$ Tauri	4.8	0.77	3.8	20 22.9	21 0.6	- 5 15.4	-0.9855	0.6088	0.0573	-24	-70
85 H <sup>1</sup> . Tauri	6.0	0.76	4.2	18 33.1	22 14.4	- 4 4.6	+0.9018	0.6090	0.0544	+90	+32
224 B. Tauri	6.1	0.78	3.9	20 37.9	22 58.3	- 3 22.5	-1.1265	0.6090	0.0528	-37	-69
227 B. Tauri	5.9	+0.79	- 3.9	+20 47.7	23 24.9	- 2 57.0	-1.2656	0.6091	+0.0517	-60	-69
234 B. Tauri	6.0	0.78	4.3	18 51.5	23 58.7	- 2 24.6	+0.6885	0.6092	0.0504	+90	+19
$\epsilon$ Tauri	3.6	0.79	4.4	19 0.2	21 1 22.9	- 1 3.9	+0.6127	0.6093	0.0471	+82	+15
282 B. Tauri	6.4	0.81	4.5	19 43.0	4 5.9	+ 1 32.6	+0.0229	0.6095	0.0408	+37	-17
129 H <sup>1</sup> . Tauri	5.8	0.83	4.4	20 31.4	5 4.1	+ 2 28.3	-0.7410	0.6095	0.0385	- 7	-69
<i>i</i> Tauri	5.1	+0.86	- 5.2	+18 42.2	10 6.6	+ 7 18.6	+1.2334	0.6096	+0.0266	+88	+64
312 B. Tauri	6.2	0.88	5.1	19 21.3	11 29.0	+ 8 37.6	+0.6193	0.6096	0.0233	+83	+17
330 B. Tauri	6.3	0.92	5.0	21 9.9	15 3.5	-11 56.6	-1.1138	0.6093	0.0148	-36	-69
333 B. Tauri	6.3	0.91	5.4	19 41.8	15 31.7	-11 29.5	+0.3552	0.6092	0.0137	+58	+ 3
<i>l</i> Tauri	5.2	0.92	5.3	20 18.7	16 23.6	-10 39.8	-0.2471	0.6092	0.0116	+22	-30
107 Tauri	6.5	+0.92	- 5.5	+19 45.3	16 47.7	-10 16.6	+0.3116	0.6091	+0.0107	+56	+ 1
351 B. Tauri	6.2	0.96	5.7	20 3.0	20 47.3	- 6 26.8	+0.0419	0.6086	+0.0012	+38	-13
363 B. Tauri	6.5	0.97	5.9	19 44.0	21 26.6	- 5 49.0	+0.3585	0.6085	-0.0004	+59	+ 5
372 B. Tauri	6.1	1.02	6.1	20 25.0	22 2 19.5	- 1 8.0	-0.3535	0.6075	0.0119	+16	-37
$\zeta$ Tauri	3.0	1.04	6.0	21 5.6	3 51.4	+ 0 20.1	-1.0496	0.6072	0.0155	-30	-69
B. D. +19°1110	6.0	+1.09	- 6.8	+19 50.8	9 34.7	+ 5 49.6	+0.0679	0.6056	-0.0289	+40	-14

ELEMENTS FOR THE PREDICTION OF OCCULTATIONS.

APRIL.

THE STAR'S				AT CONJUNCTION IN R. A.					Limiting Parallax.			
Name.	Mag.	Red'ns from 1920.0.		Apparent Declination.	Greenwich Mean Time.	Hour Angle, H	Y	Z	y	N.	S.	
		Δα	Δδ									
		s	"	'	d	h	m	h	m		'	
x <sup>1</sup> Orionis	4.5	+1.10	-6.8	+20 15.8	23	10 21.2	+6 34.2	-0.3693	0.6059	-0.0606	+15	-40
57 Orionis	5.8	1.10	6.9	19 44.0		10 34.3	+6 46.8	+0.1512	0.6059	0.0311	+45	-9
64 Orionis	5.1	1.13	7.2	19 41.5		13 53.0	+9 57.6	+0.0778	0.6041	0.0387	+40	-14
x <sup>2</sup> Orionis	4.7	1.14	7.1	20 8.4		14 3.5	+10 7.6	-0.3779	0.6040	0.0391	+14	-41
68 Orionis	5.7	1.16	7.4	19 48.4		17 13.7	-10 49.8	-0.1810	0.6029	0.0468	+26	-29
19 B. Geminorum	6.2	+1.16	-7.8	+18 42.0		17 50.5	-10 14.5	+0.8994	0.6029	-0.0477	+90	+32
71 Orionis	5.1	1.17	7.8	19 11.0		18 20.8	-9 45.4	+0.3918	0.6024	0.0488	+61	+2
16 Geminorum	6.2	1.24	7.7	20 32.6		23 28.5	-4 49.8	-1.2526	0.6002	0.0601	-56	-69
v Geminorum	4.1	1.24	7.8	20 15.7		23 52.8	-4 26.5	-0.9949	0.6000	0.0610	-25	-70
26 Geminorum	5.2	1.27	9.0	17 43.3	23	5 14.7	+0 42.7	+1.1989	0.5975	0.0724	+90	+55
74 B. Geminorum	6.2	+1.30	-9.0	+18 16.7		7 13.5	+2 36.9	+0.4922	0.5965	-0.0765	+69	+5
110 B. Geminorum	6.2	1.36	9.6	17 52.0		13 16.1	+8 25.4	+0.4079	0.5933	0.0687	+62	-1
λ Geminorum	3.6	1.42	10.5	16 41.0		19 39.0	-9 26.4	+0.9996	0.5896	0.1010	+90	+34
162 B. Geminorum	5.7	1.49	10.6	17 15.3	24	1 16.4	-4 1.8	-0.1753	0.5864	0.1113	+26	-35
68 Geminorum	5.2	1.49	11.1	15 59.8		2 2.3	-3 17.7	+1.0141	0.5860	0.1126	+90	+34
f Geminorum	5.3	+1.53	-10.6	+17 51.3		4 26.9	-0 58.5	-1.1466	0.5845	-0.1168	-37	-72
1 Cancri	6.0	1.60	11.8	16 0.1		11 48.8	+6 7.1	-0.1716	0.5800	0.1289	+26	-37
2 B. Cancri	6.0	1.61	11.5	16 43.9		12 27.2	+6 44.0	-0.9976	0.5796	0.1299	-24	-73
5 Cancri	5.9	1.62	11.6	16 40.4		13 42.9	+7 57.0	-1.1041	0.5788	0.1319	-32	-73
90 B. Cancri	6.1	1.65	12.5	14 51.8		17 46.5	+11 51.7	+0.1919	0.5763	0.1380	+48	-13
27 Cancri	5.8	+1.71	-13.6	+12 54.9	25	0 35.0	-5 34.9	+1.2105	0.5721	-0.1476	+90	+48
29 Cancri	5.9	1.73	13.0	14 28.4		1 23.2	-4 48.0	-0.5014	0.5716	0.1486	+8	-60
84 B. Cancri	6.4	1.75	13.5	13 31.7		3 38.0	-2 38.0	+0.1289	0.5703	0.1516	+44	-23
A <sup>1</sup> Cancri	5.5	1.79	13.9	12 57.9		7 47.3	+1 22.8	+0.0654	0.5678	0.1587	+40	-27
A <sup>2</sup> Cancri	5.7	1.80	14.2	12 24.0		9 26.5	+2 58.3	+0.3841	0.5668	0.1587	+60	-10
60 Cancri	5.7	+1.85	-14.5	+11 55.7		13 26.3	+6 49.7	+0.2264	0.5645	-0.1632	+49	-19
α Cancri	4.3	1.86	14.4	12 9.8		14 34.6	+7 55.7	-0.2028	0.5639	0.1645	+25	-43
κ Cancri	5.1	1.90	15.0	10 59.2		18 44.9	+11 57.4	+0.3152	0.5615	0.1688	+55	-15
209 B. Cancri	6.5	1.91	14.7	11 53.2		19 39.3	-11 10.2	-0.7666	0.5610	0.1697	-7	-78
ω Leonis	5.5	1.99	15.8	9 24.1	26	4 10.8	-2 56.0	+0.3208	0.5565	0.1774	+55	-16
3 Leonis	5.8	+1.98	-16.1	+8 32.0		4 12.2	-2 54.7	+1.2149	0.5565	-0.1774	+90	+44
h Leonis	5.2	2.01	15.6	10 3.9		5 47.2	-1 22.8	-0.6525	0.5557	0.1787	0	-77
10 B. Sextantis	6.0	2.06	16.8	7 4.4		12 23.4	+5 0.1	+1.2558	0.5525	0.1835	+90	+48
14 Sextantis	6.3	2.16	17.2	5 59.9		22 4.8	-9 37.5	+0.5731	0.5483	0.1892	+74	-3
19 Sextantis	5.9	2.19	17.6	5 0.3	27	0 56.3	-6 51.5	+1.0668	0.5472	0.1906	+90	+28
155 B. Leonis	6.5	+2.23	-17.2	+6 5.7		5 54.9	-2 2.5	-1.0268	0.5454	-0.1927	-24	-84
237 B. Leonis	6.3	2.37	18.5	1 26.7		19 54.9	+11 30.7	+1.1313	0.5410	0.1963	+90	+32
55 Leonis	6.1	2.39	18.5	1 9.5		21 36.3	-10 51.1	+1.1011	0.5406	0.1965	+90	+29
p <sup>1</sup> Leonis	6.1	2.43	18.6	0 25.5	28	1 28.2	-7 6.6	+1.1159	0.5397	0.1969	+90	+30
p <sup>2</sup> Leonis	5.7	2.43	18.0	2 23.1		3 5.3	-5 32.4	-1.2721	0.5394	0.1969	-47	-88
p <sup>3</sup> Leonis	5.3	+2.47	-18.4	+0 21.6		6 26.5	-2 17.5	+0.2062	0.5387	-0.1970	+48	-25
359 B. Leonis	6.3	2.51	18.2	+0 34.0		11 7.9	+2 15.1	-0.9353	0.5379	0.1967	-17	-89
388 B. Leonis	6.3	2.54	18.6	-1 15.9		13 24.0	+4 27.0	+0.5591	0.5375	0.1965	+73	-6
v Leonis	4.5	2.57	18.2	0 23.2		17 52.1	+8 46.7	-1.2491	0.5369	0.1958	-44	-90
431 B. Leonis	6.2	2.59	18.5	1 59.9		18 35.4	+9 28.7	+0.3218	0.5368	0.1956	+55	-18
78 B. Virginis	6.5	+2.75	-18.2	-5 16.8	29	12 22.9	+2 43.3	+0.3872	0.5357	-0.1897	+59	-15
x Virginis	4.8	2.87	17.7	7 33.6	30	0 48.0	-9 14.6	+0.5190	0.5360	0.1830	+67	-8
ψ Virginis	5.0	2.94	17.2	9 6.6		8 17.7	-1 58.6	+0.8349	0.5364	0.1779	+81	+11
49 Virginis	5.2	3.00	16.7	10 19.1		15 0.2	+4 31.4	+0.9642	0.5370	0.1726	+80	+20
g Virginis	5.6	2.98	16.5	8 33.6		15 20.0	+4 50.6	-0.9900	0.5371	0.1724	-24	-90
50 Virginis	6.2	+3.00	-16.6	-9 54.5		15 55.6	+5 25.1	+0.3623	0.5371	-0.1719	+55	-16



ELEMENTS FOR THE PREDICTION OF OCCULTATIONS.

APRIL.

THE STAR'S					AT CONJUNCTION IN R. A.					Limiting Parallels.	
Name.	Mag.	Red'ns from 1920.0.		Apparent Declination.	Greenwich Mean Time.	Hour Angle, <i>H</i>	<i>Y</i>	<i>x'</i>	<i>y'</i>	N.	S.
		$\Delta\alpha$	$\Delta\delta$								
$\alpha$ Virginis ( <i>Spica</i> )	1.2	+3.06	-15.8	-10 44.9	30 23 33.4	11 11.2	-0.0137	0.5380	-0.1651	+32	-37

MAY.

86	Virginis	5.6	+3.13	-14.7	-12 1.8	1 9 45.9	1 17.8	-0.2591	0.5394	-0.1550	+18	-52
621 B.	Virginis	6.4	+3.22	-13.7	-14 35.5	18 49.2	+ 7 28.4	+1.1707	0.5408	-0.1449	+76	+38
8	Librae	5.3	3.31	10.3	15 40.1	2 17 16.2	+ 5 13.1	-0.5891	0.5443	0.1160	- 5	-78
$\alpha$	Librae	2.9	3.31	10.3	15 42.8	17 21.8	+ 5 18.6	-0.5508	0.5443	0.1158	- 2	-74
$\nu$	Librae	5.3	3.32	9.1	15 57.0	3 0 56.6	-11 21.1	-1.1293	0.5454	0.1049	-43	-90
22	Librae	6.5	3.33	9.1	16 10.7	1 2.0	-11 15.9	-0.8884	0.5454	0.1048	-24	-90
26	Librae	6.3	+3.36	- 8.4	-17 28.4	4 44.1	- 7 40.9	+0.1560	0.5459	-0.0993	+35	-27
28	Librae	6.2	3.37	7.9	17 52.3	7 45.9	+ 4 44.9	+0.3000	0.5463	0.0947	+43	-19
41	Librae	5.3	3.40	6.4	19 2.4	16 21.5	+ 3 34.1	+0.3320	0.5473	0.0613	+71	+12
$\kappa$	Librae	5.0	3.41	6.1	19 25.3	17 48.4	+ 4 58.2	+1.1361	0.5474	0.0790	+71	+37
47	Librae	5.8	3.40	5.0	19 8.9	4 0 1.9	+10 59.8	+0.3753	0.5480	0.0690	+45	-15
$\beta$	Scorpii	2.9	+3.39	- 4.1	-19 35.3	4 59.2	- 8 12.5	+0.5396	0.5483	-0.0608	+56	- 6
56 B.	Scorpii	5.0	3.39	4.0	19 35.1	4 59.4	- 8 12.3	+0.5351	0.5483	0.0608	+55	- 6
73 B.	Scorpii	6.4	3.35	8.8	18 7.8	7 8.5	- 6 7.4	-1.1996	0.5484	0.0572	-55	-90
$\nu$	Scorpii	3.9	3.38	3.6	19 15.3	8 6.4	- 5 11.4	-0.0106	0.5485	0.0556	+20	-37
88 B.	Scorpii	6.4	3.35	3.5	18 19.9	9 23.2	- 3 57.1	-1.1008	0.5485	0.0535	-45	-90
58 G.	Scorpii	6.2	+3.39	- 2.8	-20 1.5	11 28.9	- 1 55.4	+0.6621	0.5486	-0.0499	+65	+ 2
$\psi$	Ophiuchi	4.6	3.38	2.5	19 51.1	13 50.8	+ 0 21.9	+0.3580	0.5487	0.0459	+42	-16
123 B.	Scorpii	6.5	3.36	1.0	20 15.2	21 39.0	+ 7 55.0	+0.4965	0.5488	0.0326	+50	- 8
181 B.	Scorpii	5.5	3.34	1.0	19 46.3	22 17.0	+ 8 31.8	-0.0670	0.5489	0.0316	+16	-40
68 B.	Ophiuchi	5.9	3.33	+ 0.1	20 17.0	5 3 44.6	-10 11.4	+0.3620	0.5487	0.0222	+39	-16
81 B.	Ophiuchi	6.1	+3.30	+ 0.2	-19 24.9	5 29.0	- 8 30.3	-0.6365	0.5487	-0.0191	-17	-85
109 B.	Ophiuchi	6.2	3.30	1.0	20 23.0	9 6.9	+ 4 59.5	+0.3789	0.5485	-0.0129	+39	-15
$\xi$	Ophiuchi	4.4	3.27	2.4	21 1.6	16 48.4	+ 2 27.1	+1.0463	0.5490	+0.0004	+69	+29
305 B.	Ophiuchi	6.3	3.09	4.7	18 47.3	6 9 28.8	- 5 24.7	-1.1926	0.5462	0.0290	-57	-90
16 G.	Sagittarii	6.4	3.11	5.3	20 20.0	11 24.4	- 3 32.8	+0.5815	0.5459	0.0323	+57	- 3
39 G.	Sagittarii	6.3	+3.05	+ 6.0	-19 51.4	16 47.8	+ 1 40.1	+0.2515	0.5452	+0.0413	+34	-22
16	Sagittarii	5.9	3.05	6.5	20 24.7	18 41.5	+ 3 30.3	+0.9475	0.5449	0.0444	+70	+21
64 B.	Sagittarii	6.1	3.01	6.0	18 41.1	18 51.7	+ 3 40.1	-0.9596	0.5448	0.0447	-35	-90
52 G.	Sagittarii	6.4	3.00	6.1	18 29.5	19 48.5	+ 4 35.2	-1.1316	0.5447	0.0463	-49	-90
17 H <sup>1</sup> .	Sagittarii	6.4	2.99	6.3	18 39.0	20 24.2	+ 5 9.7	-0.9283	0.5446	0.0473	-33	-90
$\Upsilon$	Sagittarii (var.)	5.4	+2.99	+ 6.5	-18 53.7	21 40.7	+ 6 23.8	-0.5947	0.5444	+0.0493	-12	-80
95 B.	Sagittarii	5.7	2.95	7.0	18 46.7	7 1 55.2	+10 30.1	-0.4995	0.5436	0.0563	- 6	-70
100 B.	Sagittarii	5.0	2.93	7.1	18 27.4	2 31.4	+11 5.1	-0.8221	0.5436	0.0573	-25	-90
171 B.	Sagittarii	6.1	2.79	9.3	19 21.6	17 49.1	+ 1 53.7	+1.2402	0.5408	0.0813	+71	+51
173 B.	Sagittarii	6.4	2.79	9.3	19 13.0	17 50.8	+ 1 55.3	+1.0840	0.5408	0.0814	+71	+32
187 B.	Sagittarii	6.4	+2.76	+ 9.4	-18 51.6	19 48.6	+ 3 49.5	+0.8516	0.5404	+0.0844	+72	+13
$\rho$	Sagittarii	4.0	2.67	9.9	17 59.8	8 2 55.2	+10 42.6	+0.5327	0.5390	0.0949	+59	- 6
45	Sagittarii	6.0	2.68	10.1	18 27.3	2 59.5	+10 46.8	+1.0465	0.5390	0.0950	+72	+28
54	Sagittarii	5.4	2.54	10.4	16 28.5	12 17.3	- 4 12.9	-0.1953	0.5373	0.1082	+16	-48
$\epsilon$	Sagittarii	5.2	2.53	10.4	16 18.6	13 10.5	- 3 21.3	-0.2809	0.5371	0.1095	+12	-54
283 B.	Sagittarii	5.5	+2.52	+10.2	-15 39.2	13 41.6	- 2 51.2	-0.9475	0.5370	+0.1102	-27	-90
$g$	Sagittarii	5.1	2.43	10.9	15 42.1	20 48.2	+ 4 2.1	-0.0761	0.5358	0.1197	+24	-41
16 B.	Capricorni	6.2	2.29	11.6	15 2.1	9 8 8.4	- 8 58.6	+0.8297	0.5340	0.1340	+71	- 1
$\beta$	Capricorni	3.2	2.29	11.7	15 1.9	8 15.5	- 8 51.7	+0.6421	0.5340	0.1342	+71	0
45 B.	Capricorni	6.1	2.20	11.7	13 59.6	14 50.5	- 2 28.9	+0.4130	0.5332	0.1419	+56	-14
84 B.	Capricorni	6.0	+2.10	+11.8	-12 50.3	23 6.3	+ 5 31.8	+0.3601	0.5324	+0.1510	+53	-16

ELEMENTS FOR THE PREDICTION OF OCCULTATIONS.

MAY.

THE STAR'S					AT CONJUNCTION IN E. A.					Limiting Parallax.	
Name.	Mag.	Red'ns from 1920.0.		Apparent Declination.	Greenwich Mean Time.	Hour Angle, H	Y	z'	y'	N.	S.
		$\Delta\alpha$	$\Delta\delta$								
16 B. Aquarii	6.4	+2.07	+11.5	-11 52.4	10 0 19.2	+ 6 42.4	-0.5078	0.5323	+0.1523	+ 4	-70
y Aquarii	4.5	1.98	11.8	11 41.6	8 35.3	- 9 16.7	+0.5904	0.5318	0.1607	+71	- 4
51 G. Aquarii	6.5	1.94	11.6	10 56.0	10 57.0	- 6 59.3	+0.1478	0.5317	0.1629	+42	-28
17 Aquarii	6.3	1.89	11.3	9 39.5	15 18.5	- 2 45.8	-0.5156	0.5317	0.1670	+ 5	-70
19 Aquarii	5.6	1.87	11.4	10 5.2	16 26.8	- 1 39.6	+0.1391	0.5317	0.1680	+42	-29
ξ Aquarii	4.8	+1.80	+11.0	- 8 12.6	22 44.8	+ 4 26.9	-0.8118	0.5318	+0.1733	-11	-90
c <sup>1</sup> Capricorni	5.8	1.76	11.5	9 26.8	11 2 22.4	+ 7 57.9	+1.1544	0.5321	0.1761	+81	+34
30 Aquarii	5.6	1.65	10.7	6 54.4	11 32.0	- 7 9.3	+0.0670	0.5330	0.1827	+39	-33
138 B. Aquarii	6.4	1.60	10.1	5 6.8	16 16.0	- 2 34.0	-0.9783	0.5336	0.1858	-20	-60
44 Aquarii	5.7	1.58	10.4	5 47.1	18 26.3	- 0 27.8	+0.1440	0.5340	0.1870	+44	-28
51 Aquarii	5.8	+1.54	+10.2	- 5 14.4	21 55.3	+ 2 54.8	+0.2178	0.5346	+0.1890	+49	-24
187 B. Aquarii	6.3	1.50	9.5	3 19.1	12 1 29.9	+ 6 22.7	-1.1450	0.5354	0.1908	-33	-60
x Aquarii	5.2	1.46	9.8	4 38.3	4 40.9	+ 9 27.9	+0.8659	0.5361	0.1923	+86	+12
207 B. Aquarii	6.3	1.45	9.6	3 58.1	6 11.0	+10 55.1	+0.4439	0.5365	0.1929	+64	-12
6 G. Piscium	6.2	1.36	9.1	2 49.3	14 45.5	- 4 46.5	+0.8980	0.5390	0.1961	+88	+14
22 B. Piscium	6.4	+1.25	+7.9	- 0 8.7	13 3 0.9	+ 7 5.8	+0.5058	0.5434	+0.1987	+69	- 9
9 Piscium	4.9	1.24	7.5	+ 0 49.2	4 38.9	+ 8 46.6	-0.1778	0.5441	0.1988	+26	-47
π Piscium	6.4	1.24	7.6	0 41.1	4 48.0	+ 9 27.9	+0.0072	0.5442	0.1988	+36	-37
16 Piscium	5.7	1.20	7.1	1 39.6	9 10.6	-10 56.4	-0.1523	0.5461	0.1991	+28	-45
λ Piscium	4.6	1.17	7.0	1 20.5	11 51.9	- 8 20.4	+0.7136	0.5473	0.1991	+90	+ 3
19 Piscium	5.4	+1.16	+6.5	+ 3 2.7	13 55.1	- 6 21.1	-0.6457	0.5483	+0.1990	+ 1	-82
22 Piscium	5.8	1.14	6.5	2 29.2	16 32.5	- 3 48.9	+0.4538	0.5496	0.1987	+65	-11
51 Piscium	5.6	1.01	4.5	6 30.9	14 11 12.5	- 9 48.3	-0.0228	0.5602	0.1984	+35	-36
82 Piscium	6.1	0.96	4.0	6 51.9	18 20.9	- 2 52.6	+0.9863	0.5648	0.1896	+90	+22
δ Piscium	4.6	0.96	3.9	7 9.1	18 31.4	- 2 42.4	+0.7278	0.5649	0.1894	+90	+ 6
π Piscium	5.6	+0.86	+ 1.5	+11 44.0	15 15 33.6	- 6 25.1	-0.0954	0.5795	+0.1715	+31	-37
NEW MOON.											
x <sup>1</sup> Orionis	4.5	+0.89	- 7.1	+20 15.6	19 19 7.4	- 6 51.8	-0.3623	0.6159	-0.0311	+16	-40
57 Orionis	3.8	0.90	7.2	19 44.0	19 20.0	- 6 39.6	+0.1504	0.6158	0.0316	+45	-10
64 Orionis	5.1	+0.91	- 7.4	+19 41.5	22 32.4	- 3 35.2	+0.0783	0.6149	-0.0393	+41	-15
x <sup>2</sup> Orionis	4.7	0.92	7.4	20 8.4	22 42.5	- 3 25.6	-0.3703	0.6148	0.0397	+15	-41
68 Orionis	5.7	0.93	7.6	19 48.4	20 1 46.5	- 0 29.1	-0.1762	0.6136	0.0470	+26	-30
19 B. Geminorum	6.2	0.93	7.9	18 42.0	2 22.1	+ 0 5.0	+0.8877	0.6134	0.0484	+90	+30
71 Orionis	5.1	0.93	7.9	19 11.0	2 51.4	+ 0 33.1	+0.3880	0.6132	0.0496	+61	+ 1
16 Geminorum	6.2	+0.98	- 7.9	+20 32.6	7 49.0	+ 5 18.5	-1.2304	0.6111	-0.0611	-50	-70
y Geminorum	4.1	0.96	8.0	20 15.7	8 12.4	+ 5 40.9	-0.9766	0.6110	0.0619	-23	-70
26 Geminorum	5.2	1.00	8.9	17 43.3	13 23.6	+10 39.4	+1.1836	0.6084	0.0736	+90	+52
74 B. Geminorum	6.2	1.02	8.9	18 16.7	15 18.5	-11 30.3	+0.4881	0.6074	0.0778	+69	+ 4
110 B. Geminorum	6.2	1.06	9.4	17 52.0	21 9.0	- 5 53.9	+0.4059	0.6040	0.0902	+63	- 2
λ Geminorum	3.6	+1.10	-10.1	+16 41.0	21 3 19.3	+ 0 1.6	+0.9895	0.6002	-0.1027	+90	+32
162 B. Geminorum	5.7	1.15	10.2	17 15.3	8 45.8	+ 5 15.3	-0.1664	0.5966	0.1130	+27	-36
68 Geminorum	5.2	1.15	10.6	15 59.8	9 30.1	+ 5 57.9	+1.0049	0.5962	0.1144	+90	+32
f Geminorum	5.3	1.18	10.2	17 51.3	11 50.1	+ 8 12.4	-1.1225	0.5945	0.1186	-34	-73
1 Cancri	6.0	1.24	11.1	16 0.1	18 58.2	- 8 55.9	-0.1612	0.5896	0.1309	+27	-37
2 B. Cancri	6.0	+1.25	-10.9	+16 43.9	19 35.3	- 8 20.2	-0.9750	0.5891	-0.1319	-21	-74
5 Cancri	5.9	1.26	11.0	16 40.4	20 48.8	- 7 9.6	-1.0798	0.5883	0.1339	-30	-74
30 B. Cancri	6.1	1.29	11.7	14 51.8	0 45.0	- 3 22.2	+0.1979	0.5854	0.1400	+48	-19
27 Cancri	5.8	1.34	12.6	12 55.0	7 21.8	+ 2 59.9	+1.2039	0.5806	0.1496	+90	+46
29 Cancri	5.9	1.36	12.1	14 28.4	8 8.6	+ 3 44.9	-0.4844	0.5800	0.1507	+ 9	-60
84 B. Cancri	6.4	+1.37	-12.5	+13 31.7	10 19.7	+ 5 51.4	+0.1376	0.5785	-0.1536	+44	-23

ELEMENTS FOR THE PREDICTION OF OCCULTATIONS.

MAY.

THE STAR'S					AT CONJUNCTION IN R. A.					Limiting Parallels.	
Name.	Mag.	Red'ns from 1920.0.		Apparent Declination.	Greenwich Mean Time.	Hour Angle, <i>H</i> .	<i>Y'</i>	<i>z'</i>	<i>y'</i>	N.	S.
		$\Delta\alpha$	$\Delta\delta$								
<i>A</i> <sup>1</sup> Cancr	5.5	+1.41	-12.8	+12 57.9	23 14 22.2	+ 9 45.0	+0.0758	0.5756	-0.1587	+41	-27
<i>A</i> <sup>2</sup> Cancr	5.7	1.42	13.0	12 24.0	15 58.9	+11 18.1	+0.3906	0.5744	-0.1607	+61	-10
60 Cancr	5.7	1.47	13.3	11 55.7	19 52.6	+ 8 56.5	+0.2357	0.5716	-0.1651	+50	-19
$\alpha$ Cancr	4.3	1.48	13.3	12 9.9	20 59.2	+ 7 52.3	-0.1880	0.5709	-0.1663	+26	-43
$\kappa$ Cancr	5.1	1.62	13.8	10 59.2	23 1 8.5	+ 3 56.6	+0.3244	0.5681	-0.1706	+56	-15
209 B. Cancr	6.5	+1.53	-13.5	+11 53.2	1 56.6	- 3 54.0	-0.7446	0.5675	-0.1715	- 5	-79
222 B. Cancr	6.3	1.57	13.6	11 50.0	5 31.6	+ 0 22.1	-1.3120	0.5651	-0.1749	-58	-77
$\omega$ Leonis	5.5	1.61	14.5	9 24.1	10 17.1	+ 4 57.8	+0.3319	0.5620	-0.1789	+56	-16
3 Leonis	5.8	1.61	14.8	8 32.0	10 18.5	+ 4 59.1	+1.2165	0.5620	-0.1790	+90	+43
$\lambda$ Leonis	5.2	1.63	14.2	10 3.9	11 51.6	+ 6 29.0	-0.6310	0.5610	-0.1802	+ 2	-76
10 B. Sextantis	6.0	+1.70	-15.4	+ 7 4.4	18 20.4	-11 15.4	+1.2596	0.5570	-0.1849	+90	+48
$\tau$ Leonis	4.9	1.77	14.9	8 25.5	24 0 47.9	- 5 0.9	-1.3899	0.5534	-0.1887	-64	-75
14 Sextantis	6.3	1.80	15.8	5 59.9	3 52.5	- 2 2.4	+0.5856	0.5517	-0.1903	+78	-3
19 Sextantis	5.9	1.84	16.1	5 0.4	6 41.7	+ 0 41.2	+1.0760	0.5502	-0.1915	+90	+28
155 B. Leonis	6.5	1.88	15.7	6 5.8	11 36.6	+ 5 26.5	-1.0016	0.5478	-0.1934	-21	-84
237 B. Leonis	6.3	+2.06	-17.1	+ 1 26.7	26 1 28.9	- 5 8.0	+1.1448	0.5420	-0.1966	+90	+33
55 Leonis	6.1	2.08	17.1	1 9.5	3 9.6	- 3 30.4	+1.1152	0.5414	-0.1967	+90	+30
<i>p</i> <sup>3</sup> Leonis	6.1	2.12	17.3	0 25.5	7 0.3	+ 0 13.0	+1.1308	0.5401	-0.1969	+90	+32
<i>p</i> <sup>4</sup> Leonis	5.7	2.12	16.6	2 23.1	8 36.9	+ 1 46.5	-1.2474	0.5396	-0.1970	-43	-88
<i>p</i> <sup>5</sup> Leonis	5.3	2.18	17.1	0 21.7	11 57.3	+ 5 0.7	+0.2252	0.5386	-0.1969	+50	-24
359 B. Leonis	6.3	+2.23	-16.8	+ 0 34.0	16 37.9	+ 9 32.5	-0.9126	0.5373	-0.1965	-15	-90
388 B. Leonis	6.3	2.26	17.4	1 15.9	18 58.9	+11 44.3	+0.5776	0.5368	-0.1962	+75	- 5
$\nu$ Leonis	4.5	2.31	16.6	0 23.2	23 21.7	+ 7 56.3	-1.2264	0.5358	-0.1964	-41	-90
431 B. Leonis	6.2	2.33	17.3	1 59.9	26 0 5.1	- 7 14.1	+0.3411	0.5356	-0.1962	+57	-18
78 B. Virginis	6.5	2.58	17.2	5 18.7	17 55.1	+10 2.8	+0.4065	0.5334	-0.1890	+61	-14
$\chi$ Virginis	4.8	+2.71	-17.0	+ 7 33.6	27 6 24.3	-1 50.8	+0.5374	0.5330	-0.1821	+70	- 7
$\psi$ Virginis	5.0	2.81	16.7	9 6.6	13 57.2	+ 5 28.3	+0.8530	0.5332	-0.1769	+81	+12
49 Virginis	5.2	2.90	16.3	10 19.1	20 42.8	-11 58.5	+0.9817	0.5336	-0.1717	+80	+20
$\phi$ Virginis	5.6	2.97	15.8	8 33.6	21 2.9	-11 39.0	-0.9763	0.5336	-0.1714	-22	-90
50 Virginis	6.2	2.90	16.1	9 54.4	21 38.8	-11 4.2	+0.3786	0.5337	-0.1710	+57	-16
$\alpha$ Virginis ( <i>Spica</i> )	1.2	+2.99	-15.4	+10 44.9	28 5 20.6	- 3 36.6	+0.0002	0.5344	-0.1642	+33	-36
86 Virginis	5.6	3.11	14.4	12 1.8	15 38.8	+ 6 22.6	-0.2484	0.5359	-0.1542	+19	-51
621 B. Virginis	6.4	3.24	13.8	14 35.5	29 0 47.0	- 8 46.3	+1.1828	0.5373	-0.1443	+76	+39
8 Librae	5.3	3.44	10.4	15 40.1	23 25.8	-10 49.9	-0.5897	0.5416	-0.1158	- 5	-78
$\alpha$ Librae	2.9	3.45	10.4	15 42.8	23 31.4	-10 44.4	-0.5613	0.5416	-0.1156	- 2	-74
$\nu$ Librae	5.3	+3.50	- 9.2	-15 57.0	30 7 9.6	- 3 20.6	-1.1344	0.5430	-0.1049	-43	-90
22 Librae	6.5	3.51	9.2	16 10.7	7 15.1	- 3 15.3	-0.8930	0.5430	-0.1048	-24	-90
26 Librae	6.3	3.56	8.7	17 28.4	10 58.8	+ 0 21.3	+0.1529	0.5437	-0.0993	+35	-28
28 Librae	6.2	3.59	8.2	17 52.3	14 1.8	+ 3 18.5	+0.2961	0.5442	-0.0948	+43	-20
41 Librae	5.3	3.67	6.7	19 2.5	22 40.5	+11 40.6	+0.8266	0.5457	-0.0816	+71	+12
$\kappa$ Librae	5.0	+3.68	- 6.5	-19 25.3	31 0 7.9	-10 54.8	+1.1299	0.5459	-0.0793	+71	+36
47 Librae	5.8	3.70	5.2	19 8.9	6 23.2	- 4 51.5	+0.3641	0.5468	-0.0693	+44	-16
$\beta$ Scorpii	2.9	3.73	4.3	19 35.3	11 21.7	- 0 2.5	+0.5264	0.5474	-0.0612	+55	- 7
56 B. Scorpii	5.0	3.73	4.3	19 35.1	11 22.0	- 0 2.3	+0.5219	0.5474	-0.0612	+55	- 7
73 B. Scorpii	6.4	3.69	-3.8	18 7.8	13 31.5	+ 2 3.0	-1.2179	0.5476	-0.0576	-58	-90
$\nu$ Scorpii	3.9	+3.73	- 3.7	-19 15.3	14 29.7	+ 2 59.4	-0.0266	0.5477	-0.0560	+19	-39
88 B. Scorpii	6.4	3.70	3.4	18 19.9	15 46.7	+ 4 13.9	-1.1194	0.5478	-0.0539	-47	-90
58 G. Scorpii	6.2	3.76	3.0	20 1.5	17 52.8	+ 6 15.9	+0.6458	0.5480	-0.0504	+64	+ 1
$\gamma$ Ophiuchi	4.6	+3.76	- 2.6	-19 51.1	20 15.2	+ 8 33.7	+0.3399	0.5482	-0.0464	+41	-17

ELEMENTS FOR THE PREDICTION OF OCCULTATIONS.

JUNE.

THE STAR'S					AT CONJUNCTION W. E. A.					Limit- ing Par- allels.	
Name.	Mag.	Red'ms from 1930.0.		Apparent Declina- tion.	Greenwich Mean Time.	Hour Angle, H	Y	z'	y'	N.	S.
		$\Delta\alpha$	$\Delta\delta$								
123 B. Scorpii	6.5	+3.78	-1.0	20 15.2	1 4 4.5	7 52.0	+0.4746	0.5487	-0.0331	+48	-9
131 B. Scorpii	5.5	3.77	-0.9	19 46.3	4 42.5	7 15.3	-0.0803	0.5487	0.0321	+14	-41
68 B. Ophiuchi	5.9	3.78	+0.2	20 17.0	10 10.6	1 57.8	+0.3306	0.5489	0.0227	+37	-17
81 B. Ophiuchi	6.1	3.76	-0.5	19 24.8	11 55.2	0 16.5	-0.6647	0.5490	0.0197	-19	-89
109 B. Ophiuchi	6.2	3.78	1.3	20 23.0	15 33.3	+ 3 14.5	+0.3507	0.5490	0.0134	+37	-16
$\xi$ Ophiuchi	4.4	+3.80	+2.7	-21 1.6	23 14.9	+10 41.1	+1.0148	0.5488	-0.0001	+60	+27
305 B. Ophiuchi	6.3	3.69	5.8	18 47.2	3 15 54.8	+ 2 48.7	-1.2372	0.5475	+0.0285	-63	-87
16 G. Sagittarii	6.4	3.72	6.3	20 20.0	17 50.4	+ 4 40.6	+0.5388	0.5472	0.0318	+53	-6
39 G. Sagittarii	6.3	3.68	7.2	19 51.4	23 13.4	+ 5 53.2	+0.2051	0.5466	0.0408	+31	-25
16 Sagittarii	5.9	3.69	7.6	20 24.6	3 1 7.0	-11 43.2	+0.9013	0.5463	0.0440	+70	+17
64 B. Sagittarii	6.1	+3.64	+7.4	-18 41.1	1 17.2	+11 53.0	-1.0093	0.5463	-0.0443	-39	-90
52 G. Sagittarii	6.4	3.63	7.6	18 29.5	2 14.0	-11 11.9	-1.1822	0.5461	0.0458	-55	-90
17 H. Sagittarii	6.4	3.63	7.7	18 39.0	2 49.6	-10 37.5	-0.9790	0.5460	0.0463	-37	-90
Y Sagittarii (var.)	5.4	3.63	8.0	18 53.7	4 6.0	-9 23.5	-0.6455	0.5459	0.0489	-15	-86
95 B. Sagittarii	5.7	3.61	8.6	18 46.7	8 20.2	-5 17.5	-0.5526	0.5451	0.0559	-9	-75
100 B. Sagittarii	5.0	+3.60	+8.7	-18 27.4	8 56.4	- 4 42.4	-0.8762	0.5450	+0.0569	-29	-90
171 B. Sagittarii	6.1	3.51	11.3	19 21.6	4 0 13.5	+10 5.6	+1.1820	0.5420	0.0810	+71	+42
173 B. Sagittarii	6.4	3.51	11.3	19 13.0	0 15.2	+10 7.2	+1.0253	0.5420	0.0810	+71	+26
187 B. Sagittarii	6.4	3.49	11.5	18 51.6	2 13.0	-11 58.6	+0.7913	0.5416	0.0846	+72	+9
$\rho$ Sagittarii	4.0	3.41	12.4	17 59.7	9 19.7	- 5 5.4	+0.4677	0.5400	0.0946	+53	-10
45 Sagittarii	6.0	+3.42	+12.4	-18 27.2	9 24.1	- 5 1.1	+0.9828	0.5400	+0.0947	+72	+23
54 Sagittarii	5.4	3.31	13.3	16 28.4	18 42.6	+ 3 59.9	-0.2680	0.5379	0.1079	+12	-53
$\epsilon$ Sagittarii	5.2	3.30	13.4	16 18.5	19 35.9	+ 4 51.6	-0.3545	0.5377	0.1091	+7	-59
283 B. Sagittarii	5.5	3.28	13.2	15 39.2	20 7.1	+ 5 21.7	-1.0237	0.5376	0.1096	-34	-90
g Sagittarii	5.1	3.21	14.1	15 42.0	3 14.8	-11 43.8	-0.1531	0.5360	0.1193	+19	-46
16 B. Capricorni	6.2	+3.10	+15.2	-15 2.0	14 38.0	- 0 41.5	+0.5502	0.5336	+0.1334	+64	-6
$\beta$ Capricorni	3.2	3.10	15.2	15 1.8	14 45.1	- 0 34.7	+0.5626	0.5336	0.1336	+65	-5
45 B. Capricorni	6.1	3.02	15.5	13 59.6	21 22.6	+ 5 50.7	-0.3293	0.5323	0.1412	+49	-18
84 B. Capricorni	6.0	2.92	15.8	12 50.2	6 5 42.3	-10 4.7	+0.2725	0.5308	0.1502	+47	-21
16 B. Aquarii	6.4	2.90	15.7	11 52.3	6 55.8	- 8 53.5	-0.6016	0.5306	0.1515	-2	-79
$\nu$ Aquarii	4.5	+2.81	+16.1	-11 41.5	15 17.1	- 0 47.3	+0.5008	0.5295	-0.1596	+64	-9
51 G. Aquarii	6.5	2.77	16.0	10 56.0	17 40.4	+ 1 31.7	+0.0541	0.5293	0.1618	+36	-33
17 Aquarii	6.3	2.72	15.9	9 39.4	22 5.3	+ 5 48.6	-0.6163	0.5288	0.1657	0	-80
19 Aquarii	5.6	2.71	16.0	10 5.1	23 14.4	+ 6 55.6	+0.0432	0.5287	0.1667	+36	-34
$\xi$ Aquarii	4.8	2.63	15.7	8 12.6	7 5 37.8	-10 52.5	-0.9179	0.5283	0.1718	-18	-90
$c^1$ Capricorni	5.3	+2.59	+16.2	-9 26.8	9 18.9	- 7 18.1	+1.0648	0.5282	+0.1746	+81	+27
30 Aquarii	5.6	2.48	15.7	6 54.3	18 38.0	+ 1 44.3	-0.0349	0.5283	0.1809	+32	-38
138 B. Aquarii	6.4	2.43	15.1	5 6.7	23 27.5	+ 6 25.1	-1.0919	0.5285	0.1835	-30	-90
44 Aquarii	5.7	2.41	15.4	5 47.0	3 1 40.5	+ 8 34.1	+0.0416	0.5287	0.1850	+38	-34
51 Aquarii	5.8	2.37	15.2	5 14.3	5 13.9	-11 58.9	+0.1158	0.5290	0.1868	+42	-30
187 B. Aquarii	6.3	+2.33	+14.6	-3 19.0	8 53.2	- 8 26.2	-1.2626	0.5295	+0.1886	-46	-90
$\kappa$ Aquarii	5.2	2.29	14.9	4 38.2	12 8.5	+ 5 16.9	+0.7707	0.5299	0.1900	+86	+6
207 B. Aquarii	6.3	2.28	14.8	3 58.0	13 40.8	+ 3 47.4	+0.3439	0.5302	0.1906	+57	-18
6 G. Piscium	6.2	2.18	14.2	2 49.2	22 27.8	+ 4 43.6	+0.8035	0.5320	0.1935	+88	+8
22 B. Piscium	6.4	2.06	13.0	0 8.7	9 11 2.7	- 7 4.8	+0.4081	0.5356	0.1959	+62	-14
$\mu$ Piscium	4.9	+2.05	+12.5	+0 49.3	12 43.5	- 5 27.1	-0.2840	0.5362	+0.1960	+21	-53
9 Piscium	6.4	2.04	12.6	0 41.2	12 52.9	+ 5 18.0	-0.1112	0.5362	0.1961	+30	-43
16 Piscium	5.7	2.00	12.1	1 39.7	17 22.8	- 0 56.4	-0.2574	0.5379	0.1962	+22	-51
$\lambda$ Piscium	4.6	1.96	12.0	1 20.6	20 8.8	+ 1 44.3	+0.6206	0.5390	0.1962	+79	-2
19 Piscium	5.4	1.96	11.4	3 2.8	22 15.6	+ 3 47.2	-0.7560	0.5399	0.1961	-5	-87
22 Piscium	5.8	+1.93	+11.5	+2 29.3	10 0 57.8	+ 6 24.0	+0.3588	0.5410	+0.1959	+58	-17

ELEMENTS FOR THE PREDICTION OF OCCULTATIONS.

JUNE.

THE STAR'S				AT CONJUNCTION IN R. A.						Limiting Parallels.			
Name.	Mag.	Red'ns from 1920.0.		Apparent Declination.	Greenwich Mean Time.			Hour Angle, H	Y	x'	y'	N.	S.
		$\Delta\alpha$	$\Delta\delta$		d	h	m						
25 Piscium	6.2	+1.91	+11.8	1 38.9	10	1 29.9	+ 6 55.2	+1.3448	0.5413	+0.1958	+78	+63	
51 Piscium	5.6	1.76	9.0	6 31.0		20 10.9	+ 1 0.0	-0.1165	0.5511	0.1907	+30	-42	
62 Piscium	6.1	1.69	8.3	6 51.9	11	3 32.0	+ 8 6.5	+0.9094	0.5556	0.1870	+90	+17	
$\delta$ Piscium	4.6	1.69	8.2	7 9.1		3 42.8	+ 8 16.9	+0.6476	0.5558	0.1869	+83	+ 1	
$\tau$ Piscium	5.6	1.53	5.0	11 44.0	13	1 20.5	+ 5 9.8	-0.1711	0.5710	0.1697	+27	-42	
26 B. Arietis	6.0	+1.45	+ 4.0	+11 54.5		10 56.1	- 9 35.3	+1.2265	0.5784	+0.1589	+90	+48	
12 H <sup>1</sup> . Arietis	6.3	1.45	3.5	13 5.5		12 15.8	- 8 18.5	+0.2410	0.5793	0.1572	+51	-17	
19 Arietis	5.8	1.44	2.6	14 54.4		16 38.9	- 4 5.1	-0.9084	0.5827	0.1515	-16	-76	
29 Arietis	6.1	1.36	1.9	14 40.9	13	0 51.8	+ 3 49.4	+0.5144	0.5891	0.1395	+71	0	
o Arietis	5.8	1.32	1.2	14 58.4		5 36.0	+ 8 22.7	+0.8629	0.5927	0.1319	+90	+21	
$\tau$ Arietis	5.2	+1.94	+ 0.5	+17 8.0		7 29.6	+10 12.0	-1.0443	0.5942	+0.1287	-27	-73	
124 B. Arietis	6.4	1.31	0.6	16 9.5		9 4.0	+11 42.7	+0.1282	0.5953	0.1260	+44	-20	
$\rho$ Arietis	5.6	1.33	0.0	17 42.3		10 20.6	-11 3.6	-1.2533	0.5962	0.1238	-51	-73	
145 B. Arietis	6.5	1.27	+ 0.2	15 32.8		13 39.4	- 7 52.6	+1.2954	0.5987	0.1178	+74	+69	
53 Arietis	6.0	1.28	- 0.3	17 34.3		14 43.7	- 6 50.8	-0.5934	0.5994	0.1158	+ 3	-64	
175 B. Arietis	6.4	+1.24	- 1.3	+18 28.6		22 24.9	+ 0 32.1	-0.6546	0.6047	+0.1009	- 1	-68	
28 B. Tauri	6.4	1.21	1.6	17 34.2	14	1 10.3	+ 3 10.8	+0.5126	0.6035	+0.0953	+71	+ 4	
NEW MOON.													
1 Cancri	6.0	+1.10	-10.5	+16 0.1	18	4 17.6	+ 2 11.5	-0.6702	0.5997	-0.1321	+32	-31	
2 B. Cancri	6.0	+1.11	-10.4	+16 43.9		4 53.6	+ 2 46.1	-0.8719	0.5993	-0.1332	-14	-74	
5 Cancri	5.9	1.12	-10.5	16 40.4		6 4.7	+ 3 54.4	-0.9737	0.5985	0.1352	-21	-74	
30 B. Cancri	6.1	1.13	-11.0	14 51.8		9 53.5	+ 7 34.3	+0.2902	0.5958	0.1415	+54	-13	
27 Cancri	5.8	1.16	-11.7	12 55.0		16 17.4	-10 16.6	+1.2380	0.5911	0.1514	+84	+60	
29 Cancri	5.9	1.17	-11.3	14 23.4		17 2.6	- 9 33.1	-0.3744	0.5906	0.1525	+16	-52	
84 B. Cancri	6.4	+1.18	-11.6	+13 31.7		19 9.4	- 7 31.1	+0.2405	0.5890	-0.1555	+51	-17	
A <sup>1</sup> Cancri	5.5	1.21	-11.8	12 57.9		23 3.9	+ 3 45.4	+0.1836	0.5862	0.1607	+47	-21	
A <sup>2</sup> Cancri	5.7	1.22	-12.0	12 24.1	19	0 37.3	+ 2 15.6	+0.4953	0.5850	0.1627	+69	- 4	
60 Cancri	5.7	1.23	-12.2	11 55.7		4 23.2	+ 1 21.9	+0.3463	0.5822	0.1674	+57	-13	
$\alpha$ Cancri	4.3	1.26	-12.2	12 9.9		5 27.6	+ 2 24.0	-0.0698	0.5814	0.1686	+32	-36	
$\kappa$ Cancri	5.1	+1.28	-12.6	+10 59.2		9 23.6	+ 6 11.3	+0.4385	0.5785	-0.1730	+64	- 9	
209 B. Cancri	6.5	1.29	-12.4	11 53.2		10 15.0	+ 7 0.8	-0.6183	0.5779	0.1739	+ 3	-72	
222 B. Cancri	6.3	1.32	-12.4	11 50.0		13 42.8	+10 21.2	-1.1689	0.5754	0.1773	-36	-79	
$\omega$ Leonis	5.5	1.36	-13.1	9 24.1		18 18.8	- 9 12.8	+0.4536	0.5721	0.1815	+65	- 9	
3 Leonis	5.8	1.36	-13.4	8 32.1		18 20.2	- 9 11.5	+1.3248	0.5721	0.1815	+79	+63	
$\lambda$ Leonis	5.2	+1.37	-12.9	+10 3.9		19 50.1	- 7 44.7	-0.4932	0.5710	-0.1828	+ 9	-64	
89 B. Leonis	6.2	1.48	-13.4	8 41.6	20	7 25.1	+ 3 26.0	-1.2749	0.5632	0.1908	-48	-82	
$\tau$ Leonis	4.9	1.49	-13.4	8 25.5		8 21.5	+ 4 20.5	-1.1826	0.5628	0.1913	-37	-82	
14 Sextantis	6.3	1.52	-14.2	5 59.9		11 20.3	+ 7 13.2	+0.7164	0.5608	0.1929	+90	+ 5	
19 Sextantis	5.9	1.55	-14.4	5 0.4		14 4.3	+ 9 51.5	+1.2015	0.5591	0.1942	+90	+40	
155 B. Leonis	6.5	+1.59	-14.0	+ 6 5.8		18 50.3	- 9 32.1	-0.8436	0.5563	-0.1960	-11	-84	
237 B. Leonis	6.3	1.75	-15.3	1 26.7	21	8 19.5	+ 3 30.3	+1.2798	0.5492	0.1990	+90	+48	
55 Leonis	6.1	1.78	-15.3	1 9.6		9 57.6	+ 5 5.1	+1.2513	0.5485	0.1991	+90	+44	
p <sup>3</sup> Leonis	6.1	1.82	-15.4	0 25.6		13 42.5	+ 8 42.8	+1.2682	0.5468	0.1992	+90	+46	
p <sup>4</sup> Leonis	5.7	1.82	-14.8	2 23.2		15 16.7	+10 13.8	-1.0600	0.5461	0.1992	-27	-88	
p <sup>5</sup> Leonis	5.3	+1.88	-15.3	+ 0 21.7		18 32.4	-10 36.8	+0.8753	0.5448	-0.1991	+59	-16	
359 B. Leonis	6.3	1.93	-15.0	+ 0 34.0		23 6.7	+ 6 11.2	-0.7486	0.5430	0.1985	- 5	-90	
383 B. Leonis	6.3	1.96	-15.6	+ 1 15.8	22	1 19.7	- 4 2.4	+0.7250	0.5423	0.1982	+89	+ 4	
v Leonis	4.5	2.01	-15.0	0 23.2		5 42.1	+ 0 11.6	-1.0591	0.5408	0.1972	-26	-90	
491 B. Leonis	6.2	2.03	-15.6	1 59.9		6 24.6	+ 0 52.9	+0.4917	0.5406	0.1970	+68	-10	
78 B. Virginis	6.5	+2.27	-15.6	- 5 16.7		23 56.6	- 6 8.2	+0.5558	0.5364	-0.1903	+72	- 6	

ELEMENTS FOR THE PREDICTION OF OCCULTATIONS.

JUNE.

THE STAR'S				AT CONJUNCTION IN R. A.					Limiting Parallels.					
Name.	Mag.	Red'ns from 1920.0.		Apparent Declination.	Greenwich Mean Time.			Hour Angle, H.	Y	x'	y'	N.	S.	
		$\Delta\alpha$	$\Delta\delta$		d	h	m							s
x	Virginis	4.8	+2.45	-15.5	7	33.8	23	12 16.8+	5 49.0+	+0.6628	0.5348	-0.1831	+62	+ 1
v	Virginis	5.0	2.56	15.3	9	6.5		19 45.7-	10 55.9+	+0.3688	0.5343	0.1778	+81	+21
49	Virginis	5.2	2.66	15.0	10	19.0	24	2 28.6-	4 25.4+	+1.1190	0.5342	0.1724	+80	+31
g	Virginis	5.6	2.64	14.4	8	33.6		2 48.4-	4 6.1-	-0.8289	0.5342	0.1722	-13	-00
50	Virginis	6.2	2.67	14.8	9	54.4		3 24.2-	3 31.5+	+0.5186	0.5342	0.1717	+66	- 8
$\alpha$	Virginis ( <i>Spica</i> )	1.2	+2.78	-14.2	-10	44.9		11 3.8+	3 53.9+	+0.1375	0.5343	-0.1649	+41	-29
	MARS	-0.3			10	23.5		15 42.6+	8 24.1-	-1.0075	0.5253	0.1554	-27	-00
86	Virginis	5.6	2.93	19.4	12	1.8		21 20.4-	10 8.5-	-0.1176	0.5351	0.1547	+25	-43
621 B.	Virginis	6.4	3.09	13.0	14	35.5	25	6 28.5-	1 17.3+	+1.8024	0.5360	0.1447	+76	+59
8	Librae	5.3	3.37	9.8	15	40.1	26	5 10.4-	3 17.8-	-0.4887	0.5394	0.1163	+ 1	-69
$\alpha$	Librae	2.9	+3.37	-9.8	-15	42.8		5 16.0-	3 12.4-	-0.4504	0.5394	-0.1162	+ 3	-66
v	Librae	5.3	3.46	8.6	15	57.0		12 56.1+	4 13.2-	-1.0418	0.5407	0.1055	-35	-90
22	Librae	6.5	3.46	8.6	16	10.7		18 1.6+	4 18.5-	-0.8007	0.5408	0.1054	-19	-00
26	Librae	6.3	3.53	8.3	17	28.4		16 46.2+	7 56.1+	+0.2405	0.5414	0.1000	+39	-23
28	Librae	6.2	3.57	7.9	17	52.3		19 50.1+	10 54.2+	+0.3801	0.5419	0.0966	+48	-15
41	Librae	5.3	+3.69	-6.5	-19	2.5	27	4 31.2-	4 41.3+	+0.8994	0.5434	-0.0624	+71	+17
$\kappa$	Librae	5.0	3.71	6.4	19	25.3		5 59.0-	3 16.2+	+1.2019	0.5436	0.0801	+71	+45
47	Librae	5.8	3.76	5.0	19	8.9		12 16.1+	2 48.9+	+0.4282	0.5446	0.0703	+48	-12
$\beta$	Scorpii	2.9	3.81	4.1	19	35.3		17 15.9+	7 39.1+	+0.5840	0.5453	0.0623	+59	- 3
56 B.	Scorpii	5.9	3.81	4.1	19	35.1		17 16.2+	7 39.3+	+0.5796	0.5453	0.0622	+59	- 3
73 B.	Scorpii	6.4	+3.78	-3.4	-18	7.8		19 26.3+	9 45.3-	-1.1637	0.5456	-0.0587	-52	-00
v	Scorpii	3.9	3.83	3.4	19	15.3		20 24.7+	10 41.9+	+0.9268	0.5458	0.0572	+23	-35
88 B.	Scorpii	6.4	3.81	3.0	18	19.9		21 42.1+	11 56.8-	-1.0682	0.5459	0.0550	-43	-00
58 G.	Scorpii	6.2	3.87	2.9	20	1.5		28 48.7-	10 0.7+	+0.6950	0.5462	0.0515	+68	+ 4
v	Ophiuchi	4.6	3.88	2.4	19	51.1	28	2 11.6-	7 42.4+	+0.3858	0.5465	0.0476	+43	-15
123 B.	Scorpii	6.5	+3.94	-0.8	-20	15.2		10 2.7-	0 6.4+	+0.5098	0.5472	-0.0344	+51	- 7
131 B.	Scorpii	5.5	3.94	0.6	19	46.3		16 40.9+	0 30.5-	-0.0462	0.5472	0.0334	+16	-39
68 B.	Ophiuchi	5.9	3.98+	0.4	20	17.0		16 10.0+	5 49.0+	+0.3632	0.5477	0.0240	+39	-16
81 B.	Ophiuchi	6.1	3.96	0.9	19	24.8		17 54.9+	7 30.5-	-0.6410	0.5478	0.0210	-18	-86
109 B.	Ophiuchi	6.2	4.01	1.6	20	23.0		21 33.5+	11 2.0+	+0.3697	0.5490	0.0148	+39	-15
$\xi$	Ophiuchi	4.4	+4.06+	-3.0	-21	1.6	29	5 16.1-	5 30.2+	+1.0230	0.5482	-0.0016	+69	+27
305 B.	Ophiuchi	6.3	4.03	6.7	18	47.2		21 56.6+	10 38.0-	-1.2542	0.5477	+0.0270	-66	-83
16 G.	Sagittarii	6.4	4.08	7.0	20	20.0		23 52.1-	11 30.2+	+0.5193	0.5476	0.0303	+51	- 7
39 G.	Sagittarii	6.3	4.06	8.1	19	51.4	30	5 14.8-	6 17.8+	+0.1774	0.5471	0.0394	+29	-26
16	Sagittarii	5.3	4.09	8.4	20	45.0		7 7.9-	4 28.4+	+1.2486	0.5470	0.0426	+70	+55
16	Sagittarii	5.9	+4.08+	-8.4	-20	24.6		7 8.3-	4 28.0+	+0.8707	0.5470	+0.0426	+70	+15
64 B.	Sagittarii	6.1	4.03	8.5	18	41.1		7 18.5-	4 18.2-	-1.0404	0.5469	0.0428	-42	-00
52 G.	Sagittarii	6.4	4.02	8.7	18	29.5		8 15.2-	3 23.3-	-1.2146	0.5468	0.0444	-59	-90
17 H.	Sagittarii	6.4	4.03	8.8	18	38.9		8 50.7-	2 48.9-	-1.0123	0.5468	0.0454	-40	-90
Y	Sagittarii ( <i>var.</i> )	5.4	4.04	9.1	18	53.6		10 7.0-	1 35.0-	-0.6807	0.5467	0.0475	-17	-90
95 B.	Sagittarii	5.7	+4.03+	-9.8	-18	46.7		14 20.8+	2 36.6-	-0.5942	0.5461	+0.0545	-12	-00
100 B.	Sagittarii	5.0	+4.02+	+10.0	-18	27.4		14 56.9+	3 5.6-	-0.9188	0.5460	+0.0555	-32	-00

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171 B.	Sagittarii	6.1	+4.01+	+12.7	-19	21.5	1	6 11.4-	6 9.1+	+1.1162	0.5437	+0.0797	+71	+35
173 B.	Sagittarii	6.4	4.01	12.7	19	13.0		6 13.1-	6 7.5+	+0.9595	0.5437	0.0798	+71	+21
187 B.	Sagittarii	6.4	4.00	13.0	18	51.5		8 10.6-	4 13.7+	+0.7224	0.5434	0.0628	+72	+ 5
$\rho$	Sagittarii	4.0	3.95	14.2	17	59.7		15 15.6+	2 37.9+	+0.3880	0.5420	0.0934	+48	-14
45	Sagittarii	6.0	3.96	14.2	18	27.2		15 20.0+	2 42.2+	+0.9031	0.5420	0.0935	+72	+17
54	Sagittarii	5.4	+3.88+	+15.6	-16	28.4	2	0 36.2+	11 41.0-	-0.3620	0.5401	+0.1068	+ 7	-59

ELEMENTS FOR THE PREDICTION OF OCCULTATIONS.

JULY.

THE STAR'S					AT CONJUNCTION IN R. A.					Limiting Parallels.		
Name.	Mag.	Red'ns from 1920.0.		Apparent Declination.	Greenwich Mean Time.	Hour Angle, H	Y	x'	y'	N.	S.	
		$\Delta\alpha$	$\Delta\delta$									
e	Sagittarii	5.2	+3.87	+15.7	16 18.5	d	h	m	h	m.	.	.
283 B.	Sagittarii	5.5	3.86	15.6	15 39.1	8	1 29.3	-11 27.6	-0.4499	0.5399	+0.1061	+ 2 -06
g	Sagittarii	5.1	3.82	16.7	15 42.0		2 0.3	-10 57.6	-1.1201	0.5398	0.1068	-42 -90
16 B.	Capricorni	6.2	3.74	18.1	15 2.0		9 6.3	-4 4.8	-0.2600	0.5383	0.1183	+14 -51
$\beta$	Capricorni	3.2	3.74	18.1	15 1.8		20 26.7	+6 54.7	+0.4273	0.5358	0.1326	+55 -13
45 B.	Capricorni	6.1	+3.68	+18.7	-13 59.5	8	20 33.8	+7 1.5	+0.4396	0.5356	0.1327	+56 -12
84 B.	Capricorni	6.0	3.61	19.3	12 50.2		3 9.9	-10 34.6	+0.1967	0.5344	+0.1404	+42 -25
16 B.	Aquarii	6.4	3.58	19.4	11 52.3		11 28.1	-2 31.6	+0.1284	0.5328	0.1494	+38 -22
r	Aquarii	4.5	3.52	20.0	11 41.4		12 41.5	-1 20.4	-0.7489	0.5326	0.1507	-10 -90
51 G.	Aquarii	6.5	3.49	20.0	10 55.9		21 1.9	+6 44.9	+0.3447	0.5311	0.1588	+53 -17
17	Aquarii	6.3	+3.44	+20.0	-9 39.3	8	23 25.1	+9 3.7	-0.1062	0.5307	0.1610	+27 -42
19	Aquarii	5.6	3.44	20.1	10 5.1	4	3 49.8	-10 39.5	-0.7840	0.5301	+0.1649	-10 -90
$\xi$	Aquarii	4.8	3.37	20.2	8 12.5		4 59.0	-9 32.4	-0.1239	0.5299	0.1659	+26 -43
c'	Capricorni	5.3	3.35	20.6	9 26.7		11 22.7	-3 20.2	-1.0961	0.5292	0.1710	-31 -90
c''	Capricorni	6.3	3.34	20.7	9 38.4		15 4.2	+0 14.7	+0.8898	0.5289	0.1737	+81 +14
30	Aquarii	5.6	+3.25	+20.4	-6 54.2	5	15 42.9	+0 52.2	+1.2148	0.5288	0.1742	+81 +41
138 B.	Aquarii	6.4	3.20	20.0	5 6.6		5 0 25.2	+9 18.9	-0.2241	0.5282	+0.1799	+23 -49
44	Aquarii	5.7	3.19	20.3	5 46.9		5 16.2	-9 58.8	-1.2914	0.5281	0.1827	-51 -89
51	Aquarii	5.8	3.16	20.2	5 14.2		7 30.0	-7 49.1	-0.1538	0.5281	0.1839	+27 -45
$\kappa$	Aquarii	5.2	3.09	20.0	4 38.1		11 4.8	-4 20.7	-0.0824	0.5281	0.1856	+31 -41
207 B.	Aquarii	6.3	+3.08	+19.9	-3 57.9	6	16 2.9	+2 24.9	+0.5714	0.5284	0.1886	+74 -5
6 G.	Piscium	6.2	2.99	19.5	2 49.1		19 36.0	+3 55.2	+0.1407	0.5286	+0.1892	+44 -28
22 B.	Piscium	6.4	2.88	18.4	0 8.6		6 4 29.0	-11 27.8	+0.5965	0.5294	0.1919	+77 -4
$\nu$	Piscium	4.9	2.87	18.0	0 49.4		17 15.0	+0 55.0	-0.1946	0.5318	0.1940	+48 -26
9	Piscium	6.4	2.87	18.1	0 41.3		18 57.5	+2 34.4	-0.5047	0.5322	0.1942	+ 9 -69
16	Piscium	5.7	+2.82	+17.6	+1 39.8	7	19 7.0	+2 43.6	-0.3303	0.5322	0.1942	+18 -56
$\lambda$	Piscium	4.6	2.80	17.5	1 20.7		23 41.8	+7 10.0	-0.4793	0.5334	+0.1942	+10 -67
19	Piscium	5.4	2.79	16.9	3 2.9		7 2 31.0	+9 54.0	+0.4072	0.5342	0.1941	+61 -14
22	Piscium	5.8	2.76	17.0	2 29.4		4 40.3	+11 59.4	-0.9845	0.5349	0.1940	-20 -87
25	Piscium	6.2	2.75	17.2	1 39.0		7 25.7	-9 20.4	+0.1422	0.5358	0.1937	+44 -23
51	Piscium	5.6	+2.60	+14.3	+6 31.1	8	7 58.7	-8 48.4	+1.1392	0.5360	0.1936	+90 +33
60	Piscium	6.2	2.53	13.8	6 18.5		8 3 7.0	+9 43.7	-0.3367	0.5439	+0.1883	+18 -56
62	Piscium	6.1	2.54	13.6	6 52.0		10 15.3	-7 21.8	+1.2190	0.5475	0.1848	+90 +41
$\delta$	Piscium	4.6	2.54	13.4	7 9.2		10 40.4	-6 57.5	+0.7060	0.5477	0.1845	+90 +4
$\epsilon$	Piscium	4.4	2.46	12.7	7 27.8		10 51.5	-6 46.7	+0.4408	0.5478	0.1844	+64 -11
$\tau$	Piscium	5.6	+2.36	+9.6	+11 44.1	9	17 33.1	-0 18.3	+1.3355	0.5516	0.1803	+75 +65
28 B.	Arietis	6.0	2.26	8.4	11 54.6		9 9 9.7	-9 13.2	-0.3746	0.5614	+0.1675	+16 -55
12 H.	Arietis	6.3	2.27	7.8	13 5.6		19 4.5	+0 20.9	+1.0587	0.5682	0.1569	+90 +31
19	Arietis	5.8	2.25	6.6	14 54.4		20 27.0	+1 40.6	+0.0948	0.5692	0.1653	+39 -23
29	Arietis	6.1	2.15	5.6	14 41.0	10	0 59.0	+6 2.9	-1.1069	0.5725	0.1497	-32 -76
o	Arietis	5.8	+2.10	+4.8	+14 58.5		9 28.8	-9 45.8	+0.3476	0.5787	0.1381	+58 -10
$\pi$	Arietis	5.2	2.12	3.9	17 8.0		14 22.6	-5 2.8	+0.7076	0.5823	+0.1307	+90 +11
$\sigma$	Arietis	5.5	2.07	4.5	14 45.3		16 20.2	-8 9.6	-1.2249	0.5837	0.1276	-46 -73
124 B.	Arietis	6.4	2.09	4.0	16 9.5		17 16.3	-2 15.0	+1.3011	0.5844	0.1261	+73 +69
145 B.	Arietis	6.5	2.02	3.4	15 32.8		17 57.7	-1 35.7	-0.0329	0.5849	0.1250	+35 -29
53	Arietis	6.0	+2.05	+2.7	+17 34.4	11	22 42.3	+2 58.1	+1.1579	0.5883	0.1171	+90 +45
175 B.	Arietis	6.4	1.98	1.4	18 28.7		23 48.6	+4 1.9	-0.7564	0.5891	+0.1152	- 7 -73
26 B.	Tauri	6.4	1.93	1.1	17 34.3		11 7 44.7	+11 39.9	-0.8057	0.5947	0.1007	-10 -72
13	Tauri	5.6	1.92	0.3	19 26.7		10 35.3	-9 36.2	+0.3818	0.5966	0.0952	+61 -4
14	Tauri	6.2	1.92	+0.2	19 24.8		13 49.2	-6 29.8	-1.1958	0.5987	0.0889	-44 -71
163 B.	Tauri	5.8	+1.83	-0.4	+17 58.1		14 24.0	-5 56.4	-1.1126	0.5991	0.0877	-34 -71
							21 6.4	+0 30.1	+0.8717	0.6032	+0.0738	+90 +27

ELEMENTS FOR THE PREDICTION OF OCCULTATIONS.

JULY.

THE STAR'S					AT CONJUNCTION OR E. A.					Limiting Parallels.			
Name.	Mag.	Red'ns from 1920.0.		Apparent Declination.	Greenwich Mean Time.			Hour Angle, <i>H</i> .	<i>P</i>	<i>x'</i>	<i>y'</i>	N.	S.
		$\Delta\alpha$	$\Delta\delta$		d	h	m						
43 Tauri	5.5	+1.82	1.2	+19 23.9	18	0 20.6	+ 3 36.4	-0.3249	0.6051	+0.0038	+18	-40	
o Tauri	4.8	1.80	1.9	20 22.9		3 28.2	+ 6 36.5	-1.1047	0.6068	0.0699	-34	-79	
85 H <sup>1</sup> Tauri	6.0	1.76	1.6	18 33.1		4 42.2	+ 7 47.5	+0.7868	0.6074	0.0572	+90	+23	
224 B. Tauri	6.1	1.78	2.2	20 38.0		5 26.3	+ 8 29.8	-1.2969	0.6079	0.0655	-53	-70	
234 B. Tauri	6.0	1.75	1.9	18 51.5		6 26.7	+ 9 27.8	+0.5780	0.6084	0.0532	+78	+11	
e Tauri	3.6	+1.74	2.1	+19 0.2		7 51.0	+10 48.6	+0.5061	0.6090	+0.0590	+71	+ 7	
282 B. Tauri	6.4	1.72	2.6	19 43.0		10 33.6	-10 35.4	-0.0746	0.6102	0.0438	+32	-24	
129 H <sup>1</sup> Tauri	5.8	1.72	3.0	20 31.5		11 31.5	- 9 39.9	-0.8330	0.6107	0.0416	-13	-70	
302 B. Tauri	6.1	1.66	3.0	18 35.4		14 35.9	- 6 43.1	+1.1963	0.6120	0.0344	+90	+58	
i Tauri	5.1	1.65	3.2	18 42.2		16 31.8	- 4 51.8	+1.1471	0.6127	0.0298	+90	+53	
312 B. Tauri	6.2	+1.65	3.6	+19 21.8		17 53.2	- 3 33.9	+0.5405	0.6133	+0.0266	+74	+12	
330 B. Tauri	6.3	1.64	4.4	21 9.9		21 24.7	- 0 11.1	-1.1681	0.6144	0.0181	-42	-69	
333 B. Tauri	6.3	1.61	4.1	19 41.8		21 52.4	+ 0 15.5	+0.2901	0.6146	0.0170	+54	- 1	
l Tauri	5.2	1.61	4.4	20 18.8		22 43.4	+ 1 4.3	-0.3042	0.6148	0.0149	+19	-34	
107 Tauri	6.5	1.60	4.3	19 45.4		23 7.1	+ 1 27.1	+0.2507	0.6149	0.0139	+52	- 3	
351 B. Tauri	6.2	+1.57	4.9	+20 3.0	18	3 1.8	+ 5 12.1	-0.0040	0.6159	+0.0044	+36	-16	
353 B. Tauri	6.5	1.56	4.9	19 44.0		3 40.3	+ 5 49.0	+0.3111	0.6160	+0.0029	+56	+ 1	
372 B. Tauri	6.1	1.59	5.6	20 25.0		8 25.5	+10 22.3	-0.3764	0.6170	-0.0038	+15	-36	
<b>NEW MOON.</b>													
o Leonis	3.8	+1.31	-11.9	+10 15.2	17	9 31.7	+ 7 36.4	-1.2572	0.5771	-0.1370	-47	-69	
89 B. Leonis	6.2	1.35	12.2	8 41.6		16 52.3	- 9 18.8	-1.0901	0.5724	0.1923	-29	-62	
τ Leonis	4.9	1.35	12.2	8 25.5		17 47.0	- 8 26.1	-0.9973	0.5718	0.1929	-21	-62	
14 Sextantis	6.3	1.37	12.7	5 59.9		20 40.7	- 5 38.5	+0.8338	0.5701	0.1945	+90	+14	
155 B. Leonis	6.5	1.42	12.6	6 5.8	18	3 57.6	+ 1 23.2	-0.6443	0.5658	0.1979	+ 1	-60	
p <sup>4</sup> Leonis	5.7	+1.59	-13.0	+ 2 28.2		23 47.1	- 3 27.9	-0.8484	0.5555	-0.2015	-11	-68	
p <sup>5</sup> Leonis	5.3	1.64	13.4	0 21.7	19	2 56.8	- 0 24.5	+0.5912	0.5540	0.2014	+76	- 4	
359 B. Leonis	6.3	1.68	13.2	+ 0 34.1		7 22.9	+ 8 52.8	-0.5125	0.5521	0.2009	+ 8	-70	
388 B. Leonis	6.3	1.71	13.6	- 1 15.8		9 32.0	+ 5 57.7	+0.9435	0.5512	0.2006	+89	+17	
v Leonis	4.5	1.75	13.2	0 23.1		13 46.7	+10 4.0	-0.8125	0.5496	0.1996	- 9	-90	
431 B. Leonis	6.2	+1.77	-13.6	- 1 59.8		14 28.0	+10 44.0	+0.7183	0.5494	-0.1994	+89	+ 4	
78 B. Virginis	6.5	1.98	13.6	5 16.7	20	7 30.8	+ 3 13.7	-0.7946	0.5440	0.1926	+85	+ 8	
f Virginis	6.0	2.11	12.9	5 23.7		18 21.5	-10 16.3	-1.1381	0.5417	0.1860	-33	-90	
x Virginis	4.8	2.15	13.6	7 33.6		19 32.6	- 9 7.5	+0.9256	0.5414	0.1852	+83	+16	
ψ Virginis	5.0	2.26	13.4	9 6.5	21	2 51.3	- 2 2.6	+1.2351	0.5403	0.1797	+81	+43	
g Virginis	5.6	+2.34	-12.6	- 8 33.6		9 45.3	+ 4 38.3	-0.5672	0.5395	-0.1740	+ 3	-74	
50 Virginis	6.2	2.36	13.0	9 54.4		10 20.3	+ 5 12.2	+0.7659	0.5395	0.1734	+81	+ 6	
α Virginis ( <i>Spica</i> )	1.2	2.47	12.5	10 44.9		17 51.4	-11 30.9	+0.3882	0.5390	0.1665	+57	-15	
h Virginis	5.4	2.50	11.8	9 45.4		21 39.2	- 7 50.2	-1.2996	0.5388	0.1628	-57	-85	
86 Virginis	5.6	2.62	11.8	12 1.8	22	3 58.0	- 1 43.3	+0.1326	0.5387	0.1561	+39	-29	
MARS	0.2	...	...	-14 88.3		18 5.3	+11 57.4	+0.8631	0.5206	-0.1326	+76	+14	
λ Virginis	4.6	+2.85	-10.0	13 0.4		20 8.1	-10 3.7	-1.1929	0.5392	0.1374	-45	-90	
8 Libree	5.3	3.10	8.7	15 40.1	23	11 28.0	+ 4 47.3	-0.2573	0.5404	0.1174	+14	-52	
α Libree	2.9	3.10	8.7	15 42.8		11 33.6	+ 4 52.7	-0.2193	0.5404	0.1173	+16	-49	
v Libree	5.3	3.21	7.5	15 57.0		19 11.1	-11 44.2	-0.8155	0.5411	0.1066	-19	-90	
22 Libree	6.5	+3.21	-7.6	-16 10.7		19 16.5	-11 39.0	-0.5757	0.5412	-0.1065	- 5	-77	
26 Libree	6.3	3.29	7.4	17 28.4		23 0.2	- 8 2.4	+0.4565	0.5415	0.1011	+54	-11	
28 Libree	6.2	3.34	7.0	17 52.2		2 3.4	- 5 5.1	+0.5922	0.5419	0.0966	+64	- 3	
41 Libree	5.3	3.48	5.9	19 2.4	24	10 43.2	+ 3 18.2	+1.0995	0.5428	0.0835	+71	+33	
47 Libree	5.8	3.57	4.5	19 8.9		18 27.6	+10 47.8	+0.6204	0.5437	0.0715	+64	- 1	
β Scorpii	2.9	+3.64	-3.7	-19 35.3		23 27.4	- 8 21.9	+0.7692	0.5442	-0.0635	+71	+ 8	



ELEMENTS FOR THE PREDICTION OF OCCULTATIONS.

JULY.

THE STAR'S					AT CONJUNCTION IN R. A.						Limiting Parallels.			
Name.	Mag.	Red'ns from 1920.0.		Apparent Declination.	Greenwich Mean Time.			Hour Angle, <i>H</i>	<i>Y</i>	<i>x'</i>	<i>y'</i>	N.	S.	
		$\Delta\alpha$	$\Delta\delta$		d	h	m							
56 B. Scorpii	5.0	+3.64	-3.8	-19 35.1	24	23	27.6	8 21.7	+0.7647	0.5442	-0.0635	+71	+8	
73 B. Scorpii	6.4	3.62	2.8	18 7.8	25	1	37.8	6 15.7	-0.9766	0.5445	0.0600	-35	-90	
Scorpii	3.9	3.66	3.0	19 15.3				2 36.2	+0.2002	0.5446	0.0584	+83	-24	
88 B. Scorpii	6.4	3.65	2.5	18 19.9				3 53.6	-4 4.3	-0.8847	0.5447	0.0563	-29	-90
58 G. Scorpii	6.2	3.72	2.5	20 1.5				6 0.3	-2 1.6	+0.8709	0.5450	0.0529	+70	+15
$\psi$ Ophiuchi	4.6	+3.74	-2.0	-19 51.1				8 23.4	+0 16.9	+0.5589	0.5451	-0.0489	+56	-4
$\chi$ Ophiuchi	4.9	3.71	1.2	18 16.6				9 48.5	+1 39.3	-1.2522	0.5453	0.0466	-64	-84
123 B. Scorpii	6.5	3.83	0.5	20 15.2				16 15.0	+7 53.4	+0.6706	0.5456	0.0359	+66	+2
131 B. Scorpii	5.5	3.82	-0.2	19 46.3				16 53.2	+8 30.3	+0.1150	0.5459	0.0348	+26	-30
68 B. Ophiuchi	5.9	3.89	+0.7	20 17.0				22 22.9	-10 10.6	-0.5149	0.5462	0.0286	+51	-7
81 B. Ophiuchi	6.1	+3.88	+1.3	-19 24.8	26	0	7.9	8 29.0	-0.4904	0.5464	-0.0226	-9	-70	
29 Ophiuchi	6.4	3.88	2.0	18 46.1				2 25.6	-6 15.7	-1.2538	0.5464	0.0187	-66	-83
109 B. Ophiuchi	6.2	3.94	1.8	20 23.0				3 47.0	+4 67.0	-0.5125	0.5466	0.0165	+50	-7
$\xi$ Ophiuchi	4.4	4.03	8.1	21 1.6				11 30.3	+2 31.4	+1.1517	0.5468	-0.0033	+69	+40
305 B. Ophiuchi	6.3	4.07	7.2	18 47.2	27	4	12.3	5 18.8	-1.1524	0.5468	+0.0251	-53	-90	
16 G. Sagittarii	6.4	+4.12	+7.3	-20 20.0				6 7.8	-3 27.0	+0.6150	0.5467	+0.0283	+60	-1
39 G. Sagittarii	6.3	4.13	8.5	19 51.4				11 30.8	+1 45.6	+0.2634	0.5465	0.0374	+35	-21
16 Sagittarii	5.9	4.16	8.8	20 24.6				13 24.3	+3 35.5	+0.9521	0.5464	0.0405	+70	+21
64 B. Sagittarii	6.1	4.11	9.1	18 41.1				13 34.5	+3 45.3	-0.9567	0.5463	0.0408	-35	-90
52 G. Sagittarii	6.4	4.11	9.3	18 29.4				14 31.2	+4 40.2	-1.1326	0.5463	0.0424	-50	-90
17 H <sup>1</sup> Sagittarii	6.4	+4.12	+9.4	-18 38.9				15 6.7	+5 14.6	-0.9316	0.5462	+0.0434	-33	-90
Y Sagittarii (var.)	5.4	4.18	9.6	18 53.6				16 23.0	+6 28.5	-0.6030	0.5462	0.0455	-13	-81
95 B. Sagittarii	5.7	4.14	10.4	18 46.6				20 36.7	+10 34.0	-0.5250	0.5458	0.0524	-8	-73
100 B. Sagittarii	5.0	4.14	10.6	18 27.3				21 12.8	+11 9.0	-0.8502	0.5458	0.0534	-27	-90
171 B. Sagittarii	6.1	4.20	13.4	19 21.5	28	12	25.9	+1 52.9	+1.1505	0.5442	0.0777	+71	+39	
173 B. Sagittarii	6.4	+4.20	+13.4	-19 12.9				12 27.6	+1 54.5	+0.9940	0.5442	+0.0778	+71	+24
187 B. Sagittarii	6.4	4.20	13.8	18 51.5				14 24.8	+3 48.1	+0.7531	0.5439	0.0808	+72	+7
$\rho$ Sagittarii	4.0	4.18	15.2	17 59.7				21 28.5	+10 38.3	+0.4044	0.5430	0.0915	+49	-14
45 Sagittarii	6.0	4.20	15.1	18 27.2				21 32.9	+10 42.5	+0.9185	0.5430	0.0916	+72	+18
54 Sagittarii	5.4	4.15	16.9	16 28.4	29	6	46.7	-4 21.1	-0.3641	0.5416	0.1050	+7	-59	
$\epsilon$ Sagittarii	5.2	+4.15	+17.1	-16 18.5				7 39.5	-3 29.9	-0.4536	0.5415	+0.1062	+2	-66
283 B. Sagittarii	5.5	4.14	17.1	15 39.1				8 10.4	-3 0.1	-1.1236	0.5414	0.1069	-42	-90
$g$ Sagittarii	5.1	4.12	18.2	15 42.0				15 14.1	+3 50.4	-0.2806	0.5402	0.1166	+13	-53
16 B. Capricorni	6.2	4.10	19.9	15 1.9	30	2	30.0	+9 14.7	+0.3804	0.5384	0.1311	+52	-15	
$\beta$ Capricorni	3.2	4.10	19.9	15 1.8				2 37.0	-9 7.9	+0.3924	0.5383	0.1312	+53	-15
45 B. Capricorni	6.1	+4.07	+20.8	-13 59.5				9 10.1	-2 46.9	+0.1357	0.5372	+0.1390	+38	-29
84 B. Capricorni	6.0	4.03	21.7	12 50.1				17 24.3	+5 12.1	+0.0495	0.5360	0.1481	+34	-33
16 B. Aquarii	6.4	4.01	21.9	11 52.2				18 37.0	+6 22.6	-0.8284	0.5358	0.1494	-15	-90
$\nu$ Aquarii	4.5	3.98	22.6	11 41.4				31 2 53.0	+9 36.6	+0.2447	0.5345	0.1577	+46	-23
51 G. Aquarii	6.5	3.96	22.8	10 55.8				5 14.9	-7 19.0	-0.2102	0.5342	0.1600	+21	-49
17 Aquarii	6.3	+3.92	+23.1	-9 39.3				9 37.2	-3 4.7	-0.8959	0.5337	+0.1639	-17	-90
19 Aquarii	5.6	3.93	23.1	10 5.0				10 45.7	-1 58.3	-0.2397	0.5336	0.1649	+20	-50
$\xi$ Aquarii	4.8	3.89	23.5	8 12.4				17 5.9	+4 10.3	-1.2233	0.5328	0.1701	-44	-90
$c^1$ Capricorni	5.3	3.88	23.8	9 26.6				20 45.4	+7 43.2	+0.7512	0.5325	0.1729	+81	+5
$c^2$ Capricorni	6.3	+3.87	+23.9	-9 38.3				21 23.7	+8 20.3	+1.0743	0.5325	+0.1734	+81	+28

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30	Aquarii	5.6	+3.81	+24.1	-6 54.2	1	6	1.4	-7 17.5	-0.3792	0.5319	+0.1792	+14	-59	
44	Aquarii	5.7	3.77	24.2	5 46.8				13 2.6	-0.291	0.5316	0.1832	+17	-55	
51	Aquarii	5.8	+3.75	+24.2	-5 14.1				16 35.7	+2 57.6	-0.2580	0.5316	+0.1850	+21	-51

ELEMENTS FOR THE PREDICTION OF OCCULTATIONS.

AUGUST.

THE STAR'S				AT CONJUNCTION IN R. A.					Limiting Parallax.		
Name.	Mag.	Red'ns from 1920.0.		Apparent Declination.	Greenwich Mean Time.	Hour Angle, <i>H</i>	<i>Y</i>	<i>z'</i>	<i>y'</i>	N.	S.
		$\Delta\alpha$	$\Delta\delta$								
$\kappa$ Aquarii	5.2	+3.70	+24.2	-4 38.1	1 23 30.8	+9 40.2	+0.3829	0.5317	+0.1890	+59	-15
207 B. Aquarii	6.3	3.70	24.1	3 57.8	2 1 3.3	+11 9.9	-0.0503	0.5317	0.1896	+32	-39
6 G. Piscium	6.2	3.64	23.9	2 49.0	9 53.2	-4 16.3	+0.9331	0.5322	0.1913	+60	-14
22 B. Piscium	6.4	3.57	23.2	0 8.5	22 36.4	+8 3.7	-0.0298	0.5338	0.1933	+34	-37
$\kappa$ Piscium	4.9	3.56	22.8	+0 49.4	3 0 18.7	+9 42.8	-0.7327	0.5341	0.1934	-5	-89
9 Piscium	6.4	+3.56	+22.9	+0 41.4	0 28.2	+9 52.1	-0.5581	0.5341	+0.1934	+5	-73
16 Piscium	5.7	3.53	22.6	1 39.9	5 2.7	+9 41.9	-0.7136	0.5349	0.1934	-4	-88
$\lambda$ Piscium	4.6	3.51	22.4	1 20.8	7 51.8	-6 57.9	+0.1716	0.5355	0.1933	+46	-26
19 Piscium	5.4	3.51	22.0	3 2.9	10 1.2	-4 52.6	-1.2264	0.5360	0.1931	-42	-87
22 Piscium	5.8	3.49	21.9	2 29.5	12 46.8	-2 12.0	-0.0997	0.5367	0.1928	+30	-41
25 Piscium	6.2	+3.47	+22.1	+1 39.1	13 19.9	-1 39.9	+0.8099	0.5368	+0.1927	+90	+15
51 Piscium	5.6	3.37	19.5	6 31.2	4 8 33.8	-7 2.1	-0.5986	0.5428	0.1870	+3	-75
60 Piscium	6.2	3.31	18.9	6 18.6	15 46.2	-0 3.5	+0.9569	0.5456	0.1834	+90	+21
62 Piscium	6.1	3.32	18.7	6 52.1	16 11.6	+0 21.1	+0.4464	0.5458	0.1832	+64	-10
$\delta$ Piscium	4.6	3.32	18.5	7 9.3	16 22.8	+0 31.9	+0.1793	0.5459	0.1831	+46	-24
$\epsilon$ Piscium	4.4	+3.26	+17.8	+7 27.9	23 9.3	+7 5.3	+1.0786	0.5489	+0.1788	+90	+31
$\pi$ Piscium	5.6	3.19	14.5	11 44.2	5 15 1.1	-1 34.4	-0.6476	0.5568	0.1658	0	-75
26 B. Arietis	6.0	3.10	13.0	11 54.7	6 1 8.5	+8 12.4	-0.7977	0.5624	0.1553	+90	+14
12 H <sup>1</sup> . Arietis	6.3	3.10	12.4	13 5.7	2 32.8	+9 33.8	-0.2119	0.5632	0.1537	+24	-42
29 Arietis	6.1	3.00	9.9	14 41.0	15 54.4	-1 32.7	+0.0911	0.5711	0.1366	+41	-23
$\sigma$ Arietis	5.8	+2.95	+9.0	+14 58.6	20 56.5	+3 18.6	+0.4595	0.5742	+0.1294	+66	-2
$\sigma$ Arietis	5.5	2.92	8.5	14 45.3	23 55.2	+6 10.9	+1.0635	0.5761	0.1248	+90	+36
124 B. Arietis	6.4	2.94	7.9	16 9.6	7 0 37.9	+6 52.0	-0.2882	0.5765	0.1237	+20	-43
145 B. Arietis	6.5	2.87	7.3	15 32.9	5 31.0	+11 34.4	+0.9236	0.5795	0.1159	+90	+27
53 Arietis	6.0	2.89	6.5	17 34.4	6 39.5	-11 19.6	-1.0167	0.5802	0.1141	-26	-72
175 B. Arietis	6.4	+2.82	+4.8	+18 28.7	14 50.8	-3 26.5	-1.0588	0.5851	+0.0999	-30	-72
26 B. Tauri	6.4	2.77	4.4	17 34.3	17 47.0	-0 36.9	+0.1495	0.5868	0.0946	+45	-16
163 B. Tauri	5.8	2.65	2.5	17 58.2	4 49.5	+0 50.9	+0.0607	0.5928	0.0736	+87	+15
43 Tauri	5.5	2.64	1.4	19 23.9	8 0.4	-10 56.0	-0.5497	0.5946	0.0668	+4	-56
85 H <sup>1</sup> . Tauri	6.0	2.56	1.0	18 33.2	12 31.2	-6 35.7	+0.5856	0.5967	0.0575	+78	+12
234 B. Tauri	6.0	+2.54	+0.5	+18 51.5	14 19.4	-4 51.7	+0.3763	0.5976	+0.0536	+60	+1
$\epsilon$ Tauri	3.6	2.53	+0.2	19 0.3	15 46.6	-3 28.0	+0.3056	0.5983	0.0505	+55	-3
282 B. Tauri	6.4	2.50	-0.5	19 43.1	18 34.9	-0 46.3	-0.2798	0.5995	0.0445	+20	-35
129 H <sup>1</sup> . Tauri	5.8	2.51	0.9	20 31.5	19 34.9	+0 11.3	-1.0483	0.5999	0.0423	-30	-69
302 B. Tauri	6.1	2.43	0.8	18 35.5	22 45.7	+3 14.6	+1.0195	0.6012	0.0353	+90	+42
$\iota$ Tauri	5.1	+2.41	-1.2	+18 42.3	9 0 45.6	+5 9.7	-0.9708	0.6020	+0.0308	+90	+39
312 B. Tauri	6.2	2.41	1.7	19 21.4	2 9.9	+6 30.7	+0.3572	0.6025	0.0277	+58	+2
333 B. Tauri	0.3	2.35	2.4	19 41.8	6 17.3	+10 28.1	+0.1101	0.6038	0.0183	+42	-10
$\iota$ Tauri	5.2	2.36	2.8	20 18.8	7 10.1	+11 18.9	-0.4918	0.6041	0.0163	+8	-47
107 Tauri	6.5	2.34	2.7	19 45.4	7 34.6	+11 42.3	+0.0723	0.6043	0.0154	+40	-12
351 B. Tauri	6.2	+2.30	-3.4	+20 3.1	11 37.3	-8 24.6	-0.1789	0.6054	+0.0061	+25	-26
353 B. Tauri	6.5	2.28	3.4	19 44.0	12 17.0	-7 46.6	+0.1421	0.6056	+0.0046	+44	-7
372 B. Tauri	6.1	2.23	4.4	20 25.0	17 11.8	-3 3.6	-0.5463	0.6067	-0.0068	+4	-51
$\zeta$ Tauri	3.0	2.22	4.8	21 5.6	18 43.9	-1 35.2	-1.2340	0.6070	0.0103	-53	-69
B. D.+19°1110	6.0	2.13	5.3	19 50.8	10 0 26.5	+3 53.5	-0.0866	0.6078	0.0237	+31	-22
$\chi^1$ Orionis	4.5	+2.12	-5.6	+20 15.7	1 12.7	+4 37.8	-0.5182	0.6079	-0.0254	+6	-50
57 Orionis	5.8	2.12	5.4	19 44.0	1 25.8	+4 50.4	+0.0017	0.6079	0.0259	+36	-17
64 Orionis	5.1	2.08	5.9	19 41.5	4 42.6	+7 59.2	-0.0539	0.6081	0.0336	+32	-21
$\chi^2$ Orionis	4.7	2.08	6.0	20 8.4	4 53.0	+8 9.2	-0.5062	0.6082	0.0340	+7	-50
68 Orionis	5.7	2.04	6.4	19 48.5	8 0.6	+11 9.2	-0.2929	0.6083	0.0412	+19	-36
19 B. Geminorum	6.2	+2.02	-6.2	+18 42.0	8 36.9	+11 44.0	+0.7830	0.6083	-0.0426	+90	+25

ELEMENTS FOR THE PREDICTION OF OCCULTATIONS.

AUGUST.

THE STAR'S					AT CONJUNCTION IN R. A.					Limiting Parallels.	
Name.	Mag.	Red'ns from 1920.0.		Apparent Declination.	Greenwich Mean Time.	Hour Angle, H	Y	x'	y'	N.	S.
		$\Delta\alpha$	$\Delta\delta$								
71 Orionis	5.1	+2.01	-6.5	+19 11.0	10 9 6.7	-11 47.4	+0.2818	0.6083	-0.0437	+53	-3
v Geminorum	4.1	1.97	7.4	20 15.7	14 32.1	-6 35.1	-1.0612	0.6082	0.0561	-31	-70
26 Geminorum	5.2	1.88	7.5	17 43.4	19 45.5	-1 34.5	+1.1362	0.6077	0.0679	+90	+49
74 B Geminorum	6.2	1.87	7.8	18 16.7	21 40.7	+0 16.2	+0.4493	0.6075	0.0722	+66	+3
110 B Geminorum	6.2	1.80	8.4	17 52.1	11 3 30.6	+5 52.0	+0.3988	0.6065	0.0849	+62	-1
λ Geminorum	3.6	+1.73	-8.8	+16 41.0	9 37.6	+11 44.3	+1.0138	0.6051	-0.0978	+90	+36
162 B Geminorum	5.7	1.69	9.4	17 15.3	14 59.0	-7 7.1	-0.1058	0.6036	0.1086	+30	-31
NEW MOON.											
359 B Leonis	6.3	+1.54	-11.8	+0 34.1	15 17 1.3	-8 40.7	-0.3239	0.5593	-0.2016	+18	-55
338 B Leonis	6.3	+1.56	-12.0	-1 15.8	19 7.7	-6 38.6	+1.1248	0.5585	-0.2013	+89	+32
v Leonis	4.5	1.59	11.7	0 23.1	23 16.9	-2 37.8	-0.6084	0.5571	0.2005	+2	-78
431 B Leonis	6.2	1.60	12.0	1 59.8	23 57.3	-1 58.7	+0.9107	0.5568	0.2003	+88	+16
78 B Virginis	6.5	1.75	11.7	5 16.7	16 16 36.8	-9 52.4	+1.0151	0.5520	0.1939	+85	+23
200 B Virginis	6.3	1.81	11.0	4 36.9	17 0 46.6	-1 58.7	-1.2386	0.5502	0.1891	-45	-90
f Virginis	6.0	+1.84	-11.1	-5 23.7	3 12.0	+0 22.0	-0.8827	0.5496	-0.1874	-15	-90
x Virginis	4.8	1.87	11.6	7 33.5	4 21.3	+1 29.1	+1.1616	0.5494	0.1866	+82	+36
319 B Virginis	6.3	1.90	10.8	5 52.0	8 17.0	+5 17.1	-1.3356	0.5487	0.1837	-65	-77
g Virginis	5.6	2.03	10.7	8 33.5	18 13.8	-9 5.4	-0.2997	0.5471	0.1755	+17	-54
50 Virginis	6.2	2.05	11.0	9 54.4	18 48.0	-8 32.3	+1.0203	0.5471	0.1749	+80	+24
α Virginis (Spica)	1.2	+2.14	-10.6	-10 44.8	18 2 8.6	-1 25.8	+0.6531	0.5462	-0.1679	+76	0
h Virginis	5.4	2.17	9.9	9 45.4	5 51.4	+2 9.8	-1.0145	0.5459	0.1642	-27	-90
86 Virginis	5.6	2.27	9.9	12 1.7	12 2.0	+8 8.5	+0.4073	0.5454	0.1575	+56	-13
λ Virginis	4.6	2.48	8.3	13 0.4	19 3 52.8	-0 31.3	-0.8992	0.5448	0.1386	-22	-90
8 Librae	5.3	2.71	7.2	15 40.0	18 57.3	-9 55.8	+0.0288	0.5448	0.1184	+29	-34
α Librae	2.9	+2.71	-7.2	-15 42.7	19 2.8	-9 50.5	+0.0665	0.5448	-0.1183	+31	-32
v Librae	5.3	2.82	6.2	15 57.0	20 2 33.8	-2 33.9	-0.5262	0.5449	0.1076	-3	-72
22 Librae	6.5	2.82	6.2	16 10.6	2 39.2	-2 28.7	-0.2882	0.5449	0.1074	+10	-53
26 Librae	6.3	2.90	6.1	17 28.3	6 20.0	+1 5.0	+0.7353	0.5450	0.1020	+73	+6
28 Librae	6.2	2.94	5.8	17 52.2	9 21.0	+4 0.2	+0.8692	0.5451	0.0975	+72	+15
32 Librae	5.9	+2.96	-4.7	-16 26.4	12 52.7	+7 25.1	-1.0260	0.5452	-0.0922	-36	-90
34 Librae	6.0	2.97	4.4	16 20.2	14 2.0	+8 32.2	-1.2440	0.5452	0.0904	-59	-88
ζ Librae	5.6	2.99	4.4	16 35.0	15 6.2	+9 34.4	-1.0708	0.5452	0.0887	-40	-90
47 Librae	5.8	3.18	3.5	19 8.9	21 1 35.7	+4 16.4	+0.8904	0.5456	0.0723	+71	+17
β Scorpii	2.9	3.25	2.8	19 35.3	6 33.3	+0 31.6	+1.0355	0.5458	0.0644	+70	+28
56 B Scorpii	5.0	+3.25	-2.8	-19 35.1	6 33.5	+0 31.8	+1.0310	0.5458	-0.0643	+70	+28
73 B Scorpii	6.4	3.24	1.9	18 7.7	8 42.8	+2 36.8	-0.7026	0.5458	0.0609	-18	-90
v Scorpii	3.9	3.28	2.1	19 15.3	9 40.9	+3 33.1	+0.4762	0.5458	0.0593	+50	-9
88 B Scorpii	6.4	3.27	1.6	18 19.9	10 57.8	+4 47.5	-0.6131	0.5459	0.0572	-13	-81
58 G Scorpii	6.2	3.34	1.8	20 1.4	13 3.9	+6 49.5	+1.1322	0.5459	0.0537	+70	+38
ψ Ophiuchi	4.6	+3.37	-1.3	-19 51.1	15 26.2	+9 7.2	+0.8200	0.5460	-0.0499	+70	+12
x Ophiuchi	4.9	3.34	0.5	18 16.6	16 50.9	+10 29.3	-0.9840	0.5460	0.0475	-38	-90
123 B Scorpii	6.5	3.47	0.1	20 15.2	23 16.0	-7 18.1	+0.9248	0.5461	0.0369	+70	+20
131 B Scorpii	5.5	3.47	0.4	19 46.3	23 54.0	-6 41.3	+0.3707	0.5461	0.0358	+41	-14
68 B Ophiuchi	5.9	3.54	1.2	20 17.0	22 5 22.8	-1 23.1	+0.7638	0.5462	0.0266	+70	+9
81 B Ophiuchi	6.1	+3.54	-1.8	-19 24.8	7 7.6	+0 18.4	-0.2396	0.5462	-0.0237	+4	-50
29 Ophiuchi	6.4	3.54	2.5	18 46.1	9 25.0	+2 31.4	-1.0030	0.5462	0.0198	-42	-90
109 B Ophiuchi	6.2	3.60	2.2	20 22.9	10 46.3	+3 50.0	+0.7558	0.5461	-0.0176	+70	+8
305 B Ophiuchi	6.3	3.80	7.4	18 47.2	23 11 11.8	+3 28.1	-0.9358	0.5456	+0.0236	-37	-90
16 G Sagittarii	6.4	3.86	7.3	20 19.0	13 7.5	+5 20.3	+0.8249	0.5454	0.0268	+70	+13
39 G Sagittarii	6.3	+3.89	-8.5	-19 51.4	18 30.9	+10 33.2	+0.4661	0.5452	+0.0357	+47	-9

ELEMENTS FOR THE PREDICTION OF OCCULTATIONS.

AUGUST.

THE STAR'S				AT CONJUNCTION OR R. A.					Limiting Parallels.		
Name.	Mag.	Red'ns from 1920.0.		Apparent Declination.	Greenwich Mean Time.	Hour Angle, H	Y'	z'	y'	N.	S.
		$\Delta\alpha$	$\Delta\delta$								
16 Sagittarii	5.9	+3.92	+8.7	-20 24.6	23 20 24.6	-11 36.6	+1.1507	0.5450	+0.0689	+70	+40
64 B. Sagittarii	6.1	3.88	9.3	18 41.1	20 34.8	-11 26.8	-0.7547	0.5450	0.0592	23	90
52 G. Sagittarii	6.4	3.88	9.5	18 29.4	21 31.5	-10 31.9	-0.9817	0.5450	0.0407	35	90
17 H. Sagittarii	6.4	3.89	9.6	18 38.9	22 7.2	-9 57.5	-0.7321	0.5450	0.0417	22	90
Y Sagittarii (var.)	5.4	3.91	9.8	18 53.6	23 23.0	-8 43.4	-0.4061	0.5448	0.0438	3	63
95 B. Sagittarii	5.7	+3.04	+10.5	-18 46.6	24 3 37.7	-4 37.5	-0.8351	0.5445	+0.0508	+2	57
100 B. Sagittarii	5.0	3.83	10.8	18 27.3	4 13.8	-4 2.5	-0.6007	0.5445	0.0518	16	98
173 B. Sagittarii	6.4	4.05	13.4	19 12.9	19 30.0	+10 44.5	+1.1539	0.5431	0.0758	71	+40
187 B. Sagittarii	6.4	4.06	13.8	18 51.5	21 27.2	-11 22.0	-0.9100	0.5429	0.0787	+71	+18
$\rho$ Sagittarii	4.0	4.07	15.3	17 59.7	25 4 31.9	-4 31.3	-0.5436	0.5422	0.0694	+50	-5
45 Sagittarii	6.0	+4.09	+15.1	-18 27.2	4 35.6	-4 27.1	+1.0617	0.5422	+0.0696	+72	+30
54 Sagittarii	5.4	4.08	17.1	16 28.4	13 49.4	+4 29.3	-0.2365	0.5412	0.1023	+13	-50
e Sagittarii	5.2	4.08	17.3	16 18.5	14 42.2	+5 20.4	-0.3277	0.5410	0.1041	+8	-56
283 B. Sagittarii	5.5	4.08	17.5	15 39.1	15 13.1	+5 50.3	-0.9972	0.5410	0.1043	33	-90
g Sagittarii	5.1	4.10	18.6	15 42.0	22 16.2	-11 19.8	-0.1703	0.5402	0.1145	+17	-46
16 B. Capricorni	6.2	+4.12	+20.4	-15 1.9	26 9 30.5	-0 26.6	+0.4651	0.5389	+0.1290	+57	-10
$\beta$ Capricorni	3.2	4.12	20.4	15 1.8	9 37.4	+0 19.8	+0.4767	0.5389	0.1291	+58	9
45 B. Capricorni	6.1	4.12	21.5	13 59.5	16 9.0	+5 59.6	+0.2063	0.5382	0.1370	+41	-24
84 B. Capricorni	6.0	4.12	22.6	12 50.1	37 0 20.8	-10 4.0	+0.1019	0.5374	0.1463	+36	-30
16 B. Aquarii	6.4	4.10	22.9	11 52.2	1 32.9	-8 53.9	-0.7758	0.5374	0.1478	-13	90
$\nu$ Aquarii	4.5	+4.11	+23.8	-11 41.4	9 45.5	-0 56.5	+0.2747	0.5367	+0.1560	+47	-20
51 G. Aquarii	6.5	4.10	24.0	10 55.8	12 6.3	+1 20.0	-0.1840	0.5365	0.1583	+22	-46
17 Aquarii	6.3	4.08	24.6	9 39.3	16 26.4	+5 32.1	-0.8770	0.5362	0.1623	-18	90
19 Aquarii	5.6	4.09	24.5	10 5.0	17 34.4	+6 38.0	-0.2260	0.5362	0.1634	+20	-49
$\xi$ Aquarii	4.8	4.08	25.3	8 12.4	23 51.0	-11 17.0	-1.2201	0.5359	0.1687	-45	-90
c <sup>1</sup> Capricorni	5.3	+4.08	+25.5	-9 26.6	25 3 28.2	-7 46.4	+0.7373	0.5358	+0.1716	+81	+5
c <sup>2</sup> Capricorni	6.3	4.09	25.5	9 38.3	4 6.1	-7 9.7	+1.0575	0.5358	0.1721	+80	+27
30 Aquarii	5.6	4.08	26.2	6 54.1	12 37.9	+1 6.5	-0.4097	0.5357	0.1781	+12	-61
44 Aquarii	5.7	4.05	26.5	5 46.8	19 34.0	+7 49.8	-0.3697	0.5358	0.1823	-14	-58
51 Aquarii	5.8	4.05	26.6	5 14.1	23 4.3	+11 13.7	-0.3134	0.5359	0.1842	+18	-54
$\kappa$ Aquarii	5.2	+4.03	+26.7	-4 38.0	29 5 53.8	-6 9.3	+0.3085	0.5363	+0.1873	+53	-19
207 B. Aquarii	6.3	4.03	26.8	3 57.8	7 25.0	-4 40.9	-0.1260	0.5364	0.1880	+28	-43
6 G. Piscium	6.2	4.02	26.7	2 49.0	16 7.2	+3 45.2	-0.2953	0.5373	0.1909	+53	-19
22 B. Piscium	6.4	4.00	26.5	0 8.4	30 4 39.0	-8 6.2	-0.1524	0.5391	0.1931	+27	-44
$\kappa$ Piscium	4.9	4.00	26.3	+0 49.5	6 19.8	-6 28.7	-0.8551	0.5394	0.1932	-12	-89
9 Piscium	6.4	+4.00	+26.3	+0 41.4	6 29.1	-6 19.5	-0.6818	0.5394	+0.1932	-2	-86
16 Piscium	5.7	3.98	26.1	1 39.9	10 59.5	-1 57.6	-0.8456	0.5403	0.1933	-12	-98
$\lambda$ Piscium	4.6	3.97	25.9	1 20.8	13 46.2	+0 44.0	+0.0294	0.5409	0.1932	+37	-34
22 Piscium	5.8	3.97	25.6	2 29.6	18 36.8	+5 25.5	-0.2501	0.5420	0.1927	+22	-50
25 Piscium	6.2	3.96	25.7	1 39.2	19 9.4	+5 57.0	+0.7437	0.5422	0.1926	+90	+6
51 Piscium	5.6	+3.94	+23.6	+6 31.2	31 14 7.7	+0 19.1	-0.7816	0.5477	+0.1870	-8	-83
60 Piscium	6.2	3.91	22.9	6 18.7	21 15.1	+7 12.7	-0.7578	0.5502	0.1833	+90	+8
62 Piscium	6.1	3.92	22.8	6 52.2	21 40.2	+7 37.0	+0.2483	0.5503	0.1831	+50	-20
$\delta$ Piscium	4.6	+3.92	+22.6	+7 9.4	21 51.3	+7 47.7	-0.0183	0.5504	+0.1830	+34	-36

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$\epsilon$ Piscium	4.4	+3.88	+21.9	+7 27.9	1 4 33.7	-9 43.1	+0.8696	0.5529	+0.1787	+90	+15
$\tau$ Piscium	5.6	3.87	18.8	11 44.3	20 18.6	+5 30.4	-0.8718	0.5596	0.1655	-14	-79
54 Ceti	6.0	3.81	18.1	10 39.2	2 2 33.5	+11 32.5	+1.2703	0.5624	0.1591	+90	+64
28 B. Arietis	6.0	+3.81	+17.1	+11 54.7	6 23.8	-8 45.0	+0.5646	0.5642	+0.1548	+74	0

ELEMENTS FOR THE PREDICTION OF OCCULTATIONS.

SEPTEMBER.

THE STAR'S					AT CONJUNCTION IN R. A.					Limiting Parallels.	
Name.	Mag.	Red'ns from 1920.0.		Apparent Declination.	Greenwich Mean Time.	Hour Angle, H	Y'	x'	y'	N.	S.
		Δα	Δδ								
12 H <sup>1</sup> Arietis	6.3	+3.83	+16.6	+13 5.8	d 7 48.0	- 7 23.7	-0.4466	0.5649	+0.1531	+11	-58
29 Arietis	6.1	3.76	13.8	14 41.1	21 10.5	+ 5 30.7	-0.1514	0.5713	0.1360	+27	-37
o Arietis	5.8	3.78	12.7	14 58.6	s 2 13.9	+10 23.4	+0.2163	0.5738	0.1287	+49	-16
e Arietis	5.5	3.70	12.2	14 45.4	5 13.7	-10 43.2	+0.8218	0.5752	0.1241	+90	+19
124 B. Arietis	6.4	3.72	11.6	16 9.7	5 56.6	-10 1.9	-0.5352	0.5756	0.1230	+ 6	-61
145 B. Arietis	6.5	+3.66	+10.9	+15 32.9	10 52.0	- 5 17.2	+0.6809	0.5779	+0.1152	+90	+11
53 Arietis	6.0	3.70	10.0	17 34.5	12 1.1	- 4 10.6	-1.2688	0.5785	0.1134	-55	-73
26 B. Tauri	6.4	3.59	7.5	17 34.4	23 16.2	+ 6 39.7	-0.0970	0.5836	0.0940	+30	-30
148 B. Tauri	5.9	3.49	6.2	17 5.5	4 7 10.5	- 9 43.7	+1.0796	0.5870	0.0792	+90	+42
163 B. Tauri	5.8	3.48	5.3	17 58.2	10 18.9	- 6 42.5	+0.4206	0.5882	0.0732	+63	+ 1
43 Tauri	5.5	+3.48	+ 4.0	+19 24.0	13 43.5	- 3 25.6	-0.7988	0.5894	+0.0665	-11	-71
85 H <sup>1</sup> Tauri	6.0	3.40	3.4	18 33.2	18 19.6	+ 1 0.0	+0.3487	0.5911	0.0572	+58	- 2
234 B. Tauri	6.0	3.38	2.8	18 51.6	20 10.0	+ 2 46.2	+0.1384	0.5917	0.0534	+44	-13
e Tauri	3.6	3.37	2.5	19 0.3	21 39.1	+ 4 11.9	+0.0677	0.5922	0.0504	+40	-18
282 B. Tauri	6.4	3.34	1.7	19 43.1	5 0 31.1	+ 6 57.3	-0.5220	0.5932	0.0444	+ 6	-52
302 B. Tauri	6.1	+3.26	+ 1.1	+18 35.5	4 47.7	+11 4.0	+0.7937	0.5944	+0.0354	+90	+26
i Tauri	5.1	3.24	0.7	18 42.3	6 50.6	-10 57.9	+0.7460	0.5949	0.0310	+90	+23
312 B. Tauri	6.2	3.24	+ 0.1	19 21.4	8 16.9	- 9 34.8	+0.1268	0.5953	0.0279	+44	-11
333 B. Tauri	6.3	3.18	0.8	19 41.8	12 30.6	- 5 30.9	-0.1199	0.5962	0.0188	+29	-24
m Tauri	5.0	3.17	0.6	18 32.3	13 16.4	- 4 47.0	+1.0683	0.5964	0.0171	+90	+47
l Tauri	5.2	+3.18	- 1.3	+20 18.8	13 24.8	- 4 38.9	-0.7281	0.5964	+0.0168	- 6	-70
107 Tauri	6.5	3.17	1.1	19 45.4	13 50.0	- 4 14.8	-0.1572	0.5965	0.0159	+27	-26
351 B. Tauri	6.2	3.11	2.1	20 8.1	17 59.2	- 0 15.2	-0.4079	0.5973	0.0068	+13	-41
353 B. Tauri	6.5	3.10	2.1	19 44.0	18 40.0	+ 0 24.0	-0.0823	0.5974	+0.0053	+31	-21
119 Tauri	4.9	3.01	2.6	18 32.1	23 10.3	+ 4 43.7	+1.1319	0.5980	-0.0046	+90	+53
120 Tauri	5.6	+3.00	- 2.6	+18 29.0	23 41.8	+ 5 14.0	+1.1813	0.5981	-0.0057	+90	+59
372 B. Tauri	6.1	3.04	3.4	20 25.1	23 43.0	+ 5 15.2	-0.7748	0.5981	0.0058	- 9	-70
B. D. +19° 1110	6.0	2.92	4.6	19 50.8	6 7 10.6	-11 34.8	-0.3016	0.5987	0.0222	+19	-35
x <sup>1</sup> Orionis	4.5	2.91	4.9	20 15.7	7 58.2	-10 49.1	-0.7382	0.5987	0.0240	- 7	-70
57 Orionis	5.8	2.90	4.7	19 44.0	8 11.6	-10 36.3	-0.2111	0.5987	0.0245	+24	-29
64 Orionis	5.1	+2.86	- 5.3	+19 41.5	11 34.5	- 7 21.3	-0.2635	0.5988	-0.0319	+21	-33
x <sup>2</sup> Orionis	4.7	2.86	5.5	20 8.4	11 45.2	- 7 11.0	-0.7217	0.5988	0.0323	- 6	-70
68 Orionis	5.7	2.81	6.0	19 48.5	14 58.6	- 4 5.1	-0.5018	0.5988	0.0393	+ 7	-50
19 B. Geminorum	6.2	2.78	5.7	18 42.0	15 36.1	- 3 29.1	+0.5897	0.5987	0.0407	+79	+13
71 Orionis	5.1	2.77	6.1	19 11.0	16 6.8	- 2 59.8	-0.0822	0.5987	0.0418	+41	-15
v Geminorum	4.1	+2.72	- 7.2	+20 15.7	21 42.4	+ 2 22.9	-1.2724	0.5985	-0.0539	-63	-70
26 Geminorum	5.2	2.60	7.3	17 43.4	7 3 5.9	+ 7 33.6	+0.9636	0.5979	0.0653	+90	+35
74 B. Geminorum	6.2	2.58	7.8	18 16.7	5 4.8	+ 9 27.8	+0.2697	0.5977	0.0695	+52	- 7
110 B. Geminorum	6.2	2.48	8.6	17 52.1	11 5.9	- 8 45.1	-0.2275	0.5967	0.0819	+50	-11
λ Geminorum	3.6	2.38	9.1	16 41.0	17 24.6	- 2 41.0	+0.8614	0.5955	0.0945	+90	+25
162 B. Geminorum	5.7	+2.31	-10.0	+17 15.3	22 56.2	+ 2 37.8	-0.2648	0.5941	-0.1051	+21	-40
68 Geminorum	5.2	2.28	9.7	15 59.8	23 41.0	+ 3 20.8	+0.9202	0.5939	0.1065	+90	+27
f Geminorum	5.3	2.28	10.5	17 51.3	s 2 2.4	+ 5 36.8	-1.2028	0.5932	0.1108	+44	-73
1 Cancri	6.0	2.17	10.8	16 0.1	9 12.1	-11 29.9	-0.1812	0.5911	0.1236	-26	-37
2 B. Cancri	6.0	2.17	11.0	16 43.9	9 49.2	-10 54.2	-0.9917	0.5909	0.1247	-23	-74
5 Cancri	5.9	+2.15	-11.1	+16 40.4	11 2.5	- 9 43.7	-1.0866	0.5906	-0.1268	-31	-74
30 B. Cancri	6.1	2.09	11.0	14 51.8	14 57.6	- 5 57.4	+0.2223	0.5892	0.1333	+49	-16
27 Cancri	5.8	2.00	11.2	12 55.0	21 29.8	+ 0 20.0	+1.2741	0.5870	0.1436	+87	+59
29 Cancri	5.9	2.00	11.6	14 28.4	22 15.9	+ 1 4.4	-0.4011	0.5867	0.1447	+14	-52
84 B. Cancri	6.4	1.97	11.6	13 31.7	9 0 24.7	+ 3 8.3	+0.2345	0.5859	0.1479	+50	-17
Δ <sup>1</sup> Cancri	5.5	+1.93	-11.6	+12 57.9	4 22.2	+ 6 57.0	+0.2038	0.5845	-0.1535	+48	-19

ELEMENTS FOR THE PREDICTION OF OCCULTATIONS.

SEPTEMBER.

THE STAR'S					AT CONJUNCTIONS OF R. A.					Limiting Parallels.	
Name.	Mag.	Red'ns from 1920.0.		Apparent Declination.	Greenwich Mean Time.	Hour Angle, <i>H</i> .	<i>Y</i>	<i>x'</i>	<i>y'</i>	N.	S.
		$\Delta\alpha$	$\Delta\delta$								
<i>A</i> <sup>2</sup> Cancri	5.7	+1.90	-11.7	+12 24.1	d 5 56.5	+ 8 27.8	+0.5284	0.5639	-0.1556	+71	- 2
60 Cancri	5.7	1.87	11.8	11 55.7	9 43.9	-11 53.2	+0.4038	0.5824	0.1606	+61	- 9
$\alpha$ Cancri	4.3	1.86	11.9	12 9.9	10 48.6	-10 50.8	-0.0072	0.5820	0.1620	+36	-31
$\kappa$ Cancri	5.1	1.82	11.9	10 59.3	14 45.0	- 7 3.1	+0.5299	0.5805	0.1667	+71	- 3
209 B. Cancri	6.5	1.82	12.1	11 53.3	15 36.4	- 6 13.7	-0.5191	0.5802	0.1677	+ 7	- 64
222 B. Cancri	6.3	+1.79	-12.2	+11 50.0	19 3.4	- 2 54.2	-1.0606	0.5789	-0.1716	-27	-79
$\omega$ Leonis	5.5	1.76	12.0	+ 9 24.1	23 37.8	+ 1 29.9	+0.6043	0.5771	0.1768	+78	0
<b>NEW MOON.</b>											
<i>g</i> Virginis	5.6	+1.82	- 9.3	- 8 33.5	14 3 32.7	+ 2 1.5	-0.1360	0.5525	-0.1755	+26	-44
50 Virginis	6.2	+1.84	- 9.4	- 9 54.3	4 6.4	+ 2 34.1	+1.1791	0.5524	-0.1750	+81	+38
$\alpha$ Virginis ( <i>Spica</i> )	1.2	1.89	8.9	10 44.8	11 20.8	+ 9 34.3	+0.8246	0.5519	0.1682	+80	+11
$\eta$ Virginis	5.4	1.91	8.4	9 45.3	15 0.2	-10 53.5	-0.8290	0.5517	0.1644	-14	-90
86 Virginis	5.6	1.98	8.2	12 1 7	21 5.1	- 5 0.5	-0.5938	0.5514	0.1579	+70	- 3
$\lambda$ Virginis	4.6	2.13	6.7	13 0.3	15 12 40.7	+10 4.6	-0.6860	0.5508	0.1391	- 8	-89
8 Librae	5.3	+2.32	- 5.6	-15 40.0	16 3 30.8	+ 0 25.5	+0.2502	0.5505	-0.1189	+42	-22
$\alpha$ Librae	2.9	2.32	5.6	15 42.7	3 36.2	+ 0 30.7	+0.2877	0.5505	0.1187	+44	-20
$\nu$ Librae	5.3	2.40	4.6	15 56.9	11 0.3	+ 7 40.4	-0.2958	0.5503	0.1080	+10	-54
22 Librae	6.5	2.41	4.7	16 10.6	11 5.6	+ 7 45.5	-0.0592	0.5503	0.1078	+23	-39
26 Librae	6.3	2.47	4.5	17 28.3	14 43.2	+11 16.0	-0.9603	0.5502	0.1024	+73	+22
28 Librae	6.2	+2.51	- 4.3	-17 52.2	17 41.5	- 9 51.5	+1.0952	0.5502	-0.0979	+73	+33
32 Librae	5.9	2.52	3.3	16 26.4	21 10.3	- 6 29.5	-0.7867	0.5501	0.0925	-19	-90
34 Librae	6.0	2.54	3.1	16 20.2	22 18.6	- 5 23.4	-1.0029	0.5501	0.0907	-34	-90
$\zeta$ Librae	5.6	2.55	3.0	16 35.0	23 22.0	- 4 22.1	-0.8302	0.5500	0.0890	-23	-90
47 Librae	5.8	2.72	2.2	19 8.9	17 9 43.5	+ 5 39.2	+1.1237	0.5497	0.0726	+71	+37
$\beta$ Scorpii	2.9	+2.78	- 1.6	-19 35.3	14 37.8	+10 23.9	+1.2696	0.5495	-0.0646	+71	+61
56 B. Scorpii	5.0	2.78	1.6	19 35.0	14 38.0	+10 24.1	+1.2651	0.5495	0.0646	+71	+59
73 B. Scorpii	6.4	2.77	0.8	18 7.7	16 45.9	-11 32.2	-0.4590	0.5494	0.0611	- 4	- 66
$\nu$ Scorpii	3.9	2.81	1.0	19 15.3	17 43.4	-10 36.6	+0.7140	0.5494	0.0595	+71	+ 5
88 B. Scorpii	6.4	2.80	0.6	18 19.9	18 59.6	- 9 22.9	-0.3695	0.5493	0.0574	+ 1	-59
$\psi$ Ophiuchi	4.6	+2.89	- 0.3	-19 51.1	23 25.4	- 5 5.8	+1.0570	0.5492	-0.0501	+71	+30
$\chi$ Ophiuchi	4.9	2.87	+ 0.5	18 16.5	18 0 49.3	+ 3 44.6	-0.7382	0.5490	0.0477	-21	-90
123 B. Scorpii	6.5	2.98	0.9	20 15.2	7 11.2	+ 2 24.9	+1.1621	0.5486	0.0371	+70	+42
131 B. Scorpii	5.5	2.98	1.2	19 46.3	7 49.0	+ 3 1.5	+0.6104	0.5486	0.0360	+60	- 1
68 B. Ophiuchi	5.9	3.05	1.9	20 16.9	13 15.5	+ 8 17.4	+1.0017	0.5482	0.0269	+70	+26
81 B. Ophiuchi	6.1	+3.05	+ 2.5	-19 24.8	14 59.7	+ 9 58.2	+0.0120	0.5481	-0.0239	+18	-36
29 Ophiuchi	6.4	3.06	3.1	18 46.1	17 16.3	-11 49.7	-0.7589	0.5479	0.0202	-25	-90
109 B. Ophiuchi	6.2	3.12	2.8	20 22.9	18 37.1	-10 31.5	+0.5933	0.5478	-0.0178	+70	+25
305 B. Ophiuchi	6.3	3.33	7.6	18 47.2	19 18 58.6	-10 57.3	-0.7021	0.5454	+0.0230	-21	-90
16 G. Sagittarii	6.4	3.39	7.4	20 19.9	20 54.3	- 9 5.3	+1.0543	0.5452	0.0262	+70	+30
39 G. Sagittarii	6.3	+3.43	+ 8.5	-19 51.4	20 2 17.9	+ 3 52.0	+0.6933	0.5445	+0.0351	+68	+ 4
64 B. Sagittarii	6.1	3.42	9.3	18 41.1	4 21.9	- 1 52.0	-0.5271	0.5442	0.0384	- 9	-72
52 G. Sagittarii	6.4	3.42	9.5	18 29.4	5 18.7	- 0 56.9	-0.7044	0.5441	0.0399	-20	-90
17 H. Sagittarii	6.4	3.44	9.6	18 33.9	5 54.4	- 0 22.4	-0.5055	0.5440	0.0409	- 8	-70
Y Sagittarii ( <i>var.</i> )	5.4	3.45	9.7	18 53.6	7 10.9	+ 0 51.7	-0.1808	0.5439	0.0429	+10	-47
85 B. Sagittarii	6.0	+3.46	+10.6	-17 50.8	10 21.3	+ 3 56.0	-1.1946	0.5434	+0.0480	-56	-90
95 B. Sagittarii	5.7	3.49	10.4	18 48.6	11 25.6	+ 4 58.2	-0.1128	0.5433	0.0498	+14	-43
100 B. Sagittarii	5.0	3.49	10.6	18 27.3	12 1.8	+ 5 33.3	-0.4385	0.5432	0.0507	- 3	-65
187 B. Sagittarii	6.4	3.65	13.4	18 51.5	21 5 18.8	- 1 42.6	+1.1167	0.5410	0.0774	+72	+35
$\rho$ Sagittarii	4.0	3.68	14.8	17 59.7	12 24.7	+ 5 9.8	-0.7486	0.5400	0.0879	+73	+ 7
45 Sagittarii	6.0	+3.70	+14.6	-18 27.2	12 29.1	+ 5 14.2	+1.2614	0.5400	+0.0880	+72	+56

ELEMENTS FOR THE PREDICTION OF OCCULTATIONS.  
SEPTEMBER.

THE STAR'S				AT CONJUNCTION IN R. A.						Limiting Parallels.		
Name.	Mag.	Red'n's from 1920.0.		Apparent Declination.	Greenwich Mean Time.	Hour Angle, H	P'	x'	y'	N.	S.	
		Δα	Δδ									
		s	"	°	d	h	m	h	m	°	'	
54 Sagittarii	5.4	+3.78	+16.7	-16 28.4	21	21	45.0	-9 46.8	-0.0466	0.5389	+0.1012	+23 -38
c Sagittarii	5.2	3.73	16.9	16 18.5	22	28.7	-8 55.4	-0.1388	0.5388	0.1024	+18 -44	
283 B. Sagittarii	5.5	3.73	17.1	15 39.1	23	9.7	-8 25.4	-0.8089	0.5387	0.1031	-19 -90	
g Sagittarii	5.1	3.77	18.2	15 42.0	23	6 15.0	+1 33.3	+0.0094	0.5379	0.1127	+27 -35	
16 B. Capricorni	6.2	3.83	19.9	15 1.9	17	32.6	+9 23.4	+0.6300	0.5368	0.1271	+70 -1	
β Capricorni	3.2	+3.83	+20.0	-15 1.8	17	39.6	+9 30.0	+0.6416	0.5368	+0.1272	+71 0	
45 B. Capricorni	6.1	3.86	21.1	13 59.5	23	0 12.8	-8 8.9	+0.3618	0.5363	0.1350	+51 -16	
84 B. Capricorni	6.0	3.89	22.3	12 50.1	8	26.2	-0 10.7	+0.2452	0.5357	0.1443	+45 -22	
16 B. Aquarii	6.4	3.88	22.8	11 52.2	9	38.7	+0 59.6	-0.6338	0.5357	0.1456	-4 -82	
ν Aquarii	4.5	3.92	23.6	11 41.4	17	52.5	+5 58.2	+0.4028	0.5354	0.1540	+56 -14	
51 G. Aquarii	6.5	+3.92	+24.0	-10 55.8	20	13.5	+11 14.9	-0.0592	0.5353	+0.1563	+29 -39	
17 Aquarii	6.3	3.93	24.7	9 39.3	24	0 33.9	-8 32.6	-0.7534	0.5353	0.1604	-10 -90	
19 Aquarii	5.6	3.94	24.6	10 5.0	1	41.8	-7 26.8	-0.1104	0.5353	0.1614	+26 -42	
ξ Aquarii	4.8	3.96	25.5	8 12.4	7	58.4	-1 21.8	-1.1132	0.5355	0.1698	-34 -90	
c <sup>1</sup> Capricorni	5.3	3.98	25.6	9 26.6	11	35.4	+2 8.6	+0.8340	0.5356	0.1698	+81 +11	
c <sup>2</sup> Capricorni	6.3	+3.98	+25.6	-9 98.3	12	13.2	+2 45.2	+1.1523	0.5356	+0.1703	+81 +35	
30 Aquarii	5.6	4.00	26.6	6 54.1	20	43.7	+11 0.2	-0.3269	0.5362	0.1765	+16 -55	
44 Aquarii	5.7	4.02	27.1	5 46.8	25	3 38.0	-6 18.4	-0.2996	0.5368	0.1808	+18 -54	
51 Aquarii	5.8	4.08	27.3	5 14.1	7	7.2	-2 55.6	-0.2500	0.5372	0.1828	+21 -51	
κ Aquarii	5.2	4.05	27.5	4 38.0	13	53.9	+3 38.5	+0.3567	0.5382	0.1861	+57 -16	
207 B. Aquarii	6.3	+4.06	+27.7	-3 57.8	15	24.4	+5 6.2	-0.0788	0.5384	+0.1868	+31 -40	
6 G. Piscium	6.2	4.08	27.8	2 49.0	26	0 2.0	-10 32.3	+0.3240	0.5400	0.1899	+55 -18	
22 B. Piscium	6.4	4.13	28.0	0 8.4	12	25.2	+1 27.6	-0.1452	0.5429	0.1925	+28 -44	
κ Piscium	4.9	4.14	28.0	+0 49.5	14	4.6	+3 3.9	-0.8467	0.5433	0.1927	-12 -90	
9 Piscium	6.4	4.13	28.0	0 41.4	14	13.8	+3 12.8	-0.6747	0.5434	0.1927	-1 -85	
16 Piscium	5.7	+4.14	+27.9	+1 40.0	18	40.5	+7 81.1	-0.8459	0.5448	+0.1929	-12 -89	
λ Piscium	4.6	4.15	27.6	1 20.8	21	24.7	+10 10.1	-0.0184	0.5454	0.1929	+37 -35	
22 Piscium	5.8	4.17	27.5	2 29.6	27	2 10.8	-9 12.8	-0.2682	0.5469	0.1926	+21 -51	
25 Piscium	6.2	4.16	27.5	1 39.2	2	42.9	-8 41.9	+0.7176	0.5470	0.1925	+90 +5	
51 Piscium	5.6	4.25	26.1	6 31.3	21	21.0	+9 26.1	-0.8297	0.5588	0.1873	-11 -84	
60 Piscium	6.2	+4.25	+25.3	+0 18.7	28	4 20.0	-7 54.8	+0.6848	0.5597	+0.1838	+87 +3	
62 Piscium	6.1	4.26	25.2	6 52.2	4	44.8	-7 31.0	+0.1790	0.5599	0.1835	+46 -24	
δ Piscium	4.6	4.26	25.2	7 9.4	4	55.5	-7 20.5	-0.0856	0.5599	0.1834	+31 -89	
ε Piscium	4.4	4.26	24.7	7 28.0	11	29.7	-0 59.5	+0.7838	0.5598	0.1792	+90 +10	
π Piscium	5.6	4.34	21.7	11 44.3	29	2 54.6	-10 6.0	-0.9655	0.5669	0.1662	-20 -79	
54 Ceti	6.0	+4.30	+20.8	+10 39.2	9	1.6	+4 11.8	+1.1492	0.5697	+0.1597	+90 +39	
26 B. Arietis	6.0	4.33	19.9	11 54.8	12	47.1	-0 34.2	+0.4449	0.5715	0.1568	+64 -7	
12 H <sup>1</sup> Arietis	6.3	4.35	19.5	13 5.8	14	9.5	+0 45.3	-0.5594	0.5722	0.1538	+5 -66	
29 Arietis	6.1	4.35	16.7	14 41.1	30	3 15.8	-10 36.6	-0.2820	0.5783	0.1364	+20 -45	
o Arietis	5.8	4.34	15.5	14 58.7	8	13.4	-5 49.7	+0.0775	0.5806	0.1291	+40 -23	
σ Arietis	5.5	+4.32	+14.9	+14 45.4	11	9.9	-2 59.7	+0.6758	0.5818	+0.1245	+85 +10	
124 B. Arietis	6.4	4.36	14.4	16 9.7	11	52.0	-2 19.2	-0.6719	0.5822	0.1234	-2 -72	
145 B. Arietis	6.5	+4.32	+13.4	+15 33.0	16	42.3	+2 20.4	+0.5311	0.5842	+0.1155	+72 +3	

OCTOBER.

26 B. Tauri	6.4	+4.30	+9.9	+17 34.4	1	4 54.9	-9 54.3	-0.2512	0.5889	+0.0940	+21 -39
33 B. Tauri	6.3	4.24	9.9	16 16.8	7	6.4	-7 47.7	+1.2668	0.5897	0.0899	+84 +63
148 B. Tauri	5.9	4.22	8.3	17 5.5	12	43.0	-2 23.9	+0.9146	0.5916	+0.0792	+90 +29
162 B. Tauri	6.3	4.19	7.5	17 4.4	15	45.4	+0 31.6	+1.1647	0.5925	0.0732	+90 +51
163 B. Tauri	5.8	+4.22	+7.3	+17 58.3	15	49.3	+0 35.3	+0.2574	0.5925	+0.0731	+51 -8

ELEMENTS FOR THE PREDICTION OF OCCULTATIONS.

OCTOBER.

THE STAR'S				AT CONJUNCTIONS IN R. A.					Limiting Parallels.		
Name.	Mag.	Red'ns from 1920.0.		Apparent Declination.	Greenwich Mean Time.	Hour Angle, H	Y	z'	y'	N.	S.
		$\Delta\alpha$	$\Delta\delta$								
43 Tauri	5.5	+4.24	+6.0	+19 24.0	d 19 11.8	+ 3 30.1	-0.9589	0.5934	+0.0663	-2	-71
85 H <sup>1</sup> Tauri	6.0	4.17	6.1	18 33.2	23 45.5	+ 8 13.3	+0.1823	0.5946	0.0570	+47	-11
234 B. Tauri	6.0	4.16	4.5	18 51.6	2 1 35.0	+ 9 58.6	-0.0231	0.5950	0.0533	+34	-22
68 Tauri	4.3	4.12	4.8	17 44.8	1 48.9	+10 11.9	+1.1134	0.5950	0.0528	+90	+48
e Tauri	3.6	4.15	4.1	19 0.3	3 3.5	+11 23.6	-0.0991	0.5953	0.0562	+30	-26
119 H <sup>1</sup> Tauri	6.2	+4.09	+4.0	+17 51.0	5 3.7	-10 49.9	+1.1692	0.5957	+0.0460	+90	+54
282 B. Tauri	6.4	4.13	3.2	19 43.1	5 54.4	- 9 52.1	-0.6884	0.5958	0.0442	-4	-68
302 B. Tauri	6.1	4.06	2.4	18 35.5	10 9.7	- 5 46.7	+0.6234	0.5965	0.0352	+83	+16
i Tauri	5.1	4.04	1.9	18 42.3	12 12.1	- 3 49.1	+0.5755	0.5968	0.0306	+77	+13
312 B. Tauri	6.2	4.04	1.3	19 21.4	13 38.1	- 2 26.4	-0.0432	0.5970	0.0277	+33	-21
333 B. Tauri	6.3	+3.99	+0.1	+19 41.9	17 51.4	+ 1 37.0	-0.2906	0.5973	+0.0196	+19	-34
m Tauri	5.0	3.98	+0.4	18 32.3	18 37.0	+ 2 20.9	+0.8970	0.5974	0.0170	+90	+34
l Tauri	5.2	4.00	-0.3	20 18.8	18 45.5	+ 2 29.1	-0.8987	0.5974	0.0167	-18	-70
107 Tauri	6.5	3.98	0.2	19 45.4	19 10.6	+ 2 58.2	-0.3280	0.5974	0.0158	+17	-37
351 B. Tauri	6.2	3.94	1.3	20 3.1	23 19.8	+ 6 52.6	-0.5795	0.5977	0.0067	+2	-54
353 B. Tauri	6.5	+3.92	-1.4	+19 44.0	3 0 0.7	+ 7 31.9	-0.2539	0.5977	+0.0058	+21	-31
119 Tauri	4.9	3.82	2.0	18 32.1	4 31.5	+11 52.1	+0.9615	0.5977	-0.0046	+90	+40
120 Tauri	5.6	3.82	2.2	18 29.0	5 3.0	+11 37.6	+1.0110	0.5977	-0.0057	+90	+43
372 B. Tauri	6.1	3.87	2.8	20 25.1	5 4.3	-11 36.4	-0.9476	0.5977	0.0058	-22	-70
B. D.+19°1110	6.0	3.75	4.4	19 50.8	12 33.9	- 4 24.2	-0.4740	0.5972	0.0221	+9	-48
$\chi^1$ Orionis	4.5	+3.74	-4.8	+20 15.7	13 21.8	- 3 36.2	-0.9116	0.5972	-0.0238	-19	-70
57 Orionis	5.8	3.73	4.6	19 44.0	13 35.3	- 3 25.3	-0.3832	0.5971	0.0243	+14	-41
64 Orionis	5.1	3.68	5.4	19 41.5	16 59.6	- 0 8.9	-0.4355	0.5968	0.0316	+11	-45
$\chi^2$ Orionis	4.7	3.69	5.5	20 8.4	17 10.4	+ 0 1.5	-0.8953	0.5967	0.0320	-18	-70
68 Orionis	5.7	3.63	6.2	19 48.5	20 25.5	+ 3 9.1	-0.6744	0.5963	0.0390	-3	-66
19 B. Geminorum	6.2	+3.60	-5.9	+18 42.0	21 3.2	+ 3 45.3	+0.4215	0.5962	-0.0403	+63	+3
124 H <sup>1</sup> Orionis	5.7	3.57	5.7	17 55.7	21 26.1	+ 4 7.2	+1.1879	0.5961	0.0411	+90	+57
71 Orionis	5.1	3.59	6.3	19 11.0	21 34.2	+ 4 15.0	-0.0878	0.5961	0.0414	+31	-25
292 B. Orionis	6.5	3.52	6.3	17 48.0	4 0 13.6	+ 6 48.3	+1.1945	0.5957	0.0470	+90	+57
26 Geminorum	5.2	3.40	8.1	17 43.3	8 40.9	- 9 4.6	+0.8017	0.5939	0.0645	+90	+23
74 B. Geminorum	6.2	+3.38	-8.6	+18 16.7	10 41.4	- 7 8.0	+0.1046	0.5934	-0.0696	+42	-16
110 B. Geminorum	6.2	3.28	9.6	17 52.0	16 48.1	- 1 15.4	+0.0650	0.5917	0.0807	+39	-20
41 H <sup>1</sup> Geminorum	6.0	3.24	9.2	16 47.3	16 52.1	- 1 11.6	+1.1528	0.5917	0.0806	+90	+48
51 Geminorum	5.3	3.17	9.8	16 17.6	21 17.5	+ 3 3.7	+1.2779	0.5904	0.0893	+80	+66
$\lambda$ Geminorum	3.6	3.15	10.3	16 41.0	23 13.4	+ 4 55.2	+0.7071	0.5898	0.0930	+90	+15
162 B. Geminorum	5.7	+3.06	-11.4	+17 15.3	3 4 51.2	+10 20.2	-0.4248	0.5879	-0.1033	+12	-51
68 Geminorum	5.2	3.04	11.1	15 59.8	5 37.0	+11 4.2	+0.7708	0.5876	0.1047	+90	+18
1 Cancri	6.0	2.89	12.5	16 0.1	15 20.3	- 3 34.3	-0.3337	0.5841	0.1213	+17	-47
2 B. Cancri	6.0	2.90	12.8	16 43.9	15 58.2	- 2 57.8	-1.1515	0.5839	0.1223	-38	-74
5 Cancri	5.9	2.88	13.0	16 40.4	17 13.2	- 1 45.0	-1.2466	0.5834	0.1244	-50	-74
12 Cancri	6.2	+2.79	-12.4	+13 52.3	20 16.8	+ 1 11.3	+1.2066	0.5822	-0.1292	+90	+52
30 B. Cancri	6.1	2.79	12.8	14 51.8	21 13.7	+ 2 6.1	+0.0785	0.5819	0.1307	+40	-24
27 Cancri	5.8	2.67	13.1	12 55.0	3 55.4	+ 8 35.0	+1.1474	0.5793	0.1407	+90	+41
29 Cancri	5.9	2.68	13.6	14 28.4	4 42.7	+ 9 18.7	-0.5451	0.5790	0.1418	+5	-64
84 B. Cancri	6.4	2.63	13.6	13 31.7	6 54.7	+11 25.8	+0.0997	0.5781	0.1448	+41	-25
$\Delta^1$ Cancri	5.5	+2.57	-13.7	+12 57.9	10 58.2	- 8 39.4	+0.0725	0.5765	-0.1503	+40	-26
$\Delta^2$ Cancri	5.7	2.54	13.7	12 24.0	12 35.0	- 7 6.1	+0.4023	0.5760	0.1524	+61	-9
60 Cancri	5.7	2.49	13.9	11 55.7	16 28.3	- 3 21.2	+0.2304	0.5744	0.1572	+53	-16
$\alpha$ Cancri	4.3	2.48	14.1	12 9.9	17 34.7	- 2 17.2	-0.1342	0.5739	0.1586	+23	-39
$\kappa$ Cancri	5.1	2.42	13.9	10 59.2	21 37.3	+ 1 36.8	+0.4136	0.5724	0.1632	+62	-9
309 B. Cancri	6.5	+2.41	-14.3	+11 53.2	22 30.0	+ 2 27.6	-0.6466	0.5720	-0.1642	0	-75



ELEMENTS FOR THE PREDICTION OF OCCULTATIONS.

OCTOBER.

THE STAR'S				AT CONJUNCTION IN R. A.					Limiting Parallels.		
Name.	Mag.	Red'ns from 1920.0.		Apparent Declination.	Greenwich Mean Time.	Hour Angle, <i>H</i>	<i>T'</i>	<i>x'</i>	<i>y'</i>	N.	S.
		$\Delta\alpha$	$\Delta\delta$								
222 B. Cancrī	6.3	+2.37	-14.5	+11 50.0	d 7 2 2.6	+ 5 52.6	-1.1894	0.5707	-0.1680	-39	-79
ω Leonis	5.5	2.30	14.1	9 24.1	6 43.7	+10 23.9	+0.4995	0.5690	0.1726	+68	- 6
λ Leonis	5.2	2.23	14.3	10 3.9	8 16.5	+11 53.5	-0.4451	0.5685	0.1740	+11	-61
89 B. Leonis	6.2	2.15	14.4	8 41.5	19 57.4	- 0 49.9	-1.1353	0.5646	0.1834	-34	-82
τ Leonis	4.9	2.14	14.4	8 25.5	20 53.9	+ 0 4.6	-1.0347	0.5642	0.1841	-25	-82
14 Sextantis	6.3	+2.10	-13.8	+ 5 59.9	23 52.8	+ 2 57.4	+0.8961	0.5634	-0.1860	+90	+16
155 B. Leonis	6.5	2.03	14.0	6 5.8	8 7 20.6	+10 9.9	-0.6084	0.5612	0.1902	+ 2	-76
p <sup>α</sup> Leonis	5.7	1.87	13.2	2 23.2	9 3 25.0	+ 5 33.9	-0.6860	0.5566	0.1960	- 2	-86
p <sup>β</sup> Leonis	5.3	1.88	12.7	0 27.7	6 35.3	+ 8 37.9	+0.7803	0.5500	0.1963	+90	+ 8
359 B. Leonis	6.3	1.86	12.6	+ 0 34.1	11 1.2	-11 5.0	-0.3019	0.5553	0.1964	+19	-54
NEW MOON.											
ν Librae	5.3	+2.14	- 3.5	-15 56.9	13 19 42.3	- 5 49.7	-0.2008	0.5540	-0.1078	+16	-48
22 Librae	6.5	2.16	3.5	16 10.6	19 47.6	- 5 44.5	+0.0354	0.5539	0.1077	+28	-34
26 Librae	6.3	2.20	3.2	17 28.3	23 23.5	- 2 15.8	+1.0561	0.5540	0.1023	+73	+29
28 Librae	6.2	+2.23	- 3.0	-17 52.2	14 2 20.4	+ 0 35.3	+1.1930	0.5540	-0.0977	+73	+44
32 Librae	5.9	2.22	2.2	16 26.4	5 47.5	+ 3 55.6	-0.6827	0.5540	0.0924	-13	-90
34 Librae	6.0	2.23	2.0	16 20.2	6 55.2	+ 5 1.0	-0.8976	0.5540	0.0906	-26	-90
ζ Librae	5.6	2.24	1.9	16 35.0	7 58.0	+ 6 1.8	-0.7245	0.5539	0.0890	-16	-90
47 Librae	5.8	2.36	- 1.0	19 8.9	18 14.1	- 8 2.4	+1.2321	0.5536	0.0725	+71	+61
73 B. Scorpii	6.4	+2.40	+ 0.3	-18 7.7	15 1 12.8	- 1 17.5	-0.3430	0.5533	-0.0610	+ 3	-57
ν Scorpii	3.9	2.43	0.1	19 15.2	2 9.8	+ 0 22.3	+0.8278	0.5533	0.0694	+71	+13
88 B. Scorpii	6.4	2.41	0.4	18 19.9	3 25.3	+ 0 50.7	-0.2525	0.5532	0.0673	+ 8	-51
ψ Ophiuchi	4.6	2.48	0.8	19 51.1	7 48.8	+ 5 5.5	+1.1730	0.5528	0.0499	+71	+43
χ Ophiuchi	4.9	2.47	1.4	18 16.5	9 12.1	+ 6 26.1	-0.6175	0.5527	0.0476	-14	-82
131 B. Scorpii	5.5	+2.56	+ 2.2	-19 46.3	16 8.4	-10 51.2	+0.7312	0.5521	-0.0656	+71	+ 7
68 B. Ophiuchi	5.9	2.61	2.8	20 16.9	21 32.4	- 5 37.9	+1.1239	0.5515	0.0267	+71	+87
81 B. Ophiuchi	6.1	2.61	3.3	19 24.8	23 15.9	- 8 57.8	+0.1268	0.5512	0.0237	+25	-28
29 Ophiuchi	6.4	2.61	3.8	18 46.1	16 1 31.5	- 1 46.6	-0.6818	0.5510	0.0199	-17	-84
109 B. Ophiuchi	6.2	2.66	3.6	20 22.9	2 51.8	+ 0 29.0	+1.1175	0.5506	0.0176	+70	+37
192 B. Ophiuchi	6.3	+2.70	+ 5.7	-18 22.2	12 15.6	+ 8 36.4	-1.1868	0.5494	-0.0017	-59	-90
805 B. Ophiuchi	6.3	2.84	7.9	18 47.2	17 3 6.4	- 1 1.7	-0.5703	0.5469	+0.0231	-13	-77
16 G. Sagittarii	6.4	2.89	7.6	20 19.9	5 1.8	+ 0 50.0	+1.1851	0.5465	0.0283	+70	+45
39 G. Sagittarii	6.3	2.93	8.6	19 51.4	10 24.8	+ 6 2.6	+0.8249	0.5454	0.0351	+71	+13
64 B. Sagittarii	6.1	2.92	9.4	18 41.1	12 28.7	+ 8 2.5	-0.3950	0.5450	0.0384	- 2	-61
52 G. Sagittarii	6.4	+2.92	+ 9.5	-18 29.4	13 25.4	+ 8 57.5	-0.5724	0.5448	+0.0400	-12	-77
17 H. Sagittarii	6.4	2.93	9.6	18 38.9	14 1.1	+ 9 32.0	-0.3735	0.5447	0.0409	- 1	-60
Y Sagittarii (var.)	5.4	2.95	9.7	18 53.6	15 17.6	+10 46.1	-0.0488	0.5444	0.0430	+17	-39
85 B. Sagittarii	6.0	2.96	10.5	17 50.8	18 28.0	-10 9.6	-1.0630	0.5438	0.0480	-43	-90
95 B. Sagittarii	5.7	2.99	10.3	18 46.6	19 32.3	- 9 7.3	-0.0190	0.5436	0.0497	+22	-35
100 B. Sagittarii	5.0	+2.96	+10.6	-18 27.3	20 8.5	- 8 32.3	-0.3068	0.5434	+0.0507	+ 4	-55
187 B. Sagittarii	6.4	3.15	13.0	18 51.5	18 13 28.1	+ 8 14.5	+1.2487	0.5398	0.0771	+72	+54
ρ Sagittarii	4.0	3.18	14.3	17 59.7	20 36.2	- 8 50.8	+0.8789	0.5383	0.0874	+73	+16
ν Sagittarii	4.4	3.15	15.0	16 6.1	20 39.5	- 8 47.6	-1.2105	0.5383	0.0875	-54	-90
54 Sagittarii	5.4	3.24	16.0	16 28.4	19 6 0.8	+ 0 16.2	+0.0797	0.5366	0.1004	+31	-31
ε Sagittarii	5.2	+3.25	+16.2	-16 18.5	6 54.3	+ 1 8.0	-0.0129	0.5364	+0.1016	+25	-36
283 B. Sagittarii	5.5	3.24	16.4	15 39.1	7 25.6	+ 1 38.3	-0.6849	0.5362	0.1023	-11	-90
g Sagittarii	5.1	3.30	17.4	15 42.0	14 34.4	+ 8 33.9	+0.1331	0.5350	0.1117	+35	-28
16 B. Capricorni	6.2	3.38	19.0	15 2.0	20 1 56.4	- 4 23.0	+0.7512	0.5333	0.1267	+75	+ 7
β Capricorni	3.2	3.38	19.0	15 1.8	2 5.5	- 4 16.2	+0.7627	0.5333	0.1259	+75	+ 8
45 B. Capricorni	6.1	+3.42	+20.1	-13 56.5	8 43.0	+ 2 9.2	+0.4791	0.5325	+0.1336	+60	- 9

ELEMENTS FOR THE PREDICTION OF OCCULTATIONS.

OCTOBER.

THE STAR'S				AT CONJUNCTION IN R. A.					Limiting Parallels.		
Name.	Mag.	Red'ns from 1920.0.		Apparent Declination.	Greenwich Mean Time.		P	r'	y'	N.	S.
		$\Delta\alpha$	$\Delta\delta$		d h m	h m					
84 B. Capricorni	6.0	+3.48	+21.3	-12 50.1	20 17 2.0	+10 15.1	+0.3577	0.5317	+0.1426	+52	-16
16 B. Aquarii	6.4	3.47	21.8	11 52.2	18 15.4	+11 24.2	-0.5253	0.5316	0.1439	+ 2	-71
v Aquarii	4.5	3.53	22.6	11 41.4	21 2 35.1	- 4 31.3	+0.5104	0.5312	0.1522	+64	- 7
51 G. Aquarii	6.5	3.54	23.0	10 55.8	4 57.8	- 2 12.9	+0.0451	0.5311	0.1544	+35	-33
17 Aquarii	6.3	3.56	23.7	9 39.3	9 21.3	+ 2 2.6	-0.6555	0.5311	0.1584	- 4	-84
19 Aquarii	5.6	+3.57	+23.6	-10 5.0	10 30.1	+ 3 9.3	-0.0097	0.5311	+0.1594	+32	-36
ξ Aquarii	4.8	3.61	24.7	8 12.4	16 51.2	+ 9 18.9	-1.0206	0.5312	0.1648	-26	-90
c <sup>1</sup> Capricorni	5.3	3.64	24.6	9 26.6	20 30.7	-11 8.2	+0.9308	0.5314	0.1677	+81	+18
c <sup>2</sup> Capricorni	6.3	3.65	24.5	9 38.3	21 9.0	-10 31.1	+1.2497	0.5314	0.1682	+81	+46
30 Aquarii	5.6	3.70	25.8	6 54.1	22 5 45.2	- 2 10.5	-0.2408	0.5321	0.1744	+21	-50
138 B. Aquarii	6.4	+3.72	+26.5	- 5 6.5	10 32.1	+ 2 27.7	-1.3339	0.5327	+0.1774	-63	-78
44 Aquarii	5.7	3.75	26.4	5 46.8	12 43.8	+ 4 35.4	-0.2188	0.5330	0.1787	+23	-48
51 Aquarii	5.8	3.77	26.6	5 14.1	16 15.0	+ 8 0.2	-0.1719	0.5336	0.1807	+25	-46
κ Aquarii	5.2	3.82	26.8	4 38.0	23 5.3	- 9 22.1	+0.4304	0.5349	0.1842	+62	-12
207 B. Aquarii	6.3	3.83	27.1	3 57.8	23 33.1	- 9 39.8	-0.0073	0.5352	0.1848	+35	-36
6 G. Piscium	6.2	+3.90	+27.4	- 2 49.0	9 17.7	+ 0 31.4	+0.3835	0.5374	+0.1881	+60	-14
22 B. Piscium	6.4	4.00	27.9	0 8.4	21 44.2	-11 25.3	-0.0921	0.5412	0.1910	+30	-41
κ Piscium	4.9	4.02	28.0	0 49.5	23 23.8	- 9 48.9	-0.7947	0.5417	0.1912	- 9	-90
9 Piscium	6.4	4.01	28.0	0 41.4	23 33.1	- 9 39.8	-0.6230	0.5418	0.1913	+ 2	-79
16 Piscium	5.7	4.05	28.1	1 40.0	24 4 0.2	- 5 21.2	-0.7978	0.5434	0.1916	- 9	-80
λ Piscium	4.6	+4.06	+27.7	+ 1 20.8	6 44.5	- 2 42.1	+0.0632	0.5445	+0.1917	+39	-32
19 Piscium	5.4	4.10	28.0	3 3.0	8 50.0	- 0 40.6	-1.3262	0.5453	0.1917	-58	-82
22 Piscium	5.8	4.12	27.8	2 29.6	11 30.5	+ 1 54.8	-0.2272	0.5465	0.1915	+23	-49
25 Piscium	6.2	4.11	27.6	1 39.2	12 2.6	+ 2 25.8	+0.7561	0.5467	0.1915	+90	+ 6
51 Piscium	5.6	4.29	26.8	6 31.3	25 6 35.7	- 3 37.2	-0.8028	0.5566	0.1870	- 9	-84
60 Piscium	6.2	+4.33	+26.0	+ 6 18.7	13 31.1	+ 3 4.3	+0.6981	0.5592	+0.1837	+89	+ 4
62 Piscium	6.1	4.35	26.0	6 52.2	13 55.4	+ 3 27.8	+0.1946	0.5594	0.1835	+47	-24
δ Piscium	4.6	4.35	26.0	7 9.4	14 6.2	+ 3 38.2	-0.0687	0.5596	0.1834	+32	-38
e Piscium	4.4	4.39	25.3	7 28.0	20 36.0	+ 9 54.8	+0.7896	0.5631	0.1794	+90	+11
π Piscium	5.6	4.56	23.1	11 44.3	26 11 47.4	+ 0 34.5	-0.9592	0.5719	0.1668	-20	-79
54 Ceti	6.0	+4.56	+21.9	+10 39.2	17 47.7	+ 6 22.1	+1.1321	0.5754	+0.1605	+90	+38
26 B. Arietis	6.0	4.61	21.2	11 54.8	21 28.8	+ 9 55.3	+0.4314	0.5776	0.1563	+63	- 7
12 H <sup>1</sup> . Arietis	6.3	4.64	21.0	13 5.8	22 49.5	+11 13.0	-0.5642	0.5784	0.1547	+ 4	-67
29 Arietis	6.1	4.72	18.2	14 41.2	27 11 38.5	- 0 26.0	-0.2983	0.5858	0.1375	+19	-46
o Arietis	5.8	4.74	16.9	14 58.7	16 28.9	+ 4 13.6	+0.0543	0.5885	0.1302	+39	-25
σ Arietis	5.5	+4.74	+16.2	+14 45.5	19 21.0	+ 6 59.2	+0.6437	0.5900	+0.1256	+84	+ 8
124 B. Arietis	6.4	4.79	16.0	16 9.7	20 2.1	+ 7 38.8	-0.6887	0.5904	0.1245	- 3	-73
145 B. Arietis	6.5	4.77	14.7	15 33.0	23 0 44.9	-11 49.2	-0.4973	0.5927	0.1166	+69	+ 1
26 B. Tauri	6.4	4.84	11.1	17 34.5	12 37.8	- 0 23.7	-0.2819	0.5982	0.0949	+20	-41
33 B. Tauri	6.3	4.79	10.9	16 18.8	14 45.6	+ 1 39.1	+1.2158	0.5990	0.0908	+90	+55
148 B. Tauri	5.9	+4.80	+ 9.3	+17 5.5	20 12.9	+ 6 53.6	+0.8654	0.6010	+0.0799	+90	+26
162 B. Tauri	6.3	4.78	8.4	17 4.4	23 10.1	+ 9 43.9	+1.1109	0.6020	0.0739	+90	+45
163 B. Tauri	5.8	4.82	8.3	17 58.3	23 13.9	+ 9 47.5	+0.2152	0.6020	0.0738	+49	-11
180 B. Tauri	6.1	4.78	7.6	17 7.7	2 4.8	-11 28.3	+1.2613	0.6028	0.0679	+83	+65
43 Tauri	5.5	4.86	7.1	19 24.0	2 30.7	-11 3.4	-0.9869	0.6030	0.0670	-24	-71
85 H <sup>1</sup> . Tauri	6.0	+4.80	+ 5.9	+18 33.2	6 56.6	- 6 48.0	+0.1379	0.6041	+0.0575	+44	-14
234 B. Tauri	6.0	4.81	5.3	18 51.6	8 43.1	- 5 5.8	-0.0705	0.6045	0.0537	+32	-25
68 Tauri	4.3	4.77	5.5	17 44.8	8 56.5	- 4 52.8	+1.0563	0.6046	0.0532	+90	+43
ε Tauri	3.6	4.80	4.9	19 0.3	10 9.1	- 3 43.1	-0.1411	0.6048	0.0506	+27	-29
119 H <sup>1</sup> . Tauri	6.2	4.75	4.5	17 51.0	12 5.9	- 1 51.0	+1.1104	0.6052	0.0463	+90	+48
282 B. Tauri	6.4	+4.81	+ 3.9	+19 43.1	12 55.2	- 1 8.7	-0.7239	0.6063	+0.0445	- 6	-71

ELEMENTS FOR THE PREDICTION OF OCCULTATIONS.

OCTOBER.

THE STAR'S				AT CONJUNCTION IN R. A.					Limiting Parallels.		
Name.	Mag.	Red'ns from 1920.0.		Apparent Declination.	Greenwich Mean Time.	Hour Angle, H	Y'	x'	y'	N.	S.
		$\Delta\alpha$	$\Delta\delta$								
302 B. Tauri	6.1	+4.74	+2.9	+18 35.5	29 17 3.4	+2 54.8	+0.5699	0.6059	+0.0354	+77	+12
i Tauri	5.1	4.73	2.3	18 42.3	19 2.4	+4 48.8	+0.5219	0.6061	0.0310	+72	+10
312 B. Tauri	6.2	4.75	1.7	19 21.4	20 26.1	+6 9.2	-0.0895	0.6062	0.0273	+30	-23
333 B. Tauri	6.3	4.72	0.4	19 41.9	30 0 32.5	+10 5.7	-0.3350	0.6064	0.0186	+17	-38
m Tauri	5.0	4.71	+0.5	18 32.3	1 16.9	+10 48.3	+0.8380	0.6065	0.0169	+90	+30
l Tauri	5.2	+4.73	0.0	+20 18.8	1 25.1	+10 56.2	-0.9360	0.6065	+0.0168	-21	-70
107 Tauri	6.5	4.71	0.0	19 45.4	1 49.6	+11 19.6	-0.3724	0.6065	0.0157	+15	-40
351 B. Tauri	6.2	4.68	-1.3	20 3.1	5 52.2	-8 47.4	-0.6220	0.6065	0.0066	0	-59
353 B. Tauri	6.5	4.67	1.4	19 44.9	6 32.0	-8 9.1	-0.3004	0.6064	+0.0051	+19	-34
119 Tauri	4.9	4.58	-2.4	18 32.1	10 56.0	-8 35.8	+0.9001	0.6062	-0.0049	+90	+35
120 Tauri	5.6	+4.58	-2.5	+18 29.0	11 26.8	-3 26.3	+0.9489	0.6061	-0.0061	+90	+39
372 B. Tauri	6.1	4.64	3.0	20 25.1	11 28.0	-3 25.1	-0.9874	0.6061	0.0061	-25	-70
B. D.+19°1110	6.0	4.54	5.0	19 50.8	18 46.8	+3 36.2	-0.5210	0.6051	0.0226	+6	-51
x <sup>1</sup> Orionis	4.5	4.54	5.4	20 15.7	19 33.5	+4 21.0	-0.9541	0.6050	0.0243	-22	-70
57 Orionis	5.8	4.53	5.2	19 44.0	19 48.7	+4 33.6	-0.4313	0.6049	0.0248	-11	-44
64 Orionis	5.1	+4.48	-6.1	+19 41.5	23 6.5	+7 45.5	-0.4837	0.6042	-0.0322	+8	-48
x <sup>2</sup> Orionis	4.7	4.50	6.3	20 8.4	23 17.0	+7 55.6	-0.9388	0.6042	0.0325	-21	-70
68 Orionis	5.7	4.44	7.1	19 48.5	31 2 27.8	+10 58.8	-0.7203	0.6034	0.0395	-6	-71
19 B. Geminorum	6.2	4.40	6.9	18 42.0	3 4.8	+11 34.3	+0.3642	0.6033	0.0409	+59	+1
124 H. Orionis	5.7	4.38	6.8	17 55.7	3 27.2	+11 55.8	+1.1232	0.6031	0.0417	+90	+50
71 Orionis	5.1	+4.41	-7.4	+19 11.0	3 35.1	-11 56.6	-0.1401	0.6031	-0.0420	+27	-28
292 B. Orionis	6.5	4.34	7.5	17 48.0	6 11.3	-9 26.6	+1.1298	0.6024	0.0478	+90	+50
26 Geminorum	5.2	4.22	9.6	17 43.3	14 29.0	-1 28.4	+0.7409	0.5997	0.0652	+90	+19
74 B. Geminorum	6.2	4.21	10.2	18 16.7	16 27.6	+0 25.4	+0.0495	0.5989	0.0692	+39	-19
110 B. Geminorum	6.2	4.11	11.4	17 52.0	22 28.4	+6 12.2	+0.0100	0.5965	0.0813	+37	-22
41 H. Geminorum	6.0	+4.08	-11.1	+16 47.3	22 32.4	+6 16.0	+1.0900	0.5965	-0.0815	+90	+43

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51 Geminorum	5.3	+4.00	-12.0	+16 17.6	1 2 54.1	+10 27.7	+1.2152	0.5946	-0.0899	+90	+55
λ Geminorum	3.6	+3.98	-12.5	+16 40.9	4 48.6	-11 42.3	+0.6483	0.5937	-0.0935	+85	+11
162 B. Geminorum	5.7	3.92	13.8	17 15.2	10 22.6	-6 21.1	-0.4770	0.5910	0.1033	+9	-55
68 Geminorum	5.2	3.87	13.5	15 59.8	11 8.0	-5 37.4	+0.7126	0.5907	0.1051	+90	+14
1 Cancri	6.0	3.72	15.3	16 0.0	20 46.6	+8 39.4	-0.3861	0.5858	0.1215	+14	-51
2 B. Cancri	6.0	3.73	15.6	16 43.9	21 24.4	+4 15.8	-1.2012	0.5854	0.1226	-44	-74
5 Cancri	5.9	+3.71	-15.8	+16 40.4	22 38.9	+5 27.5	-1.2960	0.5848	-0.1245	-64	-73
12 Cancri	6.2	3.61	15.4	13 52.2	3 1 41.7	+8 23.5	+1.1525	0.5832	0.1293	+90	+44
30 B. Cancri	6.1	3.61	15.8	14 51.8	2 38.4	+9 18.1	+0.0254	0.5828	0.1307	+37	-27
27 Cancri	5.8	3.47	16.2	12 54.9	9 19.2	-8 15.3	+1.0941	0.5792	0.1405	+90	+36
29 Cancri	5.9	3.48	16.8	14 28.3	10 6.4	-7 30.3	-0.5963	0.5788	0.1416	+3	-69
84 B. Cancri	6.4	+3.44	-16.8	+13 31.6	12 18.4	-5 23.2	+0.0481	0.5777	-0.1445	+39	-27
A <sup>1</sup> Cancri	5.5	3.37	17.0	12 57.8	16 22.2	-1 28.2	+0.9217	0.5755	0.1493	+37	-30
A <sup>2</sup> Cancri	5.7	3.33	17.1	12 24.0	17 59.1	+0 5.3	+0.3519	0.5747	0.1518	+58	-11
60 Cancri	5.7	3.27	17.3	11 55.7	21 53.2	+3 51.0	+0.2310	0.5727	0.1566	+49	-19
α Cancri	4.3	3.26	17.6	12 9.8	22 59.8	+4 55.2	-0.1837	0.5721	0.1573	+25	-42
κ Cancri	5.1	+3.18	-17.5	+10 59.2	3 3 3.7	+8 50.5	+0.3658	0.5701	-0.1623	+58	-12
209 B. Cancri	6.5	3.18	18.0	11 53.2	3 56.7	+9 41.6	-0.6961	0.5696	0.1632	-3	-79
222 B. Cancri	6.3	3.14	18.2	11 49.9	7 30.7	-10 51.9	-1.2306	0.5679	0.1668	-45	-79
ω Leonis	5.5	3.05	17.7	9 24.1	12 14.2	-6 18.2	+0.4548	0.5657	0.1713	+65	-8
h Leonis	5.2	3.03	18.0	10 3.9	13 47.3	-4 47.3	-0.4924	0.5650	0.1727	+9	-65
89 B. Leonis	6.2	+2.86	-18.2	+8 41.5	4 1 36.7	+6 36.8	-1.1834	0.5600	0.1816	-38	-82

ELEMENTS FOR THE PREDICTION OF OCCULTATIONS.

NOVEMBER.

THE STAR'S				AT CONJUNCTION IN R. A.					Limiting Parallels.			
Name.	Mag.	Red'ns from 1920.0.		Apparent Declination.	Greenwich Mean Time.			Y	r'	y'	N.	S.
		$\Delta\alpha$	$\Delta\delta$		d	h	m					
$\tau$ Leonis	4.9	+2.84	-18.2	+ 8 25.4	4	2 34.0	+ 7 32.1	-1.0621	0.5596	-0.1822	-29	-82
14 Sextantis	6.3	2.79	17.4	5 50.9	5	35.3	+10 27.2	+0.8594	0.5584	0.1841	+90	+13
155 B. Leonis	6.5	2.69	17.7	6 5.7	13	9.8	6 13.4	-0.6511	0.5558	0.1879	0	80
$p^d$ Leonis	5.7	2.46	16.6	2 23.1	5	9 35.8	-10 27.9	-0.7235	0.5502	0.1934	-4	86
$p^e$ Leonis	5.3	2.46	15.8	0 21.7	12	49.8	-7 20.2	+0.7552	0.5496	0.1937	+90	+ 6
359 B. Leonis	6.3	+2.42	-15.8	+ 0 34.0	17	20.9	-2 57.8	-0.8339	0.5488	-0.1937	+18	-56
386 B. Leonis	6.3	2.40	15.2	1 15.8	19	32.2	-0 50.8	+1.1511	0.5485	0.1936	+89	+34
$v$ Leonis	4.5	2.37	15.3	0 23.2	23	50.4	+ 3 19.0	-0.5966	0.5479	0.1932	+ 3	-77
431 B. Leonis	6.2	2.37	14.8	1 59.9	6	0 32.2	+ 3 59.5	+0.9523	0.5478	0.1931	+89	+19
78 B. Virginis	6.5	2.27	13.1	5 16.7	17	40.8	-3 24.9	+1.1213	0.5466	0.1882	+85	+32
162 B. Virginis	6.2	+2.21	-13.0	- 4 10.6	7	0 12.1	+ 2 53.8	-1.2557	0.5466	-0.1852	-46	-90
200 B. Virginis	6.3	2.21	12.8	4 36.9	2	0.8	+ 4 39.0	-1.1291	0.5465	0.1842	-33	-90
$f$ Virginis	6.0	2.20	12.5	5 23.7	4	28.7	+ 7 2.2	-0.7599	0.5466	0.1828	- 8	-90
$x$ Virginis	4.8	2.22	11.9	7 33.5	5	39.2	+ 8 10.4	+1.3102	0.5466	0.1821	+82	+56
319 B. Virginis	6.3	2.18	12.0	5 52.0	9	38.3	-11 58.1	-1.1975	0.5468	0.1796	-40	-90
$g$ Virginis	5.6	+2.17	-10.6	- 8 33.5	19	41.0	-2 14.7	-0.1177	0.5474	-0.1723	+27	-43
50 Virginis	6.2	2.18	10.3	9 54.3	20	15.4	-1 41.4	+1.2127	0.5474	0.1718	+81	+42
$\alpha$ Virginis ( <i>Spica</i> )	1.2	2.16	- 9.5	10 44.8	8	3 37.9	+ 5 27.0	+0.8647	0.5481	0.1655	+80	+13
<b>NEW MOON.</b>												
68 B. Ophiuchi	5.9	+2.42	+ 3.4	-20 16.9	12	5 25.7	+ 4 3.1	+1.1186	0.5537	-0.0269	+70	+37
81 B. Ophiuchi	6.1	2.41	3.8	19 24.8	7	8.8	+ 5 42.8	+0.1205	0.5535	0.0239	+25	-29
29 Ophiuchi	6.4	2.40	4.2	18 46.1	9	24.1	+ 7 53.6	-0.6391	0.5533	0.0201	-17	-85
109 B. Ophiuchi	6.2	2.45	4.2	20 22.9	10	44.1	+ 9 11.0	+1.1115	0.5531	0.0178	+70	+36
192 B. Ophiuchi	6.3	2.45	5.9	18 22.2	20	5.8	- 5 45.7	-1.1959	0.5519	-0.0018	-60	-90
305 B. Ophiuchi	6.3	+2.54	+ 3.1	-18 47.2	13	10 53.4	+ 8 33.1	-0.5814	0.5491	+0.0231	-14	-78
16 G. Sagittarii	6.4	2.58	8.0	20 19.9	12	48.5	+10 24.5	+1.1752	0.5487	0.0233	-70	+43
39 G. Sagittarii	6.3	2.60	8.8	19 51.4	18	10.5	- 8 23.8	+0.8138	0.5475	0.0351	+71	-12
64 B. Sagittarii	6.1	2.59	9.4	18 41.1	20	14.1	- 6 24.3	-0.4079	0.5470	0.0384	- 3	-62
52 G. Sagittarii	6.4	2.59	9.6	18 29.4	21	10.7	- 5 29.4	-0.5856	0.5468	0.0399	-12	-78
17 H. Sagittarii	6.4	+2.59	+ 9.7	-18 38.9	21	46.3	+ 4 55.0	-0.3867	0.5466	+0.0409	- 1	-61
Y Sagittarii ( <i>var.</i> )	5.4	2.61	9.8	18 53.6	23	2.6	- 3 41.1	-0.0618	0.5463	0.0429	+17	-39
85 B. Sagittarii	6.0	2.60	10.5	17 50.8	14	2 12.6	- 0 37.2	-1.0781	0.5459	0.0480	-45	-90
95 B. Sagittarii	5.7	2.63	10.4	18 46.6	3	16.7	+ 0 24.8	+0.0062	0.5468	0.0496	+21	-35
100 B. Sagittarii	5.0	2.63	10.6	18 27.3	3	52.9	+ 0 59.8	-0.3212	0.5451	0.0566	+ 3	-56
187 B. Sagittarii	6.4	+2.75	+12.7	-18 51.5	21	11.9	- 6 14.0	+1.2338	0.5406	+0.0770	+72	+51
$\rho$ Sagittarii	4.0	2.78	13.9	17 59.7	16	4 20.7	+ 0 41.4	+0.8619	0.5386	0.0672	+73	+15
$v$ Sagittarii	4.4	2.75	14.5	16 6.1	4	24.0	+ 0 44.6	-1.2334	0.5386	0.0672	-56	-90
54 Sagittarii	5.4	2.82	15.4	16 28.4	13	47.1	+ 9 50.3	+0.0583	0.5361	0.1001	+29	-32
$e$ Sagittarii	5.2	2.83	15.6	16 18.5	14	49.8	+10 42.3	-0.6349	0.5359	0.1013	-24	-38
283 B. Sagittarii	5.5	+2.82	+15.7	-15 39.1	15	12.2	+11 12.8	-0.7095	0.5357	+0.1020	-13	-90
$g$ Sagittarii	5.1	2.87	16.6	15 42.0	22	23.3	- 5 49.4	+0.1099	0.5339	0.1112	+34	-30
16 B. Capricorni	6.2	2.94	18.0	15 2.0	16	9 52.5	+ 5 18.8	+0.7266	0.5313	0.1251	+75	+ 6
$\beta$ Capricorni	3.2	2.95	18.1	15 1.8	9	59.6	+ 5 25.6	+0.7401	0.5312	0.1252	+75	+ 6
45 B. Capricorni	6.1	2.98	19.1	13 59.5	16	41.0	+11 54.9	+0.4538	0.5298	0.1327	+58	-11
84 B. Capricorni	6.0	+3.04	+20.1	-12 50.2	17	1 5.7	- 3 55.4	+0.3302	0.5284	+0.1415	+51	-17
16 B. Aquarii	6.4	3.04	20.6	11 52.2	2	20.0	- 2 43.4	-0.5587	0.5282	0.1427	0	-74
$v$ Aquarii	4.5	3.11	21.2	11 41.4	10	46.6	+ 5 28.1	+0.4822	0.5271	0.1508	+62	- 9
51 G. Aquarii	6.5	3.11	21.8	10 55.9	13	11.4	+ 7 48.6	+0.0183	0.5268	0.1590	+33	-35
17 Aquarii	6.8	3.14	22.4	9 39.3	17	39.1	-11 51.7	-0.6973	0.5263	0.1569	- 6	-90
19 Aquarii	5.6	+3.16	+22.2	-10 5.0	18	49.0	-10 43.9	-0.0430	0.5263	+0.1579	+30	-38

ELEMENTS FOR THE PREDICTION OF OCCULTATIONS.  
NOVEMBER.

THE STAR'S				AT CONJUNCTION IN R. A.						Limiting Parallels.				
Name.	Mag.	Red'ns from 1920.0.		Apparent Declination.	Greenwich Mean Time.			Hour Angle, <i>H</i>	<i>Y</i>	<i>x'</i>	<i>y'</i>	N.	S.	
		<i>Δα</i>	<i>Δδ</i>		d	h	m							
$\xi$ Aquarii	4.8	+3.21	+23.3	8 12.4	18	1	16.6	h m	-1.0626	0.5260	+0.1631	29	00	
$\zeta^1$ Capricorni	5.3	3.24	23.0	9 26.6			5 0.0	h m	+0.9037	0.5259	0.1658	+81	+16	
$\zeta^2$ Capricorni	6.3	3.25	23.0	9 38.4			5 39.0	h m	+1.2251	0.5259	0.1663	+81	+48	
30 Aquarii	5.6	3.31	24.3	6 54.2			14 25.1	h m	-0.2785	0.5262	0.1723	+19	-52	
44 Aquarii	5.7	3.37	24.9	5 46.8			21 32.1	h m	-0.2570	0.5267	0.1765	+21	-51	
51 Aquarii	5.8	+3.41	+25.2	5 14.1	19	1	7.8	h m	-0.2099	0.5271	+0.1785	+23	-48	
$\kappa$ Aquarii	5.2	3.47	25.3	4 38.0			8 6.7	h m	+0.3972	0.5281	0.1818	+60	-14	
207 B. Aquarii	6.3	3.49	25.7	3 57.8			9 39.9	h m	-0.0442	0.5284	0.1825	+33	-38	
6 G. Piscium	6.2	3.57	26.0	2 49.0			18 32.4	h m	+0.3550	0.5304	0.1857	+57	-16	
22 B. Piscium	6.4	3.72	26.6	0 8.4	20	7	14.9	h m	-0.1289	0.5342	0.1887	+29	-43	
$\kappa$ Piscium	4.9	+3.74	+26.8	+ 0 49.5			8 56.7	h m	-0.8369	0.5348	+0.1889	-11	-90	
9 Piscium	6.4	3.74	26.8	0 41.4			9 6.2	h m	-0.6638	0.5349	0.1889	-1	-84	
16 Piscium	5.7	3.78	27.0	1 39.9			13 38.8	h m	+6 5.4	-0.8392	0.5366	0.1893	-11	-89
$\lambda$ Piscium	4.6	3.81	26.5	1 20.8			16 26.4	h m	+8 47.9	+0.0287	0.5378	0.1894	+37	-34
22 Piscium	5.8	3.88	26.7	2 29.6			21 18.2	h m	-10 29.4	-0.2629	0.5399	0.1894	+21	-51
25 Piscium	6.2	+3.88	+26.4	+ 1 39.2			21 50.8	h m	-9 57.8	+0.7275	0.5401	+0.1893	+90	+ 5
51 Piscium	5.6	4.14	26.2	6 31.3	21	16	43.5	h m	+8 18.6	-0.8365	0.5500	0.1854	-11	-84
60 Piscium	6.2	4.21	25.3	6 18.7			23 44.9	h m	+8 53.8	+0.6737	0.5542	0.1824	+86	+ 3
62 Piscium	6.1	4.23	25.4	6 52.2	22	0	9.5	h m	-8 30.0	+0.1682	0.5545	0.1822	+45	-25
$\delta$ Piscium	4.6	4.24	25.4	7 9.4			0 20.4	h m	-8 19.4	-0.0980	0.5548	0.1821	+30	-40
$\epsilon$ Piscium	4.4	+4.30	+24.7	+ 7 28.0			6 54.9	h m	-1 58.2	+0.7673	0.5588	+0.1784	+90	+ 9
$\pi$ Piscium	5.6	4.56	23.2	11 44.3			22 13.8	h m	-11 10.7	-0.9784	0.5693	0.1665	-21	-79
54 Ceti	6.0	4.60	21.7	10 39.2	23	4	15.6	h m	-5 21.8	+1.1163	0.5737	0.1605	+90	+36
26 B. Arietis	6.0	4.67	21.2	11 54.8			7 57.2	h m	-1 48.1	+0.4172	0.5764	0.1564	+62	- 8
12 H. Arietis	6.3	4.71	21.1	13 5.8			9 18.0	h m	-0 30.3	-0.5766	0.5773	0.1549	+ 4	-68
29 Arietis	6.1	+4.88	+18.4	+14 41.2			22 5.4	h m	+11 49.0	-0.3034	0.5868	+0.1383	+19	-47
$\sigma$ Arietis	5.8	4.92	17.2	14 58.7	24	2	54.0	h m	-7 33.1	+0.0505	0.5900	0.1311	+39	-28
$\omicron$ Arietis	5.5	4.94	16.4	14 45.5			5 44.8	h m	+4 48.9	+0.6386	0.5920	0.1268	+83	+ 7
124 B. Arietis	6.4	4.99	16.4	16 9.7			6 25.5	h m	-4 9.6	-0.6865	0.5924	0.1255	- 3	-73
145 B. Arietis	6.5	5.01	14.9	15 33.0			11 5.6	h m	+0 19.7	+0.4957	0.5956	0.1177	+69	+ 1
26 B. Tauri	6.4	+5.15	+11.5	+17 34.5			22 48.8	h m	+11 35.4	-0.2709	0.6029	+0.0963	+21	-40
33 B. Tauri	6.3	5.12	11.0	16 16.8	25	0	54.6	h m	-10 23.8	+1.2153	0.6040	0.0922	+90	+55
148 B. Tauri	5.9	5.17	9.4	17 5.5			6 15.9	h m	-5 15.3	+0.8705	0.6068	0.0814	+90	+26
162 B. Tauri	6.3	5.18	8.4	17 4.4			9 9.7	h m	-2 28.4	+1.1150	0.6082	0.0753	+90	+45
163 B. Tauri	5.8	5.22	8.4	17 58.3			9 13.4	h m	-2 24.9	+0.2284	0.6083	0.0752	+50	-10
180 B. Tauri	6.1	+5.19	+ 7.5	+17 7.7			12 0.7	h m	+0 15.7	+1.2652	0.6096	+0.0693	+82	+65
43 Tauri	5.5	5.28	7.4	19 24.0			12 26.0	h m	+0 39.9	-0.9589	0.6097	0.0684	-22	-71
85 H. Tauri	6.0	5.25	6.0	18 33.2			16 46.0	h m	+4 49.4	+0.1567	0.6115	0.0589	+45	-13
234 B. Tauri	6.0	5.27	5.4	18 51.6			18 29.9	h m	+6 29.0	-0.0481	0.6121	0.0550	+33	-24
68 Tauri	4.3	5.23	5.3	17 44.8			18 43.0	h m	+6 41.7	+1.0658	0.6122	0.0546	+90	+44
$\epsilon$ Tauri	3.6	+5.28	+ 4.9	+19 0.3			19 53.8	h m	+7 49.6	-0.1169	0.6128	+0.0519	+29	-27
119 H. Tauri	6.2	5.23	4.3	17 51.0			21 47.7	h m	+9 38.8	+1.1208	0.6132	0.0476	+90	+49
282 B. Tauri	6.4	5.30	4.0	19 43.1			22 35.8	h m	+10 24.9	-0.6908	0.6135	0.0453	- 4	-69
302 B. Tauri	6.1	5.26	2.6	18 35.5	26	2	37.5	h m	-9 43.4	+0.5897	0.6148	0.0366	+79	+14
$i$ Tauri	5.1	5.26	2.0	18 42.3			4 33.2	h m	-7 52.5	+0.5436	0.6150	0.0321	+74	+11
312 B. Tauri	6.2	+5.28	+ 1.5	+19 21.4			5 54.6	h m	-6 34.4	-0.0589	0.6153	+0.0289	+32	-22
333 B. Tauri	6.3	5.28	+ 0.1	19 41.9			9 54.0	h m	-2 44.9	-0.2983	0.6160	0.0196	+19	-35
$m$ Tauri	5.0	5.27	0.0	18 32.3			10 37.1	h m	-2 3.6	+0.8590	0.6160	0.0179	+90	+31
$l$ Tauri	5.2	5.30	- 0.3	20 18.8			10 45.1	h m	-1 55.9	-0.8904	0.6161	0.0176	-17	-70
107 Tauri	6.5	5.28	0.3	19 45.4			11 8.8	h m	-1 33.2	-0.3343	0.6162	0.0166	+17	-37
351 B. Tauri	6.2	+5.28	- 1.7	+20 3.1			15 4.2	h m	+2 12.5	-0.5775	0.6165	+0.0074	+ 3	-54

ELEMENTS FOR THE PREDICTION OF OCCULTATIONS.

NOVEMBER.

THE STAR'S				AT CONJUNCTION IN R. A.						Limit- ing Par- allels.			
Name.	Mag.	Red'ns from 1920.0.		Apparent Declina- tion.	Greenwich Mean Time.			Hour Angle, H	P	z'	y'	N.	S.
		$\Delta\alpha$	$\Delta\delta$		d	h	m						
353 B. Tauri	6.5	+5.27	-1.9	+19 44.0	28	15 42.8	+ 2 49.5	-0.2600	0.6166	+0.0086	+21 -31		
119 Tauri	4.9	5.20	3.2	18 82.1		19 58.5	+ 6 54.6	+0.9258	0.6167	-0.0043	+90 +37		
120 Tauri	5.6	5.20	3.4	18 29.0		20 28.3	+ 7 23.2	+0.9743	0.6166	0.0055	+90 +41		
372 B. Tauri	6.1	5.27	3.6	20 25.1		20 29.5	+ 7 24.3	-0.9334	0.6166	0.0055	-21 -70		
B. D.+19°1110	6.0	5.21	5.9	19 50.8	27	3 34.0	- 9 48.7	-0.4686	0.6161	0.0223	+ 9 -47		
$\chi^1$ Orionis	4.5	+5.21	-6.3	+20 15.6		4 19.2	- 9 54.4	-0.8946	0.6160	-0.0241	-18 -70		
57 Orionis	5.8	5.20	6.2	19 44.0		4 32.0	- 8 53.2	-0.3797	0.6160	0.0246	+14 -41		
64 Orionis	5.1	5.18	7.3	19 41.5		7 45.0	- 5 48.1	-0.4290	0.6155	0.0321	+11 -45		
$\chi^2$ Orionis	4.7	5.19	7.4	20 8.4		7 55.2	- 5 38.4	-0.8768	0.6154	0.0325	-16 -70		
68 Orionis	5.7	5.15	8.3	19 48.4		10 59.5	- 2 41.7	-0.6600	0.6148	0.0396	- 2 -65		
19 B. Geminorum	6.2	+5.11	-8.4	+18 42.0		11 35.2	- 2 7.4	+0.4082	0.6146	-0.0410	+62 + 3		
124 H <sup>1</sup> . Orionis	5.7	5.08	8.3	17 55.7		11 56.8	- 1 46.7	+1.1553	0.6145	0.0419	+90 +52		
71 Orionis	5.1	5.12	8.7	19 10.9		12 4.4	- 1 39.4	-0.0879	0.6145	0.0421	+31 -24		
292 B. Orionis	6.5	5.05	9.1	17 48.0		14 35.2	- 0 45.2	+1.1635	0.6138	0.0479	+90 +53		
26 Geminorum	5.2	4.97	11.6	17 43.3		22 35.5	+ 8 25.8	+0.7860	0.6112	0.0658	+90 +22		
74 B. Geminorum	6.2	+4.97	-12.2	+18 16.7	28	0 29.9	+10 15.5	+0.1071	0.6108	-0.0700	+42 -16		
110 B. Geminorum	6.2	4.89	13.7	17 52.0		6 18.0	- 8 10.6	+0.0720	0.6080	0.0623	+40 -20		
41 H <sup>1</sup> . Geminorum	6.0	4.85	13.5	16 47.2		6 21.9	- 8 6.8	+1.1345	0.6080	0.0624	+90 +47		
51 Geminorum	5.3	4.80	14.6	16 17.5		10 34.4	- 4 4.5	+1.2605	0.6060	0.0911	+85 +62		
$\lambda$ Geminorum	3.6	4.73	15.1	16 40.9		12 24.8	- 2 18.5	+0.7039	0.6050	0.0947	+90 +15		
162 B. Geminorum	5.7	+4.73	-16.7	+17 15.2		17 47.3	+ 2 51.2	-0.4600	0.6021	-0.1052	+13 -49		
68 Geminorum	5.2	4.69	16.4	15 59.7		18 31.1	+ 3 33.3	+0.7711	0.6017	0.1065	+90 +18		
1 Cancri	6.0	4.56	18.6	16 0.0	29	3 50.2	-11 29.4	-0.3049	0.5982	0.1282	+19 -45		
2 B. Cancri	6.0	4.57	18.9	16 43.8		4 26.7	-10 54.3	-1.1072	0.5958	0.1242	-33 -74		
5 Cancri	5.9	4.55	19.1	16 40.3		5 38.8	- 9 45.0	-1.2001	0.5951	0.1263	-43 -74		
12 Cancri	6.2	+4.45	-18.9	+13 52.2		8 35.7	- 6 54.9	+1.2131	0.5933	-0.1310	+90 +50		
30 B. Cancri	6.1	4.46	19.4	14 51.7		9 30.6	- 6 2.1	+0.1034	0.5927	0.1325	+42 -23		
27 Cancri	5.8	4.32	20.1	12 54.8		15 58.9	+ 0 11.4	+1.1602	0.5886	0.1423	+90 +43		
29 Cancri	5.9	4.34	20.6	14 28.2		16 44.7	+ 0 55.6	-0.5056	0.5880	0.1434	+ 8 -61		
84 B. Cancri	6.4	4.29	20.8	13 31.5		18 52.8	+ 2 58.8	+0.1807	0.5867	0.1464	+43 -23		
A <sup>1</sup> Cancri	5.5	+4.23	-21.1	+12 57.8		22 49.5	+ 6 46.6	+0.1065	0.5841	-0.1517	+42 -24		
A <sup>2</sup> Cancri	5.7	4.19	21.2	12 23.9	30	0 23.8	+ 8 17.5	+0.4330	0.5831	0.1537	+64 - 7		
60 Cancri	5.7	4.13	21.6	11 55.6		4 11.4	+11 56.7	+0.3155	0.5806	0.1584	+55 -14		
$\alpha$ Cancri	4.3	4.12	21.8	12 9.7		5 16.3	-11 0.8	-0.0934	0.5800	0.1597	+31 -37		
$\kappa$ Cancri	5.1	4.05	21.9	10 59.1		9 13.9	- 7 11.9	+0.4508	0.5774	0.1641	+65 - 7		
209 B. Cancri	6.5	+4.05	-22.4	+11 53.1		10 5.6	- 6 22.0	-0.5978	0.5768	-0.1650	+ 3 -71		
222 B. Cancri	6.3	4.00	22.7	11 49.8		13 34.4	- 3 0.8	-1.1252	0.5747	0.1686	-33 -79		
$\omega$ Leonis	5.5	3.90	22.3	9 24.0		18 11.5	+ 1 26.5	+0.5425	0.5718	0.1729	+72 - 3		
h Leonis	5.2	3.89	22.7	10 3.8		19 43.1	+ 2 54.8	-0.3939	0.5709	0.1743	+14 -57		
o Leonis	3.8	+3.82	-23.1	+10 15.0		23 45.6	+ 6 48.8	-1.2970	0.5685	-0.1776	-55 -80		

DECEMBER.

89 B. Leonis	6.2	+3.72	-23.1	+ 8 41.4	1	7 18.6	- 9 54.0	-1.0768	0.5643	-0.1829	-28 -82		
$\pi$ Leonis	4.9	3.70	23.1	8 25.3		8 14.9	- 8 59.5	-0.9764	0.5638	0.1835	-21 -82		
14 Sextantis	6.3	+3.64	-22.4	+ 5 59.8		11 13.4	- 6 7.3	+0.9492	0.5622	-0.1852	+90 +19		
155 B. Leonis	6.5	3.53	22.8	6 5.6		18 41.8	+ 1 6.0	-0.5488	0.5585	0.1889	+ 6 -72		
p <sup>4</sup> Leonis	5.7	3.27	21.6	2 23.1	2	14 58.1	- 3 18.2	-0.6233	0.5503	0.1936	+ 2 -79		
p <sup>5</sup> Leonis	5.3	3.26	20.8	0 21.6		18 11.4	- 0 11.2	+0.8500	0.5493	0.1938	+90 +12		
359 B. Leonis	6.3	3.21	20.8	+ 0 33.9		22 42.2	+ 4 10.7	-0.2367	0.5480	0.1936	+23 -50		
388 B. Leonis	6.3	+3.20	-20.0	- 1 15.9	3	0 53.3	+ 6 17.5	+1.2446	0.5474	-0.1935	+89 +44		

ELEMENTS FOR THE PREDICTION OF OCCULTATIONS.

DECEMBER.

THE STAR'S					AT CONJUNCTION IN R. A.					Limiting Par- allels.	
Name.	Mag.	Red'ns from 1920.0.		Apparent Declina- tion.	Greenwich Mean Time.	Hour Angle, <i>H</i>	<i>P</i>	<i>z'</i>	<i>y'</i>	N.	S.
		$\Delta\alpha$	$\Delta\delta$								
<i>v</i> Leonis	4.5	+3.15	-20.1	0 23.3	d h m	+h m				°	°
431 B. Leonis	6.2	3.15	19.5	1 59.9	3 5 11.8	+10 27.8	-0.5009	0.5463	-0.1929	+ 8	-68
78 B. Virginis	6.5	3.00	17.4	5 16.7	5 53.6	+11 8.2	+1.0457	0.5462	0.1928	+89	+26
162 B. Virginis	6.2	2.93	17.4	4 10.7	23 6.9	+ 3 48.5	+1.2109	0.5433	0.1876	+85	+40
200 B. Virginis	6.3	2.92	17.1	4 87.0	4 5 41.2	+10 10.3	-1.1725	0.5428	0.1844	-37	-90
<i>f</i> Virginis	6.0	+2.91	-16.7	5 23.7	7 31.0	+11 56.6	-1.0468	0.5427	0.1834	-26	-90
319 B. Virginis	6.3	2.87	16.1	5 52.1	10 0.3	- 9 38.8	-0.6784	0.5425	-0.1820	- 3	-86
<i>g</i> Virginis	5.6	2.83	14.3	8 33.6	15 13.1	- 4 35.9	-1.1206	0.5424	0.1788	-33	-90
50 Virginis	6.2	2.84	13.8	9 54.4	5 1 22.8	+ 5 14.5	-0.0446	0.5426	0.1715	+31	-38
$\alpha$ Virginis ( <i>Spica</i> )	1.2	2.80	12.8	10 44.9	1 57.7	+ 5 48.3	+1.2902	0.5426	0.1710	+81	+53
<i>h</i> Virginis	5.4	+2.76	-12.6	9 45.4	9 26.0	-10 57.6	+0.9359	0.5430	0.1647	+80	+18
86 Virginis	5.6	2.76	11.2	12 1.7	13 12.0	- 7 18.7	-0.7375	0.5433	-0.1618	- 8	-90
$\lambda$ Virginis	4.6	2.68	8.9	13 0.4	19 27.1	- 1 15.5	-0.7076	0.5440	0.1552	+78	+ 4
8 Libræ	5.3	2.66	6.3	15 40.0	6 11 24.4	- 9 48.6	-0.5803	0.5460	0.1376	- 2	-76
$\alpha$ Libræ	2.9	2.66	6.3	15 42.7	7 2 28.8	+ 4 46.7	+0.3667	0.5482	0.1184	+50	-15
<i>r</i> Libræ	5.3	+2.64	- 5.0	15 56.9	2 34.2	+ 4 51.9	+0.4045	0.5482	0.1183	+53	-13
22 Libræ	6.5	2.64	5.0	16 10.6	10 3.2	-11 53.5	-0.1841	0.5493	-0.1079	+17	-47
26 Libræ	6.3	2.65	4.2	17 28.3	10 8.6	-11 48.3	+0.0641	0.5492	0.1078	+30	-33
28 Libræ	6.2	2.65	3.8	17 52.2	13 48.0	- 8 16.0	+1.0793	0.5498	0.1025	+73	+31
32 Libræ	5.9	2.61	3.4	16 26.4	16 47.6	- 5 22.2	+1.2138	0.5502	0.0981	+73	+47
34 Libræ	6.0	+2.61	- 3.2	16 20.2	20 17.6	- 1 59.1	-0.6798	0.5506	0.0929	-12	-90
NEW MOON.											
187 B. Sagittarii	6.4	+2.62	+12.5	-18 51.5	12 4 5.2	+ 2 26.9	+1.1267	0.5424	+0.0761	+72	+37
$\rho$ Sagittarii	4.0	2.62	13.6	17 59.7	11 13.1	+ 9 21.3	+0.7461	0.5405	0.0864	+73	+ 7
45 Sagittarii	6.0	+2.64	+13.4	-18 27.2	11 17.5	+ 9 25.7	+1.2624	0.5405	+0.0865	+72	+56
54 Sagittarii	5.4	2.64	14.8	16 28.4	20 38.6	- 5 30.7	-0.0698	0.5378	0.0994	+22	-40
<i>c</i> Sagittarii	5.2	2.64	15.0	16 18.5	21 32.2	- 4 38.8	-0.1642	0.5376	0.1006	+17	-46
283 B. Sagittarii	5.5	2.64	15.1	15 39.1	22 3.6	- 4 8.3	-0.8411	0.5374	0.1012	-21	-90
<i>g</i> Sagittarii	5.1	2.66	15.9	15 42.0	13 5 14.4	+ 2 49.3	-0.0273	0.5353	0.1105	+26	-37
16 B. Capricorni	6.2	+2.70	+17.2	-15 2.0	16 43.9	-10 2.2	+0.5819	0.5322	-0.1243	+66	- 3
$\beta$ Capricorni	3.2	2.70	17.2	15 1.8	16 51.1	- 9 55.2	+0.5933	0.5321	0.1245	+66	- 3
45 B. Capricorni	6.1	2.72	18.1	13 59.5	23 33.3	- 3 25.1	+0.2997	0.5304	0.1319	+48	-19
84 B. Capricorni	6.0	2.76	18.9	12 50.2	14 7 59.8	+ 4 46.2	+0.1681	0.5283	0.1407	+40	-26
16 B. Aquarii	6.4	2.75	19.4	11 52.3	9 14.4	+ 5 58.5	-0.7263	0.5280	0.1419	- 9	-90
<i>p</i> Aquarii	4.5	+2.81	+19.9	-11 41.4	17 44.0	- 9 47.0	+0.3132	0.5263	+0.1498	+50	-18
51 G. Aquarii	6.5	2.81	20.2	10 55.9	20 9.9	- 7 25.4	-0.1603	0.5258	0.1520	+23	-45
17 Aquarii	6.3	2.83	20.9	9 39.3	10 39.7	- 3 3.5	-0.8789	0.5250	0.1558	-17	-90
19 Aquarii	5.6	2.85	20.7	10 5.0	1 50.2	- 1 55.1	-0.2211	0.5248	0.1568	+21	-49
$\xi$ Aquarii	4.8	2.89	21.7	8 12.5	8 21.6	+ 4 24.9	-1.2527	0.5239	0.1618	-49	-90
$\zeta^1$ Capricorni	5.3	+2.92	+21.5	- 9 26.7	12 7.7	+ 8 4.3	+0.7260	0.5234	+0.1645	+81	+ 5
$\zeta^2$ Capricorni	6.3	2.92	21.4	9 38.4	12 47.1	+ 8 42.5	+1.0495	0.5234	0.1650	+81	+26
30 Aquarii	5.6	2.98	22.6	6 54.2	21 40.3	- 6 39.8	-0.4707	0.5227	0.1707	+ 9	-66
44 Aquarii	5.7	3.04	23.1	5 46.8	16 4 54.1	+ 0 21.2	-0.4522	0.5226	0.1748	+10	-64
51 Aquarii	5.8	3.07	23.3	5 14.1	8 33.5	+ 3 54.2	-0.4060	0.5226	0.1766	+13	-61
$\kappa$ Aquarii	5.2	+3.13	+23.5	- 4 38.1	15 40.5	+10 48.7	+0.2054	0.5230	+0.1798	+47	-24
207 B. Aquarii	6.3	3.15	23.8	3 57.8	17 15.6	-11 39.0	-0.2409	0.5231	0.1803	+22	-50
6 G. Piscium	6.2	3.24	24.0	2 49.0	2 19.8	- 2 50.8	+0.1616	0.5242	0.1834	+45	-27
22 B. Piscium	6.4	3.39	24.7	0 8.5	15 21.3	+ 9 47.5	-0.3272	0.5269	0.1861	+18	-55
$\kappa$ Piscium	4.9	3.41	24.9	+ 0 49.5	17 5.8	+11 28.9	-1.0439	0.5273	0.1863	-25	-90
9 Piscium	6.4	+3.41	+24.9	+ 0 41.4	17 15.5	+11 38.3	-0.8686	0.5274	+0.1863	-13	-90

ELEMENTS FOR THE PREDICTION OF OCCULTATIONS.

DECEMBER.

THE STAR'S					AT CONJUNCTION IN R. A.					Limiting Parallel.		
Name.	Mag.	Red'ns from 1920.0.		Apparent Declination.	Greenwich Mean Time.	Hour Angle, H	Y	z'	y'	N.	S.	
		$\Delta\alpha$	$\Delta\delta$									
16	Piscium	5.7	+3.46	+25.1	+ 1 39.9	17 21 55.6	- 7 50.0	-1.0452	0.5287	+0.1867	-25	-89
$\lambda$	Piscium	4.6	3.49	24.6	1 20.8	18 0 48.0	- 5 2.7	-0.1654	0.5297	0.1868	+27	-45
21	Piscium	5.6	3.54	24.9	0 38.3	4 32.4	- 1 26.1	+1.2913	0.5310	0.1867	+90	+51
22	Piscium	5.8	3.57	24.9	2 29.6	5 48.2	- 0 11.5	-0.4590	0.5314	0.1867	+11	-65
25	Piscium	6.2	3.57	24.6	1 39.2	6 21.8	+ 0 21.0	+0.5447	0.5317	0.1867	+72	- 6
51	Piscium	5.6	+3.87	+24.6	+ 6 81.2	19 1 49.2	- 4 47.7	-1.0290	0.5406	+0.1828	-24	-84
60	Piscium	6.2	3.96	23.8	6 18.7	9 3.9	+ 2 13.2	+0.5074	0.5445	0.1799	+69	- 7
62	Piscium	6.1	3.98	23.9	6 52.2	9 29.4	+ 2 37.9	-0.0044	0.5448	0.1797	+35	-35
$\delta$	Piscium	4.6	3.98	23.9	7 9.4	9 40.6	+ 2 48.7	-0.2721	0.5449	0.1796	+21	-51
$\epsilon$	Piscium	4.4	4.07	23.2	7 28.0	16 27.6	+ 9 22.5	+0.6090	0.5490	0.1761	+78	0
$\tau$	Piscium	5.6	+4.37	+22.1	+11 44.3	20 8 14.9	+ 0 33.5	-1.1412	0.5598	+0.1648	-35	-79
54	Ceti	6.0	4.43	20.6	10 39.2	14 27.4	+ 6 36.2	+0.9861	0.5644	0.1590	+90	+25
26 B.	Arietis	6.0	4.52	20.2	11 54.8	18 15.2	+10 18.1	+0.2840	0.5678	0.1552	+53	-16
12 H <sup>1</sup> .	Arietis	6.3	4.57	20.3	13 5.8	19 38.2	+11 38.1	-0.7189	0.5683	0.1537	- 5	-77
29	Arietis	6.1	4.79	17.8	14 41.2	21 8 45.3	+ 0 17.1	-0.4228	0.5786	0.1378	+12	-55
$\sigma$	Arietis	5.8	+4.87	+16.6	+14 58.7	13 40.6	+ 5 1.6	-0.0579	0.5825	+0.1309	+32	-31
$\sigma$	Arietis	5.5	4.90	15.8	14 45.4	16 35.0	+ 7 49.5	+0.5396	0.5848	0.1265	+73	+ 2
124 B.	Arietis	6.4	4.96	15.9	16 9.7	17 16.6	+ 8 29.6	-0.7949	0.5853	0.1255	-10	-74
145 B.	Arietis	6.5	5.00	14.4	15 33.0	22 2.2	-10 55.5	+0.4040	0.5890	0.1180	+62	- 5
26 B.	Tauri	6.4	5.21	11.2	17 34.5	22 9 56.8	+ 0 31.7	-0.3465	0.5979	0.0972	+16	-46
33 B.	Tauri	6.3	+5.19	+10.5	+16 16.8	12 4.1	+ 2 34.1	+1.1499	0.5994	+0.0832	+90	+48
148 B.	Tauri	5.9	5.28	8.9	17 5.5	17 29.0	+ 7 46.2	+0.8127	0.6032	0.0827	+90	+22
162 B.	Tauri	6.3	5.30	8.0	17 4.4	20 24.3	+10 34.6	+1.0625	0.6051	0.0768	+90	+41
163 B.	Tauri	5.8	5.34	8.1	17 58.3	20 28.0	+10 38.1	+0.1738	0.6051	0.0766	+46	-13
180 B.	Tauri	6.1	5.33	7.0	17 7.7	23 16.5	-10 40.2	+1.2177	0.6068	0.0708	+90	+57
43	Tauri	5.5	+5.43	+ 7.2	+19 24.0	23 42.1	-10 15.6	-1.0095	0.6071	+0.0699	-26	-71
85 H <sup>1</sup> .	Tauri	6.0	5.43	5.7	18 33.2	4 3.4	- 6 4.9	+0.1160	0.6096	0.0606	+43	-15
234 B.	Tauri	6.0	5.46	5.0	18 51.6	5 47.7	- 4 24.8	-0.0856	0.6106	0.0568	+31	-26
68	Tauri	4.3	5.42	4.8	17 44.8	6 0.8	+ 4 12.2	+1.0291	0.6107	0.0563	+90	+40
$\epsilon$	Tauri	3.6	5.48	4.6	19 0.3	7 11.9	- 3 4.0	-0.1517	0.6113	0.0537	+27	-30
119 H <sup>1</sup> .	Tauri	6.2	+5.44	+ 3.8	+17 51.0	9 6.0	- 1 14.6	+1.0892	0.6123	+0.0495	+90	+45
282 B.	Tauri	6.4	5.52	3.8	19 43.1	9 54.1	- 0 28.5	-0.7200	0.6127	0.0476	- 6	-71
302 B.	Tauri	6.1	5.51	2.1	18 35.5	13 55.7	+ 3 23.2	+0.5671	0.6145	0.0385	+76	+12
$i$	Tauri	5.1	5.52	1.5	18 42.3	15 51.3	+ 5 14.0	+0.5246	0.6154	0.0340	+72	+10
312 B.	Tauri	6.2	5.56	+ 1.1	19 21.4	17 12.4	+ 6 31.7	-0.0741	0.6159	0.0309	+31	-23
333 B.	Tauri	6.3	+5.58	- 0.3	+19 41.9	21 10.8	+10 20.3	-0.3049	0.6173	+0.0216	+18	-36
$m$	Tauri	5.0	5.58	0.7	18 32.3	21 53.7	+11 1.4	+0.8500	0.6176	0.0199	+90	+30
$l$	Tauri	5.2	5.61	0.6	20 18.8	22 1.6	+11 8.9	-0.8932	0.6176	0.0196	-18	-70
107	Tauri	6.5	5.59	0.8	19 45.4	22 25.2	+11 31.6	-0.3382	0.6177	0.0187	+16	-38
351 B.	Tauri	6.2	5.62	2.2	20 3.1	24 2 18.9	- 8 44.5	-0.5723	0.6189	0.0094	+ 3	-54
353 B.	Tauri	6.5	+5.61	- 2.4	+19 44.0	2 57.2	- 8 7.8	-0.2549	0.6190	+0.0078	+21	-31
119	Tauri	4.9	5.57	4.0	18 32.1	7 10.4	- 4 5.2	+0.9330	0.6199	-0.0023	+90	+38
120	Tauri	5.6	5.57	4.2	18 29.0	7 39.9	+ 3 36.9	+0.9821	0.6200	0.0035	+90	+41
372 B.	Tauri	6.1	5.65	4.1	20 25.0	7 41.1	- 3 35.8	-0.9148	0.6200	0.0036	-19	-70
	B. D. +19° 1110	6.0	5.63	6.7	19 50.8	14 40.0	+ 3 5.5	-0.4379	0.6208	0.0204	+11	-45
$\chi^1$	Orionis	4.5	+5.64	- 7.0	+20 15.6	15 24.5	+ 3 48.1	-0.8591	0.6208	-0.0223	-15	-70
57	Orionis	5.8	5.63	7.1	19 44.0	15 37.1	+ 4 0.2	-0.3476	0.6208	0.0228	+16	-39
64	Orionis	5.1	5.62	8.2	19 41.4	18 47.0	+ 7 2.1	-0.3899	0.6209	0.0304	+14	-42
$\chi^2$	Orionis	4.7	5.64	8.2	20 8.4	18 57.0	+ 7 11.6	-0.8337	0.6209	0.0308	-13	-70
68	Orionis	5.7	5.63	9.3	19 48.4	21 58.0	+10 5.0	-0.6122	0.6208	0.0390	+ 1	-60
19 B.	Geminorum	6.2	+5.58	- 9.6	+18 42.0	22 33.0	+10 38.6	+0.4479	0.6208	-0.0394	+66	+ 5



ELEMENTS FOR THE PREDICTION OF OCCULTATIONS.

DECEMBER.

THE STAR'S					AT CONJUNCTION IN R. A.					Limiting Parallels.	
Name.	Mag.	Red'ns from 1920.0.		Apparent Declination.	Greenwich Mean Time.	Hour Angle, <i>H</i>	<i>Y</i>	<i>x'</i>	<i>y'</i>	<i>N.</i>	<i>S.</i>
		$\Delta\alpha$	$\Delta\delta$								
		<i>s</i>	<i>"</i>	<i>°</i>	<i>d</i>	<i>h</i>	<i>m</i>	<i>h</i>	<i>m</i>	<i>°</i>	<i>'</i>
124 H <sup>1</sup> . Orionis	5.7	+5.56	9.7	+17 55.6	24 22 54.2	+10 58.9	+1.1889	0.6206	-0.0402	+90	+57
71 Orionis	5.1	5.59	9.9	19 10.9	29 1.8	+11 6.2	-0.0429	0.6207	0.0405	+33	-22
292 B. Orionis	6.5	5.54	16.6	17 47.9	25 1 29.6	-10 32.3	+1.2016	0.6205	0.0464	+90	+58
26 Geminorum	5.2	5.51	13.3	17 43.3	9 19.1	- 8 2.4	+0.8423	0.6192	0.0647	+90	+26
74 B. Geminorum	6.2	5.53	13.9	18 16.6	11 16.6	- 1 15.6	+0.1745	0.6187	0.0689	+46	-12
110 B. Geminorum	6.2	+5.48	-15.6	+17 51.9	16 49.7	+ 4 9.4	+0.1511	0.6170	-0.0816	+45	-15
41 H <sup>1</sup> . Geminorum	6.0	5.44	15.6	16 47.2	16 53.4	+ 4 13.0	+1.2004	0.6170	0.0817	+90	+55
$\lambda$ Geminorum	3.6	5.40	17.4	16 40.9	22 45.9	+ 9 50.8	+0.7861	0.6148	0.0944	+90	+20
162 B. Geminorum	5.7	5.39	19.0	17 15.1	26 3 58.5	- 9 9.4	-0.2924	0.6126	0.1051	+19	-42
68 Geminorum	5.2	5.34	19.0	15 59.7	4 40.8	- 8 28.8	+0.8632	0.6122	0.1065	+90	+24
<i>f</i> Geminorum	5.3	+5.38	-19.8	+17 51.1	6 54.4	- 6 20.7	-1.1964	0.6112	-0.1110	-44	-73
1 Cancri	6.0	5.26	21.5	15 59.9	13 41.4	+ 0 9.8	-0.1796	0.6076	0.1238	+26	-38
2 B. Cancri	6.0	5.28	21.7	16 43.8	14 16.6	+ 0 43.5	-0.9682	0.6073	0.1249	-23	-74
5 Cancri	5.9	5.26	22.0	16 40.3	15 26.2	+ 1 50.4	-1.0572	0.6066	0.1269	-29	-74
30 B. Cancri	6.1	5.18	22.6	14 51.6	19 9.6	+ 5 24.8	+0.2324	0.6044	0.1384	+50	-15
27 Cancri	5.8	+5.06	-23.8	+12 54.8	27 1 23.7	+11 24.2	+1.2827	0.6006	-0.1486	+85	+60
29 Cancri	5.9	5.09	24.1	14 28.2	2 7.8	-11 53.4	-0.3538	0.6001	0.1448	+18	-50
84 B. Cancri	6.4	5.05	24.1	13 31.5	4 11.1	- 9 54.9	+0.2754	0.5989	0.1479	+53	-15
A <sup>1</sup> Cancri	5.5	5.00	25.0	12 57.7	7 58.8	- 6 16.1	+0.2582	0.5965	0.1534	+51	-16
A <sup>2</sup> Cancri	5.7	4.96	25.2	12 23.8	9 29.4	- 4 48.9	+0.5815	0.5955	0.1555	+76	+ 2
60 Cancri	5.7	+4.92	-25.7	+11 55.5	13 8.3	- 1 13.4	+0.4720	0.5931	-0.1603	+66	- 5
$\alpha$ Cancri	4.3	4.91	25.9	12 9.7	14 10.6	+ 0 18.6	+0.0721	0.5924	0.1616	+40	- 2
$\kappa$ Cancri	5.1	4.84	26.2	10 59.0	17 59.0	+ 3 21.2	+0.6127	0.5898	0.1662	+79	+ 27
209 B. Cancri	6.5	4.85	26.6	11 53.0	18 48.6	+ 4 8.9	-0.4158	0.5893	0.1672	+13	-58
222 B. Cancri	6.3	4.82	27.0	11 49.8	22 9.3	+ 7 22.0	-0.9287	0.5870	0.1709	-18	-79
$\omega$ Leonis	5.5	+4.73	-27.0	+ 9 23.9	23 2 35.5	+11 38.2	+0.7158	0.5841	-0.1754	+90	+ 7
<i>h</i> Leonis	5.2	4.71	27.4	10 3.7	4 3.5	-10 57.0	-0.2018	0.5832	0.1768	+25	-45
<i>o</i> Leonis	3.8	4.66	27.9	10 15.0	7 56.6	- 7 12.5	-1.0833	0.5806	0.1802	-29	-80
89 B. Leonis	6.2	4.56	28.1	8 41.3	15 12.2	- 0 12.7	-0.8579	0.5759	0.1857	-13	-82
$\tau$ Leonis	4.9	4.54	28.1	8 25.2	16 6.3	+ 0 39.4	-0.7582	0.5754	0.1863	- 6	-82
14 Sextantis	6.3	+4.49	-27.6	+ 5 59.7	18 58.0	+ 3 25.0	+1.1370	0.5736	-0.1880	+90	+34
43 Leonis	6.3	4.41	28.4	6 56.5	29 2 2.8	+10 14.7	-1.1593	0.5694	0.1917	-35	-84
155 B. Leonis	6.5	4.39	28.1	6 5.6	2 9.9	+10 21.6	-0.3272	0.5694	0.1917	+18	-55
35 Sextantis	6.1	4.30	28.1	5 9.6	11 5.1	- 5 1.9	-1.1148	0.5645	0.1948	-31	-85
<i>p</i> <sup>4</sup> Leonis	5.7	4.15	27.3	2 23.0	21 45.2	+ 5 16.4	-0.3856	0.5592	0.1963	+15	-50
<i>p</i> <sup>5</sup> Leonis	5.3	+4.14	-26.5	+ 0 21.5	30 0 52.6	+ 8 17.5	+1.0673	0.5578	-0.1964	+90	+27
76 Leonis	6.0	4.11	27.1	2 4.9	8 14.2	+10 34.3	-1.1579	0.5567	0.1963	-35	-88
359 B. Leonis	6.3	4.09	26.5	+ 0 33.8	5 15.4	-11 28.5	-0.0013	0.5559	0.1962	+36	-36
<i>v</i> Leonis	4.5	4.08	25.9	- 0 23.3	11 34.4	- 5 22.1	-0.2598	0.5535	0.1963	+22	-51
431 B. Leonis	6.2	4.08	25.3	2 0.0	12 15.1	- 4 42.8	+1.2661	0.5532	0.1961	+89	+47
162 B. Virginis	6.2	+3.81	-23.0	- 4 10.7	31 11 32.1	- 6 11.4	-0.9259	0.5467	-0.1861	-18	-90
200 B. Virginis	6.3	3.80	22.6	4 37.1	13 20.1	- 4 26.9	-0.3022	0.5464	0.1850	-10	-90
<i>f</i> Virginis	6.0	3.79	22.2	5 23.8	15 47.0	- 2 4.7	-0.4383	0.5460	0.1836	+11	-63
319 B. Virginis	6.3	+3.76	-21.5	- 5 52.2	20 55.4	+ 2 53.7	-0.8793	0.5451	-0.1892	-14	-90

OCCULTATIONS VISIBLE AT WASHINGTON.

Date.	THE STAR'S		IMMERSION.				EMERSION.				Duration of Occultation.						
			Washington.		Angle East from—		Washington.		Angle East from—								
			Name.	Mag.	Sideral Time.	Mean Time.	North Point.	Ver-tex.	Sideral Time.	Mean Time.		North Point.	Ver-tex.				
Jan. 1	53	Arietis	6.0	h m	4 59	h m	10 17	•	•	55	11	6 8	h m	11 25	284	231	1 8
2	43	Tauri	5.5	4 40	9 54	145	125	5 18	10 32	202	166	0 38					
3	1	Tauri	5.2	1 18	6 29	96	182	2 24	7 35	250	303	1 6					
4	68	Orionis	5.7	1 8	6 16	97	152	2 9	7 16	261	317	1 0					
5	162	B. Geminorum	5.7	9 47	14 49	63	15	10 34	15 36	896	283	0 47					
6	84	B. Cancri	6.4	10 54	15 52	80	35	11 51	16 48	328	277	0 57					
7	ω	Leonis	5.5	9 47	14 41	103	94	11 2	15 56	313	280	1 15					
15	ω <sup>1</sup>	Scorpii	4.3	11 22	15 44	115	162	12 32	16 54	276	316	1 10					
15	ω <sup>2</sup>	Scorpii	4.6	12 2	16 24	158	201	12 47	17 9	233	270	0 45					
28	124	B. Arietis	6.4	8 50	12 22	156	103	9 7	12 38	191	140	0 17					
31	B. D. +19°	1110	6.0	7 8	10 28	181	142	7 17	10 37	194	153	0 9					
31	χ <sup>1</sup>	Orionis	4.5	7 43	11 3	52	4	8 33	11 52	327	274	0 49					
31	64	Orionis	5.1	11 49	15 8	94	40	12 40	15 59	286	236	0 51					
Feb. 2	1	Cancri	6.0	7 5	10 17	86	109	8 19	11 31	312	299	1 14					
2	30	B. Cancri	†	6.1	14 30	17 41	56	4	15 1	18 12	339	290	0 31				
3	60	Cancri	5.7	7 46	10 54	144	170	8 55	12 2	263	262	1 8					
3	κ	Cancri	5.1	14 26	17 33	62	10	15 2	18 9	340	288	0 36					
5	55	Leonis	6.1	15 30	18 38	170	120	16 12	19 11	296	185	0 33					
6	431	B. Leonis	6.2	9 42	12 38	56	86	10 17	13 13	5	27	0 35					
11	λ	Libræ	5.1	15 20	17 55	89	96	16 53	19 28	293	278	1 33					
14	21	Sagittarii	5.0	14 47	17 10	94	134	16 9	18 32	265	292	1 22					
15	d	Sagittarii	5.0	15 48	18 7	131	170	16 42	19 1	215	246	0 54					
26	282	B. Tauri	6.4	9 27	11 4	60	4	10 16	11 53	306	252	0 49					
29	162	B. Geminorum	5.7	6 38	8 4	57	82	7 32	8 58	334	332	0 54					
Mar. 1	84	B. Cancri	6.4	9 14	10 35	94	74	10 26	11 48	314	274	1 12					
2	ω	Leonis	5.5	8 55	10 12	129	140	10 14	11 31	285	266	1 19					
4	p <sup>5</sup>	Leonis	5.3	9 3	10 13	80	114	10 4	11 14	340	359	1 1					
6	ψ	Virginis	5.0	10 5	11 6	176	212	10 44	11 46	240	269	0 39					
25	353	B. Tauri	6.5	10 35	10 22	76	20	11 26	11 13	296	245	0 51					
26	71	Orionis	5.1	7 15	6 59	129	96	8 25	8 8	252	203	1 9					
28	30	B. Cancri	6.1	6 31	6 7	98	136	7 52	7 28	299	307	1 21					
29	κ	Cancri	5.1	7 43	7 14	114	144	9 5	8 37	294	294	1 22					
30	14	Sextantis	6.3	12 9	11 36	104	67	13 20	12 46	311	264	1 11					
30	19	Sextantis	†	5.9	16 6	15 32	176	124	16 29	15 55	226	175	0 23				
31	p <sup>3</sup>	Leonis	6.1	16 27	15 49	183	182	16 45	16 8	230	168	0 18					
Apr. 2	χ	Virginis	4.8	13 52	13 7	47	27	14 22	13 37	5	338	0 30					
6	47	Libræ	5.8	10 54	9 54	43	91	11 24	10 24	348	94	0 30					
10	45	Sagittarii	†	6.0	13 55	12 38	132	183	14 42	13 25	220	267	0 47				
21	312	B. Tauri	6.2	9 8	7 8	128	70	9 59	8 0	242	187	0 51					
23	110	B. Geminorum	6.2	11 1	8 54	60	4	11 43	9 36	332	277	0 42					
28	388	B. Leonis	6.3	9 36	7 9	120	149	10 59	8 32	300	308	1 23					
30	49	Virginis	5.2	12 6	9 32	182	197	12 44	10 9	234	240	0 37					
May 3	41	Libræ	5.3	12 36	9 49	129	164	13 52	11 5	266	289	1 16					
6	16	Sagittarii	5.9	15 1	32 2	114	151	16 19	13 20	246	270	1 18					
7	187	B. Sagittarii	6.4	16 15	13 12	78	112	17 44	14 41	266	284	1 20					
27	φ	Virginis	5.0	12 46	8 25	132	133	14 11	9 49	283	263	1 25					
31	58	G. Scorpii	6.2	17 30	12 52	42	25	18 27	13 49	324	296	0 57					
June 8	6	G. Piscium	6.2	21 26	16 16	77	101	22 48	17 38	223	225	1 22					
9	λ	Piscium	4.6	18 50	13 37	2	52	19 17	14 4	312	1	0 27					
23	β	Virginis	4.8	12 52	6 45	96	92	14 13	8 5	318	294	1 20					
27	β	Scorpii	2.9	19 21	12 57	35	356	20 3	13 39	327	283	0 42					
27	56	B. Scorpii	5.0	19 22	12 58	33	355	20 3	13 39	328	285	0 41					

\* Immersion below the horizon of Washington.

† Emersion below the horizon of Washington.

OCCULTATIONS VISIBLE AT WASHINGTON.

Date.	THE STAR'S		IMMERSION.						EMERSION.				Duration of Occultation.
			Washington.		Angle East from—		Washington.		Angle East from—				
			Name.	Mag.	Sidereal Time.	Mean Time.	North Point.	Ver- tex.	Sidereal Time.	Mean Time.	North Point.	Ver- tex.	
			h m	h m	°	°	h m	h m	°	°	h m		
July 1	45 Sagittarii	6.0	15 2	8 23	96	141	16 18	9 39	252	288	1 16		
2	16 B. Capricorni	6.2	22 43	15 59	23	352	23 41	16 56	289	249	0 57		
2	β Capricorni	3.2	22 49	16 4	30	358	23 51	17 6	283	242	1 2		
9	26 B. Arietis	6.0	19 21	12 10	121	172	19 56	12 44	201	253	0 34		
11	163 B. Tauri	5.8	21 36	14 17	119	171	22 16	14 56	215	269	0 40		
25	123 B. Scorpii	6.5	20 1	11 47	66	27	21 10	12 56	287	240	1 9		
27	16 Sagittarii	5.9	15 8	6 47	115	151	16 27	8 5	246	268	1 18		
28	187 B. Sagittarii	6.4	16 20	7 54	58	91	17 40	9 14	287	306	1 20		
31	c <sup>1</sup> Capricorni	5.3	1 1	16 22	132	91	1 28	16 49	177	133	0 27		
Aug. 4	60 Piscium †	6.2	17 38	8 45	83	133	18 30	9 37	238	289	0 52		
6	ο Arietis	5.8	23 28	14 26	47	99	0 36	15 34	270	314	1 8		
10	74 B. Geminorum	6.2	0 8	14 50	78	128	0 59	15 41	284	338	0 51		
23	16 G. Sagittarii	6.4	17 27	7 19	79	85	19 3	8 54	270	255	1 35		
30	25 Piscium	6.2	0 22	13 46	110	99	1 17	14 40	193	167	0 54		
31	62 Piscium	6.1	3 54	17 13	43	2	5 0	18 19	271	220	1 6		
Sept. 9	ω Leonis	5.5	4 21	17 5	168	220	4 49	17 32	223	274	0 28		
21	ρ Sagittarii	4.0	18 38	6 36	58	67	20 8	8 6	273	261	1 30		
23	ν Aquarii †	4.5	1 51	13 40	65	16	2 53	14 42	252	200	1 2		
24	c <sup>2</sup> Capricorni	6.3	17 41	5 27	136	181	18 13	5 59	186	228	0 32		
30	145 B. Arietis	6.5	22 37	9 58	51	106	23 38	10 59	271	324	1 1		
Oct. 3	19 B. Geminorum	6.2	3 28	14 37	106	158	4 43	15 52	256	295	1 15		
6	κ Cancri	5.1	8 45	14 42	116	168	4 46	15 43	272	324	1 1		
17	39 G. Sagittarii	6.3	18 47	5 2	82	73	20 18	6 33	258	231	1 31		
24	25 Piscium	6.2	19 25	5 13	43	98	20 30	6 18	264	308	1 5		
25	60 Piscium	6.2	21 6	6 50	55	104	22 16	8 0	254	294	1 10		
26	26 B. Arietis	6.0	7 35	17 14	84	82	8 30	18 8	254	203	0 55		
29	302 B. Tauri	6.1	0 57	10 24	104	159	2 0	11 27	236	288	1 3		
29	ι Tauri	5.1	3 44	13 10	124	155	4 46	14 13	225	226	1 3		
Nov. 2	A <sup>2</sup> Cancri †	5.7	1 51	11 3	85	185	2 43	11 55	295	347	0 52		
2	60 Cancri	5.7	6 13	15 24	81	127	7 22	16 33	317	350	1 9		
7	α Virginis (Spica)	1.2	13 14	22 4	130	182	14 38	23 27	280	261	1 23		
16	16 B. Capricorni	6.2	19 52	4 9	56	62	21 23	5 40	261	245	1 31		
16	β Capricorni	3.2	20 1	4 19	60	64	21 33	5 50	256	238	1 32		
17	ν Aquarii	4.5	21 32	5 45	7	0	22 21	6 34	301	283	0 49		
24	145 B. Arietis	6.5	20 52	4 38	3	55	21 9	4 54	325	18	0 17		
25	85 H <sup>1</sup> Tauri	6.0	3 25	11 6	35	61	4 20	12 0	307	305	0 55		
27	26 Geminorum	5.2	10 51	18 22	150	95	11 32	19 3	236	181	0 41		
29	84 B. Cancri	6.4	4 51	12 16	56	108	5 38	13 3	332	21	0 47		
30	ω Leonis	5.5	4 6	11 27	147	199	4 51	12 12	244	296	0 45		
Dec. 15	c <sup>1</sup> Capricorni	5.3	1 30	7 52	133	89	1 57	8 20	179	133	0 27		
19	ε Piscium	4.4	6 16	12 22	135	83	6 45	12 51	194	142	0 29		
20	26 B. Arietis †	6.0	8 6	14 8	49	358	8 53	14 54	289	240	0 47		
21	σ Arietis	5.5	6 6	12 4	122	70	6 57	12 55	218	164	0 51		
23	302 B. Tauri	6.1	1 36	7 27	111	164	2 37	8 28	230	277	1 1		
23	ι Tauri	5.1	4 24	10 14	128	141	5 22	11 13	223	203	0 58		
23	π Tauri †	5.0	11 54	17 44	144	95	12 25	18 14	223	176	0 31		
24	19 B. Geminorum	6.2	12 38	18 23	38	347	13 2	18 47	340	290	0 24		
25	110 B. Geminorum	6.2	4 59	10 41	56	102	5 56	11 38	319	350	0 57		
25	λ Geminorum	3.6	12 49	18 30	118	65	13 39	19 20	270	218	0 50		
26	30 B. Cancri	6.1	7 54	13 32	67	73	8 51	14 30	331	310	0 57		
27	κ Cancri	5.1	6 20	11 54	171	216	6 53	12 27	226	266	0 33		

† Immersion below the horizon of Washington.

‡ Emerision below the horizon of Washington.

## EPHEMERIS FOR PHYSICAL OBSERVATIONS OF THE SUN.

FOR GREENWICH MEAN NOON.

Date.	P	$B_0$	$L_0$	Date.	P	$B_0$	$L_0$
Jan. 1	+ 2.35	-3.07	110.07	July 4	- 1.21	+3.34	188.32
6	- 0.09	3.64	44.22	9	+ 1.06	3.86	122.14
11	2.50	4.19	338.38	14	3.31	4.36	55.98
16	4.88	4.70	272.54	19	5.53	4.83	349.82
21	7.20	5.17	206.71	24	7.69	5.26	283.67
26	- 9.44	-5.60	140.88	29	+ 9.77	+5.66	217.53
31	11.58	5.98	75.04	Aug. 3	11.77	6.02	151.40
Feb. 5	13.61	6.32	9.21	8	13.68	6.33	85.29
10	15.51	6.61	303.38	13	15.49	6.61	19.19
15	17.29	6.85	237.54	18	17.18	6.84	313.10
20	-18.92	-7.03	171.70	23	+18.75	+7.01	247.03
25	20.41	7.16	105.85	28	20.19	7.14	130.97
Mar. 1	21.74	7.23	39.98	Sept. 2	21.50	7.22	114.92
6	22.91	7.25	334.11	7	22.67	7.25	48.89
11	23.93	7.21	268.22	12	23.69	7.23	342.87
16	-24.77	-7.12	202.32	17	+24.56	+7.15	276.86
21	25.45	6.97	136.41	22	25.27	7.02	210.86
26	25.95	6.77	70.47	27	25.82	6.84	144.87
31	26.27	6.52	4.52	Oct. 2	26.19	6.60	78.89
Apr. 5	26.41	6.23	296.54	7	26.39	6.32	12.92
10	-26.38	-5.88	232.54	12	+26.41	+5.99	306.97
15	26.16	5.50	166.53	17	26.24	5.62	241.02
20	25.75	5.08	100.50	22	25.88	5.20	175.07
25	25.16	4.62	34.44	27	25.32	4.74	109.13
30	24.38	4.13	328.37	Nov. 1	24.57	4.24	43.20
May 5	-23.43	-3.62	262.27	6	+23.62	+3.71	337.27
10	22.30	3.07	196.16	11	22.47	3.15	271.35
15	21.00	2.51	130.04	16	21.13	2.57	205.44
20	19.53	1.93	63.90	21	19.61	1.96	139.53
25	17.91	1.34	357.75	26	17.91	1.34	73.63
30	-16.15	-0.74	291.58	Dec. 1	+16.04	+0.71	7.73
June 4	14.26	-0.14	225.41	6	14.03	+0.07	301.85
9	12.26	+0.46	159.23	11	11.88	-0.57	235.97
14	10.16	1.06	93.05	16	9.63	1.21	170.09
19	7.99	1.65	26.87	21	7.30	1.83	104.22
24	- 5.76	+2.23	320.68	26	+ 4.90	-2.45	38.36
29	- 3.49	+2.80	254.50	31	+ 2.47	-3.04	332.50

In the above table,  $P$  is the position-angle of the axis of rotation measured eastward from the north point of the disk, while  $L_0$  and  $B_0$  are the heliographic longitudes and latitudes, respectively, of the center of the disk. The longitudes are reckoned from the Solar Meridian which passed through the ascending node of the Sun's equator on the ecliptic, on January 1, 1854, Greenwich Mean Noon.

MEAN EQUATOR, ORBIT, AND MEAN LONGITUDE.  
FOR GREENWICH MEAN NOON.

Date.	Mean Equator.			Orbit.		Mean Longitude. C	Mean Solar Days.	Motion in Mean Longitude.
	i	$\Delta$	$\Omega'$	$\Gamma'$	$\Omega$			
Jan. 1	24 24.8	49 40.0	2 56.5	68 8.0	232 21.1	44 1.6	0.1	1 19.06
11	24 25.5	49 9.5	2 55.2	69 14.8	231 49.3	175 47.4	0.2	2 38.12
21	24 26.1	48 39.0	2 53.8	70 21.7	231 17.6	307 33.2	0.3	3 57.18
31	24 26.8	48 8.4	2 52.4	71 28.5	230 45.8	79 19.1	0.4	5 16.23
Feb. 10	24 27.4	47 37.9	2 51.0	72 35.4	230 14.0	211 4.9	0.5	6 35.29
20	24 28.0	47 7.4	2 49.7	73 42.2	229 42.2	342 50.8	0.6	7 54.35
Mar. 1	24 28.7	46 36.9	2 48.3	74 49.0	229 10.5	114 36.6	0.7	9 13.41
11	24 29.3	46 6.5	2 46.8	75 55.9	228 38.7	246 22.4	0.8	10 32.47
21	24 29.9	45 36.0	2 45.4	77 2.7	228 6.9	18 8.3	0.9	11 51.53
31	24 30.5	45 5.5	2 44.0	78 9.6	227 35.1	149 54.1	1.0	13 10.58
Apr. 10	24 31.1	44 35.1	2 42.5	79 16.4	227 3.4	281 40.0	2.0	26 21.17
20	24 31.7	44 4.6	2 41.0	80 23.2	226 31.6	53 25.8	3.0	39 31.75
30	24 32.3	43 34.2	2 39.6	81 30.1	225 59.8	185 11.6	4.0	52 42.33
May 10	24 32.8	43 3.8	2 38.1	82 36.9	225 28.1	316 57.5	5.0	65 52.92
20	24 33.4	42 33.4	2 36.6	83 43.8	224 56.3	88 43.3	6.0	79 3.50
30	24 34.0	42 3.0	2 35.1	84 50.6	224 24.5	220 29.1	7.0	92 14.09
June 9	24 34.6	41 32.7	2 33.5	85 57.5	223 52.7	352 15.0	8.0	105 24.67
19	24 35.1	41 2.3	2 32.0	87 4.3	223 21.0	124 0.8	9.0	118 35.25
29	24 35.7	40 32.0	2 30.4	88 11.1	222 49.2	255 46.7	10.0	131 45.84
July 9	24 36.2	40 1.6	2 28.9	89 18.0	222 17.4	27 32.5	Hours.	1 0 32.94
19	24 36.8	39 31.3	2 27.3	90 24.8	221 45.7	159 18.3	2	1 5.88
29	24 37.3	39 1.0	2 25.7	91 31.7	221 13.9	291 4.2	3	1 38.82
Aug. 8	24 37.8	38 30.7	2 24.1	92 38.5	220 42.1	62 50.0	4	2 11.76
18	24 38.4	38 0.4	2 22.5	93 45.4	220 10.3	194 35.9	5	2 44.70
28	24 38.9	37 30.1	2 20.9	94 52.2	219 38.6	326 21.7	6	3 17.65
Sept. 7	24 39.4	36 59.8	2 19.3	95 59.0	219 6.8	98 7.5	7	3 50.59
17	24 39.9	36 29.5	2 17.7	97 5.9	218 35.0	229 55.4	8	4 23.53
27	24 40.4	35 59.2	2 16.0	98 12.7	218 3.2	1 59.2	9	4 56.47
Oct. 7	24 40.9	35 28.9	2 14.4	99 19.6	217 31.5	133 25.0	10	5 29.41
17	24 41.4	34 58.7	2 12.7	100 26.4	216 59.7	265 10.9	11	6 2.35
27	24 41.9	34 28.4	2 11.0	101 33.3	216 27.9	36 54.7	12	6 35.29
Nov. 6	24 42.4	33 58.2	2 9.3	102 40.1	215 56.2	168 42.6	13	7 8.23
16	24 42.8	33 28.0	2 7.6	103 47.0	215 24.4	300 28.4	14	7 41.17
26	24 43.3	32 57.8	2 5.9	104 53.8	214 52.6	72 14.2	15	8 14.11
Dec. 6	24 43.7	32 27.6	2 4.2	106 0.6	214 30.8	204 0.1	16	8 47.06
16	24 44.2	31 57.4	2 2.5	107 7.5	213 49.1	335 45.9	17	9 20.00
26	24 44.6	31 27.2	2 0.8	108 14.3	213 17.3	107 31.7	18	9 52.94
36	24 45.1	30 57.0	1 59.0	109 21.1	212 45.5	239 17.6	19	10 25.88
							20	10 58.82
							21	11 31.76
							22	12 4.70
							23	12 37.64

Daily motion of  $\Gamma'$  . . . . . +6".684  
Daily motion of  $\Omega$  . . . . . -9".177

**EPIHEMERIS FOR PHYSICAL OBSERVATIONS OF THE MOON.  
FOR GREENWICH MEAN MIDNIGHT.**

Date.	The Earth's Selenographic—		Physical Libration.		The Sun's Selenographic—		C
	Long.	Lat.	Long.	Lat.	Colong.	Lat.	
Jan. 1	-4.17	-0.84	0.00	-0.01	40.45	+1.11	341.79
2	2.72	+0.87	0.00	0.01	52.58	1.14	346.71
3	-1.02	2.85	0.00	0.01	64.71	1.16	352.71
4	+0.83	4.06	0.00	0.01	76.83	1.19	359.27
5	2.68	5.29	0.00	0.01	88.96	1.22	5.78
6	+4.37	+6.14	0.00	-0.01	101.08	+1.24	11.70
7	5.75	6.58	0.00	0.01	113.20	1.26	16.65
8	6.72	6.59	0.00	0.01	125.33	1.28	20.44
9	7.22	6.22	0.00	0.01	137.47	1.30	22.99
10	7.22	5.54	0.00	0.01	149.61	1.32	24.31
11	+6.78	+4.59	0.00	-0.01	161.75	+1.34	24.46
12	5.95	3.45	0.00	0.01	173.91	1.35	23.50
13	4.83	2.18	0.00	0.01	186.07	1.37	21.49
14	3.51	+0.84	0.00	0.01	198.23	1.38	18.54
15	2.09	-0.58	-0.01	0.02	210.40	1.39	14.74
16	+0.65	-1.88	-0.01	-0.01	222.58	+1.40	10.25
17	-0.78	3.14	0.01	0.01	234.76	1.40	5.26
18	1.99	4.28	0.01	0.01	246.95	1.41	0.02
19	3.08	5.24	0.01	0.01	259.13	1.42	354.78
20	3.97	5.97	-0.01	0.02	271.32	1.43	349.78
21	-4.65	-6.43	-0.01	-0.02	283.51	+1.44	345.26
22	5.12	6.58	0.01	0.01	295.70	1.44	341.41
23	5.40	6.40	0.02	0.01	307.89	1.44	338.41
24	5.50	5.90	0.02	0.01	320.07	1.45	336.40
25	5.42	5.06	0.02	0.01	332.25	1.45	335.52
26	-5.17	-3.94	-0.01	-0.01	344.42	+1.46	335.88
27	4.72	2.58	0.01	0.01	356.59	1.46	337.58
28	4.07	-1.05	0.01	0.01	8.75	1.47	340.65
29	3.20	+0.57	0.01	0.01	20.90	1.48	345.03
30	2.10	2.18	0.01	0.01	33.04	1.49	350.51
31	-0.86	+3.66	-0.01	-0.01	45.18	+1.50	356.71
Feb. 1	+0.65	4.92	0.01	0.01	57.32	1.51	3.14
2	2.13	5.85	0.01	0.01	69.45	1.52	9.25
3	3.54	6.49	0.01	0.01	81.58	1.52	14.62
4	4.74	6.52	0.01	0.01	93.71	1.53	18.95
5	+5.61	+6.25	-0.01	-0.01	105.84	+1.54	22.08
6	6.07	5.63	0.01	0.01	117.97	1.54	23.94
7	6.10	4.72	0.01	0.01	130.11	1.54	24.56
8	5.69	3.59	0.01	0.01	142.26	1.55	23.98
9	4.91	2.32	0.01	0.01	154.41	1.55	22.29
10	+3.84	+0.97	-0.01	-0.02	166.56	+1.55	19.59
11	2.55	-0.40	0.01	0.02	178.72	1.55	16.01
12	+1.15	1.74	0.01	0.02	190.89	1.55	11.71
13	-0.26	3.01	0.02	0.02	203.07	1.54	6.86
14	1.58	4.15	0.02	0.02	215.25	1.54	1.69
15	-2.76	-5.12	-0.02	-0.02	227.44	+1.54	356.42
16	-3.71	-5.88	-0.02	-0.02	239.63	+1.53	351.31

EPHEMERIS FOR PHYSICAL OBSERVATIONS OF THE MOON.  
FOR GREENWICH MEAN MIDNIGHT.

Date.	The Earth's Selenographic—		Physical Libration.		The Sun's Selenographic—		C
	Long.	Lat.	Long.	Lat.	Colong.	Lat.	
Feb. 16	-3.71	-5.88	-0.02	-0.02	239.63	+1.53	351.81
17	4.40	6.37	0.02	0.02	251.82	1.53	346.59
18	4.82	6.56	0.02	0.02	264.02	1.52	342.47
19	4.97	6.42	0.02	0.02	276.22	1.51	339.15
20	4.88	5.93	0.02	0.02	288.42	-1.50	336.81
21	-4.60	-5.11	-0.02	-0.02	300.61	+1.49	335.60
22	4.16	3.99	0.02	0.02	312.81	1.48	335.66
23	3.60	2.63	0.02	0.02	325.00	1.47	337.08
24	2.94	-1.10	0.02	0.02	337.19	-1.46	339.86
25	2.19	+0.50	0.02	0.02	349.37	1.46	343.95
26	-1.36	+2.09	-0.02	-0.02	1.54	+1.45	349.12
27	-0.43	3.56	0.02	0.02	13.71	1.44	355.05
28	+0.57	4.81	0.02	0.02	25.87	1.43	1.28
29	1.61	5.76	0.02	0.02	38.02	1.42	7.36
Mar. 1	2.65	6.36	0.01	0.02	50.17	1.41	12.87
2	+3.60	+6.57	-0.01	-0.02	62.32	+1.40	17.50
3	4.38	6.38	0.01	0.02	74.46	1.39	21.04
4	4.91	5.82	0.01	0.02	86.60	1.38	23.38
5	5.12	4.96	0.01	0.02	98.75	1.37	24.49
6	4.98	3.85	0.02	0.02	110.89	1.36	24.36
7	+4.49	+2.57	-0.02	-0.02	123.04	+1.35	23.05
8	3.68	+1.19	0.02	0.02	135.20	1.34	20.87
9	2.61	-0.22	0.02	0.02	147.36	1.32	17.94
10	+1.35	1.59	0.02	0.02	159.52	1.31	13.23
11	-0.02	2.89	0.02	0.02	171.70	1.30	8.52
12	-1.39	-4.06	-0.02	-0.02	183.88	+1.28	3.44
13	2.68	5.07	0.02	0.02	196.06	1.27	358.21
14	3.81	5.86	0.02	0.02	208.25	1.26	353.06
15	4.69	6.41	0.02	0.02	220.45	1.24	348.20
16	5.28	6.66	0.02	0.02	232.65	1.23	343.86
17	-5.53	-6.58	-0.03	-0.02	244.86	+1.21	340.23
18	5.45	6.16	0.03	0.02	257.07	1.19	337.49
19	5.06	5.39	0.03	0.02	269.29	1.17	335.85
20	4.40	4.29	0.02	0.02	281.50	1.15	335.48
21	3.54	2.91	0.02	0.02	293.72	1.13	336.49
22	-2.55	-1.34	-0.02	-0.02	305.93	+1.11	338.96
23	1.49	+0.33	0.02	0.02	318.14	1.08	342.82
24	-0.42	1.97	0.02	0.02	330.34	1.06	347.85
25	+0.63	3.49	0.02	0.02	342.54	1.04	353.70
26	1.62	4.79	0.02	0.02	354.73	1.02	359.91
27	+2.54	+5.79	-0.02	-0.02	6.92	+1.00	6.00
28	3.35	6.43	0.02	0.02	19.10	0.97	11.59
29	4.03	6.69	0.02	0.02	31.27	0.95	16.38
30	4.55	6.57	0.02	0.02	43.44	0.93	20.16
31	4.86	6.08	0.02	0.02	55.61	0.90	22.81
Apr. 1	+4.95	+5.27	-0.02	-0.02	67.77	+0.88	24.29
2	+4.77	+4.20	-0.02	-0.02	79.93	+0.86	24.56

**EPIHEMERIS FOR PHYSICAL OBSERVATIONS OF THE MOON.  
FOR GREENWICH MEAN MIDNIGHT.**

Date.	The Earth's Selenographic—		Physical Libration.		The Sun's Selenographic—		C
	Long.	Lat.	Long.	Lat.	Colong.	Lat.	
	.	.	.	.	.	.	.
Apr. 1	+4.95	+5.27	-0.02	-0.02	67.77	+0.88	24.29
2	4.77	4.20	0.02	0.02	79.93	0.86	24.56
3	4.33	2.93	0.02	0.02	92.09	0.83	23.65
4	3.63	1.54	0.02	0.02	104.25	0.81	21.62
5	2.69	+0.10	0.02	0.02	116.42	0.79	18.58
6	+1.56	-1.32	-0.02	-0.02	128.59	+0.76	14.68
7	+0.28	2.67	0.02	0.02	140.76	0.74	10.12
8	-1.06	3.90	0.02	0.02	152.94	0.72	5.12
9	2.43	4.96	0.02	0.02	165.13	0.70	359.93
10	3.71	5.81	0.02	0.02	177.32	0.68	354.76
11	-4.82	-6.42	-0.02	-0.02	189.52	+0.66	349.84
12	5.70	6.76	0.02	0.02	201.72	0.64	345.36
13	6.28	6.78	0.02	0.02	213.93	0.61	341.49
14	6.51	6.46	0.03	0.02	226.15	0.59	338.42
15	6.35	5.80	0.03	0.02	238.37	0.57	336.34
16	-5.81	-4.78	-0.03	-0.02	250.60	+0.54	335.44
17	4.92	3.46	0.02	0.02	262.83	0.52	335.89
18	3.73	1.89	0.02	0.02	275.06	0.49	337.84
19	2.34	-0.18	0.02	0.02	287.29	0.46	341.29
20	-0.84	+1.56	0.02	0.02	299.52	0.44	346.11
21	+0.66	+3.20	-0.02	-0.02	311.75	+0.41	351.93
22	2.09	4.61	0.02	0.02	323.97	0.38	358.27
23	3.35	5.71	0.02	0.02	336.19	0.35	4.58
24	4.39	6.44	0.02	0.02	348.40	0.32	10.40
25	5.18	6.78	0.02	0.02	0.61	0.29	15.41
26	+5.68	+6.72	-0.02	-0.02	12.81	+0.26	19.42
27	5.91	6.29	0.01	0.02	25.00	0.23	22.32
28	5.86	5.54	0.02	0.02	37.18	0.20	24.06
29	5.55	4.52	0.02	0.02	49.37	0.16	24.63
30	5.00	3.29	0.02	0.02	61.55	0.13	24.04
May 1	+4.23	+1.92	-0.02	-0.02	73.73	+0.10	22.34
2	3.27	+0.48	0.02	0.02	85.91	0.07	19.59
3	2.16	-0.96	0.02	0.02	98.09	0.04	15.94
4	+0.91	2.34	0.02	0.02	110.27	+0.02	11.55
5	-0.41	3.62	0.02	0.02	122.45	-0.01	6.64
6	-1.76	-4.74	-0.02	-0.02	134.64	-0.03	1.48
7	3.10	5.65	0.02	0.02	146.83	0.06	356.29
8	4.35	6.33	0.02	0.02	159.03	0.08	351.30
9	5.46	6.74	0.02	0.03	171.23	0.10	346.71
10	6.37	6.85	0.02	0.02	183.44	0.12	342.69
11	-7.00	-6.64	-0.02	-0.02	195.65	-0.14	339.39
12	7.28	6.11	0.02	0.02	207.87	0.16	336.98
13	7.19	5.24	0.02	0.02	220.10	0.19	335.62
14	6.68	4.04	0.02	0.02	232.33	0.21	335.50
15	5.76	2.57	0.02	0.02	244.57	0.23	336.79
16	-4.45	-0.90	-0.02	-0.02	256.81	-0.26	339.61
17	-2.84	+0.87	-0.02	-0.02	269.06	-0.28	343.92



EPHEMERIS FOR PHYSICAL OBSERVATIONS OF THE MOON.  
FOR GREENWICH MEAN MIDNIGHT.

Date.	The Earth's Selenographic—		Physical Libration.		The Sun's Selenographic—		C
	Long.	Lat.	Long.	Lat.	Colong.	Lat.	
May 17	-2.84	+0.87	-0.02	-0.02	269.06	-0.28	343.92
18	-1.02	2.59	0.02	0.02	261.31	0.31	349.50
19	+0.87	4.14	0.02	0.02	263.55	0.34	355.89
20	2.68	5.39	0.01	0.02	305.79	0.37	2.49
21	4.29	6.26	0.01	0.02	318.03	0.40	8.72
22	+5.58	+6.71	-0.01	-0.02	330.26	-0.43	14.15
23	6.49	6.74	0.01	0.02	342.49	0.46	18.54
24	6.99	6.39	0.01	0.02	354.71	0.49	21.77
25	7.10	5.69	0.01	0.02	6.93	0.52	23.79
26	6.85	4.72	0.01	0.02	19.13	0.55	24.63
27	+6.29	+3.54	-0.01	-0.02	31.34	-0.58	24.30
28	5.46	2.22	0.01	0.02	43.53	0.61	22.86
29	4.44	+0.80	0.01	0.03	55.73	0.64	20.38
30	3.27	-0.62	0.01	0.03	67.92	0.67	16.96
31	2.00	2.01	0.01	0.03	80.11	0.70	12.76
June 1	+0.67	-3.20	-0.01	-0.03	92.30	-0.73	7.98
2	-0.68	4.45	0.01	0.03	104.50	0.75	2.85
3	2.02	5.41	0.01	0.03	116.69	0.77	357.63
4	3.31	6.13	0.02	0.03	128.88	0.79	352.56
5	4.51	6.59	0.02	0.03	141.08	0.81	347.86
6	-5.57	-6.77	-0.02	-0.03	153.29	-0.83	343.70
7	6.46	6.65	0.02	0.03	165.50	0.84	340.23
8	7.12	6.21	0.02	0.03	177.71	0.86	337.59
9	7.48	5.46	0.02	0.03	189.93	0.87	335.92
10	7.50	4.40	0.02	0.03	202.16	0.89	335.37
11	-7.13	-3.07	-0.02	-0.03	214.39	-0.90	336.09
12	6.33	-1.52	0.01	0.03	226.63	0.92	338.23
13	5.11	+0.17	0.01	0.03	238.88	0.94	341.86
14	3.50	1.88	0.01	0.03	251.13	0.95	346.89
15	-1.60	3.50	0.01	0.03	263.38	0.97	353.00
16	+0.46	+4.88	-0.01	-0.03	275.63	-0.99	359.67
17	2.51	5.90	0.01	0.03	287.88	1.02	6.23
18	4.38	6.51	0.01	0.03	300.13	1.04	12.25
19	5.90	6.66	-0.01	0.03	312.38	1.06	17.20
20	6.99	6.40	0.00	0.03	324.62	1.09	20.93
21	+7.59	+5.76	0.00	-0.03	336.86	-1.11	23.37
22	7.72	4.88	0.00	0.03	349.09	1.14	24.54
23	7.41	3.68	0.00	0.03	1.31	1.16	24.50
24	6.73	2.33	0.00	0.03	13.53	1.19	23.31
25	5.78	+1.00	0.00	0.03	25.74	1.21	21.06
26	+4.61	-0.40	0.00	-0.03	37.95	-1.24	17.86
27	3.32	1.78	0.00	0.03	50.15	1.26	13.84
28	1.96	3.06	-0.01	0.03	62.35	1.28	9.19
29	+0.60	4.21	0.01	0.03	74.54	1.30	4.13
30	-0.74	5.18	0.01	0.03	86.74	1.32	358.90
July 1	-2.02	-5.98	-0.01	-0.03	98.94	-1.33	353.76
2	-3.20	-6.42	-0.01	-0.03	111.13	-1.34	348.92

**EPIHEMERIS FOR PHYSICAL OBSERVATIONS OF THE MOON.  
FOR GREENWICH MEAN. MIDNIGHT.**

Date.	The Earth's Selenographic—		Physical Libration.		The Sun's Selenographic—		C
	Long.	Lat.	Long.	Lat.	Colong.	Lat.	
	.	.	.	.	.	.	.
July 1	-2.02	-5.93	-0.01	-0.03	98.94	-1.33	353.76
2	3.20	6.42	0.01	0.03	111.13	1.34	348.92
3	4.28	6.63	0.01	0.03	123.33	1.35	344.60
4	5.22	6.55	0.01	0.03	135.53	1.36	340.96
5	6.01	6.16	0.01	0.03	147.73	1.36	338.12
6	6.61	5.47	-0.01	-0.03	159.94	-1.37	336.22
7	6.98	4.50	0.01	0.03	172.15	1.37	335.38
8	7.06	3.28	0.01	0.03	184.37	1.37	335.72
9	6.81	1.84	-0.01	0.03	196.60	1.37	337.36
10	6.19	-0.26	0.00	0.03	208.83	1.38	340.37
11	-5.16	+1.38	0.00	-0.03	221.07	-1.38	344.76
12	3.74	2.97	0.00	0.03	233.31	1.39	350.34
13	1.98	4.38	0.00	0.03	245.56	1.39	356.74
14	-0.01	5.51	0.00	0.03	257.82	1.40	3.42
15	+2.02	6.24	0.00	0.03	270.07	1.42	9.76
16	+3.93	+6.54	0.00	-0.03	282.32	-1.43	15.27
17	5.54	6.39	0.00	0.03	294.57	1.44	19.62
18	6.73	5.83	0.00	0.03	306.82	1.45	22.64
19	7.42	4.95	0.00	0.03	319.06	1.47	24.31
20	7.60	3.81	0.00	0.03	331.30	1.48	24.66
21	+7.32	+2.52	0.00	-0.03	343.53	-1.49	23.78
22	6.64	+1.13	0.00	0.03	355.76	1.51	21.78
23	5.66	-0.28	0.00	0.03	7.98	1.52	18.78
24	4.46	1.65	0.00	0.03	20.19	1.54	14.94
25	3.13	2.93	0.00	0.03	32.40	1.55	10.42
26	+1.76	-4.08	0.00	-0.03	44.60	-1.56	5.44
27	+0.41	5.05	0.00	0.03	56.80	1.57	0.23
28	-0.87	5.81	0.00	0.03	68.99	1.57	355.03
29	2.03	6.32	0.00	0.03	81.19	1.58	350.08
30	3.07	6.55	0.00	0.03	93.38	1.58	345.59
31	-3.96	-6.49	0.00	-0.03	105.57	-1.58	341.73
Aug. 1	4.70	6.13	0.00	0.03	117.76	1.57	338.67
2	5.28	5.46	0.00	0.03	129.95	1.56	336.53
3	5.70	4.51	0.00	0.03	142.15	1.55	335.45
4	5.93	3.32	0.00	0.03	154.35	1.54	335.52
5	-5.94	-1.93	0.00	-0.03	166.55	-1.53	336.83
6	5.70	-0.41	0.00	0.03	178.76	1.52	339.44
7	5.17	+1.17	0.00	0.03	190.98	1.51	343.35
8	4.32	2.70	0.00	0.03	203.21	1.50	348.43
9	3.14	4.10	0.00	0.03	215.44	1.49	354.41
10	-1.87	+5.26	+0.01	-0.03	227.68	-1.48	0.86
11	+0.01	6.08	0.01	0.03	239.92	1.48	7.26
12	1.78	6.48	0.01	0.03	252.16	1.47	13.09
13	3.47	6.45	0.01	0.03	264.41	1.47	17.94
14	4.93	5.99	0.01	0.03	276.66	1.46	21.56
15	+6.03	+5.16	+0.01	+0.03	288.90	-1.46	23.82
16	+6.69	+4.05	+0.01	-0.03	301.14	-1.46	24.69

**EPHEMERIS FOR PHYSICAL OBSERVATIONS OF THE MOON.  
FOR GREENWICH MEAN MIDNIGHT.**

Date.	The Earth's Selenographic—		Physical Libration.		The Sun's Selenographic—		C
	Long.	Lat.	Long.	Lat.	Colong.	Lat.	
Aug. 16	+6.69	+4.05	+0.01	-0.03	301.14	-1.46	24.69
17	6.88	2.74	0.01	0.03	313.38	1.46	24.24
18	6.62	+1.32	0.01	0.03	325.61	1.47	22.57
19	5.98	-0.12	0.01	0.03	337.84	1.47	19.83
20	5.02	-1.52	0.01	0.03	350.06	1.47	16.17
21	+3.84	-2.84	+0.01	-0.03	2.27	-1.47	11.79
22	2.54	4.01	0.01	0.03	14.48	1.47	6.90
23	+1.20	5.01	0.01	0.04	26.68	1.47	1.73
24	-0.11	5.79	0.01	0.04	38.88	1.47	356.51
25	1.31	6.33	0.01	0.04	51.07	1.46	351.46
26	-2.36	-6.59	+0.01	-0.04	63.26	-1.46	346.80
27	3.23	6.56	0.00	0.04	75.44	1.44	342.72
28	3.91	6.22	0.00	0.04	87.62	1.43	339.39
29	4.39	-5.57	0.00	0.04	99.80	1.41	336.97
30	4.68	-4.63	0.00	0.04	111.98	1.39	335.59
31	-4.79	-3.43	0.00	-0.03	124.16	-1.37	335.37
Sept. 1	4.73	2.03	0.00	0.03	136.34	1.35	336.41
2	4.50	-0.50	+0.01	0.03	148.53	1.32	338.75
3	4.09	+1.08	0.01	0.03	160.72	1.30	342.37
4	3.48	2.62	0.01	0.03	172.92	1.27	347.14
5	-2.67	+4.02	+0.01	-0.03	185.13	-1.25	352.82
6	1.65	-5.19	0.01	0.03	197.34	1.23	359.02
7	-0.45	-6.05	0.01	0.03	209.55	1.20	5.30
8	+0.86	-6.53	0.01	0.03	221.79	1.18	11.20
9	2.21	6.59	0.01	0.03	234.00	1.17	16.31
10	+3.48	+6.23	+0.01	-0.03	246.24	-1.15	20.34
11	4.57	5.48	0.01	0.03	258.47	1.13	23.11
12	5.38	4.42	0.01	0.03	270.70	1.12	24.52
13	-5.83	3.12	0.01	0.03	282.94	1.10	24.58
14	5.90	-1.68	0.02	0.03	295.17	1.09	23.35
15	+5.59	+0.19	+0.02	-0.03	307.39	-1.08	20.95
16	4.94	-1.28	0.02	0.04	319.61	-1.07	17.54
17	4.00	-2.66	0.01	0.04	331.83	1.06	13.33
18	2.86	3.89	0.01	0.04	344.04	1.05	8.54
19	-1.58	4.95	0.01	0.04	356.24	1.04	3.40
20	+0.27	-5.78	+0.01	-0.04	8.44	-1.03	358.16
21	-0.99	-6.38	0.01	0.04	20.63	1.02	353.05
22	-2.15	-6.70	0.01	0.04	32.82	1.00	348.25
23	3.13	6.73	0.01	0.04	45.00	0.99	343.97
24	3.88	6.44	0.01	0.04	57.17	0.97	340.38
25	-4.38	-5.85	+0.01	-0.04	69.34	-0.95	337.63
26	4.62	-4.94	0.01	0.04	81.51	0.92	335.88
27	4.61	3.76	0.01	0.04	93.67	0.89	335.29
28	4.36	2.35	0.01	0.04	105.84	0.86	335.97
29	3.90	-0.78	0.01	0.04	118.00	0.83	337.99
30	-3.26	-4.86	+0.01	-0.03	130.17	-0.79	341.37
Oct. 1	-2.48	-2.46	+0.01	-0.03	142.34	-0.76	345.96

**EPHEMERIS FOR PHYSICAL OBSERVATIONS OF THE MOON.  
FOR GREENWICH MEAN MIDNIGHT.**

Date.	The Earth's Selenographic—		Physical Libration.		The Sun's Selenographic—		C
	Long.	Lat.	Long.	Lat.	Colong.	Lat.	
Oct. 1	-2.48	+2.46	+0.01	-0.03	142.34	-0.76	345.96
2	1.59	3.92	0.01	0.03	154.51	0.72	351.51
3	-0.61	5.14	0.01	0.03	166.69	0.69	357.64
4	+0.42	6.06	0.01	0.03	178.88	0.65	3.88
5	1.46	6.60	0.01	0.03	191.07	0.62	9.81
6	+2.48	+6.74	+0.01	-0.03	203.27	-0.59	15.04
7	3.41	6.47	0.02	0.03	215.47	0.56	19.29
8	4.21	5.81	0.02	0.03	227.68	0.53	22.39
9	4.82	4.82	0.02	0.03	239.90	0.51	24.22
10	5.19	3.58	0.02	0.04	252.11	0.48	24.74
11	+5.23	+2.16	+0.02	-0.04	264.33	-0.46	23.96
12	5.09	+0.64	0.02	0.04	276.55	0.44	21.97
13	4.61	-0.87	0.02	0.04	288.76	0.42	18.89
14	3.87	2.31	0.01	0.04	300.98	0.40	14.90
15	2.90	3.62	0.01	0.04	313.19	0.38	10.24
16	+1.76	-4.76	+0.01	-0.04	325.39	-0.36	5.15
17	+0.50	5.67	0.01	0.04	337.59	0.34	359.99
18	-0.80	6.34	0.01	0.04	349.78	0.33	354.72
19	2.06	6.74	0.01	0.04	1.96	0.31	349.82
20	3.22	6.85	0.01	0.04	14.14	0.29	345.38
21	-4.21	-6.66	+0.01	-0.04	26.32	-0.27	341.57
22	4.95	6.17	0.01	0.04	38.48	0.25	338.52
23	5.39	5.36	0.01	0.04	50.64	0.22	336.40
24	5.51	4.26	0.01	0.04	62.80	0.19	335.35
25	5.28	2.89	0.01	0.04	74.95	0.16	335.53
26	-4.72	-1.33	+0.01	-0.04	87.10	-0.13	337.06
27	3.86	+0.34	0.01	0.04	99.24	0.09	340.05
28	2.76	2.02	0.01	0.03	111.39	0.05	344.37
29	1.49	3.58	0.01	0.03	123.54	-0.02	349.82
30	-0.14	4.92	0.01	0.03	135.69	+0.02	356.00
31	+1.20	+5.94	+0.01	-0.03	147.84	+0.06	2.41
Nov. 1	2.45	6.57	0.01	0.03	160.00	0.10	8.54
2	3.55	6.79	0.01	0.04	172.17	0.13	13.98
3	4.44	6.59	0.01	0.04	184.34	0.17	18.45
4	5.10	6.02	0.01	0.04	196.52	0.20	21.79
5	+5.52	+5.11	+0.01	-0.04	208.71	+0.23	23.90
6	5.68	3.93	0.01	0.04	220.90	0.26	24.74
7	5.60	2.57	0.01	0.04	233.10	0.29	24.34
8	5.29	+1.09	0.01	0.04	245.30	0.32	22.72
9	4.76	-0.42	0.01	0.04	257.50	0.34	19.99
10	+4.03	-1.88	+0.01	-0.04	269.70	+0.37	16.29
11	3.13	3.24	0.01	0.04	281.90	0.39	11.82
12	2.07	4.43	0.01	0.04	294.10	0.41	6.82
13	+0.88	5.42	0.01	0.04	306.30	0.43	1.57
14	-0.39	6.16	0.01	0.04	318.49	0.45	356.33
15	-1.69	-6.63	+0.01	-0.04	330.68	+0.47	351.32
16	-2.97	-6.83	+0.01	-0.04	342.86	+0.49	346.75

**EPHEMERIS FOR PHYSICAL OBSERVATIONS OF THE MOON.  
FOR GREENWICH MEAN MIDNIGHT.**

Date.	The Earth's Selenographic—		Physical Libration.		The Sun's Selenographic—		C
	Long.	Lat.	Long.	Lat.	Colong.	Lat.	
Nov. 16	-2.97	-6.83	+0.01	-0.04	342.86	+0.49	346.75
17	4.17	6.73	+0.01	0.04	355.03	0.50	342.76
18	5.23	6.34	0.00	-0.04	7.20	0.52	339.48
19	6.04	5.65	0.00	0.04	19.36	0.54	337.05
20	6.56	4.67	0.00	0.04	31.52	0.56	335.60
21	-6.72	-3.43	0.00	-0.04	43.67	+0.59	335.27
22	6.47	1.97	0.00	0.04	55.81	0.61	336.22
23	5.80	-0.35	0.00	0.04	67.95	0.64	338.57
24	4.70	+1.34	0.00	0.04	80.08	0.67	342.38
25	3.24	2.98	+0.01	0.04	92.21	0.70	347.47
26	-1.53	+4.43	+0.01	-0.04	104.34	+0.74	353.58
27	+0.31	5.50	0.01	0.04	116.48	0.77	0.18
28	2.12	6.36	0.01	0.04	128.61	0.80	6.68
29	3.75	6.69	0.01	0.04	140.75	0.83	12.56
30	5.10	6.50	0.01	0.04	152.90	0.86	17.46
Dec. 1	+6.00	+6.08	+0.01	-0.04	165.05	+0.89	21.14
2	6.60	5.23	0.01	0.04	177.21	0.92	23.56
3	6.91	4.10	0.01	0.04	189.37	0.95	24.68
4	6.80	2.79	0.01	0.04	201.54	0.97	24.56
5	6.39	+1.36	0.01	0.04	213.72	1.00	23.23
6	+5.75	-0.11	+0.01	-0.04	225.90	+1.02	20.79
7	4.91	1.55	0.01	0.04	238.09	1.05	17.36
8	3.93	2.90	0.01	0.04	250.28	1.07	13.12
9	2.84	4.11	+0.01	0.04	262.47	1.09	8.27
10	1.66	5.12	0.00	0.04	274.66	1.11	3.07
11	+0.42	-5.91	0.00	-0.04	286.84	+1.12	357.79
12	-0.87	6.43	0.00	0.04	299.03	1.14	352.69
13	2.17	6.68	0.00	0.04	311.22	1.15	347.97
14	3.45	6.64	0.00	0.04	323.40	1.16	343.80
15	4.66	6.32	0.00	0.04	335.57	1.17	340.34
16	-5.76	-5.71	0.00	-0.04	347.74	+1.18	337.68
17	6.67	4.84	0.00	0.04	359.91	1.19	335.94
18	7.32	3.72	0.00	0.04	12.07	1.20	335.28
19	7.62	2.38	0.00	0.04	24.22	1.21	335.68
20	7.68	-0.88	0.00	-0.04	36.36	1.23	337.40
21	-6.94	+0.72	0.00	-0.04	48.50	+1.24	340.49
22	5.87	2.33	0.00	0.04	60.63	1.26	344.96
23	4.34	3.83	0.00	0.04	72.76	1.28	350.63
24	2.43	5.10	0.00	0.04	84.88	1.30	357.13
25	-0.30	6.01	0.00	0.04	97.00	1.31	3.88
26	+1.88	+6.50	0.00	-0.04	109.13	+1.33	10.27
27	3.89	6.52	0.00	0.04	121.25	1.35	15.78
28	5.57	6.09	0.00	0.04	133.38	1.37	20.08
29	6.80	5.29	0.00	0.04	145.52	1.38	23.00
30	7.54	4.19	0.00	0.04	157.66	1.40	24.52
31	+7.79	+2.88	0.00	-0.04	169.81	+1.41	24.71
32	+7.61	+1.47	0.00	-0.04	181.97	+1.43	23.64

# 618 ILLUMINATED DISK OF MERCURY, 1920.

FOR GREENWICH MEAN NOON.

Date.	$k$	$i$	$\theta$	$L$	Stellar Mag.	Date.	$k$	$i$	$\theta$	$L$	Stellar Mag.
Jan. 1	0.830	49	186	33.3	-0.3	July 4	0.319	111	16	29.4	+1.0
6	0.879	41	181	29.3	0.3	9	0.232	122	20	25.2	1.3
11	0.915	34	176	26.8	0.3	14	0.146	135	25	18.8	1.7
16	0.943	28	170	25.6	0.4	19	0.069	150	34	10.4	2.2
21	0.964	22	163	25.5	0.5	24	0.019	164	60	3.2	2.8
26	0.981	16	154	26.6	-0.7	29	0.016	185	140	2.9	+2.8
31	0.993	10	137	28.9	0.9	Aug. 3	0.074	148	172	12.3	2.0
Feb. 5	0.998	5	80	32.9	1.1	8	0.190	128	182	28.5	1.2
10	0.992	10	9	39.2	1.2	13	0.354	107	188	46.7	+0.4
15	0.964	22	350	48.1	1.2	18	0.550	84	194	62.1	-0.3
20	0.897	37	342	59.4	-1.1	23	0.743	61	200	69.3	-0.8
25	0.770	57	337	69.2	0.9	28	0.889	39	207	65.9	1.2
Mar. 1	0.577	81	333	69.3	-0.4	Sept. 2	0.969	20	217	56.0	1.4
6	0.354	107	329	54.0	+0.3	7	0.997	6	252	45.7	1.4
11	0.158	138	324	28.7	1.2	12	0.994	9	358	37.7	1.2
16	0.035	158	309	7.1	+2.3	17	0.977	18	15	32.3	-0.8
21	0.007	170	211	1.4	2.9	22	0.953	25	21	28.2	0.6
26	0.059	152	167	10.1	2.2	27	0.924	32	23	27.1	0.4
31	0.153	134	159	21.3	1.5	Oct. 2	0.892	38	24	26.5	0.2
Apr. 5	0.255	119	156	28.3	1.1	7	0.855	45	24	27.0	-0.1
10	0.351	107	154	31.3	+0.9	12	0.811	52	23	28.6	0.0
15	0.437	97	152	32.4	0.7	17	0.755	59	22	31.4	0.0
20	0.514	88	152	32.9	0.5	22	0.682	69	21	35.6	0.0
25	0.587	80	151	33.8	0.3	27	0.583	80	20	40.8	+0.1
30	0.659	71	151	35.6	+0.1	Nov. 1	0.447	96	19	44.4	0.3
May 5	0.734	62	152	38.9	-0.2	6	0.270	117	19	39.9	+0.7
10	0.813	51	154	44.1	0.5	11	0.065	146	19	18.0	1.6
15	0.895	38	156	51.4	0.9	16	0.000	178	232	0.1	3.1
20	0.965	22	161	60.1	1.4	21	0.113	141	205	25.0	1.3
25	0.989	8	197	68.7	1.9	26	0.341	109	204	52.7	+0.3
30	0.974	19	341	66.8	-1.6	Dec. 1	0.552	84	202	56.3	-0.2
June 4	0.894	38	349	60.5	1.1	6	0.705	66	200	48.7	0.4
9	0.789	55	355	52.0	0.6	11	0.806	52	196	40.8	0.4
14	0.682	69	0	44.7	-0.2	16	0.872	42	192	33.8	0.4
19	0.583	80	5	39.3	+0.2	21	0.916	34	187	29.4	0.4
24	0.492	91	9	35.5	+0.5	26	0.947	27	182	26.6	-0.4
29	0.405	101	18	32.5	+0.7	31	0.968	20	175	25.2	-0.5

## NOTATION

$k$ —the ratio of the area of the illuminated portion of the apparent disk to the area of the entire apparent disk regarded as circular.

$i$ —the angle between the Sun and Earth, as seen from the planet.

$\theta$ —the angle which the line joining the cusps, or extremities of the illuminated portion, makes with the meridian.

$L$ —the brilliancy of the disk. The unit of  $L$  is the amount of light received by an eye from a circular disk with the same albedo as the planet, subtending an angular radius of one second of arc, situated at distance unity from the Sun, and illuminated by the latter as the mean disk of the planet is illuminated.

# ILLUMINATED DISK OF VENUS, 1920.

619

FOR GREENWICH MEAN NOON.

Date.		$k$	$i$	$\theta$	$L$	Stellar Mag.	Date.		$k$	$i$	$\theta$	$L$	Stellar Mag.
Jan.	1	0.676	69.4	195.9	98.4	-3.7	July	4	1.000	0.9	290.8	45.4	-3.5
	6	0.694	67.2	193.8	93.9	3.7		9	1.000	2.5	340.8	45.5	3.5
	11	0.711	65.1	191.5	89.8	3.7		14	0.999	4.4	352.3	45.6	3.5
	16	0.727	63.0	189.0	86.0	3.6		19	0.997	6.3	358.4	45.8	3.4
	21	0.743	60.9	186.3	82.4	3.6		24	0.995	8.3	2.7	46.0	3.4
Feb.	26	0.758	58.9	183.5	79.2	-3.6	29	0.992	10.2	8.2	46.2	-3.4	
	31	0.773	56.9	180.7	76.2	3.5	Aug.	3	0.989	12.2	9.1	46.5	3.4
	5	0.787	55.0	177.8	73.4	3.5		8	0.985	14.1	11.6	46.9	3.4
	10	0.800	53.1	174.9	70.8	3.5		13	0.981	16.0	13.7	47.2	3.4
Mar.	15	0.813	51.2	172.1	68.4	3.5	18	0.976	18.0	15.5	47.6	3.4	
	20	0.826	49.3	169.4	66.2	-3.4	23	0.970	19.9	17.1	48.1	-3.3	
	25	0.838	47.5	166.8	64.2	3.4	28	0.964	21.8	18.3	48.6	3.3	
	1	0.849	45.7	164.3	62.3	3.4	Sept.	2	0.958	23.6	19.2	49.2	3.3
	6	0.860	43.9	162.1	60.5	3.4		7	0.951	25.5	19.9	49.8	3.3
	11	0.871	42.1	160.0	58.9	3.4		12	0.944	27.3	20.4	50.4	3.3
	Apr.	16	0.881	40.3	158.2	57.4	-3.4	17	0.937	29.2	20.5	51.2	-3.3
21		0.891	38.6	156.6	56.0	3.3	22	0.929	31.0	20.4	52.0	3.3	
26		0.900	36.8	155.3	54.8	3.3	27	0.920	32.8	20.0	52.8	3.3	
31		0.909	35.0	154.2	53.6	3.3	Oct.	2	0.912	34.6	19.4	53.8	3.3
5		0.918	33.3	153.4	52.6	3.3		7	0.903	36.4	18.5	54.8	3.3
May		10	0.926	31.5	152.9	51.6	-3.3	12	0.893	38.2	17.4	56.0	-3.3
		15	0.934	29.7	152.6	50.7	3.3	17	0.883	39.9	16.0	57.2	3.3
	20	0.942	28.0	152.6	49.9	3.3	22	0.873	41.7	14.3	58.5	3.4	
	25	0.949	26.2	152.9	49.2	3.3	27	0.863	43.5	12.4	60.0	3.4	
	30	0.956	24.3	153.5	48.5	3.3	Nov.	1	0.852	45.2	10.3	61.5	3.4
	June	5	0.962	22.5	154.4	47.9		-3.3	6	0.841	47.0	8.1	63.2
		10	0.968	20.7	155.5	47.4	3.3	11	0.829	48.8	5.7	65.1	3.4
15		0.973	18.8	157.0	47.0	3.3	16	0.817	50.6	3.2	67.1	3.4	
20		0.978	17.0	158.7	46.6	3.3	21	0.805	52.4	0.6	69.3	3.5	
25		0.983	15.1	160.8	46.3	3.4	26	0.792	54.2	358.0	71.6	3.5	
July	30	0.987	13.2	163.3	46.0	-3.4	Dec.	1	0.779	56.1	355.5	74.2	-3.5
	4	0.990	11.3	166.1	45.8	3.4		6	0.765	58.0	353.0	76.9	3.5
	9	0.993	9.4	169.4	45.6	3.4		11	0.751	59.9	350.6	79.9	3.6
	14	0.996	7.5	173.2	45.5	3.4		16	0.736	61.9	348.4	83.2	3.6
	19	0.998	5.6	178.2	45.4	3.4		21	0.720	63.9	346.3	86.7	3.6
	24	0.999	3.7	185.7	45.4	-3.5		26	0.704	65.9	344.4	90.6	-3.6
	29	1.000	1.8	203.1	45.4	-3.5		31	0.687	68.0	342.7	94.8	-3.7

### NOTATION.

$k$  = the ratio of the area of the illuminated portion of the apparent disk to the area of the entire apparent disk regarded as circular.

$i$  = the angle between the Sun and Earth, as seen from the planet.

$\theta$  = the angle which the line joining the cusps, or extremities of the illuminated portion, makes with the meridian.

$L$  = the brilliancy of the disk. The unit of  $L$  is the amount of light received by an eye from a circular disk with the same albedo as the planet, subtending an angular radius of one second of arc, situated at distance unity from the Sun, and illuminated by the latter as the mean disk of the planet is illuminated.

EPHEMERIS FOR PHYSICAL OBSERVATIONS OF MARS.  
FOR GREENWICH MEAN MIDNIGHT.

Date.	Light-Time.	Stellar Magnitude.	P	$A_{\oplus} + 180^{\circ}$	$D_{\oplus}$	$A_{\odot} - A_{\oplus}$	$D_{\odot}$	$\odot_{\mathcal{S}}$
	m		.	.	.	.	.	.
Jan. 1	12.16	+1.2	32.25	290.62	+21.62	-38.90	+22.90	73.21
3	11.99	1.1	32.55	291.84	21.44	38.97	23.01	74.06
5	11.82	1.1	33.83	292.84	21.26	39.03	23.11	74.96
7	11.65	1.1	33.10	293.63	21.06	39.06	23.21	75.83
9	11.48	1.0	33.35	294.61	20.87	39.10	23.30	76.71
11	11.32	+1.0	33.60	295.58	+20.67	-39.11	+23.39	77.56
13	11.15	1.0	33.83	296.50	20.47	39.10	23.47	78.46
15	10.98	1.0	34.05	297.43	20.27	39.07	23.54	79.34
17	10.81	0.9	34.25	298.33	20.06	39.02	23.61	80.21
19	10.64	0.9	34.45	299.22	19.86	38.95	23.67	81.09
21	10.47	+0.8	34.63	300.08	+19.65	-38.86	+23.73	81.97
23	10.30	0.8	34.80	300.93	19.44	38.75	23.78	82.85
25	10.13	0.8	34.96	301.76	19.24	38.61	23.83	83.73
27	9.96	0.7	35.11	302.56	19.03	38.46	23.87	84.61
29	9.80	0.7	35.25	303.34	18.82	38.27	23.90	85.49
31	9.63	+0.6	35.37	304.10	+18.62	-38.07	+23.93	86.38
Feb. 2	9.46	0.6	35.49	304.84	18.42	37.84	23.95	87.26
4	9.30	0.6	35.60	305.56	18.23	37.59	23.97	88.14
6	9.13	0.5	35.70	306.25	18.03	37.31	23.98	89.03
8	8.97	0.5	35.79	306.91	17.84	37.00	23.98	89.92
10	8.80	+0.4	35.88	307.55	+17.65	-36.66	+23.98	90.81
12	8.64	0.4	35.95	308.15	17.47	36.30	23.97	91.70
14	8.48	0.3	36.02	308.73	17.30	35.90	23.95	92.59
16	8.32	0.3	36.08	309.28	17.13	35.48	23.93	93.48
18	8.16	0.2	36.13	309.80	16.97	35.02	23.91	94.37
20	8.00	+0.2	36.18	310.29	+16.82	-34.53	+23.87	95.26
22	7.85	0.1	36.22	310.74	16.68	34.01	23.83	96.16
24	7.70	+0.1	36.26	311.16	16.54	33.45	23.79	97.06
26	7.54	0.0	36.29	311.54	16.42	32.85	23.74	97.96
28	7.40	0.0	36.32	311.89	16.31	32.21	23.68	98.86
Mar. 1	7.25	-0.1	36.34	312.20	+16.23	-31.54	+23.61	99.76
3	7.10	0.1	36.36	312.47	16.13	30.83	23.54	100.66
5	6.96	0.2	36.38	312.70	16.06	30.08	23.46	101.56
7	6.82	0.2	36.39	312.88	16.00	29.28	23.38	102.47
9	6.69	0.3	36.40	313.03	15.96	28.44	23.30	103.38
11	6.56	-0.4	36.41	313.13	+15.93	-27.55	+23.19	104.29
13	6.43	0.4	36.41	313.18	15.92	26.62	23.09	105.20
15	6.30	0.5	36.42	313.19	15.93	25.64	22.98	106.11
17	6.18	0.5	36.41	313.14	15.95	24.61	22.87	107.03
19	6.06	0.6	36.41	313.05	16.00	23.53	22.75	107.94
21	5.95	-0.6	36.40	312.91	+16.06	-22.41	+22.62	108.86
23	5.84	0.7	36.39	312.72	16.14	21.23	22.48	109.78
25	5.73	0.8	36.38	312.47	16.24	20.00	22.34	110.71
27	5.63	0.8	36.36	312.18	16.35	18.72	22.20	111.63
29	5.54	0.9	36.34	311.84	16.49	17.39	22.04	112.56
31	5.45	-0.9	36.31	311.45	+16.64	-16.01	+21.89	113.49
Apr. 2	5.37	-1.0	36.27	311.01	+16.81	-14.59	+21.72	114.42



EPHEMERIS FOR PHYSICAL OBSERVATIONS OF MARS.

FOR GREENWICH MEAN MIDNIGHT.

Date.	λ	Diameter.	δ	ρ	Q.	Central Meridian.		Mean Time of Transit of Zero Meridian.		
						Of Date.	Of Intermediate Date.	Of Date.	Of Intermediate Date.	
								h m	h m	
Jan.	1	0.905	6.40	35.92	0.61	292.68	166.47	98.87	4 34.2	5 13.7
	3	0.904	6.49	36.01	0.62	292.53	89.27	79.68	5 53.1	6 32.6
	5	0.904	6.58	36.09	0.63	292.38	70.09	60.51	7 12.0	7 51.4
	7	0.904	6.67	36.16	0.64	292.22	50.93	41.35	8 30.7	9 10.1
	9	0.903	6.77	36.21	0.65	292.06	31.78	22.21	9 49.4	10 28.7
	11	0.903	6.87	36.25	0.66	291.89	12.65	3.09	11 8.0	11 47.3
	13	0.903	6.96	36.28	0.68	291.72	268.58	343.98	12 26.6	13 5.8
	15	0.903	7.06	36.29	0.69	291.55	394.43	324.89	13 45.0	14 24.2
	17	0.903	7.20	36.28	0.70	291.37	315.35	305.82	15 3.4	15 42.6
	19	0.903	7.31	36.26	0.71	291.18	296.29	286.77	16 21.8	17 0.9
	21	0.903	7.43	36.23	0.72	291.00	277.25	267.74	17 40.0	18 19.1
	23	0.904	7.55	36.18	0.73	290.81	258.23	248.73	18 58.1	19 37.1
	25	0.904	7.68	36.10	0.74	290.62	239.23	229.74	20 16.2	20 55.2
27	0.904	7.81	36.01	0.75	290.43	220.25	210.77	21 34.1	22 13.1	
29	0.905	7.94	35.90	0.75	290.23	201.29	191.82	22 52.0	23 30.9	
31	0.906	8.08	35.76	0.76	290.04	182.36	172.90	...	0 9.7	
Feb.	2	0.907	8.22	35.61	0.77	289.84	163.44	154.00	0 48.6	1 27.4
	4	0.908	8.37	35.43	0.78	289.64	144.56	135.12	2 6.2	2 45.0
	6	0.909	8.52	35.23	0.78	289.44	125.69	116.27	3 23.7	4 2.4
	8	0.910	8.68	35.00	0.78	289.24	106.85	97.44	4 41.1	5 19.8
	10	0.911	8.84	34.75	0.79	289.04	88.04	78.64	5 58.4	6 37.0
	12	0.912	9.00	34.47	0.79	288.85	69.25	59.87	7 15.6	7 54.1
	14	0.914	9.17	34.16	0.79	288.65	50.50	41.13	8 32.6	9 11.1
	16	0.915	9.35	33.82	0.79	288.46	31.77	22.42	9 49.5	10 27.9
	18	0.917	9.53	33.45	0.79	288.27	13.07	3.74	11 6.3	11 44.7
	20	0.919	9.72	33.05	0.79	288.08	354.41	345.09	12 23.0	13 1.2
22	0.921	9.91	32.61	0.78	287.90	335.78	326.47	13 39.5	14 17.6	
24	0.923	10.11	32.14	0.77	287.71	317.18	307.90	14 55.8	15 33.9	
26	0.926	10.31	31.68	0.77	287.53	298.62	289.35	16 12.0	16 50.1	
28	0.928	10.52	31.06	0.76	287.35	280.09	270.84	17 28.1	18 6.0	
Mar.	1	0.931	10.73	30.49	0.74	287.18	261.60	252.37	18 43.9	19 21.8
	3	0.934	10.95	29.86	0.73	287.01	243.15	233.94	19 59.7	20 37.5
	5	0.936	11.17	29.19	0.71	286.85	224.74	215.55	21 15.2	21 52.9
	7	0.939	11.40	28.48	0.69	286.69	206.37	197.20	22 30.6	23 8.2
	9	0.943	11.63	27.72	0.67	286.53	188.05	178.90	23 45.7	...
	11	0.946	11.86	26.91	0.64	286.38	169.76	160.64	0 23.3	1 0.7
	13	0.949	12.10	26.05	0.61	286.22	151.53	142.43	1 38.1	2 15.5
	15	0.953	12.34	25.14	0.58	286.07	133.34	124.26	2 52.8	3 30.1
	17	0.956	12.59	24.18	0.55	285.92	115.19	106.14	4 7.3	4 44.5
	19	0.960	12.83	23.17	0.52	285.77	97.10	88.07	5 21.6	5 58.7
	21	0.963	13.08	22.11	0.48	285.62	79.05	70.04	6 35.7	7 12.6
	23	0.967	13.32	20.99	0.44	285.46	61.05	52.07	7 49.5	8 26.4
25	0.970	13.56	19.82	0.40	285.29	43.10	34.15	9 3.2	9 39.9	
27	0.974	13.80	18.59	0.36	285.10	25.21	16.27	10 16.6	10 53.2	
29	0.977	14.04	17.32	0.32	284.88	7.35	358.45	11 29.8	12 6.4	
31	0.981	14.27	15.99	0.28	284.63	349.55	340.66	12 42.9	13 19.3	
Apr.	2	0.984	14.49	14.61	0.23	284.32	331.79	322.93	13 55.7	14 33.0

## EPHEMERIS FOR PHYSICAL OBSERVATIONS OF MARS.

FOR GREENWICH MEAN MIDNIGHT.

Date.	Light-Time.	Stellar Magnitude.	P	$\Delta_{\oplus} + 180^{\circ}$	$D_{\oplus}$	$\Delta_{\odot} - \Delta_{\oplus}$	$D_{\odot}$	$\odot_{\oplus}$
	m	.	.	.	.	.	.	.
Mar. 31	5.45	-0.9	36.31	311.45	+16.64	-16.01	+21.89	113.49
Apr. 2	5.37	1.0	36.27	311.01	16.81	14.59	21.72	114.42
4	5.29	1.1	36.23	310.53	16.99	13.12	21.55	115.35
6	5.22	1.1	36.19	310.00	17.19	11.61	21.37	116.29
8	5.15	1.2	36.13	309.44	17.41	10.05	21.19	117.23
10	5.09	-1.2	36.07	308.83	+17.64	- 8.45	+21.00	118.17
12	5.04	1.3	36.00	308.18	17.88	6.82	20.80	119.11
14	4.99	1.3	35.92	307.51	18.18	5.16	20.60	120.06
16	4.95	1.4	35.84	306.81	18.38	3.48	20.39	121.00
18	4.92	1.4	35.74	306.09	18.65	1.77	20.17	121.95
20	4.89	-1.4	35.64	305.35	+18.92	- 0.04	+19.95	122.91
22	4.87	1.4	35.53	304.60	19.19	+ 1.69	19.72	123.86
24	4.85	1.4	35.41	303.85	19.46	3.43	19.49	124.82
26	4.85	1.4	35.29	303.11	19.73	5.16	19.25	125.78
28	4.85	1.4	35.16	302.37	19.99	6.88	19.01	126.75
30	4.85	-1.4	35.03	301.65	+20.25	+ 8.59	+18.76	127.71
May 2	4.86	1.3	34.90	300.94	20.50	10.28	18.50	128.68
4	4.88	1.3	34.76	300.27	20.75	11.94	18.24	129.65
6	4.91	1.3	34.64	299.62	20.98	13.58	17.97	130.63
8	4.94	1.2	34.51	299.01	21.21	15.17	17.69	131.61
10	4.97	-1.2	34.39	298.44	+21.42	+16.73	+17.41	132.59
12	5.01	1.2	34.27	297.91	21.62	18.24	17.13	133.57
14	5.06	1.1	34.17	297.43	21.81	19.71	16.83	134.56
16	5.11	1.1	34.07	297.00	21.99	21.12	16.54	135.55
18	5.16	1.0	33.99	296.63	22.15	22.49	16.23	136.54
20	5.22	-1.0	33.91	296.30	+22.30	+23.79	+15.92	137.54
22	5.29	1.0	33.85	296.04	22.44	25.04	15.61	138.54
24	5.35	0.9	33.81	295.83	22.56	26.24	15.29	139.54
26	5.42	0.9	33.77	295.68	22.67	27.38	14.97	140.54
28	5.50	0.8	33.75	295.59	22.77	28.46	14.64	141.55
30	5.58	-0.8	33.75	295.55	+22.85	+29.48	+14.30	142.56
June 1	5.66	0.7	33.76	295.56	22.92	30.45	13.96	143.58
3	5.74	0.7	33.79	295.64	22.98	31.37	13.62	144.60
5	5.82	0.7	33.83	295.76	23.03	32.23	13.27	145.62
7	5.91	0.6	33.88	295.94	23.06	33.04	12.91	146.65
9	6.00	-0.6	33.94	296.17	+23.06	+33.80	+12.55	147.68
11	6.09	0.5	34.02	296.45	23.09	34.51	12.19	148.71
13	6.18	0.5	34.11	296.78	23.08	35.17	11.82	149.74
15	6.28	0.4	34.20	297.15	23.07	35.78	11.44	150.78
17	6.37	0.4	34.31	297.57	23.04	36.35	11.06	151.83
19	6.47	-0.4	34.43	298.04	+23.00	+36.88	+10.68	152.88
21	6.57	0.3	34.56	298.54	22.95	37.37	10.29	153.93
23	6.66	0.3	34.69	299.09	22.88	37.82	9.90	154.98
25	6.76	0.3	34.83	299.67	22.80	38.23	9.50	156.04
27	6.86	0.2	34.97	300.30	22.71	38.60	9.10	157.10
29	6.96	-0.2	35.11	300.95	+22.61	+38.94	+ 8.70	158.16
July 1	7.07	-0.2	35.26	301.64	+22.50	+39.25	+ 8.29	159.23

MEMORIS FOR PHYSICAL OBSERVATIONS OF MARS.

FOR GREENWICH MEAN MIDNIGHT.

Date.	k	Diameter.	i	g	Q	Central Meridian.		Mean Time of Transit of Zero Meridian.	
						Of Date.	Of Intermediate Date.	Of Date.	Of Intermediate Date.
						.	.	h m	h m
Mar. 31	0.981	14.27	15.99	0.28	284.63	349.55	340.66	12 42.9	13 19.8
Apr. 2	0.984	14.49	14.61	0.23	284.32	381.79	322.93	13 55.7	14 32.0
4	0.987	14.71	13.19	0.19	283.95	314.08	305.24	15 8.3	15 44.6
6	0.990	14.91	11.72	0.16	283.47	296.41	287.59	16 20.8	16 56.9
8	0.992	15.10	10.21	0.12	282.81	278.78	269.97	17 33.0	18 9.1
10	0.994	15.28	8.66	0.09	281.89	261.18	252.40	18 45.2	19 21.2
12	0.996	15.44	7.07	0.06	280.50	243.62	234.85	19 57.1	20 33.1
14	0.998	15.59	5.46	0.04	278.19	226.09	217.34	21 9.0	21 44.9
16	0.999	15.72	3.84	0.02	273.85	208.58	199.84	22 20.7	22 56.6
18	1.000	15.83	2.26	0.01	263.02	191.10	182.36	23 32.4	...
20	1.000	15.91	1.03	0.00	217.88	173.63	164.89	0 8.2	0 44.0
22	1.000	15.98	1.68	0.00	144.39	156.16	147.43	1 19.8	1 55.6
24	0.999	16.03	3.24	0.01	126.56	188.70	129.97	2 31.4	3 7.2
26	0.998	16.05	4.89	0.03	120.57	121.23	112.50	3 43.0	4 18.8
28	0.997	16.05	6.56	0.05	117.69	163.76	95.01	4 54.7	5 30.5
30	0.995	16.08	8.23	0.08	116.02	86.26	77.50	6 6.4	6 42.3
May 2	0.993	15.99	9.89	0.12	114.96	68.74	59.97	7 18.2	7 54.1
4	0.990	15.93	11.53	0.16	114.23	51.20	42.42	8 30.1	9 6.1
6	0.987	15.86	13.15	0.21	113.71	33.62	24.82	9 42.1	10 18.2
8	0.984	15.76	14.73	0.26	113.32	16.01	7.19	10 54.3	11 30.5
10	0.980	15.65	16.27	0.31	113.03	358.36	349.51	12 6.7	12 43.0
12	0.976	15.52	17.77	0.37	112.80	340.66	331.79	13 19.3	13 55.7
14	0.972	15.38	19.24	0.43	112.62	322.91	314.02	14 32.1	15 8.6
16	0.968	15.23	20.65	0.49	112.47	305.11	296.19	15 45.1	16 21.7
18	0.964	15.06	22.02	0.55	112.35	287.26	278.31	16 58.4	17 35.1
20	0.959	14.89	23.34	0.61	112.25	269.35	260.38	18 11.9	18 48.7
22	0.955	14.71	24.60	0.67	112.17	251.39	242.38	19 25.6	20 2.6
24	0.950	14.53	25.82	0.72	112.09	233.36	224.33	20 39.6	21 16.7
26	0.946	14.34	26.98	0.78	112.03	215.28	206.22	21 53.8	22 31.0
28	0.941	14.15	28.10	0.83	111.97	197.14	188.05	23 8.3	23 45.7
30	0.937	13.95	29.16	0.88	111.92	178.94	169.82	...	0 23.0
June 1	0.932	13.75	30.17	0.93	111.87	160.69	151.54	1 0.5	1 38.0
3	0.928	13.56	31.14	0.98	111.82	142.38	133.21	2 15.6	2 53.2
5	0.924	13.36	32.06	1.02	111.77	124.02	114.82	3 30.9	4 8.7
7	0.920	13.16	32.93	1.06	111.72	105.61	96.38	4 46.5	5 24.3
9	0.916	12.97	33.76	1.09	111.67	87.14	77.89	6 2.3	6 40.2
11	0.912	12.77	34.54	1.13	111.62	68.62	59.34	7 18.3	7 56.3
13	0.908	12.56	35.28	1.16	111.57	50.06	40.76	8 34.5	9 12.7
15	0.905	12.39	35.98	1.18	111.52	31.44	22.12	9 50.9	10 29.2
17	0.901	12.21	36.64	1.21	111.46	12.78	3.44	11 7.5	11 45.9
19	0.898	12.02	37.26	1.23	111.40	344.06	344.71	12 24.3	13 2.8
21	0.895	11.84	37.84	1.25	111.33	326.33	326.94	13 41.3	14 19.9
23	0.892	11.67	38.39	1.26	111.26	316.54	307.14	14 58.5	15 37.1
25	0.889	11.50	38.90	1.28	111.18	297.72	288.29	16 15.8	16 54.5
27	0.886	11.33	39.38	1.29	111.10	278.86	269.41	17 33.3	18 12.1
29	0.884	11.17	39.83	1.30	111.01	259.96	250.50	18 51.0	19 29.8
July 1	0.882	11.01	40.25	1.30	110.92	241.08	231.55	20 8.7	20 47.7

## EPHEMERIS FOR PHYSICAL OBSERVATIONS OF MARS.

FOR GREENWICH MEAN MIDNIGHT.

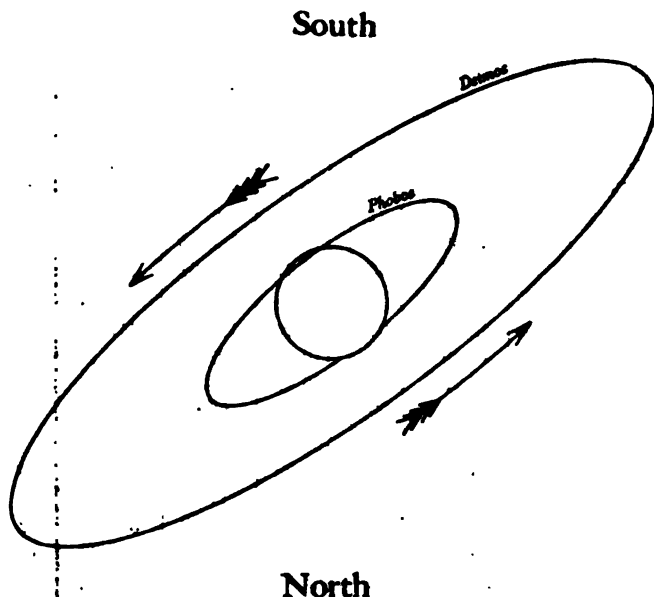
Date.	Light-Time.	Seellar Magnitude.	P	$A_{\oplus} + 130^{\circ}$	$D_{\oplus}$	$A_{\ominus} - A_{\oplus}$	$D_{\ominus}$	$\odot_{\oplus}$
	m		.	.	.	.	.	.
July 1	7.07	-0.2	35.28	301.64	+22.59	+39.25	+ 8.29	159.23
3	7.17	0.1	35.41	302.36	22.37	39.52	7.87	160.39
5	7.27	0.1	35.56	303.12	22.23	39.77	7.46	161.33
7	7.37	-0.1	35.71	303.90	22.08	40.00	7.04	162.46
9	7.47	0.0	35.86	304.70	21.92	40.19	6.61	163.54
11	7.58	0.0	36.01	305.54	+21.74	+40.36	+ 6.18	164.63
13	7.68	0.0	36.15	306.40	21.56	40.51	5.75	165.72
15	7.78	0.0	36.29	307.28	21.39	40.64	5.32	166.82
17	7.88	+0.1	36.43	308.19	21.14	40.75	4.88	167.92
19	7.99	0.1	36.56	309.11	20.92	40.83	4.44	169.02
21	8.09	+0.1	36.67	310.06	+20.68	+40.99	+ 4.00	170.13
23	8.19	0.2	36.78	311.03	20.43	40.95	3.55	171.24
25	8.29	0.2	36.89	312.01	20.17	40.99	3.10	172.35
27	8.39	0.2	36.99	313.02	19.99	41.01	2.65	173.47
29	8.50	0.2	37.08	314.05	19.69	41.02	2.20	174.59
31	8.60	+0.2	37.18	315.07	+19.39	+41.02	+ 1.74	175.72
Aug. 2	8.70	0.3	37.19	316.12	18.99	41.09	1.28	176.85
4	8.80	0.3	37.23	317.18	18.67	40.98	0.82	177.96
6	8.90	0.3	37.26	318.25	18.33	40.94	+ 0.36	179.11
8	9.00	0.4	37.28	319.33	17.98	40.90	- 0.10	180.25
10	9.10	+0.4	37.28	320.43	+17.62	+40.85	- 0.57	181.40
12	9.20	0.4	37.26	321.54	17.25	40.79	1.04	182.55
14	9.30	0.4	37.23	322.66	16.87	40.72	1.50	183.70
16	9.39	0.4	37.18	323.78	16.48	40.65	1.97	184.86
18	9.49	0.4	37.11	324.92	16.07	40.58	2.44	186.02
20	9.59	+0.5	37.03	326.07	+15.65	+40.59	- 2.91	187.18
22	9.68	0.5	36.92	327.22	15.22	40.41	3.38	188.35
24	9.78	0.5	36.80	328.38	14.78	40.33	3.85	189.52
26	9.88	0.5	36.66	329.55	14.33	40.24	4.32	190.69
28	9.97	0.5	36.49	330.72	13.87	40.14	4.79	191.87
30	10.07	+0.6	36.31	331.91	+13.49	+40.05	- 5.26	193.05
Sept. 1	10.16	0.6	36.11	333.09	12.92	39.95	5.73	194.23
3	10.26	0.6	35.88	334.29	12.43	39.83	6.20	195.42
5	10.35	0.6	35.63	335.49	11.93	39.76	6.67	196.61
7	10.44	0.6	35.37	336.69	11.42	39.66	7.14	197.80
9	10.54	+0.6	35.06	337.90	+10.99	+39.55	- 7.60	199.00
11	10.63	0.6	34.77	339.12	10.37	39.47	8.07	200.20
13	10.72	0.6	34.43	340.34	9.84	39.37	8.53	201.41
15	10.82	0.7	34.06	341.57	9.29	39.27	8.99	202.62
17	10.91	0.7	33.70	342.80	8.74	39.18	9.45	203.83
19	11.00	+0.7	33.36	344.03	+ 8.18	+39.08	+ 9.91	205.04
21	11.09	0.7	32.98	345.27	7.62	38.99	10.36	206.26
23	11.18	0.7	32.44	346.52	7.04	38.90	10.81	207.48
25	11.27	0.7	31.96	347.77	6.46	38.81	11.26	208.70
27	11.36	0.8	31.49	349.02	5.88	38.72	11.70	209.93
29	11.45	+0.8	30.99	350.28	+ 5.28	+38.63	+12.14	211.16
Oct. 1	11.54	+0.8	30.46	351.54	+ 4.69	+38.55	+12.57	212.39

EPIHEMERIS FOR PHYSICAL OBSERVATIONS OF MARS.

FOR GREENWICH MEAN MIDNIGHT.

Date.	R	Diameter.	i	g	Q	Central Meridian.		Mean Time of Transit of Zero Meridian.		
						Of Date.	Of Intermediate Date.	Of Date.	Of Intermediate Date.	
								h m	h m	
July	1	0.882	11.01	40.25	1.30	110.92	241.03	231.55	20 8.7	20 47.7
	3	0.879	10.85	40.65	1.31	110.82	222.07	212.58	21 26.7	22 5.7
	5	0.877	10.70	41.02	1.31	110.71	208.08	193.57	22 44.7	23 23.8
	7	0.875	10.55	41.36	1.32	110.60	184.05	174.53	...	0 2.9
	9	0.873	10.41	41.68	1.32	110.47	165.01	155.47	0 42.0	1 21.2
	11	0.872	10.27	41.97	1.32	110.34	145.93	136.38	2 0.4	2 39.6
	13	0.870	10.13	42.24	1.32	110.20	126.83	117.27	3 18.8	3 58.1
	15	0.869	10.00	42.49	1.31	110.06	107.71	98.14	4 37.4	5 16.7
	17	0.867	9.87	42.72	1.31	109.90	88.56	78.98	5 56.1	6 35.4
	19	0.866	9.74	42.92	1.30	109.74	69.39	59.80	7 14.8	7 54.3
	21	0.865	9.62	43.11	1.30	109.56	50.20	40.60	8 33.7	9 13.2
	23	0.864	9.50	43.28	1.29	109.38	30.99	21.38	9 52.6	10 32.1
	25	0.863	9.38	43.43	1.28	109.18	11.77	2.15	11 11.6	11 51.2
	27	0.862	9.27	43.57	1.28	108.98	352.53	342.90	12 30.7	13 10.3
	29	0.862	9.15	43.69	1.27	108.76	333.27	323.63	13 49.9	14 29.5
31	0.861	9.05	43.80	1.26	108.54	313.99	304.35	15 9.1	15 48.7	
Aug.	2	0.860	8.94	43.89	1.25	108.30	294.70	285.06	16 28.4	17 8.0
	4	0.860	8.84	43.96	1.24	108.06	275.40	265.75	17 47.7	18 27.4
	6	0.860	8.74	44.03	1.23	107.80	256.09	246.43	19 7.1	19 46.8
	8	0.859	8.64	44.08	1.22	107.53	236.77	227.10	20 26.5	21 6.3
	10	0.859	8.55	44.12	1.21	107.24	217.43	207.76	21 46.0	22 25.8
	12	0.859	8.46	44.15	1.19	106.95	198.08	188.40	23 5.6	23 45.4
	14	0.859	8.37	44.16	1.18	106.65	178.72	169.04	...	0 25.2
	16	0.859	8.28	44.17	1.17	106.33	159.35	149.67	1 5.0	1 44.8
	18	0.859	8.20	44.16	1.16	106.00	139.98	130.29	2 24.6	3 4.4
	20	0.859	8.11	44.14	1.15	105.66	120.59	110.90	3 44.3	4 24.1
	22	0.859	8.03	44.12	1.13	105.31	101.20	91.50	5 4.0	5 43.9
	24	0.859	7.95	44.08	1.12	104.94	81.80	72.10	6 23.7	7 3.6
	26	0.860	7.87	44.04	1.11	104.56	62.39	52.68	7 43.5	8 23.4
	28	0.860	7.80	43.99	1.09	104.18	42.98	33.27	9 3.3	9 43.2
	30	0.860	7.72	43.93	1.08	103.77	23.56	13.84	10 23.2	11 3.1
Sept.	1	0.861	7.65	43.86	1.07	103.36	4.13	364.41	11 43.0	12 23.0
	3	0.861	7.58	43.78	1.06	102.93	344.70	334.98	13 2.9	13 42.9
	5	0.862	7.51	43.69	1.04	102.49	325.26	315.54	14 22.8	15 2.8
	7	0.862	7.45	43.60	1.03	102.04	305.81	296.09	15 42.3	16 22.7
	9	0.863	7.38	43.50	1.01	101.58	286.36	276.64	17 2.7	17 42.7
	11	0.863	7.32	43.40	1.00	101.11	266.91	257.18	18 23.7	19 2.7
	13	0.864	7.25	43.29	0.99	100.62	247.45	237.72	19 43.7	20 22.7
	15	0.865	7.19	43.17	0.97	100.13	227.99	218.25	21 3.7	21 42.7
	17	0.866	7.13	43.04	0.96	99.62	208.52	198.78	22 23.8	23 2.8
	19	0.866	7.07	42.91	0.95	99.10	189.04	179.30	23 43.8	...
	21	0.867	7.01	42.78	0.93	98.58	169.56	159.82	0 22.9	1 2.9
	23	0.868	6.96	42.63	0.92	98.04	150.08	140.34	1 43.0	2 23.0
	25	0.869	6.90	42.48	0.91	97.49	130.59	120.85	3 3.1	3 43.2
	27	0.870	6.85	42.33	0.89	96.93	111.10	101.35	4 23.2	5 3.3
	29	0.871	6.79	42.17	0.88	96.37	91.61	81.86	5 43.4	6 23.5
Oct.	1	0.872	6.74	42.01	0.87	95.80	72.10	62.35	7 3.6	7 43.6

APPARENT ORBITS OF THE SATELLITES OF MARS, AT DATE OF OPPOSITION  
APRIL 20, 1920, AS SEEN IN AN INVERTING TELESCOPE.



GREENWICH MEAN TIME OF GREATEST ELONGATION.

		Phobos.			Deimos.									
	d	h	d	h		d	h	d	h					
Mar.	16	4.1 E.	Apr.	9	17.4 E.	May	4	6.5 E.	Mar.	12	13.2 E.	Apr.	23	4.2 E.
	17	6.9 W.		10	20.1 W.		5	9.3 W.		14	10.6 W.		25	1.6 W.
	18	9.7 E.		11	22.9 E.		6	12.1 E.		16	8.0 E.		26	23.0 E.
	19	12.5 W.		13	1.7 W.		7	14.9 W.		18	5.5 W.		28	20.4 W.
	20	15.3 E.		14	4.5 E.		8	17.7 E.		20	2.9 E.		30	17.8 E.
	21	18.1 W.		15	7.3 W.		9	20.4 W.		22	0.4 W.	May	2	15.2 W.
	22	20.8 E.		16	10.0 E.		10	23.2 E.		23	21.8 E.		4	12.6 E.
	23	23.6 W.		17	12.8 W.		12	2.0 W.		25	19.2 W.		6	10.0 W.
	25	2.4 E.		18	15.6 E.		13	4.8 E.		27	16.6 E.		8	7.4 E.
	26	5.2 W.		19	18.4 W.		14	7.6 W.		29	14.1 W.		10	4.8 W.
	27	8.0 E.		20	21.2 E.		15	10.4 E.		31	11.5 E.		12	2.2 E.
	28	10.8 W.		22	0.0 W.		16	13.1 W.	Apr.	2	8.9 W.		13	23.6 W.
	29	13.5 E.		23	2.7 E.		17	15.9 E.		4	6.3 E.		15	21.0 E.
	30	16.3 W.		24	5.5 W.		18	18.7 W.		6	3.7 W.		17	18.4 W.
	31	19.1 E.		25	8.3 E.		19	21.5 E.		8	1.1 E.		19	15.9 E.
Apr.	1	21.9 W.		26	11.1 W.		21	0.3 W.		9	22.5 W.		21	13.3 W.
	3	0.7 E.		27	13.8 E.		22	3.1 E.		11	19.9 E.		23	10.7 E.
	4	3.5 W.		28	16.6 W.		23	5.8 W.		13	17.3 W.		25	8.2 W.
	5	6.2 E.		29	19.4 E.		24	8.6 E.		15	14.7 E.		27	5.6 E.
	6	9.0 W.		30	22.2 W.		25	11.4 W.		17	12.1 W.		29	3.0 W.
	7	11.8 E.	May	2	1.0 E.		26	14.2 E.		19	9.5 E.		31	0.5 E.
	8	14.6 W.		3	3.8 W.		27	17.0 W.		21	6.9 W.	June	1	21.9 W.

For Phobos every seventh eastern and western elongation is given, and for Deimos every third; the intermediate ones may be found by adding multiples of the period of the satellite.

Sidereal period of Phobos,  $7^{\text{h}} 39^{\text{m}} 13^{\text{s}}.85$ . Sidereal period of Deimos,  $30^{\text{h}} 17^{\text{m}} 54^{\text{s}}.87$ .

Time from Eastern Elongation.	Phobos.		Time from Eastern Elongation.	Deimos.		Greenwich Mean Midnight.	Phobos.		Deimos.	
	$p^1$	$F$		$p^1$	$F$		$P-P_0$	$\frac{\alpha(\rho)}{\rho}$	$P-P_0$	$\frac{\alpha(\rho)}{\rho}$
h m			h m							
0 0	127.0	1.000	0 0	127.0	1.000	Mar. 27	+1.7	"	-0.7	"
0 10	129.5	0.992	0 40	129.3	0.991	28	1.7	19.2	0.7	47.8
0 20	132.0	0.967	1 20	131.8	0.965	29	1.7	19.4	0.7	48.6
0 30	134.7	0.925	2 0	134.3	0.923	30	1.7	19.6	0.7	49.0
0 40	137.8	0.869	2 40	137.2	0.865	31	1.7	19.7	0.7	49.4
0 50	141.3	0.800	3 20	140.6	0.793	Apr. 1	+1.7	19.9	-0.7	49.8
1 0	145.6	0.719	4 0	144.7	0.709	2	1.7	20.0	0.7	50.1
1 10	151.9	0.630	4 40	150.0	0.616	3	1.6	20.2	-0.7	50.5
1 20	158.2	0.536	5 20	157.3	0.519	4	1.6	20.3	0.7	50.9
1 30	168.5	0.445	6 0	167.9	0.424	5	1.6	20.5	0.7	51.2
1 40	183.7	0.366	6 40	183.9	0.343	6	+1.6	20.6	-0.8	51.6
1 50	205.1	0.319	7 20	207.3	0.297	7	1.6	20.7	0.8	51.9
2 0	229.8	0.320	8 0	233.8	0.305	8	1.5	20.9	0.8	52.2
2 10	251.0	0.369	8 40	255.2	0.363	9	1.5	21.0	0.9	52.5
2 20	265.9	0.448	9 20	269.5	0.450	10	1.4	21.1	0.9	52.8
2 30	276.1	0.540	10 0	279.0	0.546	11	+1.4	21.2	-0.9	53.1
2 40	283.3	0.633	10 40	285.6	0.643	12	1.4	21.3	0.9	53.4
2 50	288.6	0.722	11 20	290.5	0.733	13	1.3	21.5	1.0	53.7
3 0	292.8	0.803	12 0	294.4	0.814	14	1.3	21.6	1.0	53.9
3 10	296.3	0.872	12 40	297.6	0.882	15	1.2	21.6	1.0	54.2
3 20	299.4	0.927	13 20	300.4	0.936	16	+1.2	21.7	-1.0	54.4
3 30	302.1	0.968	14 0	302.9	0.974	17	1.2	21.8	1.1	54.6
3 40	304.6	0.992	14 40	305.3	0.996	18	1.1	21.9	1.1	54.7
3 50	307.1	1.000	15 20	307.6	0.999	19	1.1	21.9	1.1	54.9
4 0	309.6	0.991	16 0	310.0	0.986	20	1.0	22.0	1.2	55.0
4 10	312.1	0.965	16 40	312.4	0.955	21	+1.0	22.0	-1.2	55.2
4 20	314.9	0.924	17 20	315.1	0.908	22	0.9	22.1	1.3	55.3
4 30	317.9	0.867	18 0	318.1	0.846	23	0.8	22.1	1.3	55.4
4 40	321.4	0.797	18 40	321.7	0.771	24	0.8	22.2	1.4	55.4
4 50	325.7	0.716	19 20	326.1	0.684	25	0.7	22.2	1.4	55.5
5 0	331.2	0.626	20 0	331.8	0.590	26	+0.7	22.2	-1.5	55.5
5 10	338.5	0.533	20 40	339.8	0.492	27	0.6	22.2	1.5	55.5
5 20	349.0	0.441	21 20	351.6	0.400	28	0.5	22.2	1.6	55.5
5 30	4.4	0.364	22 0	9.7	0.326	29	0.5	22.2	1.6	55.5
5 40	26.0	0.318	22 40	34.7	0.293	30	0.4	22.2	1.7	55.5
5 50	50.7	0.321	23 20	60.4	-0.317	May 1	+0.3	22.1	-1.7	55.4
6 0	71.7	0.372	24 0	79.8	0.385	2	0.3	22.1	1.8	55.3
6 10	86.4	0.451	24 40	92.5	0.476	3	0.2	22.1	1.8	55.2
6 20	96.4	0.543	25 20	101.0	0.573	4	0.1	22.0	1.9	55.1
6 30	103.5	0.637	26 0	107.1	0.668	5	+0.1	22.0	1.9	55.0
6 40	106.8	0.726	26 40	111.6	0.756	6	0.0	21.9	-2.0	54.8
6 50	113.0	0.806	27 20	115.3	0.834	7	-0.1	21.9	2.0	54.7
7 0	116.5	0.874	28 0	118.4	0.899	8	0.1	21.8	2.1	54.5
7 10	119.5	0.929	28 40	121.1	0.948	9	0.2	21.7	2.1	54.3
7 20	122.2	0.969	29 20	123.6	0.982	10	0.2	21.6	2.2	54.1
7 30	124.7	0.993	30 0	126.0	0.998	11	-0.3	21.6	-2.2	53.9
7 40	127.2	1.000	30 40	128.3	0.997	12	0.4	21.5	2.3	53.6
						13	0.4	21.4	2.3	53.4
						14	0.5	21.3	2.4	53.2
						15	0.5	21.2	2.4	52.9
						16	-0.6	21.0	-2.5	52.7

Position angle of satellite  $p = p^1 + (P - P_0)$ .

Apparent distance of satellite  $s = F \frac{\alpha(\rho)}{\rho}$ .

EPHEMERIS FOR PHYSICAL OBSERVATIONS OF JUPITER.  
FOR GREENWICH MEAN MIDNIGHT.

Date.	Light-Time.	Stellar Magnitude.	P	$A_{\oplus}+180^{\circ}$	$D_{\oplus}$	$A_{\odot}+180^{\circ}$	$D_{\odot}$	
	m	.	.	.	.	.	.	
Jan.	1	37.27	-2.0	19.68	1.18	-0.07	354.84	+0.28
	8	36.79	2.1	19.49	0.51	0.07	355.39	0.25
	15	36.41	2.1	19.27	359.74	0.06	355.95	0.22
	22	36.15	2.1	19.02	358.88	0.05	356.51	0.19
	29	36.02	2.1	18.75	357.97	0.04	357.06	0.16
Feb.	5	36.01	-2.1	18.46	357.04	-0.02	357.62	+0.13
	12	36.14	2.1	18.18	356.12	0.00	358.17	0.10
	19	36.39	2.1	17.90	355.25	+0.02	358.73	0.07
	26	36.75	2.1	17.65	354.45	0.05	359.28	0.04
Mar.	4	37.24	2.0	17.42	353.76	0.07	359.83	+0.01
	11	37.82	-2.0	17.24	353.20	+0.09	0.39	-0.02
	18	38.49	2.0	17.09	352.77	0.11	0.94	0.05
	25	39.24	1.9	17.00	352.49	0.12	1.49	0.08
Apr.	1	40.04	1.9	16.96	352.37	0.13	2.05	0.11
	8	40.90	1.8	16.97	352.40	0.14	2.60	0.14
	15	41.80	-1.8	17.03	352.58	+0.14	3.15	-0.17
	22	42.71	1.7	17.14	352.92	0.14	3.70	0.20
	29	43.64	1.7	17.29	353.39	0.13	4.25	0.23
May	6	44.57	1.6	17.49	353.99	0.12	4.80	0.26
	13	45.48	1.6	17.73	354.72	0.10	5.35	0.29
	20	46.38	-1.6	18.00	355.56	+0.08	5.90	-0.32
	27	47.24	1.5	18.29	356.50	0.06	6.44	0.34
June	3	48.07	1.5	18.61	357.53	+0.03	6.99	0.37
	10	48.85	1.4	18.95	358.65	-0.01	7.54	0.40
	17	49.58	1.4	19.30	359.84	0.04	8.09	0.43
	24	50.25	-1.4	19.66	1.10	-0.09	8.63	-0.46
July	1	50.86	1.4	20.02	2.42	0.13	9.18	0.49
	8	51.41	1.3	20.39	3.79	0.18	9.73	0.52
	15	51.88	1.3	20.78	5.20	0.23	10.27	0.55
	22	52.27	1.3	21.12	6.65	0.28	10.82	0.58
	.....	..	.....	.....	...	.....	...	
Sept.	18	52.42	-1.3	23.65	19.13	-0.81	15.32	-0.81
	25	52.06	1.3	23.88	20.59	0.87	15.87	0.84
Oct.	2	51.61	1.3	24.08	22.01	0.94	16.41	0.87
	9	51.09	1.3	24.27	23.38	1.01	16.95	0.90
	16	50.49	-1.4	24.44	24.71	-1.08	17.49	-0.92
	23	49.83	1.4	24.58	25.97	1.14	18.08	0.95
	30	49.11	1.4	24.71	27.17	1.21	18.57	0.98
Nov.	6	48.33	1.4	24.82	28.28	1.27	19.11	1.01
	13	47.51	1.5	24.92	29.31	1.34	19.65	1.03
	20	46.64	-1.5	25.00	30.23	-1.40	20.19	-1.06
	27	45.75	1.6	25.06	31.05	1.45	20.73	1.09
Dec.	4	44.83	1.6	25.11	31.74	1.51	21.27	1.11
	11	43.90	1.6	25.15	32.30	1.56	21.81	1.14
	18	42.98	1.7	25.18	32.72	1.61	22.35	1.17
	25	42.07	-1.7	25.20	33.00	-1.65	22.88	-1.19
	32	41.20	-1.8	25.21	33.12	-1.69	23.42	-1.22



EPHEMERIS FOR PHYSICAL OBSERVATIONS OF JUPITER.

FOR GREENWICH MEAN MIDNIGHT.

Date.	Equatorial Diameter.	Excess of Equat. Diameter over Polar.	i	ε	Q	Central Meridian.		Correction for Phase.
						System I.	System II.	
Jan.	"	"	"	"	"	"	"	"
1	43.90	2.92	6.35	0.13	286.56	85.52	166.76	+0.18
8	44.49	2.96	5.13	0.09	286.88	111.78	139.61	0.12
15	44.95	2.99	3.80	0.05	285.05	138.09	112.50	0.06
22	45.27	3.02	2.39	0.02	283.25	164.40	85.40	+0.02
29	45.44	3.03	0.93	0.00	276.69	190.70	58.28	0.00
Feb.	45.44	3.03	0.60	0.00	122.62	216.93	31.11	0.00
12	45.29	3.02	2.05	0.01	110.86	243.07	3.84	-0.02
19	44.98	3.00	3.48	0.04	108.61	269.09	336.45	0.05
26	44.52	2.97	4.83	0.08	107.53	294.96	308.91	0.10
Mar.	43.95	2.93	6.07	0.12	106.85	320.66	281.20	0.16
11	43.27	2.88	7.19	0.17	106.34	346.17	253.31	-0.22
18	42.52	2.83	8.17	0.22	105.98	11.49	225.22	0.29
25	41.71	2.78	9.00	0.26	105.71	36.61	196.94	0.35
Apr.	40.87	2.72	9.68	0.29	105.52	61.54	168.46	0.41
8	40.01	2.66	10.20	0.32	105.40	86.29	139.80	0.45
15	39.15	2.61	10.57	0.33	105.34	110.86	110.97	-0.48
22	38.31	2.55	10.79	0.34	105.34	135.27	81.97	0.51
29	37.50	2.50	10.87	0.34	105.39	159.53	52.83	0.51
May	36.72	2.45	10.81	0.33	105.48	183.66	23.55	0.51
13	35.98	2.40	10.64	0.31	105.62	207.68	354.16	0.49
20	35.28	2.35	10.35	0.29	105.78	231.59	324.68	-0.47
27	34.64	2.31	9.96	0.26	105.97	255.42	295.10	0.43
June	34.04	2.27	9.47	0.23	106.17	279.18	265.46	0.39
10	33.50	2.23	8.90	0.20	106.38	302.89	235.76	0.34
17	33.01	2.20	8.25	0.17	106.59	326.55	206.01	0.30
24	32.56	2.17	7.54	0.14	106.79	350.18	176.23	-0.25
July	32.17	2.14	6.77	0.11	106.96	13.79	146.44	0.20
8	31.83	2.12	5.94	0.08	107.10	37.39	116.63	0.15
15	31.54	2.10	5.08	0.06	107.16	60.99	86.82	0.11
22	31.30	2.08	4.18	0.04	107.09	84.60	57.02	-0.07
Sept.	.....	.....	.....	.....	.....	.....	.....	.....
18	31.22	2.06	3.81	0.03	293.77	230.23	120.12	+0.06
25	31.44	2.09	4.72	0.05	293.50	254.30	90.78	0.10
Oct.	31.71	2.11	5.60	0.08	293.37	278.45	61.51	0.14
9	32.03	2.13	6.44	0.10	293.31	302.69	32.34	-0.18
16	32.41	2.16	7.22	0.13	293.29	327.03	3.26	+0.23
23	32.84	2.19	7.94	0.16	293.27	351.47	334.29	0.28
30	33.32	2.22	8.60	0.19	293.26	16.01	305.42	0.32
Nov.	33.86	2.25	9.17	0.22	293.25	40.67	276.67	0.37
13	34.45	2.29	9.66	0.24	293.22	65.45	248.03	0.41
20	35.09	2.34	10.04	0.27	293.19	90.36	219.52	+0.44
27	35.77	2.38	10.32	0.29	293.15	115.39	191.14	0.46
Dec.	36.50	2.43	10.47	0.31	293.08	140.55	162.89	0.48
11	37.27	2.48	10.50	0.31	293.00	165.85	134.78	0.48
18	38.07	2.53	10.38	0.31	292.89	191.30	106.80	0.47
25	38.89	2.59	10.12	0.30	292.76	216.88	78.97	+0.44
32	39.72	2.64	9.70	0.29	292.59	242.59	51.27	+0.41

EPIHEMERIS FOR PHYSICAL OBSERVATIONS OF JUPITER,  
SYSTEM I.

GREENWICH MEAN TIME.

Transit of Zero Meridian.			Interval between Successive Transits.		Transit of Zero Meridian.			Interval between Successive Transits.		Transit of Zero Meridian.			Interval between Successive Transits.									
	d	h m	h	m		d	h m	h	m		d	h m	h	m								
Jan.	1	19 29.87	9 50.41		Apr.	17	10 11.85	9 50.59		Sept.	18	15 32.80	9 50.62									
	3	20 41.94				19	11 24.78				20	16 45.88										
	5	21 54.01				21	12 37.74				22	17 58.96										
	7	23 6.07				23	13 50.71				24	19 12.03										
	10	0 18.12				25	15 3.70				26	20 25.08										
	12	1 30.17				27	16 16.71				28	21 38.12			9 50.60							
	14	2 42.21				29	17 29.73				30	22 51.15										
	16	3 54.25				May	1				18 42.77	Oct.				3	0 4.16					
	18	5 6.28					3				19 55.83					5	1 17.16					
	20	6 18.31					5				21 8.90					7	2 30.15					
22	7 30.34	7	22 21.99	9	3 43.12		9 50.59															
24	8 42.37	9	23 35.09	11	4 56.08																	
26	9 54.40	12	0 48.21	13	6 9.03																	
28	11 6.43	14	2 1.34	15	7 21.96																	
30	12 18.47	16	3 14.48	17	8 34.88																	
Feb.	1	13 30.52	9 50.42					18	4 27.64	9 50.64				19	9 47.78	9 50.57						
	3	14 42.58						20	5 40.80					21	11 0.67							
	5	15 54.65				22		6 53.98	23			12 13.55										
	7	17 6.73				24		8 7.17	25			13 26.40										
	9	18 18.83				26		9 20.37	27			14 39.25										
	11	19 30.95				9 50.43		June	28			10 33.57		9 50.64				Nov.	29	15 52.07	9 50.56	
	13	20 43.09							30			11 46.78							31	17 4.89		
	15	21 55.25							1			13 0.01							2	18 17.68		
	17	23 7.43							3			14 13.24							4	19 30.46		
	20	0 19.63							5			15 26.47							6	20 43.23		
22	1 31.86	9 50.46			7				16 39.72	9 50.65			8			21 55.98	9 50.54					
24	2 44.11				9				17 52.97				10			23 8.71						
26	3 56.39				11				19 6.23				13			0 21.43						
28	5 8.69				13				20 19.49				15			1 34.13						
Mar.	1				6 21.02				9 50.48											15		
	3				7 33.37	17	22 46.02	19						3 59.48								
	5				8 45.75	19	23 59.30	21						5 12.12								
	7				9 58.16	22	1 12.58	23						6 24.76								
	9				11 10.59	24	2 25.86	25						7 37.37								
	11				12 23.06	26	3 39.15	27						8 49.97								
	13	13 35.55	9 50.51		July	28	4 52.44	9 50.66			Dec.	29		10 2.55	9 50.51							
	15	14 48.06				30	6 5.73					1		11 15.11								
	17	16 0.61				2	7 19.02					3		12 27.66								
	19	17 13.18				4	8 32.31					5		13 40.19								
21	18 25.78	6				9 45.61	7		14 52.70													
23	19 38.40	9 50.54							8			10 58.91	9 50.66					9	16 5.19	9 50.49		
25	20 51.06								10			12 12.21						11	17 17.66			
27	22 3.74								12			13 25.50						13	18 30.12			
29	23 16.44								14			14 38.80						15	19 42.56			
Apr.	1								0 29.17			9 50.56										16
	3		1 41.92	18	17 5.39			19	22 7.38													
	5		2 54.70	20	18 18.69			21	23 19.77													
	7		4 7.50	22	19 31.98			24	0 32.14													
	9		5 20.33	24	20 45.28			26	1 44.49													
	11		6 33.17	26	21 58.55			28	2 56.82													
	13	7 46.04	9 50.58			28	23 11.83	9 50.85			30		4 9.14	9 50.46								
	15	8 58.94				.....	.....				32		5 21.44									

EPHEMERIS FOR PHYSICAL OBSERVATIONS OF JUPITER,  
SYSTEM II.

GREENWICH MEAN TIME.

Transit of Zero Meridian.			Interval between Successive Transits.	Transit of Zero Meridian.			Interval between Successive Transits.	Transit of Zero Meridian.			Interval between Successive Transits.			
d	h	m	h	m	d	h	m	h	m	d	h	m	h	m
Jan.	1	17	19.41	9 55.59	Apr.	18	6	27.50	9 55.77	Sept.	18	18	36.90	9 55.79
	3	18	57.37			20	8	6.33			20	20	15.89	
	5	20	35.32			22	9	45.18			22	21	54.86	
	7	22	13.26			24	11	24.06			24	23	33.82	
	9	23	51.19			26	13	2.95			27	1	12.77	
	12	1	29.11			28	14	41.86			29	2	51.70	
	14	3	7.03			30	16	20.78			1	4	30.62	
	16	4	44.95			2	17	59.72			3	6	9.53	
	18	6	22.86			4	19	38.68			5	7	48.48	
	20	8	0.76			6	21	17.68			7	9	27.31	
Feb.	22	9	38.67	9 55.58	May	8	22	56.65	9 55.80	Oct.	9	11	6.17	9 55.77
	24	11	16.58			11	0	35.65			11	12	45.03	
	26	12	54.49			13	2	14.67			13	14	23.97	
	28	14	32.40			15	3	53.70			15	16	2.70	
	30	16	10.32			17	5	32.74			17	17	41.51	
	1	17	48.25			19	7	11.80			19	19	20.90	
	3	19	26.18			21	8	50.86			21	20	59.08	
	5	21	4.13			23	10	29.94			23	22	37.84	
	7	22	42.09			25	12	9.03			26	0	16.59	
	10	0	20.07			27	13	48.12			28	1	55.33	
Mar.	12	1	58.07	9 55.61	June	29	15	27.23	9 55.82	Nov.	30	3	34.04	9 55.74
	14	3	36.09			31	17	6.35			1	5	12.74	
	16	5	14.14			2	18	45.47			3	6	51.43	
	18	6	52.20			4	20	24.60			5	8	30.10	
	20	8	30.29			6	22	3.74			7	10	8.75	
	22	10	8.40			8	23	42.89			9	11	47.39	
	24	11	46.53			11	1	22.04			11	13	26.01	
	26	13	24.70			13	3	1.20			13	15	4.61	
	28	15	2.89			15	4	40.38			15	16	43.20	
	1	16	41.10			17	6	19.53			17	18	21.77	
Apr.	3	18	19.34	9 55.66	July	19	7	58.70	9 55.84	Dec.	19	20	0.82	9 55.70
	5	19	57.61			21	9	37.87			21	21	38.85	
	7	21	35.91			23	11	17.05			23	23	17.37	
	9	23	14.23			25	12	56.24			26	0	55.87	
	12	0	52.59			27	14	35.42			28	2	34.35	
	14	2	30.97			29	16	14.61			30	4	12.81	
	16	4	9.38			1	17	53.80			2	5	51.26	
	18	5	47.81			3	19	32.99			4	7	29.68	
	20	7	26.28			5	21	12.19			6	9	8.09	
	22	9	4.77			7	22	51.38			8	10	46.49	
Apr.	24	10	43.29	9 55.69	July	10	0	30.58	9 55.84	Dec.	10	12	24.86	9 55.67
	26	12	21.84			12	2	9.77			12	14	3.21	
	28	14	0.41			14	3	48.97			14	15	41.55	
	30	15	39.01			16	5	28.17			16	17	19.87	
	1	17	17.63			18	7	7.36			18	18	58.17	
	3	18	56.28			20	8	46.55			20	20	36.45	
	5	20	34.96			22	10	25.74			22	22	14.72	
	7	22	13.66			24	12	4.93			24	23	52.96	
	9	23	52.38			26	13	44.11			27	1	31.19	
	12	1	31.13			28	15	23.29			29	3	9.40	
Apr.	14	3	9.90	9 55.76	July	30	17	2.47	9 55.83	Dec.	31	4	47.59	9 55.63
	16	4	48.69			.....	33	6			25.77			



# SATELLITES OF JUPITER, 1920.

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## SATELLITE V.

GREENWICH MEAN TIME OF EVERY TWENTIETH GREATEST ELONGATION.

<table style="width: 100%; border-collapse: collapse;"> <tr><td>Jan.</td><td>d</td><td>h</td><td>E.</td></tr> <tr><td></td><td>1</td><td>13.8</td><td>E.</td></tr> <tr><td></td><td>11</td><td>12.9</td><td>E.</td></tr> <tr><td></td><td>21</td><td>12.0</td><td>E.</td></tr> <tr><td></td><td>31</td><td>11.1</td><td>E.</td></tr> <tr><td>Feb.</td><td>10</td><td>10.1</td><td>E.</td></tr> <tr><td></td><td>20</td><td>9.2</td><td>E.</td></tr> <tr><td>Mar.</td><td>1</td><td>8.3</td><td>E.</td></tr> <tr><td></td><td>11</td><td>7.4</td><td>E.</td></tr> <tr><td></td><td>21</td><td>6.6</td><td>E.</td></tr> </table>	Jan.	d	h	E.		1	13.8	E.		11	12.9	E.		21	12.0	E.		31	11.1	E.	Feb.	10	10.1	E.		20	9.2	E.	Mar.	1	8.3	E.		11	7.4	E.		21	6.6	E.	<table style="width: 100%; border-collapse: collapse;"> <tr><td>Mar.</td><td>d</td><td>h</td><td>E.</td></tr> <tr><td></td><td>31</td><td>5.7</td><td>E.</td></tr> <tr><td>Apr.</td><td>10</td><td>4.9</td><td>E.</td></tr> <tr><td></td><td>20</td><td>4.0</td><td>E.</td></tr> <tr><td></td><td>30</td><td>3.2</td><td>E.</td></tr> <tr><td>May</td><td>10</td><td>2.4</td><td>E.</td></tr> <tr><td>Dec.</td><td>12</td><td>20.6</td><td>E.</td></tr> <tr><td></td><td>22</td><td>19.7</td><td>E.</td></tr> <tr><td></td><td>32</td><td>18.8</td><td>E.</td></tr> </table>	Mar.	d	h	E.		31	5.7	E.	Apr.	10	4.9	E.		20	4.0	E.		30	3.2	E.	May	10	2.4	E.	Dec.	12	20.6	E.		22	19.7	E.		32	18.8	E.	<table style="width: 100%; border-collapse: collapse;"> <tr><td>Jan.</td><td>d</td><td>h</td><td>W.</td></tr> <tr><td></td><td>1</td><td>19.8</td><td>W.</td></tr> <tr><td></td><td>11</td><td>18.9</td><td>W.</td></tr> <tr><td></td><td>21</td><td>18.0</td><td>W.</td></tr> <tr><td></td><td>31</td><td>17.0</td><td>W.</td></tr> <tr><td>Feb.</td><td>10</td><td>16.1</td><td>W.</td></tr> <tr><td></td><td>20</td><td>15.2</td><td>W.</td></tr> <tr><td>Mar.</td><td>1</td><td>14.3</td><td>W.</td></tr> <tr><td></td><td>11</td><td>13.4</td><td>W.</td></tr> <tr><td></td><td>21</td><td>12.5</td><td>W.</td></tr> </table>	Jan.	d	h	W.		1	19.8	W.		11	18.9	W.		21	18.0	W.		31	17.0	W.	Feb.	10	16.1	W.		20	15.2	W.	Mar.	1	14.3	W.		11	13.4	W.		21	12.5	W.	<table style="width: 100%; border-collapse: collapse;"> <tr><td>Mar.</td><td>d</td><td>h</td><td>W.</td></tr> <tr><td></td><td>31</td><td>11.7</td><td>W.</td></tr> <tr><td>Apr.</td><td>10</td><td>10.8</td><td>W.</td></tr> <tr><td></td><td>20</td><td>10.0</td><td>W.</td></tr> <tr><td></td><td>30</td><td>9.2</td><td>W.</td></tr> <tr><td>May</td><td>10</td><td>8.3</td><td>W.</td></tr> <tr><td>Dec.</td><td>12</td><td>14.6</td><td>W.</td></tr> <tr><td></td><td>22</td><td>13.7</td><td>W.</td></tr> <tr><td></td><td>32</td><td>12.8</td><td>W.</td></tr> </table>	Mar.	d	h	W.		31	11.7	W.	Apr.	10	10.8	W.		20	10.0	W.		30	9.2	W.	May	10	8.3	W.	Dec.	12	14.6	W.		22	13.7	W.		32	12.8	W.
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GREENWICH MEAN TIME OF SUPERIOR GEOCENTRIC CONJUNCTION.

## SATELLITE I.

<table style="width: 100%; border-collapse: collapse;"> <tr><td>Jan.</td><td>d</td><td>h</td><td>m</td></tr> <tr><td></td><td>0</td><td>18</td><td>21.1</td></tr> <tr><td></td><td>2</td><td>12</td><td>47.3</td></tr> <tr><td></td><td>4</td><td>7</td><td>13.7</td></tr> <tr><td></td><td>6</td><td>1</td><td>39.9</td></tr> <tr><td></td><td>7</td><td>20</td><td>6.1</td></tr> <tr><td></td><td>9</td><td>14</td><td>32.2</td></tr> <tr><td></td><td>11</td><td>8</td><td>58.4</td></tr> <tr><td></td><td>13</td><td>3</td><td>24.4</td></tr> <tr><td></td><td>14</td><td>21</td><td>50.5</td></tr> <tr><td></td><td>16</td><td>16</td><td>16.4</td></tr> <tr><td></td><td>18</td><td>10</td><td>42.5</td></tr> <tr><td></td><td>20</td><td>5</td><td>8.4</td></tr> <tr><td></td><td>21</td><td>23</td><td>34.3</td></tr> <tr><td></td><td>23</td><td>18</td><td>0.2</td></tr> <tr><td></td><td>25</td><td>12</td><td>26.2</td></tr> <tr><td></td><td>27</td><td>6</td><td>52.0</td></tr> <tr><td></td><td>29</td><td>1</td><td>18.0</td></tr> <tr><td>Feb.</td><td>30</td><td>19</td><td>43.8</td></tr> <tr><td></td><td>1</td><td>14</td><td>9.8</td></tr> <tr><td></td><td>3</td><td>8</td><td>35.6</td></tr> <tr><td></td><td>5</td><td>3</td><td>1.6</td></tr> <tr><td></td><td>6</td><td>21</td><td>27.5</td></tr> <tr><td></td><td>8</td><td>15</td><td>53.5</td></tr> <tr><td></td><td>10</td><td>10</td><td>19.4</td></tr> <tr><td></td><td>12</td><td>4</td><td>45.4</td></tr> <tr><td></td><td>13</td><td>23</td><td>11.4</td></tr> <tr><td></td><td>15</td><td>17</td><td>37.5</td></tr> <tr><td></td><td>17</td><td>12</td><td>3.6</td></tr> <tr><td></td><td>19</td><td>6</td><td>29.7</td></tr> <tr><td></td><td>21</td><td>0</td><td>55.9</td></tr> <tr><td></td><td>22</td><td>19</td><td>22.2</td></tr> <tr><td></td><td>24</td><td>13</td><td>48.4</td></tr> <tr><td></td><td>26</td><td>8</td><td>14.8</td></tr> <tr><td></td><td>28</td><td>2</td><td>41.1</td></tr> <tr><td></td><td>29</td><td>21</td><td>7.8</td></tr> <tr><td>Mar.</td><td>2</td><td>15</td><td>34.1</td></tr> <tr><td></td><td>4</td><td>10</td><td>0.7</td></tr> <tr><td></td><td>6</td><td>4</td><td>27.3</td></tr> <tr><td></td><td>7</td><td>22</td><td>54.0</td></tr> <tr><td></td><td>9</td><td>17</td><td>20.7</td></tr> <tr><td></td><td>11</td><td>11</td><td>47.6</td></tr> <tr><td></td><td>13</td><td>6</td><td>14.4</td></tr> <tr><td></td><td>15</td><td>0</td><td>41.4</td></tr> <tr><td></td><td>16</td><td>19</td><td>8.4</td></tr> <tr><td></td><td>18</td><td>13</td><td>35.6</td></tr> <tr><td></td><td>20</td><td>8</td><td>2.7</td></tr> </table>	Jan.	d	h	m		0	18	21.1		2	12	47.3		4	7	13.7		6	1	39.9		7	20	6.1		9	14	32.2		11	8	58.4		13	3	24.4		14	21	50.5		16	16	16.4		18	10	42.5		20	5	8.4		21	23	34.3		23	18	0.2		25	12	26.2		27	6	52.0		29	1	18.0	Feb.	30	19	43.8		1	14	9.8		3	8	35.6		5	3	1.6		6	21	27.5		8	15	53.5		10	10	19.4		12	4	45.4		13	23	11.4		15	17	37.5		17	12	3.6		19	6	29.7		21	0	55.9		22	19	22.2		24	13	48.4		26	8	14.8		28	2	41.1		29	21	7.8	Mar.	2	15	34.1		4	10	0.7		6	4	27.3		7	22	54.0		9	17	20.7		11	11	47.6		13	6	14.4		15	0	41.4		16	19	8.4		18	13	35.6		20	8	2.7	<table style="width: 100%; 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	17	23	36.0																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																												
	19	18	3.8																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																												
	21	12	31.7																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																												
	23	6	59.4																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																												
	25	1	27.1																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																												
	26	19	54.6																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																												
	28	14	22.2																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																												
	30	8	49.6																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																												
	32	3	17.0																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																												

## SATELLITES OF JUPITER, 1920.

GREENWICH MEAN TIME OF SUPERIOR GEOCENTRIC CONJUNCTION.

## SATELLITE II.

	d	h	m		d	h	m		d	h	m		d	h	m
Jan.	1	4	22.3	Mar.	22	18	31.7	June	12	12	11.4	Oct.	15	1	9.6
	4	17	31.3		26	7	43.7		16	1	33.4		18	14	33.4
	8	6	39.7		29	20	56.3		19	14	55.5		22	3	56.2
	11	19	47.9	Apr.	2	10	9.4		23	4	18.0		25	17	19.6
	15	8	55.5		5	23	23.0		26	17	40.6		29	6	41.8
	18	22	3.1		9	12	37.3		30	7	3.4	Nov.	1	20	4.7
	22	11	10.2		13	1	52.0	July	3	20	28.5		5	9	26.3
	26	0	17.3		16	15	7.3		7	9	49.8		8	22	48.6
	29	13	24.2		20	4	23.1		10	23	13.2		12	12	9.6
Feb.	2	2	31.1		23	17	39.4		14	12	36.8		16	1	31.1
	5	15	37.8		27	6	56.1		18	2	0.5		19	14	51.3
	9	4	44.8		30	20	13.4		21	15	24.4		23	4	12.0
	12	17	51.8	May	4	9	31.1		25	4	48.4		26	17	31.4
	16	6	59.1		7	22	49.3		..	..	..		30	6	51.2
	19	20	6.5		11	12	7.9		..	..	..	Dec.	3	20	9.7
	23	9	14.3		15	1	26.9	Sept.	16	13	56.6		7	9	28.6
	26	22	22.3		18	14	46.2		20	3	21.4		10	22	46.1
Mar.	1	11	30.9		22	4	6.0		23	16	45.5		14	12	3.9
	5	0	39.8		25	17	26.1		27	6	10.2		18	1	20.3
	8	13	49.1		29	6	46.6		30	19	34.1		21	14	37.0
	12	2	59.0	June	1	20	7.3	Oct.	4	8	58.6		25	3	52.3
	15	16	9.4		5	9	28.4		7	22	22.2		28	17	7.9
	19	5	20.3		8	22	49.8		11	11	46.4		32	6	22.0

## SATELLITE III.

	d	h	m		d	h	m		d	h	m		d	h	m
Jan.	0	4	46.4	Mar.	25	21	8.1	June	19	21	34.8	Oct.	12	20	18.7
	7	8	9.3	Apr.	2	0	48.1		27	1	56.6		20	0	38.1
	14	11	29.7		9	4	32.5	July	4	6	19.3		27	4	55.5
	21	14	47.4		16	8	21.7		11	10	42.9	Nov.	3	9	10.8
	28	18	4.0		23	12	16.1		18	15	7.7		10	13	24.3
Feb.	4	21	19.3		30	16	14.5		25	19	33.4		17	17	34.3
	12	0	34.8	May	7	20	17.3		..	..	..		24	21	41.3
	19	3	51.6		15	0	23.0		..	..	..	Dec.	2	1	44.1
	26	7	10.9		22	4	31.7		..	..	..		9	5	42.8
Mar.	4	10	34.2		29	8	43.3	Sept.	21	7	8.9		16	9	37.5
	11	14	1.1	June	5	12	57.8		28	11	33.6		23	13	28.1
	18	17	32.7		12	17	15.3	Oct.	5	15	57.3		30	17	14.9

## SATELLITE IV.

	d	h	m		d	h	m		d	h	m		d	h	m
Jan.	1	7	12.5	Mar.	24	8	7.4	June	16	2	58.4	Oct.	12	2	5.5
	17	21	45.3	Apr.	10	0	35.4		2	23	1.9		28	23	0.5
Feb.	3	11	51.5		26	18	1.2	July	2	19	24.8	Nov.	14	17	23.8
	20	2	0.6		13	12	18.9		..	..	..	Dec.	1	12	7.0
Mar.	7	16	39.2	May	30	7	21.6	Sept.	25	5	48.9		18	6	1.4

DIFFERENTIAL COORDINATES OF SATELLITE VI.  
FOR GREENWICH MEAN MIDNIGHT.

Date.	$\alpha_{VI} - \alpha_{Jup.}$	$\delta_{VI} - \delta_{Jup.}$	Date.	$\alpha_{VI} - \alpha_{Jup.}$	$\delta_{VI} - \delta_{Jup.}$	Date.	$\alpha_{VI} - \alpha_{Jup.}$	$\delta_{VI} - \delta_{Jup.}$		
Jan.	1	m s	Apr.	10	m s	Oct.	1	m s		
	5	+3 36		14	-3 51		5	+2 13		
	9	3 35		18	3 49		9	2 11		
	13	3 31		22	3 45		13	2 2		
	17	3 23		26	3 40		17	1 52		
21	3 11	12.8	30	3 34	14.9	21	+1 39	+ 3.0		
Feb.	21	+2 54	+13.6	May	4	3 26	-15.5	25	1 11	1.5
	25	2 34	14.1		8	3 18	15.9	29	0 54	+ 0.7
	29	2 10	14.4		12	3 8	16.2	Nov. 2	0 37	- 0.2
	2	1 43	14.5		16	2 58	16.4	6	+0 19	- 1.1
	6	1 14	14.2		20	2 48	16.4	10	0 0	1.9
Mar.	10	+0 43	+13.6	June	24	2 25	16.1	14	-0 19	2.8
	14	+0 11	12.6		28	2 13	15.7	18	0 38	3.6
	18	-0 22	11.4		5	2 0	15.3	22	0 58	4.3
	22	0 52	10.0		9	1 48	14.8	26	+1 17	- 5.0
	26	1 22	8.3		13	-1 35	-14.2	30	1 36	5.6
Apr.	1	-1 50	+ 6.5	July	17	1 22	13.5	Dec. 4	1 54	6.1
	5	2 14	4.5		21	1 10	12.8	8	2 12	6.5
	9	2 37	2.5		25	0 57	12.0	12	2 29	6.9
	13	2 56	+ 0.5		29	0 44	11.2	16	-2 45	- 7.2
	17	3 12	- 1.5		3	-0 31	-10.3	20	3 1	7.4
21	-3 26	- 3.4	7	-0 6	8.5	24	3 15	7.5		
25	3 36	5.2	11	+0 7	7.6	28	3 28	7.6		
29	3 43	6.9	15	+0 19	- 6.6	32	-3 39	- 7.6		
Apr. 2	3 48	8.5								
6	-3 50	- 9.9								

DIFFERENTIAL COORDINATES OF SATELLITE VII.

Date.	$\alpha_{VII} - \alpha_{Jup.}$	$\delta_{VII} - \delta_{Jup.}$	Date.	$\alpha_{VII} - \alpha_{Jup.}$	$\delta_{VII} - \delta_{Jup.}$	Date.	$\alpha_{VII} - \alpha_{Jup.}$	$\delta_{VII} - \delta_{Jup.}$			
Jan.	1	m s	Apr.	10	m s	Oct.	1	m s			
	5	-2 45		+34.5	14		+1 53	-20.9	5	-1 38	+19.6
	9	2 58		33.7	18		2 13	19.9	9	1 47	18.8
	13	3 13		32.6	22		2 30	18.6	13	1 56	17.9
	17	3 26		31.2	26		2 44	16.9	17	2 4	16.9
21	3 38	29.5	30	2 54	14.9	21	-2 12	+15.7			
Feb.	21	-3 48	+27.4	May	4	+3 3	-12.8	25	2 20	14.3	
	25	3 55	25.0		8	3 9	10.6	29	2 26	12.8	
	29	4 0	22.3		12	3 12	8.4	Nov. 2	2 32	11.2	
	2	4 2	19.2		16	3 14	6.1	6	2 36	9.5	
	6	4 0	15.8		20	3 13	3.9	10	-2 39	+ 7.6	
Mar.	10	-3 56	+12.3	June	24	+3 11	- 1.7	14	2 40	5.7	
	14	3 47	8.5		28	3 8	+ 0.3	18	2 38	3.7	
	18	3 34	4.7		5	3 4	2.2	22	2 35	+ 1.6	
	22	3 18	+ 1.0		9	2 59	4.0	26	2 29	- 0.5	
	26	2 59	2.8		13	2 53	5.7	30	-2 21	- 2.5	
Apr.	1	-2 37	6.3	July	17	+2 47	+ 7.3	Dec. 4	2 10	4.5	
	5	2 12	9.6		21	2 40	8.8	8	1 56	6.5	
	9	1 45	12.6		25	2 33	10.2	12	1 49	8.3	
	13	1 16	15.2		29	2 25	11.6	16	1 22	10.0	
	17	0 47	17.4		3	2 17	12.8	20	-1 1	-11.6	
21	-0 18	-19.2	7	+2 8	+14.1	24	0 39	12.9			
25	+0 11	20.5	11	2 0	15.3	28	-0 14	14.0			
29	0 39	21.3	15	1 51	16.4	32	+0 11	14.9			
Apr. 2	1 6	21.6					+0 37	-15.5			
6	+1 31	-21.5									

## GREENWICH MEAN TIME.

## JANUARY.

d	h	m		d	h	m		d	h	m		d	h	m		d	h	m		
1	1	24.6	II. Ec. D.	9	12	48.4	I.*Ec. D.	17	21	58	III.*Sh. I.	26	4	50	IV. Sh. E.					
	2	22.2	IV. Ec. R.		15	41	I.*Oc. R.		23	32	III.*Tr. I.		6	37	IV. Tr. E.					
	4	47	IV. Oc. D.		16	16	IV.*Tr. E.						8	28	I. Sh. I.					
	5	49	II. Oc. R.		22	10	II.*Sh. I.	18	0	11	IV. Oc. R.		8	37	I. Tr. I.					
	9	38	IV. Oc. R.		23	18	II.*Tr. I.		1	37	III. Sh. E.		10	44	I. Sh. E.					
	13	48	I.*Sh. I.						3	10	III. Tr. E.		10	55	I. Tr. E.					
	14	32	I.*Tr. I.	10	1	2	II. Sh. E.		9	10.7	I. Ec. D.									
	16	5	I.*Sh. E.		2	10	II. Tr. E.		11	51	I. Oc. R.	27	5	33.2	I. Ec. D.					
	16	49	I.*Tr. E.		10	10	I. Sh. I.		19	52.7	II.*Ec. D.		8	1	I. Oc. R.					
					10	43	I. Tr. I.		23	30	II.*Oc. R.		16	37	II.*Sh. I.					
2	10	54.8	I. Ec. D.		12	27	I. Sh. E.						16	55	II.*Tr. I.					
	13	56	I.*Oc. R.		13	1	I.*Tr. E.	19	6	32	I. Sh. I.		19	30	II.*Sh. E.					
	19	36	II.*Sh. I.		18	0	III.*Sh. I.		6	53	I. Tr. I.		19	48	II.*Tr. E.					
	21	1	II.*Tr. I.		20	14	III.*Tr. I.		8	50	I. Sh. E.									
	22	27	II.*Sh. E.		21	38	III.*Sh. E.		9	11	I. Tr. E.	28	2	54	I. Sh. I.					
	23	53	II.*Tr. E.		23	51	III.*Tr. E.						3	3	I. Tr. I.					
													5	12	I. Sh. E.					
													5	20	I. Tr. E.					
3	8	16	I. Sh. I.	11	7	16.9	I. Ec. D.	20	3	39.2	I. Ec. D.									
	8	58	I. Tr. I.		10	7	I. Oc. R.		6	17	I. Oc. R.									
	10	34	I. Sh. E.		17	17.6	II.*Ec. D.		14	2	II.*Sh. I.									
	11	16	I. Tr. E.		21	15	II.*Oc. R.		14	41	II.*Tr. I.									
	14	2	III.*Sh. I.						16	54	II.*Sh. E.									
	16	52	III.*Tr. I.	12	4	38	I. Sh. I.		17	33	II.*Tr. E.	29	0	1.8	I. Ec. D.					
	17	40	III.*Sh. E.		5	9	I. Tr. I.						2	27	I. Oc. R.					
	20	29	III.*Tr. E.		5	9	I. Sh. E.		21	1	0	I. Sh. I.		11	45.2	II.*Ec. D.				
					6	56	I. Tr. E.		3	18	I. Tr. I.			14	51	II.*Oc. R.				
					7	27	I. Tr. E.		3	18	I. Sh. E.			21	23	I.*Sh. I.				
4	5	23.2	I. Ec. D.						3	37	I. Tr. E.			21	29	I.*Tr. I.				
	8	23	I. Oc. R.	12	1	45.3	I. Ec. D.		11	44.2	III. Ec. D.			23	41	I.*Sh. E.				
	14	42.5	II.*Ec. D.		4	33	I. Oc. R.		16	37	III.*Oc. R.			23	46	I.*Tr. E.				
	18	58	II.*Oc. R.		11	27	II. Sh. I.		22	7.7	I.*Ec. D.									
					12	26	II.*Tr. I.													
5	2	44	I. Sh. I.		14	19	II.*Sh. E.	22	0	43	I. Oc. R.									
	3	25	I. Tr. I.		15	18	II.*Tr. E.		9	10.1	II. Ec. D.									
	5	2	I. Sh. E.		23	7	I.*Sh. I.		12	37	II.*Oc. R.									
	5	42	I. Tr. E.		23	35	I.*Tr. I.		19	29	I.*Sh. I.									
	23	51.6	I.*Ec. D.						19	45	I.*Tr. I.									
									21	47	I.*Sh. E.									
6	2	49	I. Oc. R.	14	1	24	I. Sh. E.		22	3	I.*Tr. E.									
	8	53	II. Sh. I.		1	53	I. Tr. E.													
	10	10	II. Tr. I.		7	45.4	III. Ec. D.													
	11	44	II. Sh. E.		13	19	III.*Oc. R.		23	16	36.2	I.*Ec. D.								
	13	2	II.*Tr. E.		20	13.8	I.*Ec. D.		19	9	I.*Oc. R.									
	13	2	II.*Tr. E.		22	59	I.*Oc. R.													
	21	13	I.*Sh. I.																	
	21	51	I.*Tr. I.		15	6	35.0	II. Ec. D.	24	3	20	II. Sh. I.								
	23	30	I.*Sh. E.		10	22	II. Oc. R.		3	48	II. Tr. I.									
					17	35	I.*Sh. I.		6	12	II. Sh. E.									
7	0	8	I. Tr. E.		18	1	I.*Tr. I.		6	41	II. Tr. E.									
	3	46.6	III. Ec. D.		18	1	I.*Sh. E.		13	57	I.*Sh. I.									
	9	59	III. Oc. R.		19	53	I.*Sh. E.		14	11	I.*Tr. I.									
	18	20.0	I.*Ec. D.		20	19	I.*Tr. E.		16	15	I.*Sh. E.									
	21	15	I.*Oc. R.		16	14	22.2	I.*Ec. D.	16	29	I.*Tr. E.									
					17	25	I.*Oc. R.		25	1	56	III. Sh. I.								
8	3	59.8	II. Ec. D.						2	49	III. Tr. I.									
	8	6	II. Oc. R.	17	0	45	II. Sh. I.		5	35	III. Sh. E.									
	15	41	I.*Sh. I.		1	33	II. Tr. I.		6	26	III. Tr. E.									
	16	17	I.*Tr. I.		3	37	II. Sh. E.		11	4.7	I. Ec. D.									
	17	59	I.*Sh. E.		4	26	II. Tr. E.		13	35	I.*Oc. R.									
	18	34	I.*Tr. E.		12	3	I. Sh. I.		22	27.8	II.*Ec. D.									
					12	27	I.*Tr. I.													
9	6	9	IV. Sh. I.		14	21	I.*Sh. E.	26	0	7	IV. Sh. I.									
	10	50	IV. Sh. E.		14	45	I.*Tr. E.		1	44	II. Oc. R.									
	11	31	IV. Tr. I.		15	36.6	IV.*Ec. D.		1	52	IV. Tr. I.									


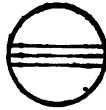


NOTE.—I. denotes ingress; E., egress; D., disappearance; R., reappearance; Ec., eclipse; Oc., occultation; Tr., transit of the satellite; Sh., transit of the shadow. \*Visible at Washington.



GREENWICH MEAN TIME.

JANUARY.

*Phases of the Eclipses of the Satellites for an Inverting Telescope.*

I.		III.	
II.		IV.	

*Configurations at 18<sup>h</sup> 0<sup>m</sup> for an Inverting Telescope.*

Day.	West.	East.
1		1 <sup>o</sup> ○ .4 .2 .3
2		○ 2 <sup>o</sup> .1 3 <sup>o</sup> .4
3	○ 3 <sup>o</sup>	2 <sup>o</sup> 1 <sup>o</sup> ○ .4
4		3 <sup>o</sup> ○ 1 <sup>o</sup> .4 ●
5		.3 .1 ○ 2 <sup>o</sup> 4 <sup>o</sup>
6		.3 2 <sup>o</sup> ○ 1 <sup>o</sup> 4 <sup>o</sup>
7		.2 .1 ○ .3 4 <sup>o</sup>
8	○ 1 <sup>o</sup>	○ .4 .3
9		4 <sup>o</sup> ○ .1 3 <sup>o</sup>
10		4 <sup>o</sup> 2 <sup>o</sup> 1 <sup>o</sup> ○ 3 <sup>o</sup>
11		4 <sup>o</sup> 3 <sup>o</sup> ○ .1 ●
12		4 <sup>o</sup> .3 .1 ○ 2 <sup>o</sup>
13		.4 .3 2 <sup>o</sup> ○ 1 <sup>o</sup>
14		.4 .2 .1 ○ .3
15		.4 1 <sup>o</sup> ○ .2 .3
16		.4 .1 2 <sup>o</sup> 3 <sup>o</sup>
17		2 <sup>o</sup> 1 <sup>o</sup> ○ 3 <sup>o</sup> ●
18		3 <sup>o</sup> .2 ○ .1 .4
19		3 <sup>o</sup> 1 <sup>o</sup> ○ .2 .4
20		.3 2 <sup>o</sup> ○ 1 <sup>o</sup> .4
21		.2 .1 ○ .3 .4
22		○ 1 <sup>o</sup> .2 .3 4 <sup>o</sup>
23		○ 2 <sup>o</sup> 3 <sup>o</sup> 4 <sup>o</sup> ●
24		2 <sup>o</sup> 1 <sup>o</sup> ○ 3 <sup>o</sup> 4 <sup>o</sup>
25		3 <sup>o</sup> .2 ○ .1
26		3 <sup>o</sup> .1 <sup>o</sup> ○ .2
27	○ 2 <sup>o</sup>	4 <sup>o</sup> .3 ○ 1 <sup>o</sup>
28		4 <sup>o</sup> .2 .1 ○ ●
29		4 <sup>o</sup> 1 <sup>o</sup> .2 .3
30		.4 .1 2 <sup>o</sup> 3 <sup>o</sup>
31	○ 1 <sup>o</sup>	.4 2 <sup>o</sup> ○ 3 <sup>o</sup>

GREENWICH MEAN TIME.

FEBRUARY.

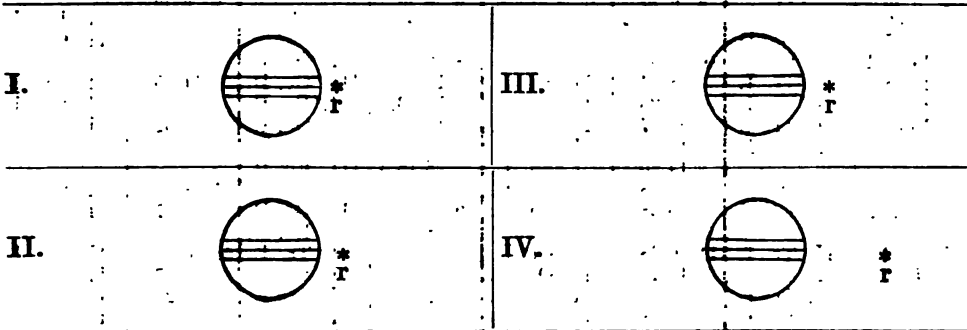
d	h	m		d	h	m		d	h	m		d	h	m	
1	5	55	III. Sh. I.	9	14	22	I.*Tr. E.	18	3	17	II. Sh. E.	27	0	57.6	II. Ec. R.
	6	4	III. Tr. I.		14	32	I.*Sh. E.		8	14	I. Tr. I.		4	25	I. Tr. I.
	9	34	III. Sh. E.						8	37	I. Sh. I.		5	0	I. Sh. I.
	9	42	III. Tr. E.	10	9	10	I. Oc. D.		10	32	I. Tr. E.		6	43	I. Tr. E.
	12	58.9	I.*Ec. D.		11	40.0	I.*Ec. R.		10	55	I. Sh. E.		7	17	I. Sh. E.
	15	19	I.*Oc. R.		21	23	II.*Tr. I.					28	1	32	I. Oc. D.
					21	48	II.*Sh. I.	19	2	2	III. Oc. D.		4	26.7	I. Ec. R.
2	1	2.9	II. Ec. D.						5	21	I. Oc. D.		6	25	I. Ec. R.
	3	57	II. Oc. R.	11	0	16	II. Tr. E.		7	19.5	III. Ec. R.		11	9	IV. Tr. I.
	10	20	I. Sh. I.		0	41	II. Sh. E.		8	3.3	I. Ec. R.		12	5	IV. Tr. E.
	10	20	I. Tr. I.		6	30	I. Tr. I.		18	40	II.*Oc. D.		12	4	IV.*Sh. I.
	12	38	I.*Sh. E.		6	43	I. Sh. I.		22	22.7	II.*Ec. R.		15	4	II.*Tr. I.
	12	38	I.*Tr. E.		8	48	I. Tr. E.		23	36	IV. Oc. D.		16	19	II.*Sh. I.
					9	0	I. Sh. E.						16	51	IV.*Sh. E.
3	7	27	I. Oc. D.		16	1	IV.*Tr. I.	20	2	40	I. Tr. I.		17	57	II.*Tr. E.
	9	26	IV. Oc. D.		18	6	IV.*Sh. I.		3	6	I. Sh. I.		19	12	II.*Sh. E.
	9	45.6	I. Ec. R.		20	45	IV.*Tr. E.		4	58	I. Tr. E.		22	52	I. Tr. I.
	14	27.0	IV.*Ec. R.		22	45	III.*Oc. D.		5	23	I. Sh. E.		23	29	I. Sh. I.
	19	9	II.*Tr. I.		22	51	IV.*Sh. E.		8	30.7	IV. Ec. R.				
	19	12	II.*Sh. I.						23	47	I. Oc. D.	29	1	9	I. Tr. E.
	22	2	II.*Tr. E.	12	3	20.8	III. Ec. R.						1	46	I. Sh. E.
	22	5	II.*Sh. E.		3	36	I. Oc. D.	21	2	31.9	I. Ec. R.		19	17	III.*Tr. I.
					6	8.7	I. Ec. R.		12	47	II.*Tr. I.		19	58	I.*Oc. D.
4	4	46	I. Tr. I.		16	26	II.*Oc. D.		13	43	II.*Sh. I.		21	51	III.*Sh. I.
	4	48	I. Sh. I.		19	47.7	II.*Ec. R.		15	40	II.*Tr. E.		22	54	III. Tr. E.
	7	4	I. Tr. E.						16	36	II.*Sh. E.		22	55.5	I. Ec. R.
	7	6	I. Sh. E.						21	6	I.*Tr. I.				
	19	30	III.*Oc. D.	13	0	56	I. Tr. I.		21	34	I.*Sh. I.				
	23	22.1	III.*Ec. R.		1	11	I. Sh. I.		23	24	I. Tr. E.				
					3	29	I. Sh. E.		23	52	I. Sh. E.				
					22	2	I.*Oc. D.								
5	1	53	I. Oc. D.					23	15	55	III.*Tr. I.				
	4	14.3	I. Ec. R.						17	52	III.*Sh. I.				
	14	12	II.*Oc. D.	14	0	37.3	I. Ec. R.		18	13	I.*Oc. D.				
	17	12.8	II.*Ec. R.		10	31	II. Tr. I.		19	33	III.*Tr. E.				
	23	12	I.*Tr. I.		11	6	II. Sh. I.		21	0.7	I.*Ec. R.				
	23	17	I.*Sh. I.		13	24	II.*Tr. E.		21	31	III.*Sh. E.				
					14	0	II.*Sh. E.								
					19	22	I.*Tr. I.								
6	1	30	I. Tr. E.		19	40	I.*Sh. I.	23	7	48	II. Oc. D.				
	1	35	I. Sh. E.		19	40	I.*Tr. E.		11	40.2	H.*Ec. R.				
	20	18	I.*Oc. D.		21	40	I.*Sh. E.		15	33	I.*Tr. I.				
	22	42.8	I.*Ec. R.		21	58			16	8	I.*Sh. I.				
									17	50	I.*Tr. E.				
7	8	16	II. Tr. I.	15	12	38	III.*Tr. I.		18	20	I.*Sh. E.				
	8	30	II. Sh. I.		13	53	III.*Sh. I.								
	11	9	II.*Tr. E.		16	14	III.*Tr. E.								
	11	23	II.*Sh. E.		16	28	I.*Oc. D.								
	17	38	I.*Tr. I.		17	32	III.*Sh. E.	24	12	39	I.*Oc. D.				
	17	46	I.*Sh. I.		19	6.0	I.*Ec. R.		15	29.3	I.*Ec. R.				
	19	56	I.*Tr. E.												
	20	3	I.*Sh. E.	16	5	33	II. Oc. D.	25	1	55	II. Tr. I.				
					9	5.3	II. Ec. R.		3	6	II. Sh. I.				
8	9	20	III. Tr. I.		13	48	I.*Tr. I.		4	48	II. Tr. E.				
	9	54	III. Sh. I.		14	8	I.*Sh. I.		5	54	II. Sh. E.				
	12	58	III.*Tr. E.		16	6	I.*Tr. E.		9	59	I. Tr. I.				
	13	33	III.*Sh. E.		16	26	I.*Sh. E.		10	31	I. Sh. I.				
	14	44	I.*Oc. D.						12	16	I.*Tr. E.				
	17	11.5	I.*Ec. R.	17	10	54	I. Oc. D.		12	49	I.*Sh. E.				
					13	34.6	I.*Ec. R.	26	5	21	III. Oc. D.				
					23	39	II. Tr. I.		7	6	I. Oc. D.				
9	3	19	II. Oc. D.						9	58.1	I. Ec. R.				
	6	30.3	II. Ec. R.						11	13.5	III. Ec. R.				
	12	4	I.*Tr. I.	18	0	24	II. Sh. I.		20	56	II.*Oc. D.				
	12	14	I.*Sh. I.		2	32	II. Tr. E.								

NOTE.—I. denotes ingress; E., egress; D., disappearance; R., reappearance; Ec., eclipse; Oc., occultation; Tr., transit of the satellite; Sh., transit of the shadow. \*Visible at Washington.

GREENWICH MEAN TIME.

FEBRUARY.

*Phases of the Eclipses of the Satellites for an Inverting Telescope.*



*Configurations at 17<sup>h</sup> 0<sup>m</sup> for an Inverting Telescope.*

Day	West.	East.
1	4 <sup>2</sup> 3 <sup>2</sup>	1
2	8 <sup>2</sup> 41 <sup>2</sup>	2
3	3	2 <sup>2</sup> 1
4	2 <sup>2</sup> 1	3 4
5		1 <sup>2</sup> 3 4 2
6		1 2 <sup>2</sup> 3 <sup>2</sup> 4
7		2 <sup>2</sup> 3 <sup>2</sup> 4 <sup>2</sup>
8		23 <sup>2</sup> 4 <sup>2</sup> 1
9		3 <sup>2</sup> 1 <sup>2</sup> 2 <sup>2</sup> 4 <sup>2</sup>
10		3 <sup>2</sup> 2 <sup>2</sup> 1 <sup>2</sup> 4 <sup>2</sup>
11	4 <sup>2</sup>	2 <sup>2</sup> 1 <sup>2</sup> 3 <sup>2</sup>
12		4 <sup>2</sup> 1 <sup>2</sup> 3 <sup>2</sup> 2
13		4 <sup>2</sup> 1 <sup>2</sup> 2 <sup>2</sup> 3 <sup>2</sup>
14		4 <sup>2</sup> 2 <sup>2</sup> 1 <sup>2</sup> 3 <sup>2</sup>
15		4 <sup>2</sup> 2 <sup>2</sup> 3 <sup>2</sup> 1
16		4 <sup>2</sup> 3 <sup>2</sup> 1 <sup>2</sup> 2
17		4 <sup>2</sup> 3 <sup>2</sup> 1 <sup>2</sup> 2 <sup>2</sup>
18		4 <sup>2</sup> 2 <sup>2</sup> 1 <sup>2</sup> 3 <sup>2</sup>
19		4 <sup>2</sup> 2 <sup>2</sup> 1 <sup>2</sup> 3 <sup>2</sup>
20		1 <sup>2</sup> 4 <sup>2</sup> 2 <sup>2</sup> 3 <sup>2</sup>
21		2 <sup>2</sup> 1 <sup>2</sup> 3 <sup>2</sup> 4 <sup>2</sup>
22	3 <sup>2</sup>	2 <sup>2</sup> 1 <sup>2</sup> 4 <sup>2</sup>
23	1 <sup>2</sup>	3 <sup>2</sup> 2 <sup>2</sup> 4 <sup>2</sup>
24		3 <sup>2</sup> 1 <sup>2</sup> 2 <sup>2</sup> 4 <sup>2</sup>
25		3 <sup>2</sup> 1 <sup>2</sup> 4 <sup>2</sup>
26		2 <sup>2</sup> 1 <sup>2</sup> 3 <sup>2</sup> 4 <sup>2</sup>
27		1 <sup>2</sup> 4 <sup>2</sup> 2 <sup>2</sup> 3 <sup>2</sup>
28	2 <sup>2</sup>	4 <sup>2</sup> 1 <sup>2</sup> 3 <sup>2</sup>
29		4 <sup>2</sup> 2 <sup>2</sup> 1 <sup>2</sup> 3 <sup>2</sup>

MARCH.

d h m		d h m		d h m		d h m	
1 1 30	III. Sh. E.	9 19 19.2	I.*Ec. R.	17 18 32	I.*Sh. E.	26 3 17.8	III. Ec. R.
10 5	II. Oc. D.					6 18	II. Oc. D.
14 15.1	II.*Ec. R.	10 6 34	II. Tr. I.	18 12 26	I.*Oc. D.	11 17.2	II. Ec. R.
17 18	I.*Tr. I.	8 14	II. Sh. I.	15 43	III.*Oc. D.	11 35	I. Tr. I.
17 57	I.*Sh. I.	9 26	II. Tr. E.	15 43.1	I.*Ec. R.	12 59	I.*Sh. I.
19 35	I.*Tr. E.	11 7	II. Sh. E.	19 22	III.*Oc. R.	13 52	I.*Tr. E.
20 15	I.*Sh. E.	13 31	I.*Tr. I.	19 38.5	III.*Ec. D.	14 55	I.*Sh. E.
		14 20	I.*Sh. I.	23 18.3	III. Ec. R.		
2 14 25	I.*Oc. D.	15 48	I.*Tr. E.	19 3 54	II. Oc. D.	27 8 45	I. Oc. D.
17 24.2	I.*Ec. R.	16 38	I.*Sh. E.	8 42.3	II. Ec. R.	12 7.1	I.*Ec. R.
3 4 14	II. Tr. I.	11 10 38	I. Oc. D.	9 46	I. Tr. I.	23 0 35	II. Tr. I.
5 37	II. Sh. I.	12 12	III.*Oc. D.	10 44	I. Sh. I.	2 47	II. Sh. I.
7 6	II. Tr. E.	13 48.0	I.*Ec. R.	12 3	I.*Tr. E.	3 27	II. Tr. E.
8 30	II. Sh. E.	19 18.1	III.*Ec. R.	13 1	I.*Sh. E.	5 40	II. Sh. E.
11 45	I.*Tr. I.					6 3	I. Tr. I.
12 26	I.*Sh. I.	12 1 33	II. Oc. D.	20 6 54	I. Oc. D.	7 7	I. Sh. I.
14 2	I.*Tr. E.	6 7.4	II. Ec. R.	10 11.9	I. Ec. R.	8 19	I. Tr. E.
14 43	I.*Sh. E.	7 58	I. Tr. I.	22 9	II. Tr. I.	9 24	I. Sh. E.
		8 49	I. Sh. I.				
4 8 45	III. Oc. D.	10 15	I. Tr. E.	21 0 10	II. Sh. I.	29 3 11	I. Oc. D.
8 51	I. Oc. D.	11 6	I. Sh. E.	1 1	II. Tr. E.	6 36.0	I. Ec. R.
11 53.0	I.*Ec. R.			3 3	II. Sh. E.	9 21	III. Tr. I.
15 18.4	III.*Ec. R.	12 5 5	I. Oc. D.	4 13	I. Tr. I.	12 58	III.*Tr. E.
23 14	II. Oc. D.	8 16.7	I. Ec. R.	5 13	I. Sh. I.	13 49	III.*Sh. E.
		19 45	II.*Tr. I.	6 30	I. Tr. E.	17 26	III.*Sh. E.
5 3 32.5	II. Ec. R.	21 33	II. Sh. I.	7 29	I. Sh. E.	19 30	II.*Oc. D.
6 11	I. Tr. I.	22 38	II. Tr. E.				
6 55	I. Sh. I.	14 0 26	II. Sh. E.	22 1 21	I. Oc. D.	30 0 30	I. Tr. I.
8 28	I. Tr. E.	2 25	I. Tr. I.	4 40.7	I. Ec. R.	0 34.5	II. Ec. R.
9 12	I. Sh. E.	3 18	I. Sh. I.	5 43	III. Tr. I.	1 36	I. Sh. I.
		4 42	I. Tr. E.	9 20	III. Tr. E.	2 47	I. Tr. E.
6 3 18	I. Oc. D.	5 35	I. Sh. E.	9 49	III. Sh. I.	3 52	I. Sh. E.
6 21.7	I. Ec. R.	5 25	I. Sh. E.	13 26	III.*Sh. E.	21 38	I. Oc. D.
17 24	II.*Tr. I.	23 52	I. Oc. D.	17 6	II.*Oc. D.		
18 56	II.*Sh. I.			21 59.7	II. Ec. R.	31 1 4.8	I. Ec. R.
20 16	II.*Tr. E.	15 2 10	III. Tr. I.	22 41	I. Tr. I.	15 48	II.*Tr. I.
21 49	II. Sh. E.	2 45.5	I. Ec. R.	23 41	I. Sh. I.	16 5	II.*Sh. I.
		5 47	III. Tr. E.			16 41	II.*Tr. E.
7 0 38	I. Tr. I.	5 49	III. Sh. I.	23 0 57	I. Tr. E.	18 58	I.*Tr. I.
1 23	I. Sh. I.	9 27	III. Sh. E.	1 58	I. Sh. E.	18 58	II.*Sh. E.
2 55	I. Tr. E.	14 44	II.*Oc. D.	19 48	I.*Oc. D.	20 5	I. Sh. I.
3 40	I. Sh. E.	19 24.9	II.*Ec. R.	23 9.5	I. Ec. R.	21 14	I. Tr. E.
14 15	IV.*Oc. D.	20 52	I.*Tr. I.			22 21	I. Sh. E.
19 4	IV.*Oc. R.	21 31	IV. Tr. I.	24 5 43	IV. Oc. D.		
21 41.5	IV. Ec. D.	21 47	I. Sh. I.	10 32	IV. Oc. R.		
21 45	I. Oc. D.	23 9	I. Tr. E.	11 21	II. Tr. I.		
22 41	III. Tr. I.			13 23	II.*Sh. I.		
		16 0 3	I. Sh. E.	14 13	II.*Tr. E.		
8 0 50.5	I. Ec. R.	2 14	IV. Tr. E.	15 44.1	IV.*Ec. D.		
1 50	III. Sh. I.	6 6	IV. Sh. I.	16 21	II.*Sh. E.		
2 18	III. Tr. E.	10 52	IV. Sh. E.	17 8	I.*Tr. I.		
2 34.0	IV. Ec. R.	17 59	I.*Oc. D.	18 10	I.*Sh. I.		
5 28	III. Sh. E.	21 14.3	I. Ec. R.	19 24	I.*Tr. E.		
12 23	II.*Oc. D.			20 26	I. Sh. E.		
16 50.0	II.*Ec. R.	17 8 56	II. Tr. I.	20 37.3	IV. Ec. R.		
19 5	I.*Tr. I.	10 51	II. Sh. I.				
19 52	I.*Sh. I.	11 49	II.*Tr. E.	25 14 16	I.*Oc. D.		
21 22	I.*Tr. E.	13 44	II.*Sh. E.	17 38.4	I.*Ec. R.		
22 9	I. Sh. E.	15 19	I.*Tr. I.	19 18	III.*Oc. D.		
		16 15	I.*Sh. I.	22 58	III. Oc. R.		
9 16 12	I.*Oc. D.	17 36	I.*Tr. E.	23 38.2	III. Ec. D.		

NOTE.—I. denotes ingress; E., egress; D., disappearance; R., reappearance; Ec., eclipse; Oc., occultation; Tr., transit of the satellite; Sh., transit of the shadow. \*Visible at Washington.

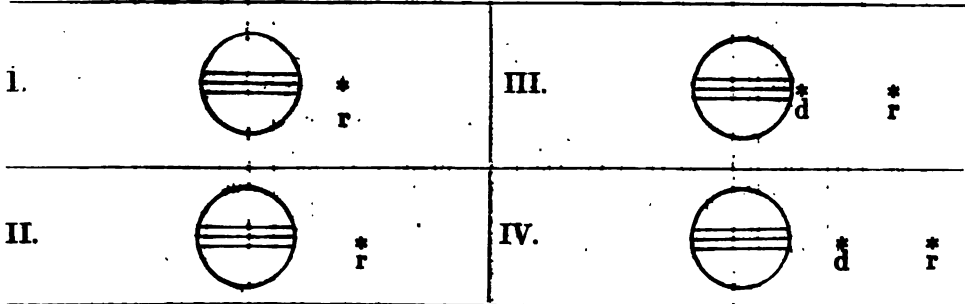
# SATELLITES OF JUPITER, 1920.

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## GREENWICH MEAN TIME.

MARCH.

*Phases of the Eclipses of the Satellites for an Inverting Telescope.*



*Configurations at 16<sup>h</sup> 15<sup>m</sup> for an Inverting Telescope.*

Day.	West.	East.
1	4 <sup>•</sup> 3 <sup>•</sup> 1 <sup>○</sup> .2	
2	4 <sup>•</sup> .3	2 <sup>•</sup> .1 ●
3	.4 .3 1 <sup>•</sup> ○	
4	.4 .2 ○ .3 1	
5	.4 1 <sup>•</sup> ○	.2 .3
6	.4 2 <sup>○</sup> .1 3 <sup>•</sup>	
7	2 <sup>•</sup> .1 ○ 3 <sup>•</sup>	.4 ●
8	3 <sup>•</sup> ○ 1 <sup>•</sup> .4	.2 ●
9	3 <sup>•</sup> ○ 2 <sup>•</sup> .4	.1 ●
10	.3 2 <sup>•</sup> 1 <sup>○</sup>	.4
11	.2 ○ .1	.4 .3 ●
12	1 <sup>•</sup> ○ .2 .3 4 <sup>•</sup>	
13	○ 2 <sup>•</sup> .1 3 <sup>•</sup> 4 <sup>•</sup>	
14	2 <sup>•</sup> .1 ○ .3 4 <sup>•</sup>	
15	.3 .4 .1 ○ .2	.4 ●
16	3 <sup>•</sup> 4 <sup>•</sup> .1 ○ 2 <sup>•</sup>	
17	○ 1 <sup>•</sup> 4 <sup>•</sup> .3 2 <sup>•</sup> ○	
18	.4 .2 ○ .1	.3 ●
19	4 <sup>•</sup> 1 <sup>•</sup> ○ .2 .3	
20	.4 ○ .1 3 <sup>•</sup>	
21	.4 2 <sup>•</sup> .1 ○ 3 <sup>•</sup>	
22	.4 3 <sup>•</sup> .2 1 <sup>•</sup> ○	
23	3 <sup>•</sup> .4 .1 ○ 2 <sup>•</sup>	
24	.3 2 <sup>•</sup> ○ .1	.4 ●
25	.2 .3 ○ .4	.1 ●
26	1 <sup>•</sup> ○ .2 .3 .4	
27	○ .1 3 <sup>•</sup> 4 <sup>•</sup>	
28	2 <sup>•</sup> 1 <sup>•</sup> ○ 3 <sup>•</sup> 4 <sup>•</sup>	
29	.2 ○ .1 .4	
30	3 <sup>•</sup> .1 ○ .2 4 <sup>•</sup>	
31	○ 2 <sup>•</sup> .3 ○ 1 <sup>•</sup> 4 <sup>•</sup>	

GREENWICH MEAN TIME.

APRIL.

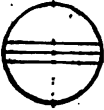
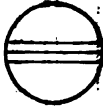


d h m		d h m		d h m		d h m	
1 13 30	IV.*Tr. I.	9 11 12	II. Oc. D.	16 20 39	I. Sh. E.	25 13 17	II.*Sh. I.
16 6	I.*Oc. D.	11 16.5	III. Ec. R.	17 14 19	I.*Oc. D.	13 31	I.*Tr. I.
18 12	IV.*Tr. E.	15 17	I.*Tr. I.	17 53.2	I.*Ec. R.	13 35	II.*Tr. E.
19 33.6	I.*Ec. R.	16 26.8	II.*Ec. R.	18 6 27	IV. Tr. I.	14 46	I.*Sh. I.
22 58	III. Oc. D.	16 28	I.*Sh. I.	8 7	II. Tr. I.	15 48	I.*Tr. E.
		17 33	I.*Tr. E.	10 40	II. Sh. I.	16 11	II.*Sh. E.
2 0 6	IV. Sh. I.	18 44	I.*Sh. E.	10 59	II. Tr. E.	17 2	I.*Sh. E.
2 38	III. Oc. R.	22 11	IV. Oc. D.	11 8	IV. Tr. E.	10 42	I. Oc. D.
3 37.6	III. Ec. D.	10 3 0	IV. Oc. R.	11 38	I. Tr. I.	14 17.6	I.*Ec. R.
4 52	IV. Sh. E.	9 47.8	IV. Ec. D.	12 52	I.*Sh. I.	15 36	IV.*Oc. D.
7 17.2	III. Ec. R.	12 26	I.*Oc. D.	13 33	II.*Sh. E.	20 26	IV. Oc. R.
8 44	II. Oc. D.	14 41.5	IV.*Ec. R.	13 54	I.*Tr. E.	0 38	III. Tr. I.
13 26	I.*Tr. I.	15 57.8	I.*Ec. R.	15 8	I.*Sh. E.	3 51.0	IV. Ec. D.
13 52.0	II.*Ec. R.	11 5 34	II. Tr. I.	18 7	IV.*Sh. I.	4 15	III. Tr. E.
14 33	I.*Sh. I.	8 2	II. Sh. I.	22 59	IV. Sh. E.	5 30	II. Oc. D.
15 42	I.*Tr. E.	8 26	II. Tr. E.	19 8 47	I. Oc. D.	5 46	III. Sh. I.
16 50	I.*Sh. E.	9 45	I. Tr. I.	12 22.1	I.*Ec. R.	8 0	I. Tr. I.
3 10 34	I. Oc. D.	10 55	II. Sh. E.	20 42	III. Tr. I.	8 45.1	IV. Ec. R.
14 2.4	I.*Ec. R.	10 57	I. Sh. I.	20 19	III. Tr. E.	9 15	I. Sh. I.
4 3 3	II. Tr. I.	12 1	I. Tr. E.	1 47	III. Sh. I.	9 22	III. Sh. E.
5 24	II. Sh. I.	13 13	I.*Sh. E.	2 57	II. Oc. D.	10 16	I. Tr. E.
5 55	II. Tr. E.	12 6 54	I. Oc. D.	5 23	III. Sh. E.	10 53.7	II. Ec. R.
7 53	I. Tr. I.	10 26.7	I. Ec. R.	6 6	I. Tr. I.	11 31	I. Sh. E.
8 18	II. Sh. E.	16 51	III.*Tr. I.	7 20	I. Sh. I.	5 10	I. Oc. D.
9 2	I. Sh. I.	20 28	III. Tr. E.	8 18.9	II. Ec. R.	6 46.4	I. Ec. R.
10 10	I. Tr. E.	21 48	III. Sh. I.	8 23	I. Tr. E.	0 0	II. Tr. I.
11 18	I. Sh. E.	18 0 26	II. Oc. D.	9 36	I. Sh. E.	2 29	I. Tr. I.
5 5 2	I. Oc. D.	1 24	III. Sh. E.	31 3 16	I. Oc. D.	2 36	II. Sh. I.
8 31.3	I. Ec. R.	4 13	I. Tr. I.	6 50.9	I. Ec. R.	2 53	II. Tr. E.
13 3	III.*Tr. I.	5 25	I. Sh. I.	21 24	II. Tr. I.	3 44	I. Sh. I.
16 40	III.*Tr. E.	5 44.1	II. Ec. R.	23 58	II. Sh. I.	4 45	I. Tr. E.
17 48	III.*Sh. I.	6 29	I. Tr. E.	23 0 16	II. Tr. E.	5 29	II. Sh. E.
21 25	III. Sh. E.	7 42	I. Sh. E.	0 34	I. Tr. I.	6 0	I. Sh. E.
21 57	II. Oc. D.	14 1 22	I. Oc. D.	1 49	I. Sh. I.	23 39	I. Oc. D.
6 2 21	I. Tr. I.	4 55.5	I. Ec. R.	2 51	I. Tr. E.	30 3 15.3	I. Ec. R.
3 9 3	II. Ec. R.	18 50	II.*Tr. I.	2 51	I. Tr. E.	14 25	III.*Oc. D.
3 31	I. Sh. I.	21 20	II. Sh. I.	4 5	I. Sh. E.	18 4	III. Oc. R.
4 37	I. Tr. E.	21 42	II. Tr. E.	21 44	I. Oc. D.	18 48	II. Oc. D.
5 47	I. Sh. E.	22 41	I. Tr. I.	23 1 19.9	I. Ec. R.	19 37.2	III. Ec. D.
23 30	I. Oc. D.	23 54	I. Sh. I.	10 26	III. Oc. D.	20 57	I. Tr. I.
7 3 0.1	I. Ec. R.	15 0 14	II. Sh. E.	14 6	III.*Oc. R.	22 12	I. Sh. I.
16 18	II.*Tr. I.	0 57	I. Tr. E.	15 37.0	III.*Ec. D.	23 13	I. Tr. E.
18 43	II.*Sh. I.	2 10	I. Sh. E.	16 14	II.*Oc. D.	23 16.3	III. Ec. R.
19 10	II.*Tr. E.	19 50	I. Oc. D.	19 3	I. Tr. I.		
20 49	I. Tr. I.	23 24.4	I. Ec. R.	19 16.3	III. Ec. R.		
21 36	II. Sh. E.	10 12	III. Oc. D.	20 18	I. Sh. I.		
21 59	I. Sh. I.	11 36.7	III. Oc. R.	21 19	I. Tr. E.		
23 5	I. Tr. E.	13 42	III. Ec. D.	21 36.3	II. Ec. R.		
8 0 16	I. Sh. E.	15 16.0	III.*Ec. R.	22 34	I. Sh. E.		
17 58	I.*Oc. D.	17 9	I.*Tr. I.	24 16 13	I.*Oc. D.		
21 29.0	I. Ec. R.	18 23	I.*Sh. I.	19 48.7	I. Ec. R.		
9 2 43	III. Oc. D.	19 1.5	II. Ec. R.	25 10 42	II. Tr. I.		
6 22	III. Oc. R.	19 26	I. Tr. E.				
7 37.0	III. Ec. D.						

NOTE.—I. denotes Ingress; E., egress; D., disappearance; R., reappearance; Ec., eclipse; Oc., occultation; Tr., transit of the satellite; Sh., transit of the shadow. \*Visible at Washington.

GREENWICH MEAN TIME.

APRIL.

*Phases of the Eclipses of the Satellites for an Inverting Telescope.*

I.		*	r
III.		*	d r
II.		*	r
IV.		*	d r

*Configurations at 15<sup>h</sup> 30<sup>m</sup> for an Inverting Telescope.*

Day.	West.	East.
1	○4.	.2 .3 ○1
2	○1.	4. ○ .2 .3
3		4. ○ .1 2. .3
4	4.	2.1. ○ .3
5	○3.	4. .2 ○ .1
6		.4 .3 .1 ○ .2
7		.4 .3 2○. 1.
8		.4 .2 .3 .1○
9	○1.	.4 ○ .3 .2●
10		○ .42. .3 .1●
11		2.1. ○ .3 .4
12		.2 3○. .1 .4
13		.3 .1. ○ .2 .4
14		.3 ○ 2.1. 4.
15		.2 .4 .1 ○ 4.
16		○1. .3 4. .2●
17		○ 4.2. .3 .1●
18		.3.4. ○ .3
19		4. .2 ○ .3.1
20	4.	4. .3 .1. ○ .2
21	4.	.3. ○ .2.1.
22	.4	.3. .1 ○
23	.4	.2.1. ○ .3.2.1
24	.4	.1. 2. .3
25	○1.	.4 2. ○ .3
26		.2 ○ .3.4
27		.3.1. ○ .2 .4
28		.3. ○ .2.1. .4
29		.3 2. .1 ○ .4
30		.2 ○ 1. .4 .3●

GREENWICH MEAN TIME.

MAY.

d	h	m		d	h	m		d	h	m		d	h	m	
1	0	11.0	II. Ec. R.	9	17	22	I.*Tr. I.	17	0	4	II. Sh. E.	25	16	54	I. Sh. I.
	0	29	I. Sh. E.		18	33	II. Sh. I.		16	31	I.*Oc. D.		16	58	III. Tr. I.
	18	8	I. Oc. D.		18	36	I. Sh. I.		20	3.8	I. Ec. R.		18	1	I. Tr. E.
	21	44.1	I. Ec. R.		18	52	II. Tr. E.						19	10	I. Sh. E.
					19	38	I. Tr. E.	18	12	48	III.*Tr. I.		20	35	III. Tr. E.
2	13	20	II.*Tr. I.		20	52	I. Sh. E.		13	21	II.*Oc. D.		21	12.6	II. Ec. R.
	15	26	I.*Tr. I.		21	26	II. Sh. E.		13	47	I.*Tr. I.		21	44	III. Sh. I.
	15	55	II.*Sh. I.						14	59	I.*Sh. I.				
	16	12	II.*Tr. E.	10	14	33	I.*Oc. D.		16	3	I.*Tr. E.	26	1	20	III. Sh. E.
	16	41	I.*Sh. I.		18	8.4	I. Ec. R.		16	25	III.*Tr. E.		12	58	I.*Oc. D.
	17	42	I.*Tr. E.						17	15	I. Sh. E.		16	28.0	I. Ec. R.
	18	48	II. Sh. E.	11	8	41	III. Tr. I.		17	45	III. Sh. I.				
	18	57	I. Sh. E.		10	42	II. Oc. D.		18	37.8	II. Ec. R.	27	10	14	I. Tr. I.
					11	51	I. Tr. I.		21	20	III. Sh. E.		10	44	II. Tr. I.
3	12	37	I.*Oc. D.		12	18	III. Tr. E.						11	23	I. Sh. I.
	16	13.0	I.*Ec. R.		13	5	I.*Sh. I.	19	11	0	I. Oc. D.		12	39	I. Tr. E.
					13	45	III.*Sh. I.		14	32.6	I.*Ec. R.		13	7	II.*Sh. I.
4	4	37	III. Tr. I.		14	7	I.*Tr. E.						13	37	II.*Tr. E.
	8	5	II. Oc. D.		15	21	I.*Sh. E.	20	8	1	II. Tr. I.		13	39	I.*Sh. E.
	8	14	III. Tr. E.		16	3.1	II.*Ec. R.		8	16	I. Tr. I.		16	0	II.*Sh. E.
	9	46	III. Sh. I.		17	21	III. Sh. E.		9	28	I. Sh. I.				
	9	55	I. Tr. I.						10	29	II. Sh. I.	23	7	28	I. Oc. D.
	11	10	I. Sh. I.	12	9	2	I. Oc. D.		10	33	I. Tr. E.		10	56.9	I. Ec. R.
	12	11	I. Tr. E.		12	37.2	I. Ec. R.		10	54	II. Tr. E.				
	13	21	III.*Sh. E.						11	44	I. Sh. E.	29	4	43	I. Tr. I.
	13	26	I.*Sh. E.	13	5	19	II. Tr. I.		13	23	II.*Sh. E.		5	21	II. Oc. D.
	13	28.4	II.*Ec. R.		6	20	I. Tr. I.						5	51	I. Sh. I.
					7	33	I. Sh. I.	21	5	29	I. Oc. D.		6	53	III. Oc. D.
5	0	18	IV. Tr. I.		7	51	II. Sh. I.		9	1.5	I. Ec. R.		7	0	I. Tr. E.
	5	0	IV. Tr. E.		8	12	II. Tr. E.		18	54	IV. Tr. I.		8	8	I. Sh. E.
	7	6	I. Oc. D.		8	36	I. Tr. E.		23	38	IV. Tr. E.		10	29.9	II. Ec. R.
	10	41.8	I. Ec. R.		9	49	I. Sh. E.						10	33	III. Oc. R.
	12	8	IV. Sh. I.		9	53	IV. Oc. D.	22	2	40	II. Oc. D.		11	36.6	III. Ec. D.
	16	54	IV.*Sh. E.		10	45	II. Sh. E.		2	42	III. Oc. D.		15	14.7	III.*Ec. R.
					14	44	IV.*Oc. R.		2	46	I. Tr. I.				
6	2	39	II. Tr. I.		21	54.1	IV. Ec. D.		3	57	I. Sh. I.	30	1	57	I. Oc. D.
	4	24	I. Tr. I.						5	2	I. Tr. E.		4	55	IV. Oc. D.
	5	13	II. Sh. I.	14	2	48.0	IV. Ec. R.		6	9	IV. Sh. I.		5	25.6	I. Ec. R.
	5	31	II. Tr. E.		3	32	I. Oc. D.		6	13	I. Sh. E.		9	48	IV. Oc. R.
	5	38	I. Sh. I.		7	6.1	I. Ec. R.		6	22	III. Oc. R.		15	57.8	IV.*Ec. D.
	6	40	I. Tr. E.		22	33	III. Oc. D.		7	37.2	III. Ec. D.		20	51.3	IV. Ec. R.
	7	55	I. Sh. E.						7	55.1	II. Ec. R.		23	13	I. Tr. I.
	8	7	II. Sh. E.	15	0	1	II. Oc. D.		10	55	IV. Sh. E.				
					0	49	I. Tr. I.		11	15.6	III. Ec. R.	31	0	7	II. Tr. I.
7	1	35	I. Oc. D.		2	2	I. Sh. I.		23	59	I. Oc. D.		0	20	I. Sh. I.
	5	10.7	I. Ec. R.		2	13	III. Oc. R.						1	29	I. Tr. E.
	18	27	III. Oc. D.		3	5	I. Tr. E.	23	3	30.3	I. Ec. R.		2	26	II. Sh. I.
	21	24	II. Oc. D.		3	37.7	III. Ec. D.		21	15	I. Tr. I.		2	36	I. Sh. E.
	22	7	III. Oc. R.		4	18	I. Sh. E.		21	23	II. Tr. I.		3	0	II. Tr. E.
	22	53	I. Tr. I.		5	20.4	II. Ec. R.		22	25	I. Sh. I.		5	20	II. Sh. E.
	23	37.8	III. Ec. D.		7	16.3	III. Ec. R.		23	31	I. Tr. E.		20	27	I. Oc. D.
					22	1	I. Oc. D.		23	48	II. Sh. I.		23	54.5	I. Ec. R.
8	0	7	I. Sh. I.												
	1	9	I. Tr. E.	16	1	34.9	I. Ec. R.	24	0	16	II. Tr. E.				
	2	23	I. Sh. E.		18	40	II. Tr. I.		0	42	I. Sh. E.				
	2	45.7	II. Ec. R.		19	18	I. Tr. I.		2	42	II. Sh. E.				
	3	16.7	III. Ec. R.		20	31	I. Sh. I.		18	28	I. Oc. D.				
	20	4	I. Oc. D.		21	11	II. Sh. I.		21	59.2	I. Ec. R.				
	23	39.5	I. Ec. R.		21	33	II. Tr. E.								
					21	34	I. Tr. E.	25	15	44	I.*Tr. I.				
9	15	59	II.*Tr. I.		22	47	I. Sh. E.		16	0	II.*Oc. D.				

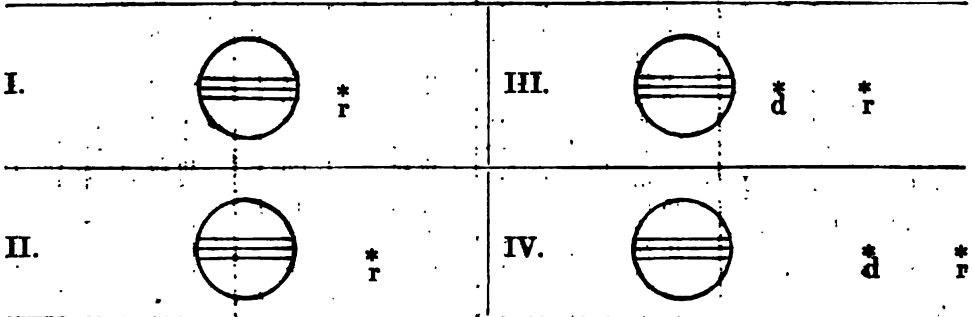
NOTE.—I. denotes ingress; E., egress; D., disappearance; R., reappearance; Ec., eclipse; Oc., occultation; Tr., transit of the satellite; Sh., transit of the shadow. \*Visible at Washington.



GREENWICH MEAN TIME.

MAY.

*Phases of the Eclipses of the Satellites for an Inverting Telescope.*



*Configurations at 14<sup>h</sup> 45<sup>m</sup> for an Inverting Telescope.*

Day	West.		East.
1		·1 ○	·2 <sup>3</sup> 4 <sup>4</sup>
2	○2 <sup>2</sup>	1 ○	3 <sup>3</sup> 4 <sup>4</sup>
3		·2 ○	3 <sup>3</sup> 4 <sup>4</sup> ·1 ●
4		·3 <sup>1</sup> ·1 ○	·4 <sup>3</sup> ·3 <sup>2</sup>
5	3 <sup>3</sup>	4 <sup>4</sup> ○	·12 <sup>2</sup>
6	·4 <sup>3</sup> ·3 <sup>2</sup> ·1 <sup>1</sup>	○	
7	4 <sup>4</sup>	·2 <sup>3</sup> ○	1 <sup>1</sup>
8	4 <sup>4</sup>	·1 ○	·3 <sup>2</sup> ·3 <sup>1</sup>
9	·4	○ <sup>2</sup> ·1	·3
10	·4 2 <sup>2</sup>	○	3 <sup>3</sup> ·1 ●
11	·4	·2 <sup>1</sup> ○	·2 ●
12	3 <sup>3</sup> ·4	○	·1 2 <sup>2</sup>
13	·3	·1 <sup>1</sup> ○	·4
14		·3 <sup>2</sup> ○	·1 ·4
15		·1 ○	·3 <sup>2</sup> ·2 <sup>1</sup> ·4
16		○ <sup>1</sup> ·1	·3 <sup>3</sup> ·4
17	2 <sup>2</sup>	·1 ○	3 <sup>3</sup> ·4
18	○3 <sup>3</sup> ○1 <sup>1</sup>	○	4 <sup>4</sup> ·2 ●
19	3 <sup>3</sup>	○ ·1	2 <sup>2</sup> 4 <sup>4</sup>
20	·3	·1 <sup>1</sup> ○	4 <sup>4</sup>
21		·3 <sup>2</sup> ·2 <sup>1</sup> ○	4 <sup>4</sup> ·1
22		·4 <sup>1</sup> ○	·3 <sup>2</sup> ·3 <sup>1</sup>
23	4 <sup>4</sup>	○	·1 <sup>1</sup> ·3 <sup>3</sup>
24	4 <sup>4</sup> 2 <sup>2</sup>	·1 ○	3 <sup>3</sup>
25	4 <sup>4</sup>	○ <sup>2</sup>	
26	·4 3 <sup>3</sup>	○	·2 ·1 ●
27	·4 ·3	·1 <sup>1</sup> ○	
28	·4	·3 <sup>2</sup> ○	·1
29		·1 <sup>1</sup> ○	·2 ·3 ●
30		○	·1 <sup>1</sup> ·3 <sup>3</sup> ·3
31	2 <sup>2</sup> ·1	○	·3 <sup>2</sup> ·4

GREENWICH MEAN TIME.

JUNE.

d	h	m		d	h	m		d	h	m		d	h	m	
1	17	42	I. Tr. I.	9	1	26	III. Tr. I.	16	18	56	I. Oc. D.	24	21	18	I. Sh. E.
	18	42	II. Oc. D.		2	22.0	II. Ec. R.		22	13.7	I. Ec. R.		21	49	II. Tr. I.
	18	49	I. Sh. I.		5	4	III. Tr. E.						22	57	IV. Sh. E.
	19	59	I. Tr. E.		5	48	III. Sh. I.	17	16	9	I. Tr. I.		23	36	II. Sh. I.
	21	5	I. Sh. E.		9	18	III. Sh. E.		17	7	I. Sh. I.				
	21	11	III. Tr. I.		16	58	I. Oc. D.		18	26	I. Tr. E.	25	0	43	II. Tr. E.
	23	47.3	II. Ec. R.		20	18.5	I. Ec. R.		19	2	II. Tr. I.		2	30	II. Sh. E.
2	0	48	III. Tr. E.	10	14	10	I.*Tr. I.		19	23	I. Sh. E.		15	26	I. Oc. D.
	1	44	III. Sh. I.		15	12	I.*Sh. I.		20	59	II. Sh. I.		18	37.6	I. Ec. R.
	5	19	III. Sh. E.		16	15	II. Tr. I.		21	55	II. Tr. E.	26	12	39	I. Tr. I.
	14	57	I.*Oc. D.		16	27	I. Tr. E.		23	53	II. Sh. E.		13	30	I.*Sh. I.
	18	23.3	I. Ec. R.		17	23	I. Sh. E.	18	13	26	I.*Oc. D.		14	56	I. Tr. E.
3	12	12	I. Tr. I.		18	22	II. Sh. I.		16	42.5	I. Ec. R.		15	47	I. Sh. E.
	13	17	I.*Sh. I.		19	8	II. Tr. E.						16	14	II. Oc. D.
	13	29	II.*Tr. I.		21	16	II. Sh. E.	19	10	39	I. Tr. I.		20	48.9	II. Ec. R.
	14	28	I.*Tr. E.						11	35	I. Sh. I.				
	15	34	I.*Sh. E.	11	11	26	I. Oc. D.		12	56	I. Tr. E.	27	0	7	III. Oc. D.
	15	44	II.*Sh. I.		14	47.4	I.*Ec. R.		13	29	II.*Oc. D.		7	13.4	III. Ec. R.
	16	22	II. Tr. E.						13	52	I.*Sh. E.		9	56	I. Oc. D.
	18	38	II. Sh. E.	12	8	40	I. Tr. I.		18	14.1	II. Ec. R.		13	6.3	I. Ec. R.
4	9	27	I. Oc. D.		9	41	I. Sh. I.		19	45	III. Oc. D.	28	7	9	I. Tr. I.
	12	52.2	I. Ec. R.		10	46	II. Oc. D.		23	25	III. Oc. R.		7	56	I. Sh. I.
5	6	41	I. Tr. I.		10	57	I. Tr. E.		23	36.2	III. Ec. D.		9	26	I. Tr. E.
	7	46	I. Sh. I.		11	57	I. Sh. E.						10	15	I. Sh. E.
	8	3	II. Oc. D.		15	25	III. Oc. D.	20	3	13.6	III. Ec. R.		11	14	II. Tr. I.
	8	58	I. Tr. E.		15	39.4	II. Ec. R.		7	56	I. Oc. D.		12	55	II. Sh. I.
	10	2	I. Sh. E.		19	5	III. Oc. R.		11	11.2	I. Ec. R.		14	8	II.*Tr. E.
	11	8	III. Oc. D.		19	5	III. Ec. R.	21	5	9	I. Tr. I.		15	49	II. Sh. E.
	13	4.6	II.*Ec. R.	12	8	40	I. Tr. I.		6	4	I. Sh. I.				
6	14	48	III.*Oc. R.		9	41	I. Sh. I.		7	26	I. Tr. E.	29	4	27	I. Oc. D.
	15	36.1	III.*Ec. D.		9	16.1	I. Ec. R.		8	21	I. Sh. E.		7	35.1	I. Ec. R.
	19	14.0	III. Ec. R.	14	3	10	I. Tr. I.		8	28	II. Tr. I.				
7	3	56	I. Oc. D.		4	9	I. Sh. I.		10	18	II. Sh. I.	30	1	39	I. Tr. I.
	7	20.9	I. Ec. R.		5	27	I. Tr. E.		11	20	II. Tr. E.		2	27	I. Sh. I.
8	1	11	I. Tr. I.		5	38	II. Tr. I.		13	12	II.*Sh. E.		3	56	I. Tr. E.
	2	15	I. Sh. I.		6	26	I. Sh. E.	22	2	26	I. Oc. D.		4	44	I. Sh. E.
	2	52	II. Tr. I.		7	41	II. Sh. I.		5	40.0	I. Ec. R.		5	37	II. Oc. D.
	3	28	I. Tr. E.		8	32	II. Tr. E.		23	39	I. Tr. I.		10	6.3	II. Ec. R.
	4	31	I. Sh. E.		10	35	II. Sh. E.						14	24	III. Tr. I.
	5	3	II. Sh. I.										17	40	III. Sh. I.
	5	46	II. Tr. E.	15	0	26	I. Oc. D.		22	39	I. Tr. I.		18	2	III. Tr. E.
	7	57	II. Sh. E.		3	44.9	I. Ec. R.		22	59	I. Tr. E.		21	15	III. Sh. E.
	14	9	IV.*Tr. I.		21	40	I. Tr. I.						22	57	I. Oc. D.
	18	55	IV. Tr. E.		22	38	I. Sh. I.		10	3	III. Tr. I.				
	22	26	I. Oc. D.		23	56	I. Tr. E.		13	41	III.*Tr. E.				
9	0	10	IV. Sh. I.	16	0	7	II. Oc. D.		13	41	III.*Sh. I.				
	1	49.8	I. Ec. R.		0	31	IV. Oc. D.		17	16	III. Sh. E.				
	4	56	IV. Sh. E.		0	55	I. Sh. E.		20	56	I. Oc. D.				
	19	41	I. Tr. I.		4	56.7	II. Ec. R.	24	0	8.8	I. Ec. R.				
	20	43	I. Sh. I.		5	25	IV. Oc. R.		9	54	IV. Tr. I.				
	21	24	II. Oc. D.		5	43	III. Tr. I.		14	42	IV.*Tr. E.				
	21	57	I. Tr. E.		9	21	III. Tr. E.		18	9	I. Tr. I.				
	23	0	I. Sh. E.		9	42	III. Sh. I.		18	11	IV. Sh. I.				
					10	0.6	IV. Ec. D.		18	11	I. Sh. I.				
					13	17	III.*Sh. E.		19	1	I. Sh. I.				
					14	53.3	IV.*Ec. R.		20	26	I. Tr. E.				

NOTE.—I. denotes ingress; E., egress; D., disappearance; R., reappearance; Ec., eclipse; Oc., occultation; Tr., transit of the satellite; Sh., transit of the shadow. \*Visible at Washington.


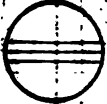
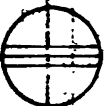

# SATELLITES OF JUPITER, 1920.

647

## GREENWICH MEAN TIME.

JUNE.

### Phases of the Eclipses of the Satellites for an Inverting Telescope.

I.		* r	III.		* d	* r
II.		* r	IV.		* d	* r

### Configurations at 14<sup>h</sup> 0<sup>m</sup> for an Inverting Telescope.

Day	West.	East.
1		.2 ○ 1 <sup>2</sup> 4
2		3 ○ 1 2 4
3	○ 2 ○ 1	3 ○ 4
4		○ 1 4
5		1 ○ 2 4 3 ●
6		○ 12 4 3
7		2 1 4 ○ 3
8		4 2 ○ 1 3
9		4 3 1 ○ 2
10	4 3	○ 2
11	4 3 2	○ 1 ●
12	4 1	○ 3 2 ●
13	4	○ 1 2 3
14	4 1 2	○ 3
15		○ 1 3
16		○ 2 4 ●
17	3	○ 1 2 4
18	3 2	○ 4 1 ●
19		○ 4 2 ●
20		○ 1 3 4
21	1 2	○ 3 4
22		○ 1 3 4
23		1 3 ○ 2 4
24	○ 4 3	○ 1 2
25		3 4 ○ 1
26	○ 1 4	3 2 ○
27	4	○ 1 3 2
28	○ 2 4	1 ○ 3
29	4	○ 1 3
30	4	1 3 ○ 2

GREENWICH MEAN TIME.

JULY.

d	h	m		d	h	m		d	h	m		d	h	m	
1	2	3.7	I. Ec. R.	8	0	58	I. Oc. D.	15	1	39	III. Sh. I.	21	17	51.0	II. Ec. R.
20	9		I. Tr. I.	1	15		III. Sh. E.	2	49		III. Tr. E.				
20	56		I. Sh. I.	3	58.6		I. Ec. R.	2	59		I. Oc. D.	23	3	37	III. Tr. I.
22	26		I. Tr. E.	22	9		I. Tr. I.	5	14		III. Sh. E.		5	0	I. Oc. D.
23	13		I. Sh. E.	22	50		I. Sh. I.	5	53.4		I. Ec. R.		5	38	III. Sh. I.
													7	15	III. Tr. E.
2	0	38	II. Tr. I.	9	0	26	I. Tr. E.	16	0	9	I. Tr. I.		7	48.1	I. Ec. R.
2	13		II. Sh. I.	1	7		I. Sh. E.	0	44		I. Sh. I.		9	13	III. Sh. E.
3	32		II. Tr. E.	3	27		II. Tr. I.	2	27		I. Tr. E.				
5	7		II. Sh. E.	4	50		II. Sh. I.	3	2		I. Sh. E.	23	2	10	I. Tr. I.
17	27		I. Oc. D.	6	21		II. Tr. E.	6	16		II. Tr. I.		2	39	I. Sh. I.
20	32.5		I. Ec. R.	7	44		II. Sh. E.	7	27		II. Sh. I.		4	23	I. Tr. E.
20	34		IV. Oc. D.	19	28		I. Oc. D.	9	10		II. Tr. E.		4	56	I. Sh. E.
				22	27.4		I. Ec. R.	10	21		II. Sh. E.		9	6	II. Tr. I.
3	1	29	IV. Oc. R.					21	29		I. Oc. D.		10	4	II. Sh. I.
4	8.0		IV. Ec. D.	10	16	39	I. Tr. I.						12	0	II. Tr. E.
8	54.5		IV. Ec. R.	17	19		I. Sh. I.	17	0	22.2	I. Ec. R.		12	58	II. Sh. E.
14	39		I. Tr. I.	18	56		I. Tr. E.	18	40		I. Tr. I.		23	30	I. Oc. D.
15	24		I. Sh. I.	19	36		I. Sh. E.	19	13		I. Sh. I.				
16	56		I. Tr. E.	21	47		II. Oc. D.	20	57		I. Tr. E.	24	2	16.8	I. Ec. R.
17	41		I. Sh. E.					21	30		I. Sh. E.		20	40	I. Tr. I.
19	0		II. Oc. R.	11	1	58.6	II. Ec. R.						21	7	I. Sh. I.
23	23.7		II. Ec. D.	6	0		IV. Tr. I.	18	0	34	II. Oc. D.		22	58	I. Tr. E.
				8	53		III. Oc. D.	4	33.6		II. Ec. R.		23	25	I. Sh. E.
4	4	29	III. Oc. D.	10	50		IV. Tr. E.	13	18		III.*Oc. D.				
11	12.5		III. Ec. R.	12	11		IV. Sh. I.	15	59		I. Oc. D.	25	3	22	II. Oc. D.
11	57		I. Oc. D.	13	58		I. Oc. D.	18	50.8		I. Ec. R.		7	8.5	II. Ec. R.
15	1.2		I. Ec. R.	15	11.0		III. Ec. R.	19	9.6		III. Ec. R.		17	44	III. Oc. D.
				16	56.0		I. Ec. R.						18	1	I. Oc. D.
5	9	9	I. Tr. I.	16	56		IV. Sh. E.	19	13	10	I.*Tr. I.		20	45.4	I. Ec. R.
9	53		I. Sh. I.					13	42		I. Sh. I.		23	8.1	III. Ec. R.
11	26		I. Tr. E.	13	11	9	I. Tr. I.	15	27		I. Tr. E.				
12	10		I. Sh. E.	11	47		I. Sh. I.	15	59		I. Sh. E.	26	15	11	I. Tr. I.
14	2		II.*Tr. I.	13	26		I.*Tr. E.	16	57		IV. Oc. D.		15	36	I. Sh. I.
15	32		II. Sh. I.	14	4		I. Sh. E.	19	41		II. Tr. I.		17	28	I. Tr. E.
16	57		II. Tr. E.	16	52		II. Tr. I.	20	46		II. Sh. I.		17	53	I. Sh. E.
18	26		II. Sh. E.	18	9		II. Sh. I.	21	53		IV. Oc. R.		22	31	II. Tr. I.
				19	46		II. Tr. E.	22	6.7		IV. Ec. D.		23	23	II. Sh. I.
6	6	27	I. Oc. D.	21	3		II. Sh. E.	22	35		II. Tr. E.				
9	30.0		I. Ec. R.					23	40		II. Sh. E.	27	1	25	II. Tr. E.
				13	8	29	I. Oc. D.						2	16	II. Sh. E.
7	3	39	I. Tr. I.	11	24.8		I. Ec. R.	20	2	55.9	IV. Ec. R.		12	31	I. Oc. D.
4	21		I. Sh. I.					10	30		I. Oc. D.		15	14.1	I. Ec. R.
5	56		I. Tr. E.	14	5	39	I. Tr. I.	13	19.5		I. Ec. R.				
6	38		I. Sh. E.	6	16		I. Sh. I.								
8	23		II. Oc. D.	7	57		I. Tr. E.	21	7	40	I. Tr. I.				
12	41.1		II. Ec. R.	8	33		I. Sh. E.		8	10	I. Sh. I.				
18	47		III. Tr. I.	11	10		II. Oc. D.		9	57	I. Tr. E.				
21	40		III. Sh. I.	15	16.0		II. Ec. R.		10	27	I. Sh. E.				
22	25		III. Tr. E.	23	11		III. Tr. I.		13	58	II. Oc. D.				

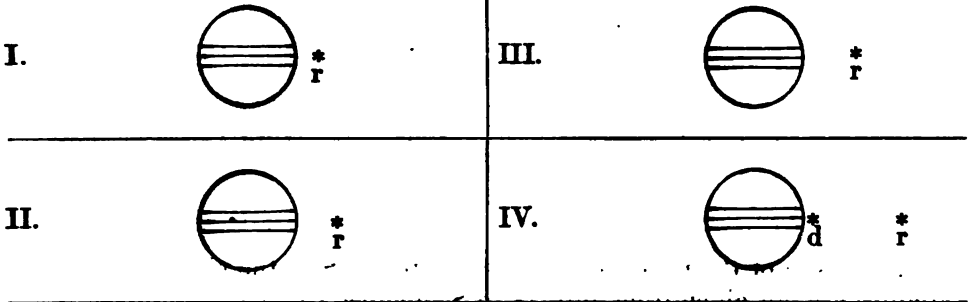
By reason of the proximity of JUPITER to the SUN the phenomena of the satellites are not given from July 28 to September 15.

NOTE.—I. denotes ingress; E., egress; D., disappearance; R., reappearance; Ec., eclipse; Oc., occultation; Tr., transit of the satellite; Sh., transit of the shadow. \*Visible at Washington.

GREENWICH MEAN TIME.

JULY.

*Phases of the Eclipses of the Satellites for an Inverting Telescope.*



*Configurations at 19<sup>h</sup> 15<sup>m</sup> for an Inverting Telescope.*

Day.	West.		East.
1		·43°	○ 1·2°
2		·3 2° ·1 <sub>4</sub>	○
3		·3 ·2 1	○ ·4
4			○ ·3 ·2 ·4
5		1·2	○ ·3 ·4
6		·2	○ ·1 3° ·4
7		1°	○ ·3 <sup>2</sup> 4°
8		3°	○ 1·2° 4°
9		3° ·1	○ 4°
10		·3 ·2	○ 1° 4°
11			○ <sub>1</sub> ·2
12	○1°	4°	○ 2° ·3
13		4° 2°	○ ·1 3°
14		4° 1°	○ 3°
15		4° 3°	○ ·12°
16		·4 3° ·1 <sup>2</sup>	○
17		·4 ·3 ·2	○ 1°
18		·4 ·1	○ <sub>2</sub> ·2
19	○1°		○ 4 2° ·3
20		2°	○ ·4 3°
21		1° ·2	○ 3° ·4
22		3°	○ ·1 2° ·4
23		3° 1° 2°	○ ·4
24		·3 ·2	○ 1° 4°
25		·1 <sup>3</sup>	○ ·2 4°
26			○ 1° 2° ·3 4°
27		2°	○ 4° ·3

## GREENWICH MEAN TIME.

SEPTEMBER.

By reason of the proximity of JUPITER to the SUN the phenomena of the satellites are not given from July 28 to September 15.

d h m		d h m		d h m		d h m	
16 1 41	I. Sh. E.	19 12 48	I. Tr. I.	23 18 13	II. Oc. R.	27 3 32.0	II. Ec. D.
2 6	I. Tr. E.	14 38	I. Sh. E.	22 37.5	I. Ec. D.	7 37	II. Oc. R.
11 38.7	II. Ec. D.	15 6	I. Tr. E.			11 34.3	I. Ec. D.
12 8	IV. Sh. I.			24 1 27	I. Oc. R.	14 27	I. Oc. R.
15 24	II. Oc. R.	20 0 56.6	II. Ec. D.	17 25	III. Sh. I.		
16 3	IV. Tr. I.	4 49	II. Oc. R.	19 38	III. Tr. I.	23 7 21.0	III. Ec. D.
16 46	IV. Sh. E.	9 40.6	I. Ec. D.	19 46	I. Sh. I.	8 43	I. Sh. I.
* 20 43.8	I. Ec. D.	12 27	I. Oc. R.	20 19	I. Tr. I.	9 19	I. Tr. I.
20 44	IV. Tr. E.			20 56	III. Sh. E.	11 0	I. Sh. E.
23 27	I. Oc. R.	21 3 22.6	III. Ec. D.	22 3	I.*Sh. E.	11 36	I. Tr. E.
		6 49	I. Sh. I.	22 9.9	IV.*Ec. D.	13 19	III. Oc. R.
17 13 27	III. Sh. I.	7 18	I. Tr. I.	22 36	I. Tr. E.	22 39	II. Sh. I.
15 13	III. Tr. I.	8 55	III. Oc. R.	23 8	III. Tr. E.	23 52	II. Tr. I.
16 58	III. Sh. E.	9 6	I. Sh. E.				
17 52	I. Sh. I.	9 36	I. Tr. E.	25 2 51.4	IV. Ec. R.	29 1 31	II. Sh. E.
18 18	I. Tr. I.	20 5	II. Sh. I.	3 23	IV. Oc. D.	2 44	II. Tr. E.
18 44	III. Tr. E.	21 5	II. Tr. I.	8 10	IV. Oc. R.	6 2.7	I. Ec. D.
20 9	I. Sh. E.	22 57	II. Sh. E.	9 22	II. Sh. I.	8 57	I. Oc. R.
20 36	I. Tr. E.	23 57	II. Tr. E.	10 23	II. Tr. I.		
				12 14	II. Sh. E.	20 3-11	I. Sh. I.
18 6 48	II. Sh. I.	22 4 9.1	I. Ec. D.	13 21	II. Tr. E.	3 49	I. Tr. I.
7 41	II. Tr. I.	6 57	I. Oc. R.	17 5.9	I. Ec. D.	5 29	I. Sh. E.
9 40	II. Sh. E.			19 57	I. Oc. R.	6 6	I. Tr. E.
10 34	II. Tr. E.	23 1 17	I. Sh. I.			16 49.5	II. Ec. D.
15 12.2	I. Ec. D.	1 48	I. Tr. I.	26 14 14	I. Sh. I.	21 1	II. Oc. R.
* 17 57	I. Oc. R.	-3 35	I. Sh. E.	14 49	I. Tr. I.		
		4 6	I. Tr. E.	16 32	I. Sh. E.		
19 12 20	I. Sh. I.	14 14.0	II. Ec. D.	17 6	I. Tr. E.		

NOTE.—I. denotes ingress; E., egress; D., disappearance; R., reappearance; Ec., eclipse; Oc., occultation; Tr., transit of the satellite; Sh., transit of the shadow.

\*Visible at Washington.

GREENWICH MEAN TIME.

SEPTEMBER.

*Phases of the Eclipses of the Satellites for an Inverting Telescope.*

I.		III.	
II.		IV.	

*Configurations at 22<sup>h</sup> 0<sup>m</sup> for an Inverting Telescope.*

Day.	West.		East.
1		○	
2		○	
3		○	
4		○	
5		○	
6		○	
7		○	
8		○	
9		○	
10		○	
11		○	
12		○	
13		○	
14		○	
15		○	
16		4 <sup>•</sup> ○ -2 3 <sup>•</sup>	•1 ●
17		4 <sup>•</sup> 2 <sup>1</sup> ○ 2 <sup>•</sup>	
18	4 <sup>•</sup> 3 <sup>•</sup> 2 <sup>•</sup>	○	•1
19	4 <sup>•</sup> 3 <sup>•</sup> 1 <sup>•</sup> 2 <sup>•</sup>	○	
20	4 <sup>•</sup> 3 <sup>•</sup>	○	•1 •2
21	4 <sup>•</sup> 3 <sup>•</sup> 1 <sup>•</sup>	○	•3
22	4 <sup>•</sup> 2 <sup>•</sup>	○	1 <sup>•</sup> 3 <sup>•</sup>
23	4 <sup>•</sup>	○	1 <sup>•</sup> 2 <sup>•</sup> 3 <sup>•</sup>
24	3 <sup>•</sup> 2 <sup>•</sup>	○	2 <sup>•</sup>
25	3 <sup>•</sup> 2 <sup>•</sup>	○	•1 •4
26	3 <sup>•</sup> 2 <sup>•</sup>	○	•4
27	3 <sup>•</sup> 2 <sup>•</sup>	○	•1 •2 •4
28	3 <sup>•</sup> 2 <sup>•</sup>	○	•3 •4
29	2 <sup>•</sup>	○	1 <sup>•</sup> 3 <sup>•</sup> 4 <sup>•</sup>
30		•1 ○ •2	3 <sup>•</sup> 4 <sup>•</sup>

GREENWICH MEAN TIME.

OCTOBER.

d	h	m		d	h	m		d	h	m		d	h	m		
1	0	31.0	I. Ec. D.	9	4	26	III. Tr. I.	17	1	54	I. Oc. R.	25	13	54.5	II. Ec. D.	
	3	27	I. Oc. R.		4	51	III. Sh. E.		19	56	I. Sh. I.		18	46	II. Oc. R.	
	21	24	III.*Sh. I.		7	53	III. Tr. E.		20	48	I.*Tr. I.		19	7.7	I. Ec. D.	
	21	40	I.*Sh. I.		14	31.	II. Sh. I.		22	13	I.*Sh. E.		22	22	I.*Oc. R.	
	22	19	I.*Tr. I.		16	1	II. Tr. I.		23	5	I. Tr. E.		23	16	18	I. Sh. I.
	23	57	I. Sh. E.		17	22	II. Sh. E.		18	11	18.8	II. Ec. D.	23	17	16	I. Tr. I.
					18	52	II. Tr. E.		18	0	II. Oc. R.		18	35	I. Sh. E.	
2	0	2	III. Tr. I.		20	52.9	I.*Ec. D.		17	14.5	I. Ec. D.		19	33	I. Tr. E.	
	0	36	I. Tr. E.		23	56	I. Oc. R.		20	24	I.*Oc. R.		23	12.4	III. Ec. D.	
	0	54	III. Sh. E.													
	3	31	III. Tr. E.	10	18	2	I. Sh. I.		19	14	24	I. Sh. I.	27	2	41.8	III. Ec. R.
	11	56	II. Sh. I.		18	48	I. Tr. I.		15	18	I. Tr. I.		3	13	III. Oc. D.	
	13	15	II. Tr. I.		20	19	I. Sh. E.		16	41	I. Sh. E.		6	38	III. Oc. R.	
	14	48	II. Sh. E.		21	6	I.*Tr. E.		17	35	I. Tr. E.		8	55	II. Sh. I.	
	16	7	II. Tr. E.						19	15.1	III. Ec. D.		10	51	II. Tr. I.	
	18	59.4	I. Ec. D.	11	8	43.1	II. Ec. D.		22	44.9	III.*Ec. R.		11	46	II. Sh. E.	
	21	56	I.*Oc. R.		13	13	II. Oc. R.		22	55	III. Oc. D.		13	36.0	I. Ec. D.	
					15	21.2	I. Ec. D.		20	0	5	IV. Sh. I.		13	41	II. Tr. E.
3	6	7	IV. Sh. I.		16	9.6	IV. Ec. D.		20	21	III. Oc. R.		16	51	I. Oc. R.	
	10	42	IV. Sh. E.		18	25	I. Oc. R.		2	21	IV. Sh. E.	28	10	9.7	IV. Ec. D.	
	12	27	IV. Tr. I.		20	48.1	IV.*Ec. R.		4	36	IV. Sh. I.		10	47	I. Sh. I.	
	16	8	I. Sh. I.		23	49	IV. Oc. D.		6	21	II. Sh. I.		11	46	I. Tr. I.	
	16	49	I. Tr. I.						8	8	II. Tr. I.		13	3	I. Sh. E.	
	17	0	IV. Tr. E.	12	4	22	IV. Oc. R.		8	33	IV. Tr. I.		14	3	I. Tr. E.	
	18	25	I. Sh. E.		12	31	I. Sh. I.		9	12	II. Sh. E.		14	45.0	IV. Ec. R.	
	19	6	I. Tr. E.		13	18	I. Tr. I.		10	58	II. Tr. E.		19	49	IV.*Oc. D.	
					14	48	I. Sh. E.		11	42.8	I. Ec. D.					
4	6	7.5	II. Ec. D.		15	17.5	III. Ec. D.		12	57	IV. Tr. E.					
	10	26	II. Oc. R.		15	36	I. Tr. E.		14	54	I. Oc. R.	29	0	12	IV. Oc. R.	
	13	27.8	I. Ec. D.		22	3	III.*Oc. R.		21	8	53	I. Sh. I.		3	12.0	II. Ec. D.
	16	26	I. Oc. R.						21	9	47	I. Tr. I.		8	4.3	I. Ec. D.
				13	3	48	II. Sh. I.		11	10	I. Sh. E.		8	9	II. Oc. R.	
5	10	37	I. Sh. I.		5	23	II. Tr. I.		12	4	I. Tr. E.		11	21	I. Oc. R.	
	11	19	I. Tr. I.		6	39	II. Sh. E.		23	0	36.3	II. Ec. D.				
	11	19.7	III. Ec. D.		8	14	II. Tr. E.		5	23	II. Oc. R.		5	15	I. Sh. I.	
	12	54	I. Sh. E.		9	49.5	I. Ec. D.		6	11.1	I. Ec. D.		6	16	I. Tr. I.	
	13	36	I. Tr. E.		12	55	I. Oc. R.		9	23	I. Oc. R.		7	32	I. Sh. E.	
	17	42	III. Oc. R.						23	3	21	I. Sh. I.		13	17	III. Sh. I.
				14	6	59	I. Sh. I.		23	4	17	I. Tr. I.		16	44	III. Sh. E.
6	1	14	II. Sh. I.		7	48	I. Tr. I.		23	5	38	I. Sh. E.		17	25	III. Tr. I.
	2	38	II. Tr. I.		9	16	I. Sh. E.		5	38	I. Sh. E.		22	12	III.*Tr. E.	
	4	5	II. Sh. E.		10	5	I. Tr. E.		6	34	I. Tr. E.		22	48	II.*Sh. I.	
	5	29	II. Tr. E.		22	0.6	II.*Ec. D.		9	19	III. Sh. I.	31	0	12	II. Tr. I.	
	7	56.2	I. Ec. D.						12	47	III. Sh. E.		1	2	II. Sh. E.	
	10	56	I. Oc. R.	15	2	37	II. Oc. R.		13	8	III. Tr. I.		2	32.6	I. Ec. D.	
					4	17.8	I. Ec. D.		16	32	III. Tr. E.		3	2	II. Tr. E.	
7	5	5	I. Sh. I.		7	25	I. Oc. R.		16	32	III. Tr. E.		5	60	I. Oc. R.	
	5	49	I. Tr. I.						21	30	II.*Tr. I.		23	43	I. Sh. I.	
	7	22	I. Sh. E.	16	1	27	I. Sh. I.		22	29	II.*Sh. E.					
	8	6	I. Tr. E.		2	18	I. Tr. I.		24	0	20	II. Tr. E.				
	19	25.0	II. Ec. D.		3	45	I. Sh. E.		24	0	39.4	I. Ec. D.				
	23	49	II. Oc. R.		4	35	I. Tr. E.		24	3	53	I. Oc. R.				
					5	21	III. Sh. I.		21	56	I.*Sh. I.					
8	2	24.5	I. Ec. D.		8	48	III. Tr. I.		22	47	I.*Tr. I.					
	5	26	I. Oc. R.		8	49	III. Sh. E.									
	23	34	I. Sh. I.		12	13	III. Tr. E.									
					17	5	II. Sh. I.									
9	0	19	I. Tr. I.		18	46	II. Tr. I.									
	1	22	III. Sh. I.		19	56	II. Sh. E.									
	1	51	I. Sh. E.		21	36	II.*Tr. E.									
	2	36	I. Tr. E.		22	46.2	I.*Ec. D.									


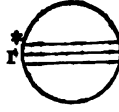
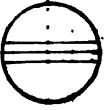
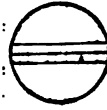
NOTE.—I. denotes ingress; E., egress; D., disappearance; R., reappearance; Ec., eclipse; Oc., occultation; Tr., transit of the satellite; Sh., transit of the shadow. \*Visible at Washington.



GREENWICH MEAN TIME.

OCTOBER.

*Phases of the Eclipses of the Satellites for an Inverting Telescope.*

<p>I.      * d      </p>	<p>III.    * d      r      </p>
<p>II.     * d      </p>	<p>IV.    *      * d      r      </p>

*Configurations at 21<sup>h</sup> 30<sup>m</sup> for an Inverting Telescope.*

Day.	West.	East.
1		1 1/2 O . 2. 4.
2		3. 2. O 4. -1 ●
3		.3 .2 1/4 O
4		4. .3 O .1 .2
5	4.	1. O 3/2
6	4.	2. O 1. .3
7	.4	.1 O 3.
8	.4	O 1/2 2.
9	.4	.3 2. O -1 ●
10	3. .4 .2	1. O
11		.3 .4 .1 .2
12		1. O 2. .4 -3 ●
13		2. O .1 .3 .4
14		.1 .2 O 3. .4
15		O 1.3 .2 .4
16	O 2.	3. .1 O 4.
17	O 1.	3. .2 O 4.
18		.3 O .1 .2 4.
19		1. O 4.2. -3 ●
20		2. 4. O .1 .3
21		4. 1. .2 O 3.
22	4.	O 1. 3/2
23	O 2.	4. 3/1 O
24	.4	3. .2 1 O .
25	.4	.3 O .2 -1 ●
26		.4 3/1 O 2.
27		.4 2. O .1 .3
28		1/2 O .3 -4 ●
29		O 1. 3/2
30		.1 3. O 2. .4
31	3. 2.	O 1. .4

GREENWICH MEAN TIME.

NOVEMBER.

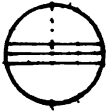
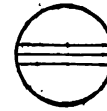
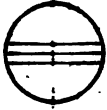
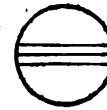
d	h	m		d	h	m		d	h	m		d	h	m		
1	0	45	I. Tr. I.	9	2	16	I. Oc. R.	17	14	33.7	III. Ec. R.	25	0	18	II. Tr. E.	
	2	0	I. Sh. E.		20	6	I.*Sh. I.		15	54	III. Oc. D.		0	36	I. Oc. R.	
	3	2	I. Tr. E.		21	12	I.*Tr. I.		16	35	II. Sh. I.		18	21	I.*Sh. I.	
	16	30.2	II. Ec. D.		22	22	I.*Sh. E.		18	53	II.*Tr. I.		19	34	I.*Tr. I.	
	21	0.8	I.*Ec. D.		23	28	I. Tr. E.		19	14	III.*Oc. R.		20	38	I.*Sh. E.	
	21	31	II.*Oc. R.						19	15.1	I.*Ec. D.		21	49	I.*Tr. E.	
				10	7	8.2	III. Ec. D.		19	25	II.*Sh. E.					
2	0	19	I. Oc. R.		10	36.5	III. Ec. R.		21	41	II.*Tr. E.	26	13	35.2	II. Ec. D.	
	18	12	I. Sh. I.		11	43	III. Oc. D.		22	41	I.*Oc. R.		15	36.2	I. Ec. D.	
	19	15	I. Tr. I.		14	2	II. Sh. I.						18	58	II.*Oc. R.	
	20	29	I.*Sh. E.		15	5	III. Oc. R.	18	16	28	I. Sh. I.		19	5	I.*Oc. R.	
	21	31	I.*Tr. E.		16	13	II. Tr. I.		17	38	I. Tr. I.					
					16	52	I. Ec. D.		18	44	I.*Sh. E.					
					17	22.1	II.*Tr. E.		19	54	I.*Tr. E.		27	12	50	I. Sh. I.
3	3	9.9	III. Ec. D.		19	2	I.*Oc. R.	19	10	59.3	II. Ec. D.		14	2	I. Tr. I.	
	6	38.8	III. Ec. R.		20	45			13	43.3	I. Ec. D.		15	6	I. Sh. E.	
	7	29	III. Oc. D.						16	18	II. Oc. R.		16	18	I. Tr. E.	
	10	53	III. Oc. R.						16	18	I. Sh. I.		28	5	9	III. Sh. I.
	11	23	II. Sh. I.	11	14	34	I. Sh. I.		17	10	II. Oc. R.		8	24		II. Sh. I.
	13	33	II. Tr. I.		15	41	I. Tr. I.						8	33		III. Sh. R.
	14	19	II. Sh. E.		16	51	I. Sh. E.						10	4.4		I. Ec. D.
	15	29.1	I. Ec. D.		17	57	I. Tr. E.	20	10	56	I. Sh. I.		10	8		III. Tr. I.
	16	22	II. Tr. E.						12	7	I. Tr. I.		10	8		III. Tr. I.
	18	49	I. Oc. R.	12	8	23.5	II. Ec. D.		13	13	I. Sh. E.		10	48		II. Tr. I.
					11	50.4	I. Ec. D.		14	23	I. Tr. E.		11	14		II. Sh. E.
					13	36	II. Oc. R.						13	23		III. Tr. E.
4	12	40	I. Sh. I.		15	14	I. Oc. R.	21	1	11	III. Sh. I.		13	33		I. Oc. R.
	13	44	I. Tr. I.						4	36	III. Sh. E.		13	36		II. Tr. E.
	14	57	I. Sh. E.						5	51	II. Sh. I.					
	16	0	I. Tr. E.	13	9	2	I. Sh. I.		6	2	III. Tr. I.	29	7	18		I. Sh. I.
					10	11	I. Tr. I.		8	11	II. Tr. I.		8	31		I. Tr. I.
5	5	47.7	II. Ec. D.		11	19	I. Sh. E.		8	11.5	I. Ec. D.		9	34		I. Sh. E.
	9	57.3	I. Ec. D.		12	27	I. Tr. E.		8	41	II. Sh. E.		10	47		I. Tr. E.
	10	53	II. Oc. R.		21	13	III.*Sh. I.		9	19	III. Tr. E.					
	13	18	I. Oc. R.						10	59	II. Tr. E.	30	2	53.5		II. Ec. D.
	18	3	IV. Sh. I.	14	0	39	III. Sh. E.		11	39	I. Oc. R.		4	32.7		I. Ec. D.
	22	30	IV.*Sh. E.		1	53	III. Tr. I.						8	2		I. Oc. R.
					3	18	II. Sh. I.						8	17		II. Oc. R.
6	4	15	IV. Tr. I.		4	8.8	IV. Ec. D.	22	5	24	I. Sh. I.		22	7.4		IV.*Ec. D.
	7	9	I. Sh. I.		5	11	III. Tr. E.		6	36	I. Tr. I.					
	8	13	I. Tr. I.		5	33	II. Tr. I.		7	41	I. Sh. E.					
	8	28	IV. Tr. E.		6	8	II. Sh. E.		8	52	I. Tr. E.					
	9	25	I. Sh. E.		6	18.6	I. Ec. D.		12	0	IV. Sh. I.					
	10	30	I. Tr. E.		8	22	II. Tr. E.		16	24	IV. Sh. E.					
	17	15	III. Sh. I.		8	40.6	IV. Ec. R.		23	24	IV.*Tr. I.					
	20	42	III.*Sh. E.		9	43	I. Oc. R.									
	21	40	III.*Tr. I.		15	18	IV. Oc. D.	23	0	17.7	II. Ec. D.					
					19	29	IV.*Oc. R.		2	39.8	I. Ec. D.					
									3	23	IV. Tr. E.					
7	0	45	II. Sh. I.						5	38	II. Oc. R.					
	1	1	III. Tr. E.	15	3	31	I. Sh. I.		6	8	I. Oc. R.					
	2	53	II. Tr. I.		4	40	I. Tr. I.		23	53	I. Sh. I.					
	3	35	II. Sh. E.		5	47	I. Sh. E.									
	4	25.6	I. Ec. D.		6	56	I. Tr. E.									
	5	42	II. Tr. E.		21	41.8	II.*Ec. D.	24	1	5	I. Tr. I.					
	7	47	I. Oc. R.						2	9	I. Sh. E.					
					16	0	46.8	I. Ec. D.	3	21	I. Tr. E.					
					2	58	II. Oc. R.		15	4.1	III. Ec. D.					
8	1	37	I. Sh. I.		4	12	I. Oc. R.		18	31.1	III.*Ec. R.					
	2	43	I. Tr. I.		21	59	I.*Sh. I.		19	8	II.*Sh. I.					
	3	54	I. Sh. E.		23	9	I.*Tr. I.		20	2	III.*Oc. D.					
	4	59	I. Tr. E.						21	8.0	I.*Ec. D.					
	19	6.0	II.*Ec. D.		17	0	16	I. Sh. E.	21	30	II.*Tr. I.					
	22	53.9	I.*Ec. D.		1	25	I. Tr. E.		21	57	II.*Sh. E.					
					11	6.0	III. Ec. D.		23	20	III.*Oc. R.					
9	0	15	II. Oc. R.													

NOTE.—I. denotes ingress; E., egress; D., disappearance; R., reappearance; Ec., eclipse; Oc., occultation; Tr., transit of the satellite; Sh., transit of the shadow. \*Visible at Washington.

GREENWICH MEAN TIME:

NOVEMBER.

*Phases of the Eclipses of the Satellites for an Inverting Telescope.*

<p>I.            *<sub>d</sub>    </p>	<p>III.           *<sub>d</sub>           *<sub>r</sub>    </p>
<p>II.            *<sub>d</sub>    </p>	<p>IV. *<sub>d</sub>           *<sub>r</sub>    </p>

*Configurations at 21<sup>h</sup> 0<sup>m</sup> for an Inverting Telescope.*

Day.	West.	East.
1	·3	·0 1            ·4            ·2 ●
2	○1·	·3    ○    2·            4·
3		2·    ○ ·1 ·3            4·
4		·21·    ○            4··3
5		○ ·4 ·1·2 3·
6		<sup>4·</sup> <sub>·1</sub> 3○· 2·
7		4· 3·2·    ○ 1·
8	4·	·8            ·1○            ·2 ●
9	4·	·8            1○·            2·
10	·4	2· ○·1 ·3
11	·4	·2 1· ○            ·3
12		·4            ○ <sup>2·</sup> <sub>·1</sub> 3·
13		<sup>1·</sup> <sub>·4</sub> ○ 3· 2·
14		<sup>2·</sup> <sub>·3</sub> ○ ·4 1·
15	3·	·1·2○            ·4
16	·3	○ 1·    ·2            ·4
17	○2·	○ ·3            ·4            ·1 ●
18		·2 1·○            ·3            ·4
19		○ <sup>2·</sup> <sub>·1</sub> 3·            4·
20		1·    ○ 3·2·            4·
21		<sup>2·</sup> <sub>·3</sub> ○    ·1 4·
22	3·	<sup>2·</sup> <sub>·1</sub> 4○·
23	·3 4·	○ 1·    ·2
24	4·	<sup>2·</sup> <sub>·1</sub> ○ <sub>1</sub> ·3 ●
25	○1·	4·            ·2            ○            ·3
26	4·	○ <sup>2·</sup> <sub>·1</sub> 3·
27	·4	1·    ○ <sup>2·</sup> <sub>·3</sub>
28	·4	<sup>2·</sup> <sub>·3</sub> ○    ·1
29	<sup>4·</sup> <sub>·2</sub>	<sup>2·</sup> <sub>·1</sub> ○
30	·3	·4    ○ 1· ·2

GREENWICH MEAN TIME.

DECEMBER.

d	h	m		d	h	m		d	h	m		d	h	m	
1	1	46	I. Sh. I.	9	0	53.7	I. Ec. D.	16	8	1	III. Oc. D.	24	5	22	I. Tr. E.
	2	35.4	IV. Ec. R.		2	24.2	III. Ec. R.		11	14	III. Oc. B.		23	7.5	I.*Ec. D.
	3	0	I. Tr. I.		2	40	II. Tr. I.						23	58.7	II. Ec. D.
	4	3	I. Sh. E.		3	3	II. Sh. E.	17	0	2	I. Sh. I.				
	5	16	I. Tr. E.		4	6	III. Oc. D.		1	15	I. Tr. I.	25	2	35	I. Oc. R.
	10	9	IV. Oc. D.		4	24	I. Oc. R.		2	18	I. Sh. E.		5	18	II. Oc. R.
	14	5	IV. Oc. R.		5	27	II. Tr. E.		3	31	I. Tr. E.		20	24	I.*Sh. I.
	19	1.4	III.*Ec. D.		5	57	IV. Sh. I.		16	6.9	IV. Ec. D.		21	35	I.*Tr. I.
	21	41	II.*Sh. I.		7	20	III. Oc. R.		20	30.6	IV.*Ec. R.		22	40	I.*Sh. E.
	22	27.8	III.*Ec. R.		10	17	IV. Sh. E.		21	14.8	I.*Ec. D.		23	50	I.*Tr. E.
	23	0.9	I.*Ec. D.		17	49	IV.*Tr. I.		21	22.8	II.*Ec. D.		23	54	IV.*Sh. I.
					21	34	IV.*Tr. E.								
					22	8	I.*Sh. I.	18	0	44	I. Oc. R.	26	4	10	IV. Sh. E.
					23	22	I.*Tr. I.		2	46	II. Oc. R.		11	21	IV. Tr. I.
2	0	6	II. Tr. I.						4	10	IV. Oc. D.		14	58	IV. Tr. E.
	0	6	III. Oc. D.						7	58	IV. Oc. R.		17	35.8	I.*Ec. D.
	0	30	II. Sh. E.	10	0	25	I. Sh. E.		18	30	I.*Sh. I.		18	36	II.*Sh. I.
	2	30	I. Oc. R.		1	38	I. Tr. E.		19	43	I.*Tr. I.		20	58	II.*Tr. I.
	2	53	II. Tr. E.		18	46.9	II.*Ec. D.		20	46	I.*Sh. E.		21	1	III.*Sh. I.
	3	22	III. Oc. R.		19	21.9	I.*Ec. D.		21	59	I.*Tr. E.		21	2	I.*Oc. R.
	20	15	I.*Sh. I.		22	52	I.*Oc. R.						21	25	II.*Sh. E.
	21	29	I.*Tr. I.										23	42	II.*Tr. E.
	22	31	I.*Sh. E.		11	0	12	II. Oc. R.	19	15	43.0				
	23	44	I. Tr. E.		16	37	I. Sh. I.		16	3	II. Sh. I.				
3	16	11.0	II. Ec. D.		17	51	I.*Tr. I.		17	3	III.*Sh. I.	27	0	22	III. Sh. E.
	17	29.1	I. Ec. D.		18	53	I.*Sh. E.		18	27	II.*Tr. I.		1	53	III. Tr. I.
	20	59	I.*Oc. R.		20	6	I.*Tr. E.		18	52	II.*Sh. E.		5	1	III. Tr. E.
	21	36	II.*Oc. R.						19	12	I.*Oc. R.		14	52	I. Sh. I.
					19	13	5	III. Sh. I.	20	25	III.*Sh. E.		16	3	I. Tr. I.
					18	30	II. Sh. I.		21	13	II.*Tr. E.		17	8	I.*Sh. E.
					13	50.1	I. Ec. D.		22	4	III.*Tr. I.		18	18	I.*Tr. E.
					15	56	II. Tr. I.								
					16	19	II. Sh. E.	20	1	13	III. Tr. E.	28	12	4.1	I. Ec. D.
					16	28	III. Sh. E.	20	12	58	I. Sh. I.		13	17.2	II. Ec. D.
					17	20	I.*Oc. R.		14	11	I. Tr. I.		15	30	I. Oc. R.
4	14	43	I. Sh. I.		18	10	III.*Tr. I.		15	15	I. Sh. E.		18	33	II.*Oc. R.
	15	57	I. Tr. I.		18	43	II.*Tr. E.		16	27	I. Tr. E.				
	17	0	I. Sh. E.		21	20	III.*Tr. E.								
	18	13	I.*Tr. E.		18	11	5	I. Sh. I.	21	10	11.2				
5	9	7	III. Sh. I.		12	19	I. Tr. I.		13	39	I. Ec. D.	28	9	20	I. Sh. I.
	10	57	II. Sh. I.		13	21	I. Sh. E.		16	2	II. Oc. R.		10	30	I. Tr. I.
	11	57.3	I. Ec. D.		14	34	I. Tr. E.						11	37	I. Sh. E.
	12	31	III. Sh. E.										12	46	I. Tr. E.
	13	23	II. Tr. I.		14	8	5.3	II. Ec. D.	22	7	27				
	13	46	II. Sh. E.		8	18.4	I. Ec. D.		8	39	I. Sh. I.	29	6	32.3	I. Ec. D.
	14	11	III. Tr. I.		11	48	I. Oc. R.		9	43	I. Sh. E.		7	52	II. Sh. I.
	15	27	I. Oc. R.		13	30	II. Oc. R.		10	55	I. Tr. E.		9	57	I. Oc. R.
	16	10	II. Tr. E.										10	9	II. Tr. I.
	17	24	III. Tr. E.										10	41	II. Sh. E.
6	9	11	I. Sh. I.		15	5	33	I. Sh. I.	23	4	39.4		10	51.1	III. Ec. D.
	10	26	I. Tr. I.		6	47	I. Tr. I.		5	19	II. Sh. I.		12	55	II. Tr. E.
	11	28	I. Sh. E.		7	50	I. Sh. E.		6	53.0	III. Ec. D.		14	14.9	III. Ec. R.
	12	41	I. Tr. E.		9	3	I. Tr. E.		7	42	II. Tr. I.		15	40	III. Oc. D.
7	5	29.4	II. Ec. D.						8	7	I. Oc. R.		18	50	III.*Oc. R.
	6	25.5	I. Ec. D.		16	2	46	II. Sh. I.	8	8	II. Sh. E.				
	9	55	I. Oc. R.		2	46.5	I. Ec. D.		10	17.4	III. Ec. R.	31	3	49	I. Sh. I.
	10	54	II. Oc. R.		2	55.6	III. Ec. D.		10	28	II. Tr. E.		4	58	I. Tr. I.
8	3	40	I. Sh. I.		5	12	II. Tr. I.		11	58	III. Oc. D.		6	5	I. Sh. E.
	4	54	I. Tr. I.		5	35	II. Sh. E.		15	4	III. Oc. R.		7	13	I. Tr. E.
	5	56	I. Sh. E.		6	16	I. Oc. R.								
	7	10	I. Tr. E.		6	20.7	III. Ec. R.	24	1	55	I. Sh. I.				
	22	58.5	III.*Ec. D.		7	58	II. Tr. E.		3	7	I. Tr. I.				
9	0	14	II. Sh. I.						4	12	I. Sh. E.				

NOTE.—I. denotes ingress; E., egress; D., disappearance; R., reappearance; Ec., eclipse; Oc., occultation; Tr., transit of the satellite; Sh., transit of the shadow. \*Visible at Washington.


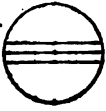
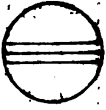
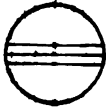
# SATELLITES OF JUPITER, 1920.

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## GREENWICH MEAN TIME.

DECEMBER.

*Phases of the Eclipses of the Satellites for an Inverting Telescope.*

I.	<sup>*</sup> d		III.	<sup>*</sup> d	<sup>*</sup> r	
II.	<sup>*</sup> d		IV.	<sup>*</sup> d	<sup>*</sup> r	

*Configurations at 20<sup>h</sup> 30<sup>m</sup> for an Inverting Telescope.*

Day.	West.	East.
1		-1 ○ 2·4 ·3 ●
2	2·	1○ ·3 ·4
3		○ ·3 ·4 ·1 ● ·2 ●
4		1· ○ ·4
5		<sup>2</sup> · ○ ·1 4·
6	3·	<sup>1</sup> · ○ 4·
7	·3	○ 1·2 4·
8		<sup>2</sup> · ○ 2· 4·
9	○ 4·	2· ○ 1· ·3
10		4· ○ ·3 ·1 ● ·2 ●
11	4·	1· ○ 2·3·
12	○ 3·	4· 2· ○ ·1
13	4·	3· ·2 1· ○
14	·4	·3 ○ <sup>2</sup> · <sub>1</sub>
15	·4	<sup>2</sup> · <sub>1</sub> ○ 2·
16	·4 2·	○ 1· ·3
17		<sup>2</sup> · <sub>1</sub> ○ ·3 ·4 ●
18	○ 1·	○ ·4 ·2 3·
19	○ 2·	3· ○ <sup>1</sup> · ·4
20		3· ·2 1· ○ ·4
21	·3	○ <sup>2</sup> · <sub>1</sub> ·4
22		·3 ·1 ○ 2· 4·
23		2· ○ <sup>2</sup> · <sub>1</sub> 4·
24		<sup>2</sup> · <sub>1</sub> ○ <sup>2</sup> · <sub>1</sub>
25		1○ ·4 ·2 3·
26		4·2 ○ ·3 ·1 ●
27	4· <sup>2</sup> · <sub>2</sub>	1· ○
28	4· 3·	○ ·2 1
29	4·	·3 1· ○ 2·
30	·4	2· ○ ·3 1·
31	·4	<sup>2</sup> · <sub>1</sub> ○ ·3
32	·4	○ 1· ·2 3·

# 658 MAGNITUDE AND RINGS OF SATURN, 1920.

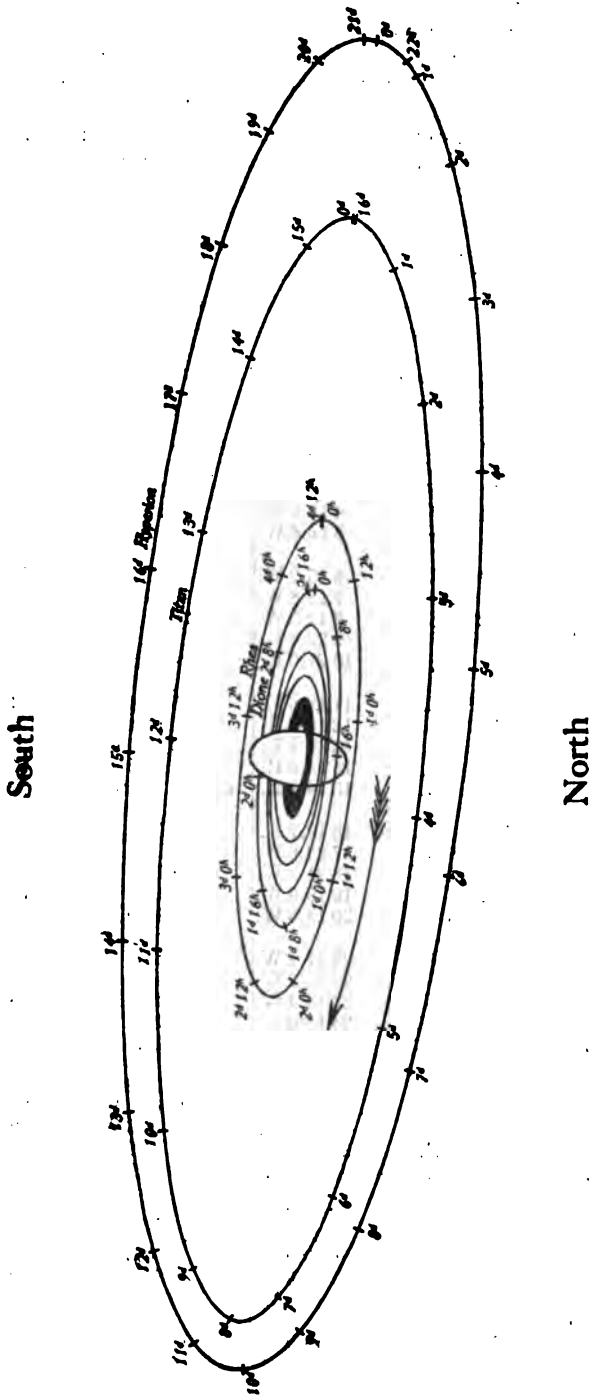
## ELEMENTS FOR DETERMINING THE GEOCENTRIC POSITION, APPEAR- ANCE, AND MAGNITUDE OF SATURN'S RINGS.

Greenwich Mean Midnight.	<i>a</i>	<i>b</i>	<i>P</i>	<i>B</i>	<i>U</i>	$\omega$	<i>B'</i>	<i>U'</i>	Stellar Mag.
Jan. 2	42.78	-3.58	-5 30.9	-4 47.9	37 8.7	42 18.2	-7 10.0	350 6.4	-0.9
10	43.32	3.72	5 31.8	4 55.7	36 58.1	42 18.2	7 2.6	350 21.8	0.5
18	43.82	3.90	5 33.1	5 6.4	36 41.8	42 18.2	6 55.8	350 37.1	0.5
26	44.25	4.11	5 34.8	5 19.7	36 20.2	42 18.1	6 47.9	350 52.4	0.7
Feb. 3	44.61	4.34	5 36.9	5 35.2	35 54.1	42 18.1	6 40.5	351 7.6	0.7
11	44.87	-4.59	-5 39.2	-5 52.3	35 24.3	42 18.1	-6 33.1	351 22.9	+0.6
19	45.03	4.84	5 41.7	6 10.4	34 52.0	42 18.0	6 25.7	351 38.2	0.5
27	45.08	5.09	5 44.3	6 28.9	34 18.3	42 18.0	6 18.3	351 53.4	0.5
Mar. 6	45.02	5.32	5 46.9	6 47.2	33 44.4	42 17.9	6 10.9	352 8.6	0.5
14	44.86	5.53	5 49.4	7 4.6	33 11.5	42 17.9	6 3.5	352 23.9	0.6
22	44.60	-5.70	-5 51.7	-7 20.4	32 40.8	42 17.9	-5 56.1	352 39.1	+0.6
30	44.25	5.83	5 53.7	7 34.2	32 13.3	42 17.8	5 48.7	352 54.2	0.6
Apr. 7	43.83	5.92	5 55.4	7 45.6	31 50.0	42 17.8	5 41.3	353 9.4	0.7
15	43.34	5.96	5 56.7	7 54.3	31 31.6	42 17.8	5 33.9	353 24.6	0.7
23	42.81	5.96	5 57.6	8 0.1	31 18.6	42 17.7	5 26.4	353 39.7	0.8
May 1	42.25	-5.91	-5 58.1	-8 2.7	31 11.4	42 17.7	-5 19.0	353 54.8	+0.8
9	41.66	5.82	5 58.1	8 2.1	31 10.1	42 17.6	5 11.6	354 9.9	0.9
17	41.07	5.69	5 57.7	7 58.4	31 14.8	42 17.6	5 4.2	354 25.0	0.9
25	40.48	5.53	5 56.9	7 51.6	31 25.4	42 17.6	4 56.7	354 40.1	1.0
June 2	39.91	5.34	5 55.7	7 41.9	31 41.7	42 17.5	4 49.3	354 55.2	1.0
10	39.36	-5.13	-5 54.1	-7 29.5	32 3.5	42 17.5	-4 41.9	355 10.2	+1.0
18	38.85	4.89	5 52.1	7 14.5	32 30.2	42 17.5	4 34.4	355 25.3	1.0
26	38.37	4.64	5 49.8	6 57.1	33 1.8	42 17.4	4 27.0	355 40.3	1.1
July 4	37.93	4.38	5 47.1	6 37.5	33 37.5	42 17.4	4 19.6	355 55.3	1.1
12	37.54	4.10	5 44.1	6 16.0	34 17.1	42 17.3	4 12.1	356 10.3	1.1
20	37.19	-3.81	-5 40.8	-5 52.9	35 0.1	42 17.3	-4 4.7	356 25.3	+1.1
28	36.89	3.52	5 37.2	5 28.3	35 45.9	42 17.3	3 57.2	356 40.3	1.1
Aug. 5	36.64	3.22	5 33.4	5 2.5	36 34.1	42 17.2	3 49.8	356 55.3	1.1
13	36.44	2.92	5 29.4	4 35.8	37 24.3	42 17.2	3 42.4	357 10.2	1.1
21	36.29	2.62	5 25.3	4 8.4	38 16.0	42 17.2	3 34.9	357 25.2	1.1
29	36.20	-2.32	-5 21.0	-3 40.5	39 8.7	42 17.1	-3 27.5	357 40.1	+1.1
Sept. 6	36.17	2.02	5 16.6	3 12.5	40 2.0	42 17.1	3 20.0	357 55.0	1.1
14	36.19	1.73	5 12.1	2 44.6	40 55.4	42 17.0	3 12.6	358 10.0	1.2
22	36.26	1.44	5 7.6	2 17.0	41 48.4	42 17.0	3 5.2	358 24.9	1.2
30	36.39	1.16	5 3.2	1 50.0	42 40.5	42 17.0	2 57.7	358 39.8	1.3
Oct. 8	36.57	-0.89	-4 58.8	-1 24.0	43 31.3	42 16.9	-2 50.3	358 54.6	+1.3
16	36.81	0.63	4 54.5	0 59.2	44 20.2	42 16.9	2 42.8	359 9.5	1.3
24	37.10	0.38	4 50.4	0 35.8	45 6.7	42 16.9	2 35.4	359 24.4	1.4
Nov. 1	37.44	-0.15	4 46.6	-0 14.2	45 50.4	42 16.8	2 28.0	359 39.2	1.4
9	37.83	+0.07	4 43.0	+0 5.4	46 30.6	42 16.8	2 20.5	359 54.0	1.4
17	38.27	+0.26	-4 39.7	+0 22.7	47 6.9	42 16.8	-2 13.1	0 8.9	+1.4
25	38.75	0.43	4 36.8	0 37.5	47 38.7	42 16.7	2 5.6	0 23.7	1.4
Dec. 3	39.27	0.57	4 34.4	0 49.5	48 5.6	42 16.7	1 58.2	0 38.5	1.3
11	39.81	0.68	4 32.4	0 58.5	48 27.2	42 16.6	1 50.8	0 53.3	1.3
19	40.38	0.76	4 30.9	1 4.5	48 43.0	42 16.6	1 43.3	1 8.1	1.2
27	40.96	+0.60	-4 30.0	+1 7.3	48 52.8	42 16.6	-1 35.9	1 22.9	+1.2
35	41.54	+0.80	-4 29.7	+1 6.6	48 56.4	42 16.5	-1 28.5	1 37.6	+1.2

The factor to be multiplied by *a* and *b* to obtain the axes of—

The inner ellipse of the outer ring—0.8801,	log factor—9.9445
The outer ellipse of the inner ring—0.8599,	log factor—9.9344
The inner ellipse of the inner ring—0.6850,	log factor—9.8228
The inner ellipse of the dusky ring—0.5486,	log factor—9.7892

NOTE.—The negative sign of *B* indicates that the visible surface of the rings is the southern one; the positive sign of *B* indicates that the visible surface of the rings is the northern one.



MEAN SYNODIC PERIODS.

	d	h
I.	0	22.6
II.	1	8.9
III.	1	21.3
IV.	2	17.7
V.	4	12.5
VI.	15	23.3
VII.	21	7.6
VIII.	79	22.1
IX.	523	15.6

**NAMES OF THE SATELLITES.**

- I. Mimas.
- II. Enceladus.
- III. Tethys.
- IV. Dione.
- V. Rhea.
- VI. Titan.
- VII. Hyperion.
- VIII. Iapetus.
- IX. Phoebe.

**APPARENT ORBITS OF THE SEVEN INNER SATELLITES OF SATURN, AT DATE OF OPPOSITION, FEBRUARY 27, 1920, AS SEEN IN AN INVERTING TELESCOPE, AND ELONGATED IN THE RATIO OF TWO TO ONE IN THE DIRECTION OF THEIR MINOR AXES.**

## GREENWICH MEAN TIME.

In the diagram on the preceding page the points of the orbits marked "0" are those of the eastern elongation, as seen in an inverting telescope. The times of these elongations may be found from the following tables, and the apparent position of a satellite at any other time may be marked on the diagram by setting off on the proper orbit the elapsed interval in days and hours since the last eastern elongation. The orbits of the five inner satellites are regarded as circular, and the time of any greatest elongation not given in the tables may be readily found from those given by adding or subtracting the proper multiple of the mean synodic period. For Titan, Hyperion, and Iapetus the eccentricity is taken into account, and for Iapetus the times both of the greatest elongations and of the conjunctions are given. The following abbreviations are used in the tables:

E., Eastern Elongation.

I., Inferior Conjunction (south of planet).

W., Western Elongation.

S., Superior Conjunction (north of planet).

## MIMAS.

*Greatest Elongations Visible in the United States.*

Jan.	d h	Feb.	d h	Mar.	d h	Apr.	d h	May	d h	Nov.	d h
	1 1.2 E.	2 13.4 W.		2 18.5 W.		1 22.1 W.		10 13.5 W.		16 0.9 W.	
	1 23.8 E.	3 0.7 E.		3 17.1 W.		2 20.8 W.		13 20.7 E.		16 23.5 W.	
	2 22.5 E.	3 23.4 E.		4 15.7 W.		3 19.4 W.		14 19.3 E.		17 22.1 W.	
	3 21.1 E.	4 22.0 E.		5 14.3 W.		4 18.0 W.		15 17.9 E.		18 20.7 W.	
	4 19.7 E.	5 20.6 E.		6 1.6 E.		5 16.6 W.		16 16.5 E.		19 19.4 W.	
	5 18.3 E.	6 19.2 E.		6 12.0 W.		6 15.2 W.		17 15.2 E.		24 1.1 E.	
	6 16.9 E.	7 17.8 E.		7 0.2 E.		7 13.8 W.		18 13.8 E.		24 23.8 E.	
	7 15.5 E.	8 16.4 E.		7 22.8 E.		8 12.5 W.		22 19.6 W.		25 22.4 E.	
	9 1.5 W.	9 15.0 E.		8 21.4 E.		9 22.4 E.		23 18.2 W.		26 21.0 E.	
	10 0.1 W.	10 2.3 W.		9 20.1 E.		10 21.0 E.		24 16.8 W.		27 19.6 E.	
	10 22.7 W.	10 13.6 E.		10 18.7 E.		11 19.6 E.		25 15.4 W.		Dec. 2 1.4 W.	
	11 21.3 W.	11 1.0 W.		11 17.3 E.		12 18.2 E.		26 14.1 W.		3 0.0 W.	
	12 19.9 W.	11 23.6 W.		12 15.9 E.		13 16.8 E.		30 19.9 E.		3 22.6 W.	
	13 18.5 W.	12 22.2 W.		13 14.5 E.		14 15.5 E.		31 18.5 E.		4 21.3 W.	
	14 17.1 W.	13 20.8 W.		14 13.1 E.		15 14.1 E.		June 1 17.1 E.		5 19.9 W.	
	15 15.8 W.	14 19.4 W.		15 0.4 W.		16 12.7 E.		2 15.7 E.		6 18.5 W.	
	16 14.4 W.	15 18.0 W.		15 11.8 E.		17 22.6 W.		3 14.4 E.		10 1.7 E.	
	17 1.7 E.	16 16.6 W.		15 23.1 W.		18 21.3 W.		8 18.8 W.		11 0.3 E.	
	18 0.3 E.	17 15.2 W.		16 21.7 W.		19 19.9 W.		9 17.4 W.		11 22.9 E.	
	18 22.9 E.	18 13.9 W.		17 20.3 W.		20 18.5 W.		10 16.0 W.		12 21.5 E.	
	19 21.5 E.	19 1.2 E.		18 18.9 W.		21 17.1 W.		11 14.6 W.		13 20.1 E.	
	20 20.1 E.	19 12.5 W.		19 17.5 W.		22 15.7 W.		12 13.3 W.		14 18.8 E.	
	21 18.8 E.	19 23.8 E.		20 16.1 W.		23 14.4 W.		17 17.7 E.		18 1.9 W.	
	22 17.4 E.	20 22.4 E.		21 14.8 W.		24 13.0 W.		18 16.3 E.		19 0.5 W.	
	23 16.0 E.	21 21.0 E.		22 13.4 W.		26 21.5 E.		19 14.9 E.		19 23.2 W.	
	24 14.6 E.	22 19.6 E.		23 12.0 W.		27 20.1 E.		20 13.6 E.		20 21.8 W.	
	25 1.9 W.	23 18.2 E.		23 23.3 E.		28 18.8 E.		25 18.0 W.		21 20.4 W.	
	26 0.5 W.	24 16.8 E.		24 21.9 E.		29 17.4 E.		26 16.6 W.		22 19.0 W.	
	26 23.1 W.	25 15.5 E.		25 20.5 E.		30 16.0 E.		27 15.2 W.		23 17.6 W.	
	27 21.8 W.	26 14.1 E.		26 19.1 E.		May 1 14.6 E.		28 13.9 W.		26 2.2 E.	
	28 20.4 W.	27 1.4 W.		27 17.8 E.		2 13.2 E.		.....		27 0.8 E.	
	29 19.0 W.	27 12.7 E.		28 16.4 E.		5 20.4 W.		.....		27 23.4 E.	
	30 17.6 W.	28 0.0 W.		29 15.0 E.		6 19.0 W.		Nov. 8 0.6 E.		28 22.0 E.	
	31 16.2 W.	28 22.6 W.		30 13.6 E.		7 17.8 W.		8 23.2 E.		29 20.6 E.	
Feb.	1 14.8 W.	29 21.2 W.		31 12.2 E.		8 16.3 W.		9 21.8 E.		30 19.2 E.	
	2 2.1 E.	Mar. 1 19.8 W.		31 23.5 W.		9 14.9 W.		10 20.5 E.		31 17.9 E.	



# SATELLITES OF SATURN, 1920.

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GREENWICH MEAN TIME.

## ENCELADUS.

	d h	d h	d h	d h	d h	d h
Jan.	2 7.2 E.	Feb. 11 0.7 E.	Mar. 21 18.1 E.	Apr. 30 11.7 E.	June 9 5.5 E.	Nov. 23 11.0 E.
	3 16.1 E.	12 9.5 E.	23 8.0 E.	May 1 20.6 E.	10 14.4 E.	24 19.9 E.
	5 1.0 E.	13 18.4 E.	24 11.9 E.	9 5.5 E.	11 23.3 E.	26 4.8 E.
	6 9.8 E.	15 3.3 E.	25 20.7 E.	4 14.4 E.	13 8.2 E.	27 13.7 E.
	7 18.7 E.	16 12.2 E.	27 5.6 E.	5 23.2 E.	14 17.1 E.	28 22.6 E.
	9 3.6 E.	17 21.0 E.	28 14.5 E.	7 8.1 E.	16 2.0 E.	30 7.4 E.
	10 12.5 E.	19 5.9 E.	29 23.4 E.	8 17.0 E.	17 10.9 E.	Dec. 1 116.3 E.
	11 21.4 E.	20 14.8 E.	31 8.3 E.	10 1.9 E.	18 19.8 E.	8 1.2 E.
	18 6.2 E.	21 23.7 E.	Apr. 1 117.1 E.	11 10.8 E.	20 4.7 E.	4 10.1 E.
	14 15.1 E.	23 8.5 E.	8 2.0 E.	12 19.7 E.	21 13.6 E.	5 19.0 E.
	16 0.0 E.	24 17.4 E.	4 10.9 E.	14 4.6 E.	22 22.5 E.	7 3.9 E.
	17 8.9 E.	26 2.3 E.	5 19.8 E.	15 13.5 E.	24 7.4 E.	8 12.8 E.
	18 17.8 E.	27 11.2 E.	7 4.7 E.	16 22.4 E.	25 16.3 E.	9 21.7 E.
	20 2.6 E.	28 20.1 E.	8 13.6 E.	18 7.2 E.	27 1.2 E.	11 6.5 E.
	21 11.5 E.	Mar. 1 4.9 E.	9 22.4 E.	19 16.1 E.	28 10.1 E.	12 15.4 E.
	22 20.4 E.	2 13.8 E.	11 7.3 E.	21 1.0 E.	29 19.0 E.	14 0.3 E.
	24 5.3 E.	3 22.7 E.	12 16.2 E.	22 9.9 E.	July 1 3.9 E.	15 9.2 E.
	25 14.2 E.	5 7.6 E.	14 1.1 E.	23 18.8 E.	2 12.8 E.	16 18.1 E.
	26 23.0 E.	6 16.4 E.	15 10.0 E.	25 3.7 E.	.....	18 3.0 E.
	28 7.9 E.	8 1.3 E.	16 18.8 E.	26 12.6 E.	.....	19 11.9 E.
	29 16.8 E.	9 10.2 E.	18 3.7 E.	27 21.5 E.	Nov. 11 3.0 E.	20 20.7 E.
	31 1.7 E.	10 19.1 E.	19 12.6 E.	29 6.4 E.	12 11.9 E.	22 5.6 E.
Feb.	1 110.5 E.	12 4.0 E.	20 21.5 E.	30 15.3 E.	13 20.8 E.	23 14.5 E.
	2 19.4 E.	13 12.8 E.	22 6.4 E.	June 1 0.2 E.	15 5.6 E.	24 23.4 E.
	4 4.3 E.	14 21.7 E.	23 15.3 E.	2 9.0 E.	16 14.5 E.	26 8.3 E.
	5 13.2 E.	16 6.6 E.	25 0.2 E.	3 18.0 E.	17 23.4 E.	27 17.2 E.
	6 22.0 E.	17 15.5 E.	26 9.0 E.	5 2.8 E.	19 8.3 E.	29 2.1 E.
	8 6.9 E.	19 0.4 E.	27 17.9 E.	6 11.7 E.	20 17.2 E.	30 10.9 E.
	9 15.8 E.	20 9.2 E.	29 2.8 E.	7 20.6 E.	22 2.1 E.	31 19.8 E.

## TETHYS.

	d h	d h	d h	d h	d h	d h
Jan.	1 7.7 E.	Feb. 9 22.9 E.	Mar. 20 14.0 E.	Apr. 29 5.3 E.	June 7 20.9 E.	Nov. 22 23.3 E.
	3 5.0 E.	11 20.2 E.	22 11.3 E.	May 1 2.6 E.	9 18.2 E.	24 20.6 E.
	5 2.3 E.	13 17.4 E.	24 8.6 E.	2 23.9 E.	11 15.6 E.	26 17.9 E.
	6 23.6 E.	15 14.7 E.	26 5.9 E.	4 21.2 E.	13 12.9 E.	28 15.2 E.
	8 20.9 E.	17 12.0 E.	28 3.2 E.	6 18.5 E.	15 10.2 E.	30 12.5 E.
	10 18.2 E.	19 9.3 E.	30 0.4 E.	8 15.8 E.	17 7.6 E.	Dec. 2 9.8 E.
	12 15.5 E.	21 6.6 E.	31 21.7 E.	10 13.2 E.	19 4.9 E.	4 7.2 E.
	14 12.8 E.	23 3.9 E.	Apr. 2 19.0 E.	12 10.5 E.	21 2.2 E.	6 4.5 E.
	16 10.1 E.	25 1.2 E.	4 16.4 E.	14 7.8 E.	22 23.5 E.	8 1.8 E.
	18 7.4 E.	26 22.5 E.	6 13.6 E.	16 5.1 E.	24 20.8 E.	9 23.1 E.
	20 4.6 E.	28 19.8 E.	8 10.9 E.	18 2.4 E.	26 18.2 E.	11 20.4 E.
	22 2.0 E.	Mar. 1 17.0 E.	10 8.2 E.	19 23.7 E.	28 15.5 E.	13 17.7 E.
	23 23.2 E.	3 14.3 E.	12 5.5 E.	21 21.0 E.	30 12.8 E.	15 15.0 E.
	25 20.5 E.	5 11.6 E.	14 2.8 E.	23 18.4 E.	July 2 10.2 E.	17 12.4 E.
	27 17.8 E.	7 8.9 E.	16 0.1 E.	25 15.7 E.	.....	19 9.7 E.
	29 15.1 E.	9 6.2 E.	17 21.4 E.	27 13.0 E.	Nov. ....	21 7.0 E.
	31 12.4 E.	11 3.5 E.	19 18.8 E.	29 10.3 E.	13 12.7 E.	23 4.3 E.
Feb.	2 9.7 E.	18 0.8 E.	21 16.1 E.	31 7.6 E.	15 10.0 E.	25 1.6 E.
	4 7.0 E.	14 22.1 E.	23 13.4 E.	June 2 5.0 E.	17 7.3 E.	26 22.9 E.
	6 4.3 E.	16 19.4 E.	25 10.7 E.	4 2.3 E.	19 4.6 E.	28 20.2 E.
	8 1.6 E.	18 16.7 E.	27 8.0 E.	5 23.6 E.	21 2.0 E.	30 17.5 E.

## SATELLITES OF SATURN, 1920.

GREENWICH MEAN TIME.

## DIONE.

Jan.	d h 1 8.3 E. 4 2.0 E. 6 19.6 E. 9 13.3 E. 12 7.0 E.	Feb.	d h 11 9.2 E. 14 2.8 E. 16 20.5 E. 19 14.2 E. 22 7.8 E.	Mar.	d h 23 10.0 E. 26 3.7 E. 28 21.3 E. 31 15.0 E.	Apr.	d h 3 8.6 E.	May	d h 3 11.1 E. 6 4.8 E. 8 22.4 E. 11 16.2 E. 14 9.8 E.	June	d h 13 12.7 E. 16 6.4 E. 19 0.1 E. 21 17.8 E. 24 11.6 E.	July	d h 27 5.3 E. 29 23.0 E. 2 216.7 E. 5 10.4 E. .....	Nov.	d h 22 2.9 E. 24 20.6 E. 27 14.3 E. 30 8.0 E. 3 1.8 E.	Dec.	d h 3 1.8 E.
	15 0.6 E. 17 18.3 E. 20 12.0 E. 23 5.6 E. 25 23.3 E.		25 1.4 E. 27 19.1 E. Mar. 1 12.8 E. 4 6.4 E. 7 0.0 E.		6 2.3 E. 8 20.0 E. 11 13.6 E. 14 7.3 E. 17 1.0 E.		17 3.6 E. 19 21.3 E. 22 15.0 E. 25 8.6 E. 28 2.4 E.		27 5.3 E. 29 23.0 E. July 2 216.7 E. 5 10.4 E. .....		5 19.5 E. 8 13.2 E. 11 6.9 E. 14 0.6 E. 16 18.3 E.		19 12.0 E.				
Feb.	3 4.2 E. 5 21.9 E. 8 15.6 E.		9 17.7 E. 12 11.4 E. 15 5.0 E. 17 22.7 E. 20 16.3 E.		19 18.7 E. 22 12.3 E. 25 6.0 E. 27 23.7 E. 30 17.4 E.	June	30 20.1 E. 2 13.8 E. 5 7.5 E. 8 1.2 E. 10 18.9 E.	Nov.	11 4.0 E. 13 21.8 E. 16 15.5 E. 19 9.2 E.		22 5.7 E. 24 23.3 E. 27 17.0 E. 30 10.7 E.						

## RHEA.

Jan.	d h 2 18.1 E. 7 6.5 E. 11 18.9 E. 16 7.2 E. 20 19.6 E.	Feb.	d h 12 9.3 E. 16 21.6 E. 21 9.9 E. 25 22.2 E. Mar. 1 110.6 E.	Mar.	d h 24 0.2 E. 28 12.6 E. Apr. 2 0.9 E. 6 13.3 E. 11 1.7 E.	May	d h 3 15.7 E. 8 4.1 E. 12 16.5 E. 17 5.0 E. 21 17.4 E.	June	d h 13 7.8 E. 17 20.4 E. 22 8.9 E. 26 21.4 E. .....	Nov.	d h 23 3.6 E. 27 16.1 E. Dec. 2 4.6 E. 6 17.1 E. 11 5.5 E.	Dec.	d h 2 4.6 E. 6 17.1 E. 11 5.5 E.
	25 8.0 E. 29 20.3 E. Feb. 3 8.6 E. 7 21.0 E.		5 22.9 E. 10 11.2 E. 14 23.6 E. 19 11.9 E.		15 14.1 E. 20 2.4 E. 24 14.8 E. 29 3.2 E.		26 5.9 E. 30 18.4 E. June 4 6.9 E. 8 19.4 E.	Nov.	9 14.1 E. 14 2.6 E. 18 15.1 E.		15 18.0 E. 20 6.4 E. 24 18.9 E. 29 7.3 E.		

## TITAN.

Jan.	d h 6 2.7 W. 14 6.2 E. 22 0.8 W. 30 4.2 E.	Feb.	d h 22 20.0 W. Mar. 1 23.4 E. 9 17.4 W. 17 21.0 E.	Apr.	d h 10 12.9 W. 18 16.8 E. 26 11.1 W. May 4 15.3 E. 12 9.7 W.	May	d h 28 8.8 W. June 5 13.4 E. 13 8.3 W. 21 13.1 E. 29 8.2 W.	June	d h ..... ..... 19 11.8 W. 27 15.6 E.	Nov.	d h 20 12.1 W. 28 15.4 E. Dec. 6 11.8 W. 14 14.8 E. 23 11.1 W.	Dec.	d h 20 12.1 W. 28 15.4 E. 6 11.8 W. 14 14.8 E. 23 11.1 W.
Feb.	6 22.5 W. 15 1.8 E.		25 15.0 W. Apr. 2 18.8 E.		20 14.2 E.	July	7 13.0 E.	Nov.	4 12.1 W. 12 15.6 E.		30 13.8 E.		

## HYPERION.

Jan.	d h 9 7.0 W. 20 14.0 E. 30 13.3 W.	Feb.	d h 20 18.5 W. Mar. 3 0.1 E. 12 23.0 W.	Apr.	d h 3 3.2 W. 14 8.4 E. 24 7.5 W.	May	d h 15 12.2 W. 26 18.7 E. June 5 17.3 W. 17 0.9 E.	June	d h 26 22.8 W. July 8 7.8 E. .....	Nov.	d h 22 21.0 W. Dec. 4 15.5 E. 14 3.7 W. 25 22.9 E.	Dec.	d h 22 21.0 W. 4 15.5 E. 14 3.7 W. 25 22.9 E.
Feb.	10 19.6 E.		24 4.2 E.	May	5 13.2 E.	Nov.	13 7.7 E.		13 7.7 E.				

## IAPETUS.

Jan.	d h 14 19.2 S. Feb. 4 7.7 E.	Feb.	d h 23 9.8 I. Mar. 18 0.3 W.	Apr.	d h 1 22.6 S. 22 13.4 E.	May	d h 11 23.7 I. 30 23.2 W.	June	d h 20 10.0 S. Nov. 9 3.0 W.	Nov.	d h 29 22.5 S. Dec. 20 18.6 E.	Dec.	d h 29 22.5 S. 20 18.6 E.
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# SATELLITES OF SATURN, 1920.

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## DIFFERENTIAL COORDINATES OF PHOEBE.

FOR GREENWICH MEAN MIDNIGHT.

Date.	$\alpha_{Ph.} - \alpha_{Sat.}$	$\delta_{Ph.} - \delta_{Sat.}$	Date.	$\alpha_{Ph.} - \alpha_{Sat.}$	$\delta_{Ph.} - \delta_{Sat.}$	Date.	$\alpha_{Ph.} - \alpha_{Sat.}$	$\delta_{Ph.} - \delta_{Sat.}$
	m      s	'      "		m      s	'      "		m      s	'      "
Jan. 1	+1 44.0	-10 59	Apr. 14	+0 14.9	+ 0 45	July 27	-1 38.7	+12 2
3	1 43.7	10 53	16	0 12.4	1 2	29	1 40.1	12 10
5	1 43.3	10 47	18	0 9.9	1 18	31	1 41.5	12 18
7	1 42.8	10 41	20	0 7.3	1 34	Aug. 2	1 42.8	12 26
9	1 42.3	10 34	22	0 4.8	1 50	4	1 44.1	12 34
11	+1 41.6	-10 26	24	+0 2.2	+ 2 6	6	-1 45.3	+12 41
13	1 41.0	10 18	26	-0 0.3	2 21	8	-1 46.5	+12 48
15	1 40.2	10 9	28	0 2.8	2 37		.....	.....
17	1 39.3	10 0	30	0 5.4	2 52		.....	.....
19	1 38.4	9 51	May 2	0 7.9	3 8	Oct. 9	-2 0.8	+13 59
21	+1 37.4	- 9 41	4	-0 10.5	+ 3 23	11	-2 0.6	+13 56
23	1 36.4	9 30	6	0 13.0	3 39	13	2 0.2	13 53
25	1 35.3	9 19	8	0 15.5	3 54	15	1 59.8	13 49
27	1 34.1	9 8	10	0 18.0	4 9	17	1 59.3	13 45
29	1 32.9	8 56	12	0 20.5	4 24	19	1 58.8	13 41
31	+1 31.6	- 8 44	14	-0 23.0	+ 4 39	21	-1 58.3	+13 36
Feb. 2	1 30.3	8 32	16	0 25.5	4 54	23	1 57.7	13 31
4	1 28.9	8 20	18	0 28.0	5 8	25	1 57.0	13 26
6	1 27.4	8 7	20	0 30.4	5 23	27	1 56.3	13 20
8	1 25.9	7 54	22	0 32.9	5 37	29	1 55.6	13 13
10	+1 24.3	- 7 40	24	-0 35.3	+ 5 51	Nov. 31	-1 54.8	+13 7
12	1 22.7	7 26	26	0 37.7	6 5	2	1 53.9	13 0
14	1 21.1	7 12	28	0 40.1	6 19	4	1 53.0	12 52
16	1 19.4	6 58	30	0 42.4	6 33	6	1 52.1	12 45
18	1 17.6	6 43	June 1	0 44.8	6 47	8	1 51.1	12 36
20	+1 15.8	- 6 29	3	-0 47.1	+ 7 0	10	-1 50.0	+12 28
22	1 13.9	6 14	5	0 49.4	7 14	12	1 48.9	12 19
24	1 12.0	5 59	7	0 51.7	7 27	14	1 47.8	12 10
26	1 10.1	5 43	9	0 53.9	7 40	16	1 46.6	12 1
28	1 8.1	5 28	11	0 56.2	7 53	18	1 45.3	11 51
Mar. 1	+1 6.2	- 5 12	13	-0 58.3	+ 8 6	20	-1 44.0	+11 41
3	1 4.1	4 57	15	1 0.5	8 18	22	1 42.7	11 30
5	1 2.0	4 41	17	1 2.7	8 31	24	1 41.3	11 19
7	0 59.9	4 25	19	1 4.8	8 43	26	1 39.9	11 8
9	0 57.8	4 9	21	1 6.9	8 55	28	1 38.4	10 56
11	+0 55.6	- 3 53	23	-1 8.9	+ 9 7	Dec. 30	-1 36.9	+10 44
13	0 53.4	3 36	25	1 11.0	9 19	2	1 35.3	10 32
15	0 51.1	3 20	27	1 13.0	9 31	4	1 33.7	10 19
17	0 48.8	3 4	29	1 14.9	9 42	6	1 32.0	10 6
19	0 46.6	2 47	July 1	1 16.9	9 54	8	1 30.3	9 53
21	+0 44.2	- 2 31	3	-1 18.8	+10 5	10	-1 28.5	+ 9 39
23	0 41.9	2 15	5	1 20.6	10 16	12	1 26.7	9 25
25	0 39.5	1 58	7	1 22.4	10 26	14	1 24.8	9 11
27	0 37.1	1 42	9	1 24.2	10 37	16	1 23.0	8 56
29	0 34.7	1 25	11	1 26.0	10 47	18	1 21.0	8 41
31	+0 32.3	- 1 9	13	-1 27.7	+10 57	20	-1 19.0	+ 8 26
Apr. 2	0 29.8	0 52	15	1 29.4	11 7	22	1 17.0	8 10
4	0 27.4	0 36	17	1 31.1	11 17	24	1 14.9	7 54
6	0 24.9	0 20	19	1 32.7	11 26	26	1 12.8	7 38
8	0 22.4	- 0 3	21	1 34.2	11 35	28	1 10.7	7 22
10	+0 19.9	+ 0 13	23	-1 35.8	+11 44	30	-1 8.5	+ 7 5
12	+0 17.4	+ 0 29	25	-1 37.3	+11 53	32	-1 6.2	+ 6 48

Time from Eastern Elongation.	Mimas.		Time from Eastern Elongation.	Enceladus.		Tethys.		Time from Eastern Elongation.	Dione.	
	$p^{\circ}$	$F$		$p^{\circ}$	$F$	$p^{\circ}$	$F$		$p^{\circ}$	$F$
h	°		d h	°		°		d h	°	
0.0	85.0	1.000	0 0	85.0	1.000	85.0	1.000	0 0	85.0	1.000
0.5	83.9	0.991	0 1	83.8	0.982	84.2	0.991	0 2	83.8	0.982
1.0	82.8	0.962	0 2	82.4	0.929	83.4	0.962	0 4	82.4	0.929
1.5	81.6	0.916	0 3	80.9	0.842	82.5	0.916	0 6	80.9	0.842
2.0	80.2	0.853	0 4	78.8	0.726	81.5	0.852	0 8	78.9	0.725
2.5	78.6	0.773	0 5	75.9	0.585	80.3	0.772	0 10	76.0	0.584
3.0	76.5	0.680	0 6	70.9	0.425	78.8	0.677	0 12	71.0	0.423
3.5	73.8	0.574	0 7	59.5	0.256	76.8	0.571	0 14	59.6	0.254
4.0	69.7	0.460	0 8	15.5	0.121	73.8	0.454	0 16	14.8	0.119
4.5	62.8	0.340	0 9	302.1	0.186	68.5	0.331	0 18	301.4	0.187
5.0	48.6	0.225	0 10	282.8	0.350	57.0	0.207	0 20	282.4	0.352
5.5	12.6	0.142	0 11	275.9	0.516	19.6	0.109	0 22	275.7	0.515
6.0	319.6	0.165	0 12	272.3	0.666	311.5	0.136	1 0	272.2	0.665
6.5	294.5	0.267	0 13	270.0	0.794	287.7	0.249	1 2	269.9	0.796
7.0	284.0	0.386	0 14	268.3	0.895	279.3	0.374	1 4	268.2	0.896
7.5	278.5	0.504	0 15	266.8	0.963	275.0	0.495	1 6	266.8	0.964
8.0	275.1	0.616	0 16	265.6	0.997	272.4	0.609	1 8	265.5	0.997
8.5	272.6	0.717	0 17	264.3	0.994	270.6	0.712	1 10	264.3	0.994
9.0	270.8	0.805	0 18	263.0	0.957	269.2	0.801	1 12	263.0	0.955
9.5	269.3	0.879	0 19	261.5	0.884	268.1	0.876	1 14	261.6	0.882
10.0	268.0	0.936	0 20	259.8	0.781	267.2	0.934	1 16	259.8	0.778
10.5	266.8	0.975	0 21	257.4	0.650	266.3	0.974	1 18	257.4	0.646
11.0	265.7	0.996	0 22	253.5	0.497	265.5	0.996	1 20	253.5	0.492
11.5	264.6	0.999	0 23	246.0	0.331	264.7	0.999	1 22	245.9	0.325
12.0	263.5	0.982	1 0	223.4	0.169	263.9	0.983	2 0	222.4	0.164
12.5	262.3	0.947	1 1	145.4	0.130	263.1	0.948	2 2	142.8	0.132
13.0	261.1	0.894	1 2	108.4	0.275	262.2	0.895	2 4	107.7	0.280
13.5	259.6	0.824	1 3	98.3	0.444	261.1	0.826	2 6	98.0	0.449
14.0	257.8	0.739	1 4	93.7	0.602	259.8	0.740	2 8	93.8	0.607
14.5	255.6	0.641	1 5	90.9	0.741	258.2	0.642	2 10	90.7	0.745
15.0	252.4	0.532	1 6	89.0	0.854	255.9	0.531	2 12	88.9	0.858
15.5	247.6	0.415	1 7	87.4	0.937	252.3	0.412	2 14	87.4	0.939
16.0	238.7	0.295	1 8	86.1	0.986	245.7	0.287	2 16	86.0	0.967
16.5	218.7	0.186	1 9	84.9	1.000	229.2	0.187	2 18	84.8	1.000
17.0	170.7	0.136	1 10	83.6	0.978	173.4	0.099	2 20	83.6	0.976
17.5	127.0	0.200	1 11			119.8	0.172			
18.0	109.6	0.312	1 12			104.0	0.292			
18.5	101.6	0.432	1 13			97.5	0.417			
19.0	97.0	0.548	1 14			94.0	0.536			
19.5	94.0	0.656	1 15			91.7	0.646			
20.0	91.9	0.752	1 16			90.1	0.744			
20.5	90.2	0.835	1 17			88.8	0.829			
21.0	88.7	0.903	1 18			87.8	0.898			
21.5	87.5	0.953	1 19			86.9	0.950			
22.0	86.3	0.986	1 20			86.0	0.984			
22.5	85.2	1.000	1 21			85.2	0.999			
23.0	84.2	0.994	1 22			84.5	0.995			

Position angle of satellite  $p = p^{\circ} + (P - P_0)$ .  
 Apparent distance of satellite  $s = P^d(\rho)$ .

# SATELLITES OF SATURN, 1920.

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Time from Eastern Elongation.		Rhea.		Time from Eastern Elongation.		Titan.		Hyperion.		Time from Eastern Elongation.		Iapetus.	
		$p^{\circ}$	$F$			$p^{\circ}$	$F$	$p^{\circ}$	$F$			$p^{\circ}$	$F$
d	h			d	h					d			
0	0	85.0	1.000	0	0	85.0	0.978	85.0	1.077	0		95.0	1.010
0	3	83.8	0.985	0	10	83.9	0.961	84.2	1.064	2		95.5	0.993
0	6	82.6	0.941	0	20	82.7	0.916	83.5	1.039	4		96.1	0.952
0	9	81.2	0.869	1	6	81.3	0.846	82.6	1.001	6		96.7	0.888
0	12	79.4	0.771	1	16	79.6	0.751	81.7	0.950	8		97.4	0.801
0	15	77.1	0.651	2	2	77.4	0.635	80.7	0.887	10		98.4	0.693
0	18	73.7	0.514	2	12	74.0	0.501	79.5	0.812	12		99.7	0.568
0	21	67.4	0.363	2	22	68.1	0.356	78.0	0.727	14		101.8	0.428
1	0	52.3	0.213	3	8	53.7	0.210	76.1	0.631	16		106.2	0.279
1	3	358.0	0.117	3	18	1.8	0.112	73.5	0.527	18		121.2	0.127
1	6	299.6	0.203	4	4	300.7	0.189	69.6	0.416	20		225.7	0.074
1	9	283.2	0.353	4	14	283.6	0.334	62.7	0.302	22		260.3	0.216
1	12	276.6	0.503	5	0	276.9	0.480	47.6	0.193	24		266.9	0.369
1	15	276.1	0.642	5	10	273.3	0.617	6.8	0.120	26		269.6	0.513
1	18	270.7	0.764	5	20	271.0	0.739	812.8	0.156	28		271.2	0.643
2	21	269.0	0.863	6	6	269.3	0.841	290.7	0.257	30		272.3	0.757
2	0	267.5	0.937	6	16	267.9	0.923	281.5	0.371	32		273.1	0.850
2	3	266.3	0.983	7	2	266.8	0.980	276.7	0.481	34		273.8	0.920
2	6	265.1	1.000	7	12	265.7	1.018	273.6	0.585	36		274.4	0.967
2	9	263.9	0.987	7	22	264.7	1.021	271.4	0.677	38		274.9	0.988
2	12	262.7	0.945	8	8	266.6	1.008	269.7	0.758	40		275.5	0.983
2	15	261.3	0.875	8	18	262.5	0.960	268.3	0.823	42		276.0	0.954
2	18	259.6	0.779	9	4	261.3	0.894	267.1	0.872	44		276.6	0.900
2	21	257.3	0.661	9	14	259.8	0.806	266.0	0.904	46		277.3	0.824
3	0	254.0	0.524	10	0	257.9	0.699	265.0	0.919	48		278.2	0.728
3	3	248.0	0.374	10	10	255.3	0.576	264.0	0.916	50		279.4	0.615
3	6	234.0	0.223	10	20	251.1	0.440	262.9	0.895	52		281.1	0.487
3	9	183.9	0.118	11	6	242.9	0.298	261.8	0.858	54		284.2	0.348
3	12	121.7	0.193	11	16	220.8	0.165	260.5	0.807	56		291.6	0.204
3	15	103.9	0.342	12	2	154.9	0.123	259.1	0.741	58		329.4	0.073
3	18	97.0	0.493	12	12	114.2	0.232	257.3	0.663	60		67.1	0.126
3	21	93.3	0.633	12	22	101.7	0.373	255.0	0.576	62		82.6	0.269
4	0	90.8	0.756	13	8	96.2	0.511	251.9	0.480	64		87.4	0.412
4	3	89.1	0.857	13	18	92.9	0.640	247.1	0.379	66		89.7	0.547
4	6	87.6	0.933	14	4	90.7	0.752	238.9	0.278	68		91.1	0.669
4	9	86.3	0.981	14	14	89.0	0.845	221.6	0.184	70		92.1	0.777
4	12	85.2	1.000	15	0	87.6	0.915	182.2	0.130	72		92.9	0.866
4	15	84.0	0.989	15	10	86.4	0.960	136.9	0.164	74		93.6	0.936
				15	20	85.3	0.978	115.5	0.252	76		94.1	0.983
				16	6	84.2	0.968	105.8	0.354	78		94.7	1.007
				16	16			100.4	0.457	80		95.2	1.007
				17	2			97.0	0.556	82		95.7	0.982
				17	12			94.6	0.651				
				17	22			92.8	0.738				
				18	8			91.3	0.818				
				18	18			90.1	0.888				
				19	4			89.1	0.948				
				19	14			88.2	0.998				
				20	0			87.3	1.036				
				20	10			86.6	1.062				
				20	20			85.8	1.076				
				21	6			85.0	1.077				
				21	16			84.3	1.085				

Position angle of satellite  $p = p^{\circ} + (P - P_0)$ .  
 Apparent distance of satellite  $s = F \frac{\alpha(\rho)}{\rho}$ .

## SATELLITES OF SATURN, 1920.

FOR GREENWICH MEAN MIDNIGHT.

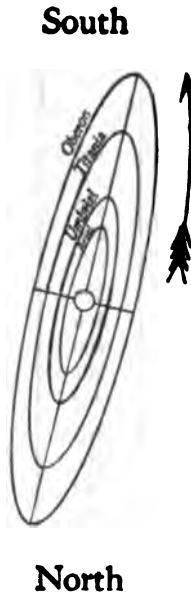
Date.	Mimas.		Enceladus.		Tethys.		Dione.	
	P-P <sub>0</sub> .	$\frac{s(p)}{p}$	P-P <sub>0</sub> .	$\frac{s(p)}{p}$	P-P <sub>0</sub> .	$\frac{s(p)}{p}$	P-P <sub>0</sub> .	$\frac{s(p)}{p}$
	.	"	.	"	.	"	.	"
Jan. 1	+1.1	29.1	-0.5	37.3	+0.1	46.2	-0.5	50.2
6	1.1	29.3	0.5	37.6	0.1	46.6	0.5	50.7
11	1.0	29.6	0.5	37.9	0.1	47.0	0.5	60.1
16	1.0	29.8	0.5	38.2	0.1	47.3	0.5	60.6
21	0.9	30.0	0.5	38.5	0.1	47.6	0.5	61.0
26	+0.9	30.2	-0.6	38.7	+0.1	47.9	-0.5	61.3
31	0.8	30.3	0.6	38.9	0.0	48.2	0.6	61.7
Feb. 5	0.7	30.5	0.6	39.1	0.0	48.4	0.6	61.9
10	0.6	30.6	0.6	39.2	0.0	48.5	0.6	62.1
15	0.5	30.6	0.7	39.3	0.0	48.7	0.6	62.3
20	+0.3	30.7	-0.7	39.4	0.0	48.8	-0.7	62.4
25	0.2	30.7	0.7	39.4	0.0	48.8	0.7	62.5
Mar. 1	+0.1	30.7	0.8	39.4	0.0	48.8	0.7	62.5
6	-0.1	30.7	0.8	39.4	-0.1	48.7	0.7	62.4
11	0.2	30.6	0.8	39.3	0.1	48.6	0.8	62.3
16	-0.4	30.5	-0.8	39.2	-0.1	48.5	-0.8	62.1
21	0.5	30.4	0.8	39.0	0.1	48.3	0.8	61.9
26	0.7	30.3	0.9	38.9	0.1	48.1	0.8	61.8
31	0.8	30.1	0.9	38.7	0.1	47.9	0.9	61.3
Apr. 5	1.0	29.9	0.9	38.4	0.2	47.6	0.9	60.9
10	-1.1	29.8	-0.9	38.2	-0.2	47.3	-0.9	60.5
15	1.3	29.5	0.9	37.9	0.2	46.9	0.9	60.1
20	1.4	29.3	1.0	37.6	0.2	46.6	0.9	59.6
25	1.6	29.1	1.0	37.3	0.2	46.2	0.9	59.2
30	1.7	28.8	1.0	37.0	0.1	45.8	0.9	58.7
May 5	-1.8	28.6	-1.0	36.7	-0.1	45.4	-0.9	58.2
10	1.9	28.3	1.0	36.4	0.1	45.0	0.9	57.6
15	2.0	28.1	1.0	36.0	0.1	44.6	0.9	57.1
20	2.1	27.8	1.0	35.7	0.1	44.2	0.9	56.6
25	2.2	27.6	1.0	35.4	-0.1	43.8	0.9	56.1
30	-2.3	27.3	-0.9	35.1	0.0	43.4	-0.9	55.6
June 4	2.4	27.1	0.9	34.8	0.0	43.0	0.9	55.1
9	2.4	26.9	0.9	34.5	0.0	42.7	0.9	54.6
14	2.4	26.6	0.9	34.2	0.0	42.3	0.8	54.2
19	-2.5	26.4	-0.9	33.9	+0.1	42.0	-0.8	53.8
..	..	...	..	...	..	...	..	...
Nov. 17	+1.8	26.1	+0.3	33.5	+1.4	41.4	+0.4	53.1
22	1.9	26.3	0.4	33.7	1.4	41.7	0.4	53.5
27	2.0	26.5	0.4	34.0	1.4	42.1	0.5	53.9
Dec. 2	2.0	26.7	0.4	34.3	1.4	42.4	0.5	54.3
7	+2.0	26.9	+0.4	34.6	+1.4	42.8	+0.5	54.8
12	2.1	27.2	0.4	34.9	1.4	43.2	0.5	55.3
17	2.1	27.4	0.4	35.2	1.5	43.6	0.6	55.8
22	2.1	27.7	0.5	35.5	1.5	43.9	0.6	56.3
27	2.0	27.9	0.5	35.8	1.5	44.3	0.6	56.8
32	+2.0	28.2	+0.5	36.1	+1.5	44.7	+0.6	57.3

SATELLITES OF SATURN, 1920.

FOR GREENWICH MEAN MIDNIGHT.

Date.	Rhea.		Titan.		Hyperion.		Iapetus.	
	$P-P_0$	$\frac{a(p)}{p}$	$P-P_0$	$\frac{a(p)}{p}$	$P-P_0$	$\frac{a(p)}{p}$	$P-P_0$	$\frac{a(p)}{p}$
	.	"	.	"	.	"	.	"
Jan. 1	-0.7	82.7	-0.1	192	-0.3	232	+0.4	559
6	0.7	83.4	0.1	196	0.3	234	0.4	563
11	0.7	84.0	0.1	195	0.3	236	0.4	568
16	0.8	84.6	0.1	196	0.3	238	0.3	572
21	0.8	85.2	0.2	197	0.3	239	0.3	575
26	-0.8	85.7	-0.2	199	-0.3	241	+0.2	579
31	0.8	86.1	0.2	200	0.4	242	0.1	582
Feb. 5	0.8	86.5	0.2	200	0.4	243	+0.1	584
10	0.8	86.8	0.2	201	0.4	244	0.0	586
15	0.9	87.1	0.3	202	0.4	245	-0.1	588
20	-0.9	87.2	-0.3	202	-0.4	245	-0.2	589
25	0.9	87.3	0.3	202	0.5	245	0.3	590
Mar. 1	1.0	87.3	0.4	202	0.5	245	0.4	590
6	1.0	87.2	0.4	202	0.5	245	0.4	589
11	1.0	87.0	0.4	202	0.5	244	0.5	588
16	-1.0	86.7	-0.4	201	-0.5	244	-0.6	586
21	1.1	86.4	0.5	200	0.6	243	0.7	584
26	1.1	86.0	0.5	199	0.6	242	0.8	581
31	1.1	85.6	0.5	198	0.6	240	0.8	578
Apr. 5	1.1	85.1	0.5	197	0.6	239	0.9	575
10	+1.1	84.5	-0.5	196	-0.6	237	-1.0	571
15	1.1	83.9	0.6	195	0.6	236	1.0	567
20	1.2	83.3	0.6	193	0.7	234	1.0	563
25	1.2	82.6	0.6	192	0.7	232	1.1	558
30	1.2	81.9	0.6	190	0.7	230	1.1	553
May 5	-1.2	81.2	-0.6	189	-0.7	228	-1.1	549
10	1.2	80.5	0.6	187	0.7	226	1.1	544
15	1.2	79.8	0.6	185	0.7	224	1.1	539
20	1.2	79.1	0.6	183	0.7	222	1.1	534
25	1.2	78.4	0.6	182	0.7	220	1.0	529
30	-1.2	77.7	-0.5	180	-0.6	218	-1.0	525
June 4	1.1	77.0	0.5	178	0.6	216	0.9	520
9	1.1	76.3	0.5	177	0.6	214	0.9	516
14	1.1	75.7	0.5	175	0.6	213	0.8	511
19	-1.1	75.1	-0.5	174	-0.6	211	-0.7	507
..	..	...	..	...	..	...	..	...
Nov. 17	+0.1	74.1	+0.7	172	+0.4	208	+2.8	501
22	0.1	74.7	0.8	173	0.5	210	2.9	505
27	0.1	75.3	0.8	174	0.5	211	2.9	509
Dec. 2	0.2	75.9	0.8	176	0.5	213	3.0	513
7	+0.2	76.5	+0.8	177	+0.5	215	+3.0	517
12	0.2	77.2	0.8	179	0.6	217	3.1	522
17	0.2	77.9	0.8	181	0.6	219	3.1	526
22	0.2	78.6	0.9	182	0.6	221	3.2	531
27	0.2	79.3	0.9	184	0.6	223	3.2	536
32	+0.2	80.0	+0.9	185	+0.6	225	+3.2	540

APPARENT ORBITS OF THE SATELLITES OF URANUS AT DATE OF OPPOSITIC  
AUGUST 26, 1920, AS SEEN IN AN INVERTING TELESCOPE.



GREENWICH MEAN TIME OF GREATEST ELONGATION.

ARIEL.		UMBRIEL.		TITANIA.		OBERON.
North.	South.	North.	South.	North.	South.	North and South.
d h	d h	d h	d h.	d h	d h	d h
May 24 7.4	May 28 2.1	May 14 12.7	May 16 14.4	May 9 8.4	May 13 16.8	June 5 21.6N.
31 20.8	June 4 15.5	22 19.6	24 21.8	18 1.3	22 9.7	12 15.1S.
June 8 10.2	12 5.0	31 2.5	June 2 4.2	26 18.2	31 2.6	19 8.7N.
15 23.7	19 18.4	June 8 9.4	10 11.1	June 4 11.1	June 8 19.6	26 2.2S.
23 13.1	27 7.9	16 16.3	18 18.0	13 4.0	17 12.5	July 2 19.8N.
July 1 2.6	July 4 21.3	24 23.2	27 0.9	21 21.0	26 5.4	9 13.4S.
8 16.1	12 10.8	July 3 6.1	July 5 7.8	30 13.9	July 4 22.4	16 6.9N.
16 5.5	20 0.3	11 13.0	13 14.7	July 9 6.8	13 15.3	23 0.5S.
23 19.0	27 13.7	19 19.9	21 21.7	17 23.8	22 8.3	29 18.1N.
31 8.5	Aug. 4 3.2	28 2.8	30 4.6	26 16.7	31 1.2	Aug. 5 11.7S.
Aug. 7 21.9	11 16.6	Aug. 5 9.8	Aug. 7 11.5	Aug. 4 9.7	Aug. 8 18.2	12 5.2N.
15 11.4	19 6.1	13 16.7	15 18.4	13 2.7	17 11.1	18 22.8S.
23 0.9	26 19.6	21 23.6	24 1.4	21 19.6	26 4.1	25 16.4N.
30 14.3	Sept. 3 9.1	30 6.6	Sept. 1 8.8	30 12.6	Sept. 3 21.1	Sept. 1 10.0S.
Sept. 7 3.8	10 22.5	Sept. 7 13.5	9 15.2	Sept. 8 5.6	12 14.1	8 3.6N.
14 17.3	18 12.0	15 20.4	17 22.2	16 22.5	21 7.0	14 21.2S.
22 6.8	26 1.5	24 3.4	26 5.1	25 15.5	30 0.0	21 14.8N.
29 20.3	Oct. 3 15.0	Oct. 2 10.3	Oct. 4 12.1	Oct. 4 8.5	Oct. 8 17.0	28 8.4S.
Oct. 7 9.7	11 4.5	10 17.3	12 19.0	13 1.5	17 9.9	Oct. 5 2.0N.
14 23.2	18 18.0	19 0.2	21 1.9	21 18.4	26 2.9	11 19.6S.
22 12.7	26 7.4	27 7.1	29 8.9	30 11.4	Nov. 3 19.9	18 13.2N.
30 2.2	Nov. 2 20.9	Nov. 4 14.1	Nov. 6 15.8	Nov. 8 4.4	12 12.8	25 6.8S.
Nov. 6 15.7	10 10.4	12 21.0	14 22.8	16 21.3	21 5.8	Nov. 1 0.4N.
14 5.2	17 23.9	21 4.0	23 5.7	25 14.3	29 22.7	7 17.9S.
21 18.6	25 13.4	29 10.9	Dec. 1 12.6	Dec. 4 7.2	Dec. 8 15.7	14 11.5N.

In the above diagram the central circle represents the planet.

For Ariel every third greatest elongation is given, and for Umbriel every alternate one; the intermediate ones may be found by adding multiples of the period of the satellite.

Sidereal period of Ariel, 2<sup>d</sup> 12<sup>h</sup>.489; of Umbriel, 4<sup>d</sup> 3<sup>h</sup>.460; of Titania, 8<sup>d</sup> 16<sup>h</sup>.941; of Oberon, 13<sup>d</sup> 11<sup>h</sup>.118.



# SATELLITES OF URANUS, 1920.

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Time from Northern Elongation.		Ariel.		Umbriel.		Time from Northern Elongation.		Titania.		Time from Northern Elongation.		Oberon.	
		$p^1$	$F$	$p^1$	$F$			$p^1$	$F$			$p^1$	$F$
0	0	347.0	1.000	347.0	1.000	0	0	347.0	1.000	0	0	347.0	1.000
0	2	349.7	0.980	348.6	0.992	0	5	348.9	0.989	0	8	349.0	0.989
0	4	352.6	0.919	350.3	0.970	0	10	350.9	0.967	0	16	351.1	0.964
0	6	356.0	0.822	352.0	0.933	0	15	353.1	0.905	1	0	353.3	0.898
0	8	0.6	0.693	354.0	0.882	0	20	355.6	0.834	1	8	356.0	0.823
0	10	7.6	0.542	356.2	0.817	1	1	358.7	0.746	1	16	359.3	0.729
0	12	20.3	0.381	358.8	0.742	1	6	2.6	0.643	2	0	3.6	0.621
0	14	49.0	0.248	2.1	0.666	1	11	8.2	0.531	2	8	9.9	0.503
0	16	90.5	0.238	6.4	0.583	1	16	16.8	0.414	2	16	20.1	0.382
0	18	131.4	0.362	12.5	0.465	1	21	32.0	0.305	3	0	39.0	0.276
0	20	145.3	0.522	21.8	0.369	2	2	60.0	0.230	3	8	73.1	0.221
0	22	152.7	0.676	37.3	0.282	2	7	97.7	0.235	3	16	109.6	0.259
1	0	157.5	0.808	63.1	0.226	2	12	124.1	0.316	4	0	131.1	0.360
1	2	161.1	0.909	95.0	0.231	2	17	138.3	0.426	4	8	142.5	0.479
1	4	164.0	0.974	119.3	0.292	2	22	146.5	0.543	4	16	149.4	0.599
1	6	166.7	1.000	133.7	0.381	3	3	151.9	0.655	5	0	154.0	0.709
1	8	169.8	0.984	142.5	0.479	3	8	155.7	0.756	5	8	157.4	0.806
1	10	172.2	0.929	148.8	0.576	3	13	158.7	0.842	5	16	160.2	0.885
1	12	175.5	0.836	152.4	0.668	3	18	161.1	0.912	6	0	162.5	0.945
1	14	179.9	0.711	155.6	0.753	3	23	163.3	0.962	6	8	164.6	0.964
1	16	186.5	0.561	158.1	0.827	4	4	166.3	0.992	6	16	166.6	1.000
1	18	198.2	0.400	160.3	0.889	4	9	167.2	1.000	7	0	168.6	0.993
1	20	224.1	0.260	162.2	0.938	4	14	169.1	0.987	7	8	170.6	0.963
1	22	273.8	0.229	164.0	0.974	4	19	171.1	0.953	7	16	172.9	0.911
2	0	308.8	0.343	165.6	0.994	5	0	173.4	0.898	8	0	175.4	0.839
2	2	324.1	0.502	167.2	1.000	5	5	175.9	0.825	8	8	178.6	0.749
2	4	332.0	0.658	168.8	0.990	5	10	179.0	0.736	8	16	182.6	0.643
2	6	337.0	0.793	170.5	0.966	5	15	183.1	0.632	9	0	188.4	0.527
2	8	340.7	0.899	172.3	0.927	5	20	188.9	0.519	9	8	197.6	0.406
2	10	343.7	0.968	174.2	0.874	6	1	198.0	0.402	9	16	214.3	0.294
2	12	348.4	0.999	176.5	0.806	6	6	214.2	0.294	10	0	245.3	0.225
2	14	349.0	0.988	179.2	0.731	6	11	243.9	0.226	10	8	233.6	0.245
2	16			182.6	0.644	6	16	231.3	0.240	10	16	307.9	0.338
2	18			187.1	0.560	6	21	306.1	0.327	11	0	320.8	0.456
2	20			193.5	0.452	7	2	319.4	0.439	11	8	328.3	0.576
2	22			203.5	0.356	7	7	327.2	0.556	11	16	333.2	0.688
3	0			220.1	0.272	7	12	332.3	0.666	12	0	336.8	0.788
3	2			247.3	0.223	7	17	336.0	0.766	12	8	339.7	0.871
3	4			279.0	0.237	7	22	339.0	0.851	12	16	342.1	0.935
3	6			301.7	0.303	8	3	341.4	0.918	13	0	344.2	0.978
3	8			315.2	0.394	8	8	343.5	0.966	13	8	346.2	0.998
3	10			323.4	0.492	8	13	345.5	0.993	13	16	348.2	0.996
3	12			328.9	0.589	8	18	347.4	1.000				
3	14			332.9	0.680								
3	16			336.0	0.763								
3	18			338.5	0.836								
3	20			340.6	0.897								
3	22			342.5	0.944								
4	0			344.2	0.977								
4	2			345.8	0.996								
4	4			347.4	1.000								

Position angle of satellite  $p = p^1 + (P - P_0)$ .

Apparent distance of satellite  $s = F \frac{s(p)}{p}$ .

SATELLITES OF URANUS, 1920.

FOR GREENWICH MEAN MIDNIGHT.

Date.	P-P <sub>e</sub> .	$\alpha(\rho)$				Date.	P-P <sub>e</sub> .	$\alpha(\rho)$			
		Ariel.	Umbriel.	Titania.	Oberon.			Ariel.	Umbriel.	Titania.	Oberon.
May 1	0	"	"	"	"	Aug. 29	0	"	"	"	"
6	-0.3	12.9	18.0	29.6	39.6	Sept. 3	+0.1	13.9	19.3	31.7	42.4
11	0.3	13.0	18.1	29.7	39.7	8	0.1	13.9	19.3	31.7	42.4
16	0.3	13.1	18.2	29.9	40.0	13	0.2	13.8	19.3	31.6	42.3
21	0.4	13.2	18.3	30.0	40.2	18	0.2	13.8	19.3	31.6	42.3
26	-0.4	13.2	18.4	30.2	40.4	23	+0.2	13.8	19.2	31.6	42.3
31	0.4	13.3	18.5	30.3	40.5	28	0.3	13.8	19.2	31.5	42.1
June 5	0.4	13.3	18.6	30.4	40.7	Oct. 3	0.3	13.7	19.1	31.4	42.0
10	0.4	13.4	18.6	30.6	40.9	8	0.3	13.7	19.1	31.3	41.9
15	0.4	13.4	18.7	30.7	41.0	13	0.4	13.6	19.0	31.2	41.7
20	-0.4	13.5	18.8	30.8	41.2	18	+0.4	13.6	18.9	31.1	41.6
25	0.4	13.5	18.8	30.9	41.4	23	0.4	13.6	18.9	31.0	41.4
30	0.4	13.6	18.9	31.0	41.5	28	0.4	13.5	18.8	30.9	41.3
July 5	0.3	13.6	19.0	31.1	41.7	Nov. 2	0.4	13.4	18.7	30.7	41.1
10	0.3	13.7	19.0	31.2	41.8	7	0.4	13.4	18.6	30.6	40.9
15	-0.3	13.7	19.1	31.4	41.9	12	+0.4	13.3	18.6	30.5	40.8
20	0.3	13.8	19.2	31.4	42.0	17	0.4	13.3	18.5	30.3	40.6
25	0.2	13.8	19.2	31.5	42.1	22	0.4	13.2	18.4	30.2	40.4
30	0.2	13.8	19.2	31.6	42.2	27	0.4	13.2	18.3	30.1	40.2
Aug. 4	0.1	13.8	19.3	31.6	42.3	Dec. 2	0.4	13.1	18.3	30.0	40.1
9	-0.1	13.9	19.3	31.7	42.4	7	+0.4	13.0	18.2	29.8	39.9
14	-0.1	13.9	19.3	31.7	42.4	12	0.3	13.0	18.1	29.7	39.7
19	0.0	13.9	19.3	31.7	42.4	17	0.3	12.9	18.0	29.6	39.6
24	0.0	13.9	19.3	31.7	42.4	22	+0.3	12.9	18.0	29.5	39.4

SATELLITE OF NEPTUNE, 1920.

Time from Eastern Elongation.	$p^1$	F	Time from Eastern Elongation.	$p^1$	F	Date.	P-P <sub>e</sub> .	$\alpha(\rho)$	Date.	P-P <sub>e</sub> .	$\alpha(\rho)$
d h	.		d h	.		Jan. 1	+0.9	16.7	Apr. 30	-1.3	16.2
0 0	127.0	1.000	3 0	304.7	0.999	6	0.8	16.7	May 5	1.3	16.2
0 3	122.3	0.995	3 3	300.0	0.988	11	0.7	16.7	10	1.3	16.1
0 6	117.5	0.978	3 6	295.1	0.966	16	0.5	16.8	15	1.2	16.1
0 9	112.5	0.951	3 9	289.9	0.934	21	0.4	16.8	20	1.1	16.0
0 12	107.1	0.915	3 12	284.3	0.894	26	+0.2	16.8	25	-1.0	16.0
0 15	101.3	0.871	3 15	278.2	0.847	31	+0.1	16.8	Oct. 8	+3.3	16.0
0 18	94.8	0.822	3 18	271.3	0.797	Feb. 5	0.0	16.8	13	3.4	16.0
0 21	87.4	0.770	3 21	263.4	0.745	10	-0.2	16.8	18	3.4	16.1
1 0	79.0	0.719	4 0	254.4	0.695	15	0.3	16.8	23	3.5	16.1
1 3	69.3	0.673	4 3	244.1	0.654	20	-0.5	16.7	28	+3.6	16.2
1 6	58.4	0.637	4 6	232.6	0.624	25	0.6	16.7	Nov. 2	3.6	16.2
1 9	46.4	0.615	4 9	220.3	0.610	Mar. 1	0.7	16.7	7	3.6	16.2
1 12	33.9	0.610	4 12	207.8	0.614	6	0.8	16.7	12	3.7	16.3
1 15	21.6	0.624	4 15	195.8	0.636	11	0.9	16.6	17	3.7	16.3
1 18	10.1	0.653	4 18	184.9	0.672	16	-1.0	16.6	22	+3.7	16.4
1 21	359.8	0.695	4 21	175.2	0.718	21	1.1	16.6	27	3.6	16.4
2 0	350.7	0.744	5 0	166.7	0.769	26	1.2	16.5	Dec. 2	3.6	16.5
2 3	342.8	0.796	5 3	159.3	0.821	31	1.3	16.5	7	3.5	16.5
2 6	335.9	0.847	5 6	152.8	0.870	Apr. 5	1.3	16.4	12	3.5	16.6
2 9	329.8	0.894	5 9	146.9	0.914	10	-1.3	16.4	17	+3.4	16.6
2 12	324.2	0.934	5 12	141.6	0.951	15	1.3	16.4	22	3.3	16.6
2 15	319.0	0.965	5 15	136.6	0.978	20	1.3	16.3	27	3.2	16.7
2 18	314.1	0.987	5 18	131.8	0.994	25	-1.3	16.3	32	+3.1	16.7
2 21	309.4	0.999	5 21	127.1	1.000						

Position angle of satellite  $p-p^1+(P-P_e)$ .

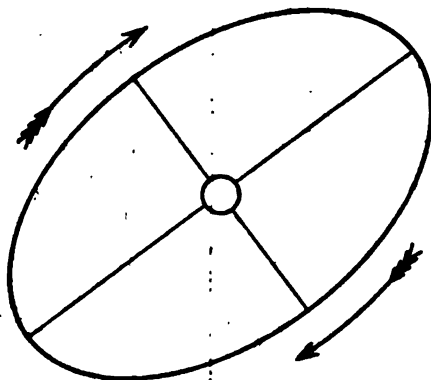
Apparent distance of satellite  $s-F\frac{\alpha(\rho)}{p}$ .

# SATELLITE OF NEPTUNE, 1920.

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APPARENT ORBIT OF THE SATELLITE OF NEPTUNE AT DATE OF OPPOSITION, JANUARY 30, 1920, AS SEEN IN AN INVERTING TELESCOPE.

South



North

## GREENWICH MEAN TIME OF GREATEST ELONGATION.

Jan. 5 20.4 E.	Mar. 10 12.7 E.	May 14 4.4 E.	Aug. 27 21.9 E.	Oct. 31 12.5 E.
8 19.0 W.	13 11.2 W.	17 3.0 W.	30 20.4 W.	Nov. 3 11.1 W.
11 17.5 E.	16 9.8 E.	20 1.5 E.	Sept. 2 18.8 E.	6 9.6 E.
14 16.1 W.	19 8.4 W.	23 0.0 W.	5 17.3 W.	9 8.1 W.
17 14.6 E.	22 6.9 E.	25 22.5 E.	8 15.8 E.	12 6.6 E.
20 13.2 W.	25 5.4 W.	28 21.0 W.	11 14.2 W.	15 5.1 W.
23 11.7 E.	28 4.0 E.	31 19.5 E.	14 12.7 E.	18 3.6 E.
26 10.3 W.	31 2.5 W.	June 3 18.0 W.	17 11.2 W.	21 2.1 W.
29 8.9 E.	Apr. 3 1.1 E.	6 16.5 E.	20 9.7 E.	24 0.6 E.
Feb. 1 7.4 W.	5 23.6 W.	9 15.0 W.	23 8.1 W.	26 23.2 W.
4 6.0 E.	8 22.2 E.	12 13.4 E.	26 6.6 E.	29 21.7 E.
7 4.6 W.	11 20.7 W.	15 11.9 W.	29 5.1 W.	Dec. 2 20.2 W.
10 3.1 E.	14 19.2 E.	18 10.4 E.	Oct. 2 3.6 E.	5 18.8 E.
13 1.7 W.	17 17.8 W.	21 8.9 W.	5 2.1 W.	8 17.3 W.
16 0.2 E.	20 16.3 E.	24 7.4 E.	8 0.6 E.	11 15.8 E.
18 22.8 W.	23 14.8 W.	27 5.9 W.	10 23.1 W.	14 14.4 W.
21 21.4 E.	26 13.3 E.	30 4.4 E.	13 21.6 E.	17 12.9 E.
24 19.9 W.	29 11.9 W.	July 3 2.8 W.	16 20.0 W.	20 11.4 W.
27 18.5 E.	May 2 10.4 E.	6 1.3 E.	19 18.5 E.	23 10.0 E.
Mar. 1 17.0 W.	5 8.9 W.	8 23.8 W.	22 17.0 W.	26 8.5 W.
4 15.6 E.	8 7.4 E.	11 22.3 E.	25 15.5 E.	29 7.1 E.
7 14.1 W.	11 5.9 W.	.....	28 14.0 W.	32 5.6 W.

In the above diagram the central circle represents the planet.  
The sidereal period of the satellite of Neptune is  $5^d 21^h.044$ .

PLANETARY CONFIGURATIONS.

Month	d	h	m	Planet	Event	Time
Jan.	3	10	-	♃	in Perihelion.	
	6	5	-	♃	in ♄	
	7	6	38	♃	♃	+ 5 11
	7	16	38	♃	♃	+ 6 12
	9	13	41	♃	♃	+ 7 9
	12	17	9	♃	♃	+ 4 52
	13	15	-	♃	in Aphelion.	
	16	11	-	♃	in Aphelion.	
	17	1	37	♃	♃	+ 0 3
	19	20	36	♃	♃	- 5 43
Feb.	23	6	40	♃	♃	- 6 4
	30	20	-	♃	♃	
	2	18	-	♃	♃	
	3	16	0	♃	♃	+ 5 6
	3	21	32	♃	♃	+ 6 8
	5	8	-	♃	Superior.	
	5	20	-	♃	Greatest Hel. Lat. S.	
	5	21	14	♃	♃	+ 7 7
	9	22	8	♃	♃	+ 3 43
	13	18	-	♃	♃	- 1 0
Mar.	16	12	5	♃	♃	- 4 4
	19	16	27	♃	♃	- 5 58
	20	13	56	♃	♃	- 5 41
	21	2	-	♃	in ♄	
	24	20	-	♃	in ♄	
	25	9	-	♃	in ♄	
	27	16	-	♃	in Perihelion.	
	29	10	-	♃	in Perihelion.	
	1	23	34	♃	♃	+ 5 10
	2	0	44	♃	♃	+ 6 9
Apr.	3	11	-	♃	Greatest elong. E.	18 12
	4	8	5	♃	♃	+ 7 10
	8	17	26	♃	♃	+ 3 7
	9	22	-	♃	Stationary.	
	10	17	-	♃	Greatest Hel. Lat. N.	
	12	15	-	♃	♃	+ 0 58
	14	12	-	♃	Stationary.	
	17	21	57	♃	♃	- 6 18
	18	4	2	♃	♃	- 5 59
	19	20	-	♃	Inferior.	
Apr.	19	22	52	♃	♃	- 0 30
	20	9	59	♃	enters ♄, Spring con.	
	20	17	-	♃	♃	- 0 21
	29	4	18	♃	♃	+ 6 16
	29	5	9	♃	♃	+ 5 20
	30	20	-	♃	in Aphelion.	
	31	7	10	♃	Stationary.	
	3	4	-	♃	in ♄	
	3	16	-	♃	Stationary.	
	Apr.	4	14	-	♃	♃
4		20	35	♃	♃	+ 2 5
13		10	-	♃	in Aphelion.	
14		16	5	♃	♃	- 6 4
16		12	48	♃	♃	- 6 9
16		18	-	♃	Greatest elong. W.	2 1
17		0	26	♃	♃	- 5 1
18		23	-	♃	Stationary.	
19		16	-	♃	♃	+ 6 5
20		21	-	♃	♃	
Apr.	22	6	-	♃	Greatest Hel. Lat. S.	
	25	10	24	♃	♃	+ 5 7
	25	10	59	♃	♃	+ 6 25
	27	11	2	♃	♃	+ 7 5
	27	17	-	♃	nearest ♃.	
	28	22	-	♃	♃	
	29	6	-	♃	♃	
	1	9	54	♃	♃	+ 2 5
	2	-	-	♃	Tot. ecl. vis. at Wash	
	3	19	-	♃	Greatest Hel. Lat. S.	
May	7	0	-	♃	Stationary.	
	12	2	46	♃	♃	- 6 1
	13	5	-	♃	♃	- 6 25
	16	21	2	♃	♃	- 1 25
	17	-	-	♃	Par. ecl. invis. at Wash	
	17	1	43	♃	♃	- 0 5
	22	17	26	♃	♃	+ 5 7
	22	19	-	♃	in ♄	
	22	22	21	♃	♃	+ 6 2
	24	17	2	♃	♃	+ 7 5
May	25	14	-	♃	Superior.	
	26	6	-	♃	♃	
	26	17	-	♃	in Perihelion.	
	27	10	-	♃	in ♄	
	27	14	-	♃	in ♄	
	28	4	12	♃	♃	+ 2 1
	1	13	-	♃	Stationary.	
	2	8	-	♃	in ♄	
	6	16	-	♃	Greatest Hel. Lat. N.	
	8	10	50	♃	♃	- 6 1
June	10	1	-	♃	Stationary.	
	15	17	11	♃	♃	+ 2 5
	17	12	-	♃	in ♄	
	17	17	18	♃	♃	+ 6 2
	19	3	6	♃	♃	+ 5 2
	19	14	13	♃	♃	+ 6 15
	21	2	37	♃	♃	+ 7 1
	21	5	40	♃	enters ♄, Summer con.	
	24	15	43	♃	♃	+ 0 56
	29	2	-	♃	Greatest elong. E.	25 4

GREENWICH MEAN TIME.

PLANETARY CONFIGURATIONS.

Month	d	h	m	Planet	Configuration	Time	
June	30	3	-	♃	in ♃		
	July	3	8	-	♃	Superior.	
		4	0	-	♃	in Aphelion.	
		5	16	13	♃	in Aphelion.	♁ - 5 50
	10	9	-	♃	in Aphelion.		
	12	6	-	♃	Stationary.		
	15	16	8	♃		♀ + 5 59	
	16	11	49	♃		♂ + 1 18	
	16	14	49	♃		♄ + 5 15	
	17	9	8	♃		♅ + 6 6	
18	15	40	♃		♁ + 6 41		
21	5	-	♃	in Perihelion.			
22	16	-	♃		♂ - 6 10		
22	18	5	♃		♁ - 0 48		
26	19	-	♃	Inferior.			
27	0	-	♃		♀ + 1 19		
Aug.	30	18	-	♃	Greatest Hel. Lat. S.		
	1	20	14	♃		♁ - 5 42	
	3	12	-	♃			
	3	13	-	♃			
	5	18	-	♃	Stationary.		
	8	8	-	♃		♀ + 0 39	
	12	0	-	♃	Greatest Hel. Lat. N.		
	12	9	8	♃		♂ + 3 23	
	13	2	48	♃		♄ + 5 14	
	14	5	20	♃		♅ + 5 56	
14	13	-	♃	Greatest elong. W.	18 44		
14	16	23	♃		♀ + 6 23		
15	6	51	♃		♁ + 6 22		
18	18	-	♃	in ♁			
20	6	54	♃		♁ - 2 42		
21	6	-	♃		♂ + 0 32		
21	21	-	♃				
22	8	-	♃		♀ - 0 28		
23	9	-	♃	in Perihelion.			
26	19	-	♃				
29	0	41	♃		♁ - 5 41		
31	18	-	♃		♁ + 0 57		
Sept.	2	15	-	♃	Greatest Hel. Lat. N.		
	7	12	-	♃			
	8	2	-	♃		♂ - 0 6	
	8	14	-	♃	Superior.		
	9	13	23	♃		♄ + 5 19	
	11	1	0	♃		♅ + 5 47	
	11	22	20	♃		♁ + 6 10	
	12	11	7	♃		♂ + 5 17	
	13	16	32	♃		♀ + 3 24	
	18	3	31	♃		♁ - 4 30	
22	20	29	♃	enters ♋, Autumn com.			
25	6	48	♃		♁ - 5 47		
Sept.	26	3	-	♃	in ♃		
	Oct.	6	8	-	♃	in Aphelion.	
		6	21	30	♃		♄ + 5 26
	7	2	-	♃	in ♃		
	8	18	39	♃		♅ + 5 39	
	9	12	24	♃		♁ + 6 2	
	13	6	55	♃		♀ - 2 32	
	13	19	16	♃		♁ - 1 22	
	17	6	3	♃		♁ - 5 56	
	22	14	37	♃		♁ - 5 52	
24	22	-	♃	Greatest elong. E.	24 8		
26	17	-	♃	Greatest Hel. Lat. S.			
27	-	-	♃	Tot. ecl. invis. at Wash.			
31	12	-	♃	Greatest Hel. Lat. S.			
Nov.	3	3	38	♃		♄ + 5 29	
	5	6	-	♃	Stationary.		
	5	9	16	♃		♅ + 5 30	
	5	23	-	♃			
	5	23	55	♃		♁ + 5 57	
	10	-	-	♃	Par. ecl. vis. at Wash.		
	10	12	-	♃	in Aphelion.		
	11	0	48	♃		♁ - 3 16	
	11	2	-	♃	Stationary.		
	13	4	45	♃		♀ - 5 35	
14	18	-	♃	in ♁			
15	12	0	♃		♁ - 6 44		
15	18	-	♃	Inferior.			
15	23	-	♃	Stationary.			
18	23	13	♃		♁ - 5 49		
19	8	-	♃	in Perihelion.			
23	21	-	♃				
24	22	-	♃	Stationary.			
25	4	-	♃	in Perihelion.			
29	15	-	♃	Greatest Hel. Lat. N.			
30	9	46	♃		♄ + 5 24		
Dec.	2	20	49	♃		♅ + 5 19	
	2	22	-	♃	Greatest Hel. Lat. S.		
	3	0	-	♃	Greatest elong. W.	20 30	
	3	8	58	♃		♁ + 5 50	
	8	3	34	♃		♁ + 0 2	
	9	19	-	♃			
	13	18	25	♃		♀ - 7 27	
	14	13	6	♃		♁ - 6 35	
	16	5	-	♃			
	16	7	36	♃		♁ - 5 36	
21	15	17	♃	enters ♋, Winter com.			
23	2	-	♃	in ♃			
27	17	49	♃		♄ + 5 15		
30	6	5	♃		♅ + 5 7		
30	16	51	♃		♁ + 5 40		
31	17	-	♃	in Perihelion.			

No.	Place.	Latitude.	Reduction to Geocentric Latitude.	Altitude (Meters).	Log $\rho$ (Including altitude).	Longitude from Greenwich.	Reduction from Greenwich to Local S.T.M.N.
		° ' "	' "			<sup>h</sup> <sup>m</sup> <sup>s</sup>	<sup>s</sup>
1	Abbadia, France . . .	+43 22 52.2	-11 34.4	69	9.999317	+ 0 7 0.1	+ 1.15
2	Adelaide, S. Australia .	-34 55 38.0 <sup>a</sup>	+10 52.4	41 <sup>b</sup>	9.999526	- 9 14 20.07 <sup>a</sup>	- 91.06
3	Adelaide, S. Australia .	-34 55 37.4 <sup>c</sup>	+10 52.4	...	9.999523	- 9 14 20.17 <sup>c</sup>	- 91.06
4	Albany, N. Y. . . . .	+42 39 12.7 <sup>a</sup>	-11 33.1	70 <sup>a</sup>	9.999336	+ 4 55 7.12 <sup>a</sup>	+ 48.48
5	Albany, N. Y. . . . .	+42 39 49.5 <sup>a</sup>	-11 33.1	52	9.999335	+ 4 54 59.97 <sup>a</sup>	+ 48.46
6	Algiers, Algeria . . .	+36 47 50	-11 6.7	342	9.999501	- 0 12 8.38	- 1.99
7	Allegheny, Pa. . . . .	+40 28 58.1 <sup>d</sup>	-11 26.7	370 <sup>d</sup>	9.999411	+ 5 20 5.39 <sup>d</sup>	+ 52.58
8	Allegheny, Pa. . . . .	+40 27 41.6	-11 26.6	...	9.999387	+ 5 20 2.93	+ 52.58
9	Amherst, Mass. . . . .	+42 21 56.5 <sup>e</sup>	-11 32.5	110 <sup>e</sup>	9.999346	+ 4 50 5.93 <sup>e</sup>	+ 47.66
10	Amherst, Mass. . . . .	+42 22 17.1 <sup>f</sup>	-11 32.5	...	9.999338	+ 4 50 4.67 <sup>f</sup>	+ 47.65
11	Ann Arbor, Mich. . . .	+42 16 48.7 <sup>a</sup>	-11 32.3	282 <sup>a</sup>	9.999360	+ 5 34 55.27 <sup>a</sup>	+ 55.02
12	Appleton, Wis. . . . .	+44 15 39.2 <sup>g</sup>	-11 35.4	242	9.999307	+ 5 53 35.92 <sup>g</sup>	+ 58.09
13	Arcetri, Italy . . . . .	+43 45 14.4	-11 34.9	184	9.999316	- 0 45 1.30	- 7.40
14	Arequipa, Peru . . . .	-16 22 28.0 <sup>h</sup>	+ 6 15.2	2451 <sup>h</sup>	0.000052	+ 4 46 11.73 <sup>h</sup>	+ 47.02
15	Armagh, Ireland . . . .	+54 21 12.7 <sup>c</sup>	-10 59.6	61 <sup>c</sup>	9.999040	+ 0 26 35.4 <sup>c</sup>	+ 4.37
16	Athens, Greece . . . .	+37 58 19.7 <sup>i</sup>	-11 14.3	107 <sup>i</sup>	9.999456	- 1 34 53 <sup>i</sup>	- 15.59
17	Baltimore, Md. . . . .	+39 17 52.0 <sup>j</sup>	-11 21.5	36 <sup>j</sup>	9.999418	+ 5 6 29.1 <sup>j</sup>	+ 50.35
18	Bamberg, Bavaria . . . .	+49 53 6.0 <sup>c</sup>	-11 26.0	299 <sup>c</sup>	9.999167	- 0 43 33.57 <sup>c</sup>	- 7.16
19	Barcelona, Spain . . . .	+41 25 18	-11 30.0	420	9.999391	- 0 8 28.0	- 1.39
20	Beloit, Wis. . . . .	+42 30 8.4	-11 32.8	...	9.999335	+ 5 56 7.4	+ 58.50
21	Bergedorf, Germany . . .	+53 28 46.2	-11 6.1	35	9.999060	- 0 40 57.74	- 6.73
22	Berkeley, Cal. . . . .	+37 52 23.6	-11 18.7	97	9.999458	+ 8 9 2.82	+ 80.34
23	Berlin, Prussia . . . . .	+52 30 16.7 <sup>k</sup>	-11 12.5	47 <sup>k</sup>	9.999065	- 0 53 34.90 <sup>k</sup>	- 8.80
24	Berlin, Prussia . . . . .	+52 31 13.1	-11 12.4	...	9.999081	- 0 53 34.41	- 8.80
25	Berlin, Prussia . . . . .	+52 31 30.7	-11 12.4	...	9.999081	- 0 53 27.40	- 8.78
26	Berlin, Prussia . . . . .	+52 29 7	-11 12.6	38	9.999064	- 0 53 54.2	- 8.86
27	Berne, Switzerland . . . .	+46 57 8.7	-11 34.2	573	9.999260	- 0 29 45.70 <sup>a</sup>	- 4.89
28	Besançon, France . . . .	+47 14 59.0	-11 33.7	312	9.999235	- 0 23 57.13	- 3.93
29	Birr Castle, Ireland . . . .	+53 5 47	-11 8.7	56	9.999071	+ 0 31 40.9	+ 5.20
30	Bloomington, Ind. . . . .	+39 9 56 <sup>d</sup>	-11 20.8	238 <sup>d</sup>	9.999435	+ 5 46 5 <sup>d</sup>	+ 56.85
31	Bogota, Colombia . . . .	+ 4 35 55.2 <sup>c</sup>	- 1 50.8	2634	0.000170	+ 4 56 23.5	+ 48.69
32	Bombay (Colaba), India . .	+18 53 36.2 <sup>c</sup>	- 7 5.1	14 <sup>c</sup>	9.999649	- 4 51 15.72 <sup>e</sup>	- 47.85
33	Bonn, Prussia . . . . .	+50 43 45.0 <sup>k</sup>	-11 23.3	62 <sup>j</sup>	9.999130	- 0 28 23.17 <sup>k</sup>	- 4.66
34	Bordeaux (Flourac), France	+44 50 7.2 <sup>a</sup>	-11 35.6	73	9.999281	+ 0 2 2.551 <sup>a</sup>	+ 0.34
35	Boston, Mass. . . . .	+42 20 58 <sup>m</sup>	-11 32.5	31 <sup>m</sup>	9.999341	+ 4 44 19.1 <sup>m</sup>	+ 46.71
36	Boston, Mass. . . . .	+42 21 32.5	-11 32.5	48	9.999342	+ 4 44 15.0	+ 46.70
37	Bothkamp, Prussia . . . .	+54 12 9.6 <sup>n</sup>	-11 0.8	32 <sup>n</sup>	9.999042	- 0 40 31.02 <sup>n</sup>	- 6.66
38	Bremen, Germany . . . . .	+53 4 36	-11 8.8	...	9.999067	- 0 35 15	- 5.79
39	Breslau, Prussia . . . . .	+51 6 55.8 <sup>k</sup>	-11 20.4	147 <sup>k</sup>	9.999126	- 1 8 8.72 <sup>k</sup>	- 11.20
40	Brisbane, Queensland . . .	-27 28 0.0	+ 9 23.3	...	9.999691	-10 12 6.17	-100.55
41	Brussels (Uccle), Belgium	+50 47 55.5 <sup>a</sup>	-11 21.9	105 <sup>a</sup>	9.999131	- 0 17 26.05 <sup>a</sup>	- 2.86
42	Brussels, Belgium . . . .	+50 51 10.6 <sup>c</sup>	-11 21.7	...	9.999123	- 0 17 28.02 <sup>c</sup>	- 2.87
43	Budapest, Hungary . . . .	+47 29 34.7 <sup>c</sup>	-11 33.2	131 <sup>c</sup>	9.999217	+ 1 16 15.3 <sup>c</sup>	- 12.53
44	Cambridge, England . . . .	+52 12 51.6	-11 14.3	28	9.999091	- 0 0 22.75	- 0.06
45	Cambridge, Mass. . . . .	+42 22 47.6 <sup>o</sup>	-11 32.6	24	9.999340	+ 4 44 31.05 <sup>o</sup>	+ 46.74
46	Cape of Good Hope . . . .	-33 56 3.5 <sup>p</sup>	+10 43.6	13 <sup>p</sup>	9.999548	- 1 13 54.76 <sup>p</sup>	- 12.14

<sup>a</sup> Meridian circle.

<sup>b</sup> Standard barometer.

<sup>c</sup> Transit instrument.

<sup>d</sup> Transit instrument pier.

<sup>e</sup> Center of large dome.

<sup>f</sup> Center of dome tower.

<sup>g</sup> Center of dome.

<sup>h</sup> Transit pier.

<sup>i</sup> Cerole Syngros.

<sup>j</sup> Center of instrument house.

<sup>k</sup> Center of observatory.

<sup>l</sup> Floor of meridian room.

<sup>m</sup> Foot of pillar of 7-in. equatorial.

<sup>n</sup> Cube of equatorial.

<sup>o</sup> Dome of 13-in. equatorial.

<sup>p</sup> 8-in. meridian circle.

No.	Authority for—		Description.
	Latitude.	Longitude.	
1	<i>Les Obs. Astron.</i> , Bruxelles, 1907.	<i>Les Obs. Astron.</i> , Bruxelles, 1907.	Obs. Paris Acad. of Sci., Hendaye.
2	Letter from Govt. Astronomer, 1912.	Letter from Govt. Astronomer, 1912.	Govt. Obs., since 1884.
3	Letter from Govt. Astronomer, 1912.	Letter from Govt. Astronomer, 1912.	Govt. Obs., before 1884.
4	Letter from Director, 1913.	Letter from Director, 1913.	Dudley Obs., since 1898.
5	Letter from Director, 1913.	Letter from Director, 1913.	Dudley Obs., before 1898.
6	<i>Les Obs. Astron.</i> , Bruxelles, 1907.	<i>Astron. Nach.</i> , Nr. 5993, 1906.	At Bouzattah. Old Obs. $7^{\circ} 38' S$ , $8^{\circ} E$ .
7	<i>Publications of Obs.</i> , 1909.	<i>Publications of Obs.</i> , 1909.	• Obs. Western Univ. of Pa., since 1906.
8	Letter from Director, 1897.	Letter from Director, 1897.	Obs. Western Univ. of Pa., before 1906.
9	Letter from Director, 1913.	Letter from Director, 1913.	Amherst College Obs., since 1908.
10	Letter from Director, 1913.	Letter from Director, 1913.	Lawrence Obs., before 1908.
11	<i>Publications of Obs.</i> , 1915.	<i>Publications of Obs.</i> , 1915.	Detroit Obs., Univ. of Mich.
12	See footnote (b).	See footnote (b).	Underwood Obs., Lawrence College.
13	<i>Pubbl. dell'Osserv.</i> , 1900.	<i>Astron. Nach.</i> , Nr. 3993, 1906.	Royal Observatory.
14	<i>Harvard Annals</i> , 1903.	<i>Harvard Annals</i> , 1903.	Branch of Harvard Coll. Obs.
15	<i>Armagh Catalogue of Stars</i> , 1840.	<i>Armagh Catalogue of Stars</i> , 1840.	Armagh Observatory.
16	<i>Annales de l'Obs.</i> , 1910.	Letter from Director, 1913.	• National Observatory.
17	Letter from Director, 1913.	Letter from Director, 1913.	Johns Hopkins Univ. Obs.
18	Letter from Director, 1913.	<i>Astron. Nach.</i> , Nr. 3993, 1906.	Remeis Observatory.
19	<i>Les Obs. Astron.</i> , Bruxelles, 1907.	<i>Les Obs. Astron.</i> , Bruxelles, 1907.	Fabra Obs., Acad. of Sci. and Arts.
20	Letter from Director, 1897.	Letter from Director, 1897.	Smith Obs., Beloit College.
21	Letter from Director, 1913.	<i>Astron. Nach.</i> , Nr. 3993, 1906.	Hamburg Obs., since 1909.
22	Letter from Director, 1897.	See footnote (d).	Students' Obs., Univ. of Cal.
23	<i>Astron. Nach.</i> , Nr. 3545, 1898.	<i>Astron. Nach.</i> , Nr. 3993, 1906.	Royal Obs., since 1836.
24	Letter from Director, 1913.	Letter from Director, 1913.	Royal Obs., before 1835.
25	<i>Astron. Nach.</i> , Nr. 3170, 1893.	<i>Astron. Nach.</i> , Nr. 3170, 1893.	Urania Observatory.
26	<i>Les Obs. Astron.</i> , Bruxelles, 1907.	<i>Les Obs. Astron.</i> , Bruxelles, 1907.	Treptow Observatory.
27	<i>Berliner Jahrbuch</i> .	<i>Astron. Nach.</i> , Nr. 3202, 1893.	Observatory, Cantonal Univ.
28	<i>Astron. Nach.</i> , Nr. 2805, 1887.	<i>Astron. Nach.</i> , Nr. 2805, 1887.	National Observatory.
29	<i>British Nautical Almanac</i> .	<i>British Nautical Almanac</i> .	Private Obs. of Earl of Rosse.
30	Letter from Director, 1913.	Letter from Director, 1913.	Kirkwood Obs., Univ. of Ind.
31	Letter from Director, 1913.	Letter from Director, 1913.	National Observatory.
32	Letter from Director, 1913.	Letter from Director, 1913.	Government Observatory.
33	Letter from Director, 1913.	<i>Astron. Nach.</i> , Nr. 3993, 1906.	Royal Observatory.
34	Letter from Director, 1897.	<i>Annales de l'Obs.</i> , 1885.	Obs., Univ. of Bordeaux.
35	Letter from Director, 1909.	Letter from Director, 1909.	Boston Univ. Obs., since 1908.
36	Letter from Director, 1895.	Letter from Director, 1895.	Boston Univ. Obs., before 1908.
37	<i>Beob. zu Bothkamp</i> , 1872.	Letter from Director, 1913.	Obs. of Harr von Bülow.
38	<i>Astron. Nach.</i> , Nr. 15, 1822.	<i>Astron. Nach.</i> , Nr. 15, 1822.	Formerly Olber's Obs.
39	Letter from Director, 1897.	<i>Astron. Nach.</i> , Nr. 3993, 1906.	Royal University Obs.
40	<i>British Nautical Almanac</i> .	• <i>British Nautical Almanac</i> .	Brisbane Observatory.
41	Letter from Director, 1913.	Letter from Director, 1913.	Royal Obs., since 1891.
42	<i>Annales de l'Obs.</i> , 1857.	Letter from Director, 1913.	Royal Obs., before 1891.
43	<i>Astron. Nach.</i> , Nr. 2752, 1836.	<i>Astron. Nach.</i> , Nr. 2752, 1836.	University Observatory.
44	Letter from Director, 1879.	Letter from Director, 1879.	University Observatory.
45	<i>Harvard Annals</i> , 1887.	<i>U. S. C. and G. S. Report</i> , 1897.	Harvard College Obs.
46	<i>Cape Gen. Catalogue of Stars</i> , 1886.	<i>Monthly Notices, R. A. S.</i> , Nov. 1908.	Royal Observatory.

• Name of Western Univ. of Pa. changed in 1906; now the Univ. of Pittsburgh.

• *Professional Papers, Corps of Engineers, U. S. A.*, 1832.

• Old meridian circle  $0^{\circ} 4' S$ ,  $0^{\circ} 1' W$  of Carole Syngron.

• *Publications of the Astronomical Society of the Pacific*, No. 165, 1914.

• With the new value of the longitude of Sydney.

No.	Place.	Latitude.	Reduction to Geocentric Latitude.	Altitude (Meters).	Log $\rho$ (Including altitude).	Longitude from Greenwich.	Reduction from Greenwich to Local S.T.M.N.
47	Carloforte, Sardinia . . .	+39 8 8.9 <sup>a</sup>	-11 20.7	18 <sup>a</sup>	9.999421	h m s a	- 5.46
48	Catania, Sicily . . . . .	+37 30 13.2 <sup>b</sup>	-11 11.4	49 <sup>b</sup>	9.999464	-1 0 20.70 <sup>b</sup>	- 9.91
49	Charkow, Russia . . . . .	+50 0 9.9 <sup>c</sup>	-11 25.5	138 <sup>d</sup>	9.999153	-2 24 55.75 <sup>c</sup>	-23.81
50	Charlottesville, Va. . . . .	+38 2 1.2 <sup>e</sup>	-11 14.6	259 <sup>e</sup>	9.999465	+5 14 5.33 <sup>e</sup>	+51.60
51	Chicago, Ill. . . . .	+41 50 1.0	-11 31.2	. . .	9.999352	+5 50 26.84	+57.57
52	Christiania, Norway . . . . .	+59 54 44.0 <sup>e</sup>	-10 4.6	25 <sup>c</sup>	9.998908	-0 42 53.50 <sup>c</sup>	- 7.05
53	Cincinnati, Ohio . . . . .	+39 8 19.8 <sup>f</sup>	-11 20.7	247 <sup>f</sup>	9.999437	+5 37 41.40 <sup>f</sup>	+55.48
54	Cincinnati, Ohio . . . . .	+39 6 26.5	-11 20.5	. . .	9.999421	+5 37 59.00	+55.52
55	Cleveland, Ohio . . . . .	+41 90 14.5 <sup>g</sup>	-11 30.2	215 <sup>g</sup>	9.999375	+5 26 25.86 <sup>g</sup>	+53.62
56	Clinton, N. Y. . . . .	+43 3 17.0	-11 33.9	276	9.999340	+5 1 37.45	+49.55
57	Coimbra, Portugal . . . . .	+40 12 24.5	-11 25.6	99	9.999400	+0 33 43.1	+ 5.54
58	Columbia, Mo. . . . .	+38 56 51.7 <sup>h</sup>	-11 19.7	225 <sup>h</sup>	9.999440	+6 9 18.33 <sup>h</sup>	+60.67
59	Columbus, Ohio . . . . .	+39 59 50.4 <sup>h</sup>	-11 24.7	233 <sup>h</sup>	9.999414	+5 32 2.00 <sup>h</sup>	+54.55
60	Copenhagen, Denmark . . . . .	+55 41 12.6	-10 48.6	14	9.999005	-0 50 18.69 <sup>i</sup>	- 8.26
61	Cordova, Arg. Rep. . . . .	-31 25 15.5 <sup>k</sup>	+10 18.0	434 <sup>k</sup>	9.999634	+4 16 48.22 <sup>k</sup>	+42.19
62	Cracow, Austria . . . . .	+50 3 52.0 <sup>c</sup>	-11 25.2	221 <sup>c</sup>	9.999157	-1 19 50.27 <sup>c</sup>	-13.12
63	Danzig, Prussia . . . . .	+54 21 18.0	-10 59.6	3	9.999036	-1 14 39.6	-12.26
64	Dehra Dun, India . . . . .	+30 18 51.8 <sup>l</sup>	-10 5.3	681 <sup>l</sup>	9.999676	-5 12 11.76 <sup>l</sup>	-51.29
65	Denver, Colo. . . . .	+39 40 36.4 <sup>c</sup>	-11 23.3	1644 <sup>m</sup>	9.999518	+6 59 47.72 <sup>c</sup>	+68.96
66	Des Moines, Iowa . . . . .	+41 36 0	-11 30.5	296	9.999378	+6 14 30.56	+61.52
67	Dorpat (Jurjew), Russia . . . . .	+58 22 47.2 <sup>e</sup>	-10 22.1	67 <sup>c</sup>	9.998945	-1 46 53.22 <sup>c</sup>	-17.56
68	Dresden, Saxony . . . . .	+51 2 16.8	-11 20.8	121	9.999007	-0 54 54.74	- 9.02
69	Dublin, Ireland . . . . .	+53 23 18.1 <sup>c</sup>	-11 6.7	86 <sup>c</sup>	9.999066	+0 25 21.1 <sup>c</sup>	+ 4.16
70	Dun Echt, Scotland . . . . .	+57 9 36	-10 34.8	141	9.998979	+0 9 40.0	+ 1.59
71	Durham, England . . . . .	+54 46 6.2 <sup>b</sup>	-10 56.4	107 <sup>n</sup>	9.999033	+0 6 19.75 <sup>b</sup>	+ 1.04
72	Dusseldorf, Prussia . . . . .	+51 12 25.0 <sup>o</sup>	-11 19.9	46 <sup>o</sup>	9.999117	-0 27 2.69 <sup>o</sup>	- 4.44
73	Edinburgh, Scotland . . . . .	+55 55 30.0 <sup>c</sup>	-10 46.5	134 <sup>p</sup>	9.999007	+0 12 44.22 <sup>c</sup>	+ 2.09
74	Edinburgh, Scotland . . . . .	+55 57 23.2 <sup>q</sup>	-10 46.2	106 <sup>r</sup>	9.998996	+0 12 43.05 <sup>q</sup>	+ 2.09
75	Elmira, N. Y. . . . .	+42 6 25	-11 31.9	. . .	9.999345	+5 7 13.90	+50.47
76	Evansston, Ill. . . . .	+42 3 33.4	-11 31.8	175	9.999358	+5 50 42.3	+57.61
77	Flagstaff, Ariz. . . . .	+35 12 30.5	-10 54.7	2210	9.999667	+7 26 44.58	+73.39
78	Garthersburg, Md. . . . .	+39 8 13.2 <sup>a</sup>	-11 20.7	165	9.999431	+5 8 47.73	+50.73
79	Geneva, N. Y. . . . .	+42 52 46.2	-11 33.6	152	9.999336	+5 8 1.00	+50.60
80	Geneva, Switzerland . . . . .	+46 11 59.3 <sup>c</sup>	-11 35.2	407 <sup>c</sup>	9.999268	-0 24 36.61 <sup>c</sup>	- 4.04
81	Genoa, Italy . . . . .	+44 25 9.3 <sup>c</sup>	-11 35.5	105	9.999293	-0 35 41.28 <sup>c</sup>	- 5.86
82	Georgetown, D. C. . . . .	+38 54 26.7 <sup>f</sup>	-11 19.5	47	9.999429	+5 8 13.26 <sup>f</sup>	+50.65
83	Glasgow, Mo. . . . .	+39 13 45.6	-11 21.1	227	9.999433	+6 11 18.08	+61.00
84	Glasgow, Scotland . . . . .	+55 52 42.8 <sup>c</sup>	-10 46.9	55 <sup>o</sup>	9.999003	+0 17 10.55 <sup>c</sup>	+ 2.82
85	Gotha, Germany . . . . .	+50 56 37.9 <sup>o</sup>	-11 21.2	322 <sup>c</sup>	9.999142	-0 42 50.51 <sup>o</sup>	- 7.04
86	Gotha, Germany . . . . .	+50 56 4.4 <sup>b</sup>	-11 21.2	360 <sup>b</sup>	9.999145	-0 42 55.09 <sup>b</sup>	- 7.05
87	Göttingen, Prussia . . . . .	+51 31 48.1 <sup>t</sup>	-11 18.2	161 <sup>t</sup>	9.999116	-0 39 46.22 <sup>t</sup>	- 6.53
88	Greencastle, Ind. . . . .	+39 38 46.6 <sup>c</sup>	-11 23.1	262 <sup>c</sup>	9.999425	+5 47 24.36 <sup>c</sup>	+57.07
89	Greenwich, England . . . . .	+51 28 38.2 <sup>e</sup>	-11 18.5	49 <sup>c</sup>	9.999110	+0 0 0.00 <sup>e</sup>	0.00
90	Hamburg, Germany . . . . .	+53 33 6.0	-11 5.6	25	9.999057	-0 39 53.60 <sup>c</sup>	- 6.55
91	Hamburg, Germany . . . . .	+53 32 51.3 <sup>h</sup>	-11 5.6	30 <sup>h</sup>	9.999058	-0 39 53.46 <sup>h</sup>	- 6.55
92	Hanover, N. H. . . . .	+43 42 15.3	-11 34.8	183	9.999317	+4 49 8.02	+47.50

<sup>a</sup> Zenith telescope.      <sup>k</sup> Transit pier.  
<sup>b</sup> Transit instrument.    <sup>l</sup> Observatory bench mark.  
<sup>c</sup> Meridian circle.       <sup>m</sup> Center of observatory.  
<sup>d</sup> Barometer in meridian room.    <sup>n</sup> Old meridian circle.  
<sup>e</sup> Center of large dome.       <sup>o</sup> Floor-level of south sector pillar.  
<sup>f</sup> Center of dome.           <sup>p</sup> Main floor.  
<sup>g</sup> Zenith telescope pier.       <sup>q</sup> Barometer in transit room.  
<sup>h</sup> Equatorial.  
<sup>i</sup> Standard barometer.  
<sup>j</sup> Point midway between transit instrument and mural circle.  
<sup>k</sup> Floor of main building.  
<sup>l</sup> Floor of meridian circle room.  
<sup>m</sup> Position of meridian circle before 1888.



No.	Authority for—		Description.
	Latitude.	Longitude.	
47	See footnote (a).	Letter from Director, 1913.	International Lat. Obs.
48	Letter from Director, 1913.	Letter from Director, 1913.	Royal Obs. of Catania and Etna.
49	<i>Annales de l'Obs.</i> , 1904.	<i>Annales de l'Obs.</i> , 1904.	University Observatory.
50	Letter from Director, 1913.	Letter from Director, 1913.	Leander McCormick Obs., Univ. Va.
51	U. S. Lake Survey, 1864.	Smithsonian Report, 1886.	<sup>b</sup> Dearborn Observatory.
52	<i>Astron. Nach.</i> , Nr. 8193, 1893.	<i>Astron. Nach.</i> , Nr. 3993, 1905.	University Observatory.
53	<i>Publications of the Obs.</i> , 1908.	<i>Astronomical Journal</i> , 1897.	Cincinnati Obs., since 1873.
54	Letter from Director, 1897.	<i>Astronomical Journal</i> , 1854.	Cincinnati Obs., before 1873.
55	Letter from Director, 1913.	Letter from Director, 1913.	Case Obs., Case School of Appl'd Sci.
56	<i>Astron. Nach.</i> , Nr. 2553, 1863.	<i>Astron. Nach.</i> , Nr. 2553, 1863.	Litchfield Obs., Hamilton College.
57	<i>Eph. Astron. de Coimbra</i> , 1889.	<i>Eph. Astron. de Coimbra</i> , 1889.	University Observatory.
58	<i>Trans. Acad. of Sci. of St. Louis</i> , 1894.	<i>Trans. Acad. of Sci. of St. Louis</i> , 1894.	Laws Obs., Univ. of Mo.
59	Letter from Director, 1913.	Letter from Director, 1899.	McMillin Obs., State Univ.
60	<i>British Nautical Almanac.</i>	<i>Astron. Nach.</i> , Nr. 3993, 1905.	University Observatory.
61	<i>Resultados del Obs.</i> , 1887.	<i>Resultados del Obs.</i> , 1887.	National Observatory.
62	Letter from Director, 1913.	Letter from Director, 1913.	Imperial and Royal Obs.
63	Letter from Director, 1897.	Letter from Director, 1897.	Obs. of the School of Navigation.
64	<i>Great Trig. Survey of India</i> , 1906.	Letter from Supt. of Survey, 1913.	Halg Obs., Trig. Survey of India.
65	Letter from Director, 1913.	Letter from Director, 1913.	Chamberlin Obs., Univ. of Denver.
66	<i>Les Obs. Astron.</i> , Bruxelles, 1907.	<i>Les Obs. Astron.</i> , Bruxelles, 1907.	Drake Univ. Obs.
67	<i>Publikationen der Sternw.</i> , 1911.	<i>Astron. Nach.</i> , Nr. 3993, 1905.	Imperial University Obs.
68	<i>Berliner Jahrbuch.</i>	<i>Berliner Jahrbuch.</i>	c Baron Engelhardt's Obs.
69	<i>Trans. Royal Dublin Soc.</i> , 1880.	<i>Trans. Royal Irish Acad.</i> , 1838.	Dunsmuir Obs., Trinity College.
70	Letter from Royal Astronomer, 1897.	Letter from Royal Astronomer, 1897.	d Lord Crawford's Obs.
71	Letter from Director, 1913.	Letter from Director, 1913.	University Observatory.
72	<i>Astron. Nach.</i> , Nr. 643, 1848.	Letter from Director, 1913.	Municipal Obs., Bilk.
73	<i>Monthly Notices, R. A. S.</i> , 1907.	Letter from Director, 1913.	Royal Obs. since 1805; Blackford Hill.
74	<i>Monthly Notices, R. A. S.</i> , 1896.	<i>Edinburgh Observations</i> , 1858.	e Royal Obs. before 1805; Calton Hill.
75	Letter from Director, 1912.	Letter from Director, 1912.	Elmira College Obs.
76	Letter from Director, 1893.	Letter from Director, 1893.	Dearborn Obs., North Western Univ.
77	<i>British Nautical Almanac.</i>	<i>British Nautical Almanac.</i>	Lowell Observatory.
78	See footnote (e).	See footnote (f).	International Lat. Obs.
79	<i>Les Obs. Astron.</i> , Bruxelles, 1907.	<i>Les Obs. Astron.</i> , Bruxelles, 1907.	Smith Observatory.
80	<i>Memoires par J. Pidoix</i> , 1900.	<i>Astron. Nach.</i> , Nr. 3993, 1905.	Municipal Observatory.
81	Letter from Director, 1897.	<i>Astron. Nach.</i> , Nr. 3993, 1905.	Hydrographic Institute.
82	See footnote (g).	See footnote (g).	Georgetown College Obs.
83	<i>Astron. Nach.</i> , Nr. 2625, 1854.	<i>Washington Observations</i> , 1877.	Morrison Observatory.
84	<i>First Glasgow Catalogue</i> , 1870.	<i>Monthly Notices, R. A. S.</i> , 1865.	University Observatory.
85	Letter from Director, 1913.	Letter from Director, 1913.	Ducal Obs. since 1857.
86	Letter, Director new Obs., 1913.	Letter, Director new Obs., 1913.	Ducal Obs. before 1857.
87	<i>Astron. Nach.</i> , Nr. 4426, 1910.	<i>Astron. Nach.</i> , Nr. 3993, 1905.	Royal University Obs.
88	Letter from Director, 1912.	Letter from Director, 1912.	McKim Obs., De Pauw Univ.
89	<i>Greenwich Observations</i> , 1910.	<i>Greenwich Observations</i> , 1910.	k Royal Observatory.
90	Letter, Director new Obs., 1913.	<i>Astron. Nach.</i> , Nr. 3993, 1905.	l Hamburg Observatory before 1909.
91	Letter from Director, 1913.	Letter from Director, 1913.	j Imperial Marine Obs.
92	Letter from Director, 1894.	Letter from Director, 1894.	Shattuck Obs., Dartmouth College.

a Resultate des Internationalen Breitenkreises, 1900-1908.

b Transferred to Evanston, Ill., in 1887.

c Instruments transferred to Univ. of Kasan in 1897.

d Instruments transferred to Royal Obs. at Edinburgh in 1896.

e City Obs. since 1896.

f Resultate des Internationalen Breitenkreises, Band I, 1903.

g Based upon data from the U. S. C. and G. Survey.

h Point of reference before 1863, 74° 2' N., 19 ft. W.

i At Bergedorf since 1909.

j Transit instrument before 1908, 0° 5' N., 0° 04' W.

No.	Place.	Latitude.	Reduction to Geocentric Latitude.	Attitude (Meters).	Log $\rho$ (Including altitude).	Longitude from Greenwich.	Reduction from Greenwich to Local S.T.M.N.
93	Haverford, Pa. . . . .	+40 0 40.1 <sup>a</sup>	-11 24.8	...	9.999398	h m s +5 1 12.70 <sup>a</sup>	+49.48
94	Heidelberg, Baden . . .	+49 23 55.2 <sup>b</sup>	-11 27.8	567 <sup>b</sup>	9.999198	-0 34 53.13 <sup>b</sup>	- 5.73
95	Heidelberg, Baden . . .	+49 23 55.7 <sup>c</sup>	-11 27.8	570 <sup>c</sup>	9.999198	-0 34 52.96 <sup>c</sup>	- 5.73
96	Heidelberg, Baden . . .	+49 24 34.3 <sup>d</sup>	-11 27.8	126 <sup>d</sup>	9.999168	-0 34 46.80 <sup>d</sup>	- 5.71
97	Helsingfors, Finland . . .	+60 9 42.2 <sup>e</sup>	-10 1.5	33 <sup>e</sup>	9.999908	-1 39 49.10 <sup>e</sup>	-16.40
98	Herény, Hungary . . . . .	+47 15 47.4	-11 33.7	229	9.999229	-1 6 24.7	-10.91
99	Hong Kong, China . . . . .	+22 18 13.2 <sup>f</sup>	- 8 7.4	33 <sup>f</sup>	9.999793	-7 36 41.86 <sup>f</sup>	-75.01
100	Iowa City, Iowa . . . . .	+41 40 0	-11 30.7	183	9.999369	+6 6 6	+60.14
101	Ithaca, N. Y. . . . .	+42 26 47.3 <sup>g</sup>	-11 32.6	256 <sup>g</sup>	9.999354	+5 5 55.99 <sup>g</sup>	+50.26
102	Ithaca, N. Y. . . . .	+42 26 51.4	-11 32.6	...	9.999337	+5 5 56.47	+50.26
103	Jamaica, West Indies . . .	+18 24 51 <sup>h</sup>	- 6 55.9	540 <sup>h</sup>	9.999692	+5 11 29.48 <sup>h</sup>	+51.17
104	Jena, Saxe-Weimar . . . . .	+50 55 34.9 <sup>i</sup>	-11 21.3	165 <sup>i</sup>	9.999182	-0 46 20.22 <sup>i</sup>	- 7.61
105	Jena, Saxe-Weimar . . . . .	+50 55 35.8	-11 21.3	155	9.999181	-0 46 20.31	- 7.61
106	Jena, Saxe-Weimar . . . . .	+50 56 11.0	-11 21.3	174	9.999182	-0 46 20.73	- 7.61
107	Johannesburg, Transvaal . .	-26 10 54.6 <sup>j</sup>	+ 9 9.8	1804 <sup>j</sup>	9.999840	-1 52 18.0 <sup>j</sup>	-18.45
108	Kalocsa, Hungary . . . . .	+46 31 41.7 <sup>k</sup>	-11 34.8	117 <sup>k</sup>	9.999240	-1 15 54.12 <sup>k</sup>	-12.47
109	Kasan, Russia . . . . .	+55 50 20.0 <sup>e</sup>	-10 47.3	98 <sup>e</sup>	9.999007	-3 15 15.61 <sup>e</sup>	-32.08
110	Kasan, Russia . . . . .	+55 47 23.9 <sup>l</sup>	-10 47.7	79 <sup>l</sup>	9.999007	-3 16 29.00 <sup>l</sup>	-32.23
111	Kew, England . . . . .	+51 28 6	-11 18.5	10	9.999108	+0 1 15.1	+ 0.21
112	Kief, Russia . . . . .	+50 27 10.0 <sup>m</sup>	-11 23.5	179 <sup>e</sup>	9.999145	-2 2 0.56 <sup>e</sup>	-20.04
113	Kiel, Prussia . . . . .	+54 20 27.6 <sup>e</sup>	-10 59.7	52 <sup>e</sup>	9.999040	-0 40 35.45 <sup>e</sup>	- 6.67
114	Kis-Kartal, Hungary . . . .	+47 41 54.8	-11 32.8	...	9.999202	-1 18 11.7	-12.85
115	Konigsberg, Prussia . . . .	+54 42 50.5 <sup>e</sup>	-10 56.8	24 <sup>e</sup>	9.999029	-1 21 58.97 <sup>e</sup>	-13.47
116	Kremsmunster, Austria . . .	+48 3 23.1 <sup>e</sup>	-11 32.0	394 <sup>e</sup>	9.999220	-0 56 31.58 <sup>e</sup>	- 9.29
117	La Plata, Arg. Rep. . . . .	-34 54 31.8 <sup>n</sup>	+10 52.2	18 <sup>n</sup>	9.999525	+3 51 44.8 <sup>n</sup>	+38.07
118	Leiden, Netherlands . . . . .	+52 9 19.8 <sup>e</sup>	-11 14.6	6 <sup>e</sup>	9.999090	-0 17 56.15 <sup>e</sup>	- 2.95
119	Leipzig, Saxony . . . . .	+51 20 5.9 <sup>o</sup>	-11 19.2	119 <sup>o</sup>	9.999118	-0 49 33.92 <sup>o</sup>	- 8.14
120	Leipzig, Saxony . . . . .	+51 20 20.1	-11 19.2	...	9.999110	-0 49 29.92	- 8.13
121	Liege, Belgium . . . . .	+50 37 6	-11 22.8	127	9.999137	-0 22 15.44	- 3.66
122	Lisbon (Tapada), Portugal . .	+38 42 30.5 <sup>p</sup>	-11 18.5	95 <sup>p</sup>	9.999437	+0 36 44.68 <sup>p</sup>	+ 6.04
123	Liverpool, England . . . . .	+53 24 4.8	-11 6.6	61 <sup>q</sup>	9.999064	+0 12 17.33	+ 2.02
124	Liverpool, England . . . . .	+53 24 47.8	-11 6.5	...	9.999059	+0 12 0.11	+ 1.97
125	Lund, Sweden . . . . .	+56 41 51.6 <sup>o</sup>	-10 48.5	38	9.999006	-0 52 44.97 <sup>o</sup>	- 8.67
126	Lund, Sweden . . . . .	+55 52 12.0	-10 47.0	...	9.999000	-0 52 47.50	- 8.67
127	Lussinpiccolo, Austria . . . .	+44 32 11.0	-11 35.5	42	9.999236	-0 57 52.41	- 9.51
128	Lyons, France . . . . .	+45 41 41.0	-11 35.5	299	9.999274	-0 19 8.52 <sup>q</sup>	- 3.14
129	Madison, Wis. . . . .	+43 4 36.8 <sup>e</sup>	-11 33.9	292 <sup>r</sup>	9.999840	+5 57 37.90 <sup>e</sup>	+53.75
130	Madras, India . . . . .	+13 4 8.0 <sup>e</sup>	- 5 5.5	7	9.999096	-5 20 59.14	-52.73
131	Madrid, Spain . . . . .	+40 24 30.0 <sup>e</sup>	-11 26.4	655 <sup>e</sup>	9.999433	+0 14 45.09 <sup>e</sup>	+ 2.42
132	Manila, P. I. . . . .	+14 34 41	- 5 38.2	3	9.999906	-8 3 54.2	-79.48
133	Mare Island, Cal. . . . .	+28 5 55.8 <sup>t</sup>	-11 15.0	18 <sup>t</sup>	9.999467	+8 9 5.63 <sup>t</sup>	+80.35
134	Markecree, Ireland . . . . .	+54 10 31.8	-11 1.0	45	9.999044	+0 33 48.4	+ 5.55
135	Marseilles, France . . . . .	+43 18 19 <sup>e</sup>	-11 34.3	75 <sup>u</sup>	9.999320	-0 21 34.55 <sup>e</sup>	- 3.54
136	Marseilles, France . . . . .	+43 17 52	-11 34.3	27	9.999317	-0 21 28.1	- 3.53
137	Mauritius (Fort Louis) . . . .	-20 5 39	+ 7.27.7	54	9.999532	-3 50 12.6	-37.32
138	Melbourne, Victoria . . . . .	-37 49 53.2 <sup>v</sup>	+11 13.4	26 <sup>v</sup>	9.999454	-9 39 53.92 <sup>v</sup>	-95.26

<sup>a</sup> Zenith telescope.  
<sup>b</sup> Repsold meridian circle.  
<sup>c</sup> Bruce telescope.  
<sup>d</sup> Equatorial.  
<sup>e</sup> Meridian circle.  
<sup>f</sup> Transit instrument.  
<sup>g</sup> Top of east pier in transit room.  
<sup>h</sup> Transit instrument pier.

<sup>i</sup> Besenberger equatorial.  
<sup>j</sup> International latitude hut.  
<sup>k</sup> Seven-inch equatorial.  
<sup>l</sup> Center of great dome.  
<sup>m</sup> Photographic equatorial, 41 feet south of prime vertical transit.  
<sup>n</sup> Gautier meridian circle.  
<sup>o</sup> Center of observatory.

<sup>p</sup> Center of dome.  
<sup>q</sup> Pier of small meridian circle.  
<sup>r</sup> Main floor.  
<sup>s</sup> Center of rotunda.  
<sup>t</sup> East transit instrument.  
<sup>u</sup> Barometer.  
<sup>v</sup> Old meridian circle.  
<sup>w</sup> Floor of meridian room.

No.	Authority for—		Description.
	Latitude.	Longitude.	
93	<i>Proc. Amer. Ph. Soc.</i> , 1883.	<i>Proc. Amer. Ph. Soc.</i> , 1883.	Haverford College Obs.
94	Letter from Director, 1913.	Letter from Director, 1913.	Astron. Institute, Königstuhl Obs.
95	<i>Publik. des Obs., Königstuhl</i> , 1902.	<i>Publik. des Obs., Königstuhl</i> , 1902.	Astrophys. Inst., Königstuhl Obs.
96	<i>Publik. des Obs., Königstuhl</i> , 1902.	<i>Publik. des Obs., Königstuhl</i> , 1902.	Dr. Wolf's Obs. before 1896.
97	Letter from Director, 1913.	<i>Astron. Nach.</i> , Nr. 3993, 1905.	Imperial Univ. Obs.
98	<i>Astron. Nach.</i> , Nr. 2633, 1884.	<i>British Nautical Almanac</i> .	Astrophysical Observatory.
99	<i>Hong Kong Observations</i> , 1897.	Letter from Director, 1897.	Colonial Observatory.
100	<i>Les Obs. Astron.</i> , Bruxelles, 1907.	<i>Les Obs. Astron.</i> , Bruxelles, 1907.	Obs., Univ. of Iowa.
101	Letter from the Dean, 1913.	Letter from the Dean, 1913.	Fuertes Obs., Cornell Univ.
102	Letter from the Dean, 1913.	Letter from the Dean, 1913.	Fuertes Obs., Cornell Univ.
103	<i>Memoirs, R. A. S.</i> , 1879.	See footnote (d).	Mr. Hall's Obs., Montego Bay.
104	Letter from Director, 1913.	Letter from Director, 1913.	Univ. Obs., since 1888.
105	Letter, Director new Obs., 1913.	Letter, Director new Obs., 1913.	Univ. Obs., before 1888.
106	<i>V. J. S. Astron. Gesell.</i> , 1910.	<i>V. J. S. Astron. Gesell.</i> , 1910.	The late Dr. Winkler's Obs.
107	Transvaal Obs. Circular, 1910.	Transvaal Obs. Circular, 1910.	Union Obs., formerly Transvaal Obs.
108	Letter from Director, 1913.	Letter from Director, 1913.	Archiepiscopal Haynald Obs.
109	Letter from Director, 1913.	Publications of the Obs., 1911.	Engelhardt Obs., Univ. of Kasan.
110	Publications of the Obs., 1911.	Letter from Director, 1913.	University Observatory.
111	Letter from Director, 1897.	Letter from Director, 1897.	Meteorological Obs., London.
112	<i>Annales de l'Obs.</i> , Vol. IV, 1898.	<i>Astron. Nach.</i> , Nr. 3993, 1905.	Imperial Univ. Obs.
113	<i>Les Obs. Astron.</i> , Bruxelles, 1907.	<i>Astron. Nach.</i> , Nr. 3993, 1905.	Royal University Obs.
114	<i>Les Obs. Astron.</i> , Bruxelles, 1907.	<i>Les Obs. Astron.</i> , Bruxelles, 1907.	Near Assód, Hungary.
115	Letter from Director, 1913.	<i>Astron. Nach.</i> , Nr. 3993, 1905.	Royal University Obs.
116	Letter from Director, 1897.	<i>Astron. Nach.</i> , Nr. 3993, 1905.	Obs. of the Benedictines.
117	Letter from Director, 1913.	Letter from Director, 1913.	National Univ. Obs.
118	Letter from Director, 1913.	<i>Astron. Nach.</i> , Nr. 3993, 1905.	University Observatory.
119	Letter from Director, 1913.	<i>Astron. Nach.</i> , Nr. 3993, 1905.	University Obs., since 1861.
120	Letter, Director new Obs., 1913.	Letter, Director new Obs., 1913.	University Obs., before 1861.
121	<i>Les Obs. Astron.</i> , Bruxelles, 1907.	<i>Les Obs. Astron.</i> , Bruxelles, 1907.	University Obs., Cointe.
122	Letter from Director, 1913.	<i>Astron. Nach.</i> , Nr. 3202, 1893.	Obs. of Lisbon.
123	<i>Monthly Notices, R. A. S.</i> , 1894.	<i>Monthly Notices, R. A. S.</i> , 1894.	Bidston, Birkenhead, since 1867.
124	<i>British Nautical Almanac</i> , 1872.	<i>British Nautical Almanac</i> , 1872.	Liverpool Obs., before 1867.
125	Letter from Director, 1913.	<i>Astron. Nach.</i> , Nr. 3993, 1905.	Royal Univ. Obs., since 1867.
126	Letter, Director new Obs., 1913.	Letter, Director new Obs., 1913.	Royal Univ. Obs., before 1867.
127	Letter from Director, 1897.	Letter from Director, 1897.	Manora Observatory.
128	Letter from Director, 1897.	<i>Astron. Nach.</i> , Nr. 3202, 1893.	Obs. of the Univ., St. Gais Leval.
129	Publications of the Obs., 1892.	Letter from Director, 1912.	Washburn Obs., Univ. of Wis.
130	<i>Great Trig. Survey of India</i> , 1905.	<i>Great Trig. Survey of India</i> , 1901.	Obs. founded by East India Co.
131	<i>Annuario del Obs.</i> , 1912.	<i>Astron. Nach.</i> , Nr. 3993, 1905.	Astron. and Meteorolog. Obs.
132	<i>Les Obs. Astron.</i> , Bruxelles, 1907.	<i>Les Obs. Astron.</i> , Bruxelles, 1907.	Meteorological Observatory.
133	Letter from Director, 1913.	<i>Lick Obs. Bulletin</i> , 1906.	Chromom. and Time Sta., Navy Yd.
134	<i>Astron. Nach.</i> , Nr. 758, 1851.	<i>British Nautical Almanac</i> , 1901.	Col. Cooper's Observatory.
135	Letter from Director, 1913.	<i>Astron. Nach.</i> , Nr. 3993, 1905.	See footnote (f).
136	Letter, Director new Obs., 1913.	Letter, Director new Obs., 1913.	See footnote (g).
137	<i>Mag. and Meteor. Results</i> , 1908.	<i>Mag. and Meteor. Results</i> , 1908.	Royal Alfred Obs.
138	<i>Astron. Results</i> , 1881-84.	<i>Astron. Results</i> , 1881-84.	Government Observatory.

• Instruments transferred to the Astrophysical Institute of the Königstuhl Obs. in 1898.

• Since 1902.

• Before 1902.

• *British Report on Transit of Venus*, 1880.

• Old position of meridian circle, 0° 9' N., 0° 12' E.

f National Obs., Univ. of Aix-Marseille, since 1864-66.

g National Obs., at Accoules, before 1864-66.

h With the new values of the longitudes of Adelaide and Sydney.

i Transferred from Williamstown in 1861.

No.	Place.	Latitude.	Reduction to Geocentric Latitude.	Altitude (Meters).	Log $\rho$ (Including altitude).	Longitude from Greenwich.	Reduction from Greenwich to Local S. T. M. T.
		° ' "	' "			h m s	s
139	Mendon, France . . .	+48 48 18	-11 29.8	162	9.999185	-0 8 55.6	- 1.5
140	Middletown, Conn. . .	+41 33 16.0	-11 30.4		9.999359	+4 50 37.18	+47.7
141	Milan, Italy . . .	+45 27 59.3	-11 35.6	120	9.999268	-0 36 45.88 a	- 6.6
142	Minneapolis, Minn. . .	+44 58 40.0 b	-11 35.7	260 b	9.999290	+6 12 57.04 b	+61.7
143	Mizusawa, Japan . . .	+39 8 3.6 c	-11 20.7	62	9.999424	-9 24 30.75	-32.7
144	Modena, Italy . . .	+44 38 51.4	-11 35.6	64	9.999285	-0 43 43.40	- 7.15
145	Montreal, Canada . . .	+45 30 20 d	-11 35.6	57 d	9.999282	+4 54 18.63 e	+45.5
146	Moscow (Prenia), Russia	+55 45 19.5	-10 48.0	150 e	9.999012	-2 30 17.03 e	-24.6
147	Mount Hamilton, Cal. . .	+37 20 25.6 b	-11 10.4	1284 b	9.999552	+8 6 34.89 b	+79.96
148	Mount Wilson, Cal. . .	+34 12 59.5 f	-10 46.2	1799 f	9.999663	+7 52 14.33 f	+77.3
149	Mount Wilson, Cal. . .	+34 12 55	-10 46.1	1727 g	9.999658	+7 52 14.3	+77.53
150	Munich, Bavaria . . .	+48 8 45.5 h	-11 31.7	529 h	9.999227	-0 46 26.02 h	- 7.5
151	Naples, Italy . . .	+40 51 46.3	-11 28.1	164	9.999388	-0 57 1.70 i	- 9.5
152	Nashville, Tenn. . .	+36 8 54.4 b	-11 2.0	172 j	9.999505	+5 47 12.2	+57.94
153	Neuchâtel, Switzerland	+46 59 50.6	-11 34.1	488	9.999254	-0 27 49.90 c	- 4.5
154	New Brunswick, N. J. . .	+40 30 1.4 b	-11 26.7	21 b	9.999387	+4 57 47.45 b	+48.32
155	New Haven, Conn. . .	+41 19 22.3	-11 29.6	40	9.999368	+4 51 40.53	+47.92
156	New Haven, Conn. . .	+41 18 36.5	-11 29.6		9.999365	+4 51 42.16	+47.92
157	New York, N. Y. . .	+40 48 34.6	-11 27.9	25	9.999380	+4 55 50	+48.6
158	New York, N. Y. . .	+40 45 23.1	-11 27.7		9.999379	+4 55 53.64	+48.61
159	Nice, France . . .	+43 43 16.9 k	-11 34.9	378	9.999330	-0 29 12.15 k	- 4.69
160	Nikolaiëff, Russia . . .	+46 58 22.1	-11 34.2	55	9.999225	-2 7 53.78 l	-21.01
161	North Abington, Mass. . .	+42 7 43.8 l	-11 31.9	43 l	9.999348	+4 43 45.56 l	+46.61
162	Northampton, Mass. . .	+42 19 1.9 b	-11 32.4	70 b	9.999345	+4 50 33.10 b	+47.73
163	Northfield, Minn. . .	+44 27 41.6 m	-11 35.5	290 m	9.999305	+6 12 35.92 m	+61.21
164	Oakland, Cal. . .	+37 48 5 e	-11 13.2	11 e	9.999454	+8 9 6.55 e	+80.35
165	Odessa, Russia . . .	+46 28 37.5	-11 34.9		9.999234	-2 3 2.18 b	-20.21
166	Odessa, Russia . . .	+46 28 36.7 e	-11 34.9	55 e	9.999237	-2 3 2.04 e	-20.21
167	O-Gyalla, Hungary . . .	+47 52 27.3	-11 32.4	113	9.999206	-1 12 45.49	-11.95
168	Omaha, Nebr. . .	+41 16 5.6 b	-11 29.5	344 b	9.999390	+6 23 46.96 b	+63.65
169	Orono, Me. . .	+44 54 0	-11 35.6	38	9.999277	+4 34 40.3	+45.12
170	Ottawa, Canada . . .	+45 23 39.1 e	-11 35.6	85 m	9.999267	+5 2 51.98 e	+49.75
171	Oxford, Miss. . .	+34 22 12.6	-10 47.5		9.999536	+5 58 7.18	+58.63
172	Oxford, England . . .	+51 45 35.6 e	-11 16.9	65 e	9.999104	+0 5 2.6	+ 0.8
173	Oxford, England . . .	+51 45 34.2	-11 16.9	64	9.999104	+0 5 0.40	+ 0.82
174	Padua, Italy . . .	+45 24 1.0 p	-11 35.6	31 p	9.999263	-0 47 29.13 p	- 7.99
175	Palermo, Sicily . . .	+38 6 44.0 r	-11 15.1	76 e	9.999451	-0 53 25.87	- 8.78
176	Paris, France . . .	+48 50 11.2 s	-11 29.8	67 t	9.999178	-0 9 20.93 u	- 1.53
177	Perth, West Australia . . .	-31 57 8.9 s	+10 23.8	60	9.999597	-7 43 21.51 e	-76.12
178	Philadelphia, Pa. . .	+39 58 2.1 v	-11 24.6	74 v	9.999404	+5 1 6.81 v	+49.46
179	Pola, Austria . . .	+44 51 48.6 e	-11 35.6	32 e	9.999277	-0 55 23.07 e	- 9.19
180	Potsdam, Prussia . . .	+52 22 56.0 w	-11 13.3	97 w	9.999091	-0 52 15.86 w	- 8.50
181	Poughkeepsie, N. Y. . .	+41 41 18	-11 30.8	61	9.999360	+4 55 33.6 b	+48.55
182	Prague, Bohemia . . .	+50 5 16.0 w	-11 25.1	197 v	9.999155	-0 57 40.28 w	- 9.47
183	Princeton, N. J. . .	+40 20 55.8	-11 26.1	75	9.999395	+4 58 39.44	+49.04
184	Princeton, N. J. . .	+40 20 57.8 e	-11 26.1	65 e	9.999394	+4 58 37.61 e	+49.06

a Center of great dome.  
 b Transit instrument.  
 c Zenith telescope.  
 d East transit pier.  
 e Meridian circle.  
 f Snow telescope pier.  
 g Floor.  
 h West dome.

i Center of observatory.  
 j Bench mark on obs. steps.  
 k Small meridian circle.  
 l Base of pillar of 5-in. equatorial.  
 m Meridian circle pier.  
 n Bench mark in east wall.  
 o Barometer basin.  
 p Axis of tower.

q Barometer.  
 r Center of south dome.  
 s South facade of observatory.  
 t Level of obs. terrace.  
 u Cassini's Meridian.  
 v Center of dome.  
 w Center of middle dome.

No.	Authority for—		Description.
	Latitude.	Longitude.	
139	<i>Les Obs. Astron., Bruxelles, 1907.</i>	<i>Les Obs. Astron., Bruxelles, 1907.</i>	Seine-et-Oise, near Paris. Wesleyan University Obs.
140	Letter from Director, 1894.	Letter from Director, 1894.	
141	<i>Pubbl. del R. Osserv., 1914.</i>	<i>Astron. Nach., Nr. 3993, 1906.</i>	Royal Observatory, Brera.
142	Letter from Director, 1915.	Letter from Director, 1915.	Obs. Univ. of Minn.
143	See footnote (c).	<i>Les Obs. Astron., Bruxelles, 1907.</i>	International Lat. Obs.
144	Letter from Director, 1913.	Letter from Director, 1913.	Royal Univ. Geophysical Obs.
145	Letter from Director, 1912.	<i>U. S. C. and G. S. Report, 1897.</i>	McGill University Obs.
146	<i>Les Obs. Astron., Bruxelles, 1907.</i>	<i>Astron. Nach., Nr. 3993, 1906.</i>	Obs. of the Imperial Univ.
147	<i>Publications of the Obs., 1900.</i>	<i>U. S. C. and G. S. Report, 1897.</i>	Lick Obs., Univ. of Cal.
148	<i>Astrophysical Journal, 1906.</i>	<i>Astrophysical Journal, 1906.</i>	Solar Obs., Carnegie Inst.
149	Letter from C. G. Abbot, 1912.	Letter from C. G. Abbot, 1912.	Branch of Smithsonian Astrophys. Obs.
150	Letter from Director, 1897.	<i>Astron. Nach., Nr. 3993, 1906.</i>	Royal Observatory.
151	Letter from Director, 1897.	<i>Astron. Nach., Nr. 3202, 1893.</i>	Royal Obs., Capo di Monte.
152	Letter from the Dean, 1913.	Letter from Director, 1893.	Obs. of Vanderbilt Univ.
153	Swiss Triangulation, 1890.	<i>Astron. Nach., Nr. 3202, 1893.</i>	Cantonal Observatory.
154	Letter from Director, 1913.	Letter from Director, 1913.	Schanck Obs., Rutgers College.
155	Letter from Director, 1893.	See footnote (b).	Yale Univ. Obs., since 1882.
156	Letter, Director new Obs., 1898.	Letter, Director new Obs., 1898.	Yale Univ. Obs., before 1882.
157	<i>Contributions from the Obs., 1908.</i>	<i>Contributions from the Obs., 1908.</i>	Columbia Univ. Obs., since 1897.
158	Letter from Director, 1879.	<i>British Nautical Almanac.</i>	Columbia Univ. Obs., before 1897.
159	<i>Annales de l'Obs., Tome II, 1887.</i>	<i>Astron. Nach., Nr. 3993, 1906.</i>	Mt. Gros, near Nice.
160	<i>Les Obs. Astron., Bruxelles, 1907.</i>	<i>Astron. Nach., Nr. 3202, 1893.</i>	Naval Observatory.
161	Letter from Director, 1917.	Letter from Director, 1917.	Mr. Burbeck's Observatory.
162	Letter from Director, 1913.	<i>Harvard Annals, 1893.</i>	Smith College Obs.
163	Letter from Director, 1912.	<i>Publications of Obs., 1901.</i>	• Goodell Obs., Carleton College.
164	Letter from Director, 1912.	Letter from Director, 1912.	Chabot Observatory.
165	Pulkowa <i>Mittheilungen</i> , No. 85, 1912.	<i>Astron. Nach., Nr. 3993, 1906.</i>	Branch of Pulkowa Obs.
166	Letter from Director, 1897.	<i>Astron. Nach., Nr. 3993, 1906.</i>	University Observatory.
167	Letter from Director, 1897.	Letter from Director, 1897.	Royal Astrophysical Obs.
168	Letter from Director, 1912.	Letter from Director, 1912.	Creighton University Obs.
169	Letter from Director, 1912.	Letter from Director, 1912.	Obs. Univ. of Maine.
170	Letter from Chief Astronomer, 1912.	Letter from Chief Astronomer, 1912.	Dominican Astronomical Obs.
171	<i>Smithsonian Report, 1880.</i>	<i>Smithsonian Report, 1880.</i>	Obs. Univ. of Mississippi.
172	<i>Radcliffe Catalogue of Stars, 1900.</i>	<i>Radcliffe Observations, 1842.</i>	Radcliffe Observatory.
173	<i>Oxford Astron. Observations, 1873.</i>	<i>Oxford Astron. Observations, 1873.</i>	University Observatory.
174	Letter from Director, 1913.	<i>Astron. Nach., Nr. 3993, 1906.</i>	Royal University Obs.
175	Letter from Director, 1913.	<i>Astron. Nach., Nr. 3202, 1893.</i>	Royal Observatory.
176	Letter from Director, 1913.	<i>Astron. Nach., Nr. 3993, 1906.</i>	Observatory of Paris.
177	<i>Meridian Observations, Vol. 2, 1908.</i>	<i>Meridian Observations, Vol. 2, 1908.</i>	Government Observatory.
178	Letter from Director, 1913.	Letter from Director, 1913.	Flower Obs., Univ. of Pa.
179	Letter from Director, 1913.	Letter from Director, 1913.	See footnote (c).
180	<i>Veroff. K. Preuss. Geod. Inst., 1906.</i>	<i>Astron. Nach., Nr. 3993, 1906.</i>	Royal Astrophysical Obs.
181	<i>Smithsonian Report, 1880.</i>	<i>Smithsonian Report, 1880.</i>	Vassar College Obs.
182	<i>Prague Observations, 1907.</i>	<i>Astron. Nach., Nr. 3993, 1906.</i>	Imperial and Royal Obs.
183	Letter from Director, 1913.	Letter from Director, 1913.	Habstet Obs., Princeton Univ.
184	Letter from Director, 1913.	<i>Washington Observations, 1873.</i>	Obs. of Instruction, Princeton Univ.

<sup>a</sup> *Bulletin des Internationalen Erdbemessungen, 1900-1906.*

<sup>b</sup> Based upon data from the U. S. C. and G. Survey.

<sup>c</sup> Old observatory, 1877-1886, 415 feet W.

<sup>d</sup> With the new value of the longitude of Sydney.

<sup>e</sup> Observatory of Imperial and Royal Hydrographic Office.

No.	Place.	Latitude.	Reduction to Geocentric Latitude.	Altitude (Meters).	Log $\rho$ (Including altitude).	Longitude from Greenwich.	Relation to Greenwich Local S.T.M.
185	Providence, R. I. . . .	+41 50 21	-11 31.2	64	9.999956	+ 4 45 35.95	+41
186	Providence, R. I. . . .	+41 49 46.4	-11 31.3	.. .	9.999352	+ 4 45 37.64	+41
187	Pulkowa, Russia . . . .	+59 48 18.7 <sup>a</sup>	-10 6.2	75 <sup>b</sup>	9.998914	- 2 1 18.57 <sup>a</sup>	-191
188	Quebec, Canada . . . .	+46 47 59.2	-11 34.4	90	9.999231	+ 4 44 52.71 <sup>c</sup>	+41
189	Quito, Ecuador . . . .	- 0 14 0	+ 0 5.6	2906	0.000198	+ 5 14 6.66	+511
190	Riga, Russia . . . . .	+56 57 9.3	-10 36.9	.. .	9.998974	- 1 36 28.10 <sup>d</sup>	-151
191	Rio de Janeiro, Brazil .	-22 54 23.8 <sup>e</sup>	+ 8 17.7	62 <sup>e</sup>	9.999794	+ 2 52 41.4 <sup>e</sup>	+21
192	Rome, Italy . . . . .	+41 53 53.6 <sup>f</sup>	-11 31.3	51 <sup>g</sup>	9.999354	- 0 49 55.12 <sup>f</sup>	- 31
193	Rome, Italy . . . . .	+41 53 33.6 <sup>f</sup>	-11 31.3	65 <sup>b</sup>	9.999855	- 0 49 56.34 <sup>f</sup>	- 31
194	Rome, Italy . . . . .	+41 54 12.4 <sup>f</sup>	-11 31.4	100 <sup>f</sup>	9.999357	- 0 49 48.02 <sup>f</sup>	- 31
195	Rome, Italy . . . . .	+41 54 16.7	-11 31.4	75 <sup>g</sup>	9.999655	- 0 49 49.28 <sup>f</sup>	- 31
196	San Fernando, Spain . . .	+36 27 42.0 <sup>h</sup>	-11 4.3	30 <sup>h</sup>	9.999488	+ 0 24 49.32 <sup>h</sup>	+ 41
197	San Fernando, Spain . . .	+36 31 7	-11 4.7	.. .	9.999485	+ 0 25 10.82	+ 41
198	San Francisco, Cal. . . .	+37 47 27.9	-11 13.2	.. .	9.999454	+ 8 9 42.86 <sup>i</sup>	+96
199	San Luis, Arg. Rep. . . .	-33 17 45.7	+10 37.6	800	9.999616	+ 4 25 22	+51
200	Santiago, Chile . . . . .	-33 26 42 <sup>f</sup>	+10 39.0	520 <sup>f</sup>	9.999594	+ 4 42 46.0 <sup>f</sup>	+44
201	Santiago, Chile . . . . .	-33 26 25	+10 38.9	619	9.999600	+ 4 42 36.5	+44
202	Santiago, Chile . . . . .	-33 33 46 <sup>e</sup>	+10 40.1	580 <sup>e</sup>	9.999595	+ 4 42 46 <sup>e</sup>	+44
203	South Bethlehem, Pa. . . .	+40 36 23.2 <sup>e</sup>	-11 27.2	110	9.999391	+ 5 1 31.96 <sup>e</sup>	+93
204	South Hadley, Mass. . . .	+42 15 18.2 <sup>e</sup>	-11 32.2	76 <sup>e</sup>	9.999346	+ 4 50 20.40 <sup>e</sup>	+41
205	Springfield, Ill. . . . .	+39 48 58.6 <sup>e</sup>	-11 23.9	187 <sup>e</sup>	9.999416	+ 5 58 34.20 <sup>e</sup>	+31
206	St. Louis, Mo. . . . .	+38 38 3.0	-11 18.1	.. .	9.999432	+ 6 0 49.26	+32
207	St. Petersburg, Russia . .	+59 56 32.0	-10 4.2	4	9.998906	- 2 1 11.4	-191
208	Stockholm, Sweden . . . .	+59 20 32.7 <sup>f</sup>	-10 11.8	44 <sup>f</sup>	9.998922	- 1 12 13.97 <sup>f</sup>	-115
209	Stonyhurst, England . . .	+53 50 40	-11 3.4	117 <sup>f</sup>	9.999056	+ 0 9 52.63	+ 15
210	Strasbourg, Alsace . . . .	+48 35 0.3 <sup>f</sup>	-11 30.5	144 <sup>f</sup>	9.999190	- 0 31 4.52 <sup>f</sup>	- 51
211	Swarthmore, Pa. . . . .	+39 54 23.3	-11 24.3	.. .	9.999401	+ 5 1 24.89	+42
212	Sydney, N. S. W. . . . .	-33 51 41.1	+10 42.9	44	9.999552	-10 4 49.31	-93
213	Syracuse, N. Y. . . . .	+43 2 13.1	-11 33.9	160	9.999332	+ 5 4 33.36	+30
214	Syracuse, N. Y. . . . .	+43 0 48.8 <sup>f</sup>	-11 33.8	137 <sup>h</sup>	9.999332	+ 5 4 34.31 <sup>f</sup>	+30
215	Tacubaya, Mexico . . . .	+19 24 17.9 <sup>f</sup>	- 7 14.8	2255 <sup>f</sup>	9.999996	+ 6 36 46.67 <sup>f</sup>	+51
216	Tashkent, Turkestan . . .	+41 19 31.3	-11 29.6	457	9.999396	- 4 37 10.80	-45
217	Taunton, Mass. . . . .	+41 54 0	-11 31.3	8	9.999351	+ 4 44 20	+41
218	Teramo, Italy . . . . .	+42 39 27 <sup>i</sup>	-11 33.1	398	9.999358	- 0 54 56	- 91
219	Tokyo, Japan . . . . .	+35 39 17.0 <sup>f</sup>	-10 58.3	25	9.999507	- 9 18 58.22 <sup>r</sup>	-91
220	Toronto, Canada . . . . .	+43 39 46.0 <sup>m</sup>	-11 34.8	110 <sup>m</sup>	9.999313	+ 5 17 34.70 <sup>m</sup>	+31
221	Toronto, Canada . . . . .	+43 40 0.8 <sup>m</sup>	-11 34.8	116 <sup>m</sup>	9.999313	+ 5 17 35.60 <sup>m</sup>	+31
222	Toulouse, France . . . . .	+43 36 44.0	-11 34.7	194	9.999320	- 0 5 51.23	- 31
223	Triest, Austria . . . . .	+45 38 35.5 <sup>f</sup>	-11 35.5	68 <sup>e</sup>	9.999290	- 0 55 5.23 <sup>f</sup>	- 31
224	Triest, Austria . . . . .	+45 38 45.4 <sup>p</sup>	-11 35.5	26 <sup>e</sup>	9.999257	- 0 55 3.0	- 31
225	Tschardjui, Turkestan . . .	+39 8 11.0 <sup>i</sup>	-11 26.7	138 <sup>i</sup>	9.999433	- 4 14 17.2 <sup>i</sup>	- 31
226	Tschardjui, Turkestan . . .	+39 8 10.7 <sup>i</sup>	-11 20.7	167	9.999491	- 4 13 57.3	-41
227	Tulse Hill, England . . . .	+51 26 47	-11 18.6	48	9.999111	+ 0 0 27.7	+ 15
228	Turin, Italy . . . . .	+45 2 16.3 <sup>q</sup>	-11 35.7	616 <sup>q</sup>	9.999313	- 0 31 5.96 <sup>q</sup>	- 31
229	Turin, Italy . . . . .	+45 4 8.3 <sup>f</sup>	-11 35.7	276 <sup>e</sup>	9.999238	- 0 30 47.15 <sup>f</sup>	- 31
230	Tuscaloosa, Ala. . . . .	+33 12 36.8 <sup>f</sup>	-10 36.7	69	9.999568	+ 5 50 11.74 <sup>f</sup>	+51

<sup>a</sup> Center of observatory.

<sup>b</sup> Main floor.

<sup>c</sup> Transit instrument.

<sup>d</sup> Tower of school.

<sup>e</sup> Center of dome.

<sup>f</sup> Meridian circle.

<sup>g</sup> Barometer.

<sup>h</sup> Center of building, ground floor.

<sup>i</sup> West transit pier.

<sup>j</sup> Equatorial pier.

<sup>k</sup> Intersection of equatorial axes.

<sup>l</sup> Zenith telescope.

<sup>m</sup> Main dome.

<sup>n</sup> Transit pier.

<sup>o</sup> Barometer cistern.

<sup>p</sup> Stone pier in terrace wall.

<sup>q</sup> Prime vertical instrument.

<sup>r</sup> Great transit instrument.

No.	Authority for—		Description.
	Latitude.	Longitude.	
185	Letter from Director, 1893.	Letter from Director, 1893.	Ladd Obs., Brown Univ.
186	<i>Astron. Nach.</i> , Nr. 2254, 1879.	<i>Astron. Nach.</i> , Nr. 2254, 1879.	Mr. Seagrave's Observatory.
187	<i>Description de l'Obs.</i> , 1845.	<i>Astron. Nach.</i> , Nr. 3993, 1905.	Obs. Central Nicolas.
188	Letter from Director, 1912.	Letter from Director, 1912.	Quebec Obs., Plains of Abraham.
189	Letter from Director, 1897.	Letter from Director, 1897.	National Observatory.
190	Letter from Director, 1897.	<i>Astron. Nach.</i> , Nr. 3993, 1905.	Polytechnic School Obs.
191	See footnote (a).	See footnote (a). <sup>1</sup>	National Observatory.
192	<i>Memorie del R. Osserv.</i> , 1904.	Letter from Director, 1913.	Royal Obs. at Roman College.
193	Letter from Director, 1913.	<i>Astron. Nach.</i> , Nr. 3993, 1905.	Royal Univ. Obs. at Capitol.
194	Letter from Director, 1913.	Letter from Director, 1913.	Vatican Obs., since 1906-7.
195	<i>Pubbl. della Specola Vaticana</i> , 1905.	<i>Astron. Nach.</i> , Nr. 3993, 1905.	<sup>b</sup> Vatican Obs., before 1906-7.
196	<i>Annales del Obs.</i> , 1892.	Letter from Director, 1913.	Naval Obs., since 1797.
197	Letter, Director new Obs., 1913.	Letter, Director new Obs., 1913.	<sup>c</sup> Naval Obs., before 1797.
198	Letter from Director, 1897.	<i>U. S. C. and G. S. Report</i> , 1897.	Davidson Observatory.
199	Letter from Director, 1911.	Letter from Director, 1911.	Southern Obs. of Carnegie Inst.
200	Letter from Director, 1913.	Letter from Director, 1913.	<sup>d</sup> National Obs., since 1862.
201	Letter, Director new Obs., 1913.	Letter, Director new Obs., 1913.	<sup>e</sup> National Obs., before 1862.
202	Letter from Director, 1913.	Letter from Director, 1913.	National Obs., Espejo.
203	Letter from Director, 1913.	<i>Washington Observations</i> , 1876.	Sayre Obs., Lehigh Univ.
204	<i>Amer. Jour. of Sci.</i> , 1883.	Letter from Director, 1913.	Williamston Obs., Mt. Holyoke Coll.
205	Letter from Director, 1916.	Letter from Director, 1916.	Obs. of Illinois Watch Co.
206	Letter from Director, 1897.	<i>U. S. C. and G. S. Report</i> , 1897.	<sup>f</sup> Washington University Obs.
207	<i>Astron. Nach.</i> , Nr. 2582, 1884.	<i>Astron. Nach.</i> , Nr. 2582, 1884.	Imperial University Obs.
208	Letter from Director, 1914.	<i>Astron. Nach.</i> , Nr. 3993, 1905.	Obs. of Acad. of Sci.
209	Letter from Director, 1913.	<i>Monthly Notices, R. A. S.</i> , 1851.	Stonyhurst College Obs.
210	<i>Annalen der Sternw.</i> , 1896.	<i>Astron. Nach.</i> , Nr. 3993, 1905.	Imperial Univ. Obs.
211	Letter from Director, 1912.	Letter from Director, 1912.	Sproul Obs., Swarthmore College.
212	<i>Astron. Results</i> , 1879-81.	See footnote (g).	Government Observatory.
213	Letter from Director, 1891.	Letter from Director, 1891.	Syracuse Univ. Obs.
214	Letter from Director, 1914.	Letter from Director, 1914.	Roe Observatory.
215	<i>Boletin del Obs.</i> , 1914.	<i>Annuario del Obs.</i> , 1902.	National Observatory.
216	Letter from Director, 1897.	Letter from Director, 1897.	Tashkent Observatory.
217	<i>Les Obs. Astron.</i> , Bruxelles, 1907.	<i>Les Obs. Astron.</i> , Bruxelles, 1907.	Mr. Metcal's Obs., before 1911.
218	<i>Pubbl. dell'Osserv.</i> , 1900.	Letter from Director, 1913.	Collurania Observatory.
219	<i>Annales de l'Obs.</i> , 1894.	<i>Annales de l'Obs.</i> , 1894.	University Observatory.
220	Letter from Director, 1913.	Letter from Director, 1913.	University Observatory.
221	Letter from Director, 1912.	Letter from Director, 1912.	Meteorological Observatory.
222	<i>Annales de l'Obs.</i> , 1912.	<i>British Nautical Almanac</i> .	University Observatory.
223	Letter from Director, 1913.	Letter from Director, 1913.	<sup>h</sup> Imperial and Royal Maritime Obs.
224	Letter, Director new Obs., 1913.	Letter, Director new Obs., 1913.	<sup>i</sup> Imperial and Royal Maritime Obs.
225	<i>Astron. Nach.</i> , Nr. 4588, 1912.	Letter from Director, 1913.	International Lat. Obs., since 1909.
226	See footnote (j).	See footnote (k).	International Lat. Obs., before 1909.
227	<i>British Nautical Almanac</i> .	<i>British Nautical Almanac</i> .	Obs. of Sir W. Huggins, London.
228	Letter from Director, 1915.	Letter from Director, 1915.	<sup>l</sup> Royal Obs. of the Univ., since 1913.
229	Letter from Director, 1913.	<i>Astron. Nach.</i> , Nr. 3993, 1905.	<sup>m</sup> Royal Obs. of the Univ., before 1913.
230	Letter from Director, 1897.	Letter from Director, 1897.	Obs. Univ. of Ala.

<sup>a</sup> Green and Davis, *Telegraphic Determinations of Longitudes on the East Coast of South America*, 1830.

<sup>b</sup> In the Gregorian tower.

<sup>c</sup> In Cadix.

<sup>d</sup> In Quinta Normal.

<sup>e</sup> On the hill Santa Lucia, in Santiago.

<sup>f</sup> Old observatory 0-125 E.

<sup>g</sup> Letter from Government Astronomer at Adelaide, 1912.

<sup>h</sup> Since 1893.

<sup>i</sup> Before 1893.

<sup>j</sup> *Resultats des Internationales Breitenmessungen*, 1900-1908.

<sup>k</sup> *Resultats des Internationales Breitenmessungen*, Band I, 1908.

<sup>l</sup> At Pinar Torinese.

<sup>m</sup> At Palasno Madama.

No.	Place.	Latitude.	Reduction to Geocentric Latitude.	Altitude (Meters).	Log $\rho$ (Including altitude).	Longitude from Greenwich.	Reduction from Greenwich to Local S. T. M. T.
231	Ukiah, Cal. . . . .	+39 8 12.1 <sup>a</sup>	-11 20.7	220 <sup>a</sup>	9.999495	+ 8 12 50.3 <sup>a</sup>	+ 80.95
232	Upsala, Sweden . . . .	+59 51 29.4 <sup>b</sup>	-10 5.2	21 <sup>b</sup>	9.999909	- 1 10 30.12 <sup>b</sup>	- 11.53
233	Urbana, Ill. . . . .	+40 6 20.2 <sup>c</sup>	-11 25.2	286 <sup>c</sup>	9.999412	+ 5 52 53.90 <sup>c</sup>	+ 57.97
234	Utrecht, Netherlands . .	+52 5 9.7 <sup>d</sup>	-11 15.0	12 <sup>d</sup>	9.999093	- 0 20 31.0 <sup>d</sup>	- 3.37
235	Utrecht, Netherlands . .	+52 5 13	-11 15.0	23	9.999093	- 0 20 28.9	- 3.36
236	Venice, Italy . . . . .	+45 28 10.5 <sup>e</sup>	-11 35.6	15 <sup>e</sup>	9.999261	- 0 49 22.12 <sup>e</sup>	- 8.11
237	Victoria, B. C. . . . .	+48 31 15.7 <sup>m</sup>	-11 30.7	9.999182	+ 8 13 49.17 <sup>m</sup>	+ 81.19	
238	Vienna, Austria . . . . .	+48 13 55.1 <sup>f</sup>	-11 31.5	240 <sup>g</sup>	9.999205	- 1 5 21.35 <sup>f</sup>	- 10.74
239	Vienna, Austria . . . . .	+48 12 35.5	-11 31.6	186 <sup>g</sup>	9.999202	- 1 5 31.61	- 10.75
240	Vienna, Austria . . . . .	+48 12 53.8	-11 31.6	214	9.999204	- 1 5 25.17	- 10.75
241	Vienna, Austria . . . . .	+48 12 46.7 <sup>e</sup>	-11 31.6	285	9.999909	- 1 5 10.96	- 10.71
242	Warsaw, Russia . . . . .	+52 13 4.6 <sup>e</sup>	-11 14.3	121 <sup>e</sup>	9.999997	- 1 24 7.25 <sup>e</sup>	- 13.82
243	Washington, D. C. . . . .	+38 55 14.0 <sup>h</sup>	-11 19.6	82 <sup>f</sup>	9.999431	+ 5 8 15.78 <sup>h</sup>	+ 59.64
244	Washington, D. C. . . . .	+38 53 36.7 <sup>f</sup>	-11 19.4	31 <sup>h</sup>	9.999428	+ 5 8 12.15 <sup>f</sup>	+ 59.63
245	Washington, D. C. . . . .	+38 53 17.3 <sup>i</sup>	-11 19.4	10 <sup>i</sup>	9.999427	+ 5 8 6.24 <sup>i</sup>	+ 59.64
246	Washington, D. C. . . . .	+38 56 14.8 <sup>m</sup>	-11 19.7	9.999425	+ 5 8 0.0 <sup>m</sup>	+ 59.69	
247	Wellesley, Mass. . . . .	+42 17 34.8	-11 32.3	61	9.999344	+ 4 45 12.7	+ 46.85
248	Wellington, N. Z. . . . .	-41 17 3.8 <sup>b</sup>	+11 29.5	127 <sup>b</sup>	9.999375	-11 39 4.27 <sup>b</sup>	-114.84
249	West Point, N. Y. . . . .	+41 23 22.1	-11 29.9	170	9.999375	+ 4 55 50.55	+ 48.66
250	Wilhelmshaven, Germany	+53 31 52.1 <sup>e</sup>	-11 5.7	9 <sup>e</sup>	9.999057	- 0 32 35.06 <sup>e</sup>	- 5.55
251	Williams Bay, Wis. . . . .	+42 34 12.6 <sup>n</sup>	-11 38.0	320 <sup>n</sup>	9.999355	+ 5 54 13.24 <sup>n</sup>	+ 58.19
252	Williamstown, Mass. . . .	+42 42 30	-11 33.2	213	9.999344	+ 4 52 50	+ 48.19
253	Winchester, Mass. . . . .	+42 27 11	-11 32.7	30	9.999338	+ 4 44 32.4	+ 46.74
254	Windsor, N. S. W. . . . .	-33 36 39.8 <sup>b</sup>	+10 40.6	16 <sup>h</sup>	9.999556	-10 3 19.9	- 99.11
255	Zé-Sé, China . . . . .	+31 5 46.0 <sup>e</sup>	-10 14.4	100 <sup>e</sup>	9.999619	- 8 4 44.82 <sup>e</sup>	- 79.63
256	Zurich, Switzerland . . . .	+47 22 38.3 <sup>e</sup>	-11 33.5	469 <sup>e</sup>	9.999243	- 0 34 12.26 <sup>e</sup>	- 5.62

<sup>a</sup> Zenith telescope.  
<sup>b</sup> Transit instrument.  
<sup>c</sup> 12-inch equatorial.  
<sup>d</sup> Altazimuth pier.  
<sup>e</sup> Meridian circle.

<sup>f</sup> Central dome.  
<sup>g</sup> Barometer cistern.  
<sup>h</sup> Center of the clock room.  
<sup>i</sup> Ground floor of main building.  
<sup>j</sup> Small dome.

<sup>k</sup> Barometer.  
<sup>l</sup> Stileostat pier.  
<sup>m</sup> Center of dome.  
<sup>n</sup> 40-inch equatorial.



No.	Authority for—		Description.
	Latitude.	Longitude.	
231	See footnote (a).	Letter from Director, 1912.	International Lat. Obs.
232	Letter from Director, 1913.	<i>Astron. Nach.</i> , Nr. 3993, 1905.	University Observatory.
233	Letter from Director, 1913.	Letter from Director, 1913.	Obs., Univ. of Ill.
234	Letter from Director, 1913.	Letter from Director, 1913.	University Obs., since 1855.
235	Letter, Director new Obs., 1913.	Letter, Director new Obs., 1913.	University Obs., before 1855.
236	Letter from Director, 1913.	Letter from Director, 1913.	Obs. of the Nautical Institute.
237	Letter from Director, 1917.	Letter from Director, 1917.	Dominion Astrophysical Obs.
238	See footnote (b).	<i>Astron. Nach.</i> , Nr. 3993, 1905.	Imperial and Royal Univ. Obs.
239	Letter, Director new Obs., 1913.	Letter, Director new Obs., 1913.	Imperial and Royal Univ. Obs.
240	<i>Berliner Jahrbuch.</i>	<i>Berliner Jahrbuch.</i>	Oppolzer Obs., Josephstadt.
241	<i>Publik. der Sternw.</i> , 1892.	<i>Astron. Nach.</i> , Nr. 3993, 1905.	Kuffner Obs., Ottakring.
242	<i>Astron. Nach.</i> , Nr. 4666, 1913.	<i>Astron. Nach.</i> , Nr. 3993, 1905.	Imperial University Obs.
243	<i>U. S. Naval Obs. Publications</i> , 1909.	<i>U. S. C. and G. S. Report</i> , 1907.	U. S. N. Obs., Georgetown Heights.
244	See footnote (c).	<i>U. S. C. and G. S. Report</i> , 1907.	U. S. Naval Obs., 1842-1893.
245	Letter from Director, 1912.	Letter from Director, 1912.	Smithsonian Astrophysical Obs.
246	<i>Astronomical Journal</i> , 1897.	<i>Astronomical Journal</i> , 1897.	Catholic Univ. Obs., Brookland.
247	Letter from Director, 1912.	<i>Les Obs. Astron.</i> , Bruxelles, 1907.	Whitin Obs., Wellesley College.
248	See footnote (d).	See footnote (f).	Hector Observatory.
249	Letter from Director, 1891.	Letter from Director, 1891.	U. S. Military Academy.
250	Letter from Director, 1913.	<i>Astron. Nach.</i> , Nr. 3993, 1905.	Imperial Naval Obs.
251	<i>Astrophysical Journal</i> , 1901.	<i>Astrophysical Journal</i> , 1901.	Yerkes Obs., Univ. of Chicago.
252	Letter from Director, 1893.	Letter from Director, 1893.	Field Memorial Obs., Williams Coll.
253	Letter from Director, 1913.	Letter from Director, 1913.	Mr. Metcalf's Obs., since 1911.
254	<i>Monthly Notices, R. A. S.</i> , 1884.	<i>Monthly Notices, R. A. S.</i> , 1888.	Mr. John Tebbutt's Obs.
255	<i>Annales de l'Obs.</i> , 1907.	<i>Annales de l'Obs.</i> , 1907.	Obs. of the Jesuits near Shanghai.
256	Letter from Director, 1913.	<i>Astron. Nach.</i> , Nr. 3202, 1893.	Obs. of Swiss Polytechnic School.

a *Revue des Observations des Observatoires, 1900-1906.*

b *Astron. Arbeiten des K. K. Gradmessungs-Bureau*, 1896.

c Since 1879.

d Before 1879.

e *Washington Observations for 1892*, Appendix I, pp. XXI and XXXII.

f *Transactions of the New Zealand Institute*, Vol. XLVII, 1914.

g Old observatory 9' N., 142 E.

h And the new value of the longitude of Sydney.

THE COMPUTATION OF LUNAR DISTANCES.

Tables of lunar distances are no longer given in the Ephemeris, in accordance with the decision of the Navy Department that they are now of little practical use to navigators. However, in case it is desired to use this method, the angular distance between the Moon and any heavenly body may be calculated by solving the spherical triangle of which the known parts are the polar distances of the Moon and the other body and the difference of their right ascensions, or, in other words, the angle at the pole between their hour-circles. Then, the Greenwich mean time of the observation being approximately known and the lunar distances for the star or other body calculated for the even hours before and after, the required lunar distance may be interpolated and the longitude derived by the methods given in books on navigation.

EXAMPLE 1.

Find the lunar distance of Aldebaran, March 29, 1920, at 10 P. M., Greenwich Mean Time.

Let $\alpha$ and $\delta$ - Right Ascension and Declination of the star			
" $\alpha'$ and $\delta'$ - "	" " " " "	" " "	" " Moon
" D - Lunar Distance			
Also let $\tan M = \tan \delta' \sec (\alpha - \alpha')$			
Then $\cos D = \sin \delta' \cos (M - \delta) \operatorname{cosec} M$			
$\alpha$	$4^h 31^m 20.7$	$M$	$27^\circ 38' 15''$
$\alpha'$	$9^h 56^m 54.4$	$\delta$	$+16^\circ 20' 54''$
$\alpha - \alpha'$	$19^h 35^m 15.3$	$M - \delta$	$11^\circ 17' 21''$
$\alpha - \alpha'$	$293^\circ 48' 50''$	$\sin \delta'$	9.315854
$\delta'$	$+ 11^\circ 56' 16''$	$\cos (M - \delta)$	9.991515
$\tan \delta'$	9.325149	$\operatorname{cosec} M$	0.333598
$\sec (\alpha - \alpha')$	0.393869	$\cos D$	9.640767
$\tan M$	9.719018	$D$	$64^\circ 4' 9''$

EXAMPLE 2.

Find the lunar distance of Jupiter, February 3, 1920, at noon, Greenwich Mean Time. In this case the distance is smaller and the following method is more accurate:

Let $\alpha$ and $\delta$ - Right Ascension and Declination of the planet			
" $\alpha'$ and $\delta'$ - "	" " " " "	" " "	" " Moon
" D - Lunar Distance			
Also let $\tan N = \tan \frac{1}{2} (\alpha - \alpha') \cos \frac{1}{2} (\delta + \delta') \operatorname{cosec} \frac{1}{2} (\delta - \delta')$			
Then $\sin \frac{1}{2} D = \sin \frac{1}{2} (\alpha - \alpha') \cos \frac{1}{2} (\delta + \delta') \operatorname{cosec} N$			
Sin N and $\sin \frac{1}{2} (\alpha - \alpha')$ have the same algebraic sign.			
$\alpha$	$9^h 3^m 23.1$	$\tan \frac{1}{2} (\alpha - \alpha')$	9.054087
$\alpha'$	$8^h 11^m 41.4$	$\cos \frac{1}{2} (\delta + \delta')$	9.981854
$\alpha - \alpha'$	$0^h 51^m 41.7$	$\operatorname{cosec} \frac{1}{2} (\delta - \delta')$	1.647570
$\alpha - \alpha'$	$12^\circ 55' 26''$	$\tan N$	0.683511
$\delta$	$+ 17^\circ 44' 16''$	$N$	$78^\circ 17' 29''$
$\delta'$	$+ 15^\circ 9' 27''$	$\sin \frac{1}{2} (\alpha - \alpha')$	9.051320
$\delta + \delta'$	$+ 32^\circ 53' 43''$	$\cos \frac{1}{2} (\delta + \delta')$	9.981854
$\delta - \delta'$	$+ 2^\circ 34' 49''$	$\operatorname{cosec} N$	0.009132
$\frac{1}{2} (\alpha - \alpha')$	$6^\circ 27' 43''$	$\sin \frac{1}{2} D$	9.042306
$\frac{1}{2} (\delta + \delta')$	$+ 16^\circ 28' 52''$	$\frac{1}{2} D$	$6^\circ 19' 43''$
$\frac{1}{2} (\delta - \delta')$	$+ 1^\circ 17' 24''$	$D$	$12^\circ 39' 28''$

FOR FINDING THE LATITUDE BY AN OBSERVED ALTITUDE OF POLARIS, 1920.

Reduce the observed altitude of Polaris to the true altitude.

Reduce the recorded time of observation to the local sidereal time.

Take out the apparent right ascension and declination of Polaris for the time of observation.

Subtract the apparent right ascension from the local sidereal time of observation and the remainder is the hour-angle of Polaris.

With this hour-angle as the vertical argument, and the apparent declination of Polaris as the horizontal argument, take out the correction from Table I and add it to or subtract it from the true altitude, according to its sign.

For altitudes other than 45°, corrections taken from the supplementary table at the bottom of Table I (Table Ia) may be applied when necessary for the degree of accuracy required.

*Example.*—August 5, 1920, at 10<sup>h</sup> 40<sup>m</sup> 30<sup>s</sup> P. M. local mean solar time, in longitude 59° west of Greenwich, suppose the true altitude of Polaris to be 33° 20' 0", required the latitude of the place.

Local astronomical mean time	10 40 30
Reduction from Table III for 10 <sup>h</sup> 40 <sup>m</sup> 30 <sup>s</sup>	+ 1 45
Greenwich sidereal time of mean noon, August 5, page 10	8 54 56
Reduction from Table III for longitude (−3 <sup>h</sup> 56 <sup>m</sup> west, or plus)	+ 0 39
<hr/>	
Sum (having regard to signs) is equal to local sidereal time	19 37 50
R. A. of Polaris (page 281) for time of observation	1 32 49
<hr/>	
Remainder is equal to hour-angle of Polaris	18 5 1
Decl. of Polaris (page 281) for time of observation, 88° 52' 33"	" " "
<hr/>	
True altitude	+33 20 0
Correction from Table I	− 0 49
Correction from Table Ia	−13
<hr/>	
Latitude of the place	+33 18 58

Observations of Polaris for latitude should be made when practicable near the times of upper or of lower culminations (hour-angle 0<sup>h</sup> or 12<sup>h</sup>). However, at sea, if made near elongation (hour-angle 6<sup>h</sup> or 18<sup>h</sup>), the hour-angle, and hence the local time, should be known within one minute.

Decl. H. A.	Decl.						Decl. H. A.
	88° 52' 30"	88° 52' 40"	88° 52' 50"	88° 53' 0"	88° 53' 10"	88° 53' 20"	
h m	' "	' "	' "	' "	' "	' "	h m
0 0	−67 30 0	−67 20 0	−67 10 0	−67 0 0	−66 50 0	−66 40 0	24 0
3	67 30 1	67 20 1	67 10 1	67 0 1	66 50 1	66 40 1	23 57
6	67 29 2	67 19 2	67 9 2	66 59 2	66 49 2	66 39 2	54
9	67 27 3	67 17 3	67 7 3	66 57 3	66 47 3	66 37 3	51
12	67 24 3	67 14 3	67 4 3	66 54 3	66 44 3	66 34 3	48
0 15	−67 21 4	−67 11 4	−67 1 4	−66 51 4	−66 41 4	−66 31 4	23 45
18	67 17 4	67 7 4	66 57 4	66 47 4	66 37 4	66 27 4	42
21	67 13 4	67 3 4	66 53 4	66 43 4	66 33 4	66 23 4	39
24	67 7 6	66 57 6	66 48 6	66 38 6	66 28 6	66 18 6	36
27	67 1 6	66 51 6	66 42 6	66 32 6	66 22 6	66 12 6	33
0 30	−66 55 8	−66 45 8	−66 35 8	−66 25 8	−66 15 8	−66 5 8	23 30
33	66 47 8	66 37 8	66 27 8	66 18 8	66 8 8	65 58 8	27
36	66 39 9	66 29 9	66 19 9	66 10 9	66 0 9	65 50 9	24
39	66 30 9	66 21 9	66 11 9	66 1 9	65 51 9	65 41 9	21
42	66 21 10	66 11 10	66 1 10	65 51 10	65 42 10	65 32 10	18
0 45	−66 11 11	−66 1 11	−65 51 11	−65 41 11	−65 32 11	−65 22 11	23 15
48	66 0 12	65 50 12	65 40 12	65 30 12	65 21 12	65 11 12	12
51	65 48 12	65 38 12	65 29 12	65 19 12	65 9 12	65 0 12	9
54	65 36 13	65 26 13	65 17 13	65 7 13	64 57 13	64 47 13	6
0 57	65 23 13	65 13 13	65 4 13	64 54 13	64 44 13	64 35 13	3
1 0	−65 9 14	−65 0 14	−64 50 14	−64 40 14	−64 31 14	−64 21 14	23 0
3	64 55 15	64 45 15	64 36 15	64 26 15	64 17 15	64 7 15	22 57
6	64 40 15	64 30 15	64 21 15	64 11 15	64 2 15	63 52 15	54
9	64 24 16	64 15 16	64 5 16	63 56 16	63 46 16	63 37 16	51
1 12	−64 8 16	−63 59 16	−63 49 16	−63 40 16	−63 30 16	−63 21 16	22 48

FOR FINDING THE LATITUDE BY AN OBSERVED ALTITUDE OF POLARIS, N

Decl.		88° 52' 30"	88° 52' 40"	88° 52' 50"	88° 53' 0"	88° 53' 10"	88° 53' 20"	Decl.
H. A.								H
h	m							h
1	12	-64 8 17	-63 59 17	-63 49 17	-63 40 17	-63 30 17	-63 21 17	22 4
	15	63 51 18	63 42 18	63 32 18	63 23 18	63 13 17	63 4 18	22 5
	18	63 33 18	63 24 18	63 14 18	63 5 18	62 56 18	62 46 18	22 6
	21	63 15 18	63 6 18	62 56 18	62 47 18	62 38 18	62 28 18	22 7
	24	62 56 19	62 47 19	62 37 19	62 28 19	62 19 19	62 9 19	22 8
1	27	-62 36 20	-62 27 20	-62 18 20	-62 8 20	-61 59 20	-61 50 20	22 9
	30	62 16 21	62 7 21	61 58 21	61 48 21	61 39 21	61 30 21	22 10
	33	61 55 21	61 46 21	61 37 21	61 27 21	61 18 21	61 9 21	22 11
	36	61 33 22	61 24 22	61 15 22	61 6 22	60 57 22	60 48 22	22 12
	39	61 11 22	61 2 22	60 53 22	60 44 22	60 35 22	60 26 22	22 13
1	42	-60 48 23	-60 39 23	-60 30 23	-60 21 23	-60 12 23	-60 3 23	22 14
	45	60 25 24	60 16 24	60 7 24	59 58 24	59 49 24	59 40 24	22 15
	48	60 1 24	59 52 24	59 43 24	59 34 24	59 25 24	59 16 24	22 16
	51	59 36 25	59 27 25	59 18 25	59 9 25	59 0 25	58 52 25	22 17
	54	59 10 25	59 2 25	58 53 25	58 44 25	58 35 25	58 27 25	22 18
1	57	-58 44 26	-58 36 26	-58 27 26	-58 18 26	-58 9 26	-58 1 26	22 19
2	0	58 18 26	58 9 26	58 0 26	57 52 26	57 43 26	57 35 26	22 20
	3	57 50 26	57 42 26	57 33 26	57 25 26	57 16 26	57 8 26	21 57
	6	57 22 26	57 14 26	57 6 26	56 57 26	56 49 26	56 40 26	21 54
	9	56 54 26	56 46 26	56 37 26	56 29 26	56 20 26	56 12 26	21 51
2	12	-56 25 26	-56 17 26	-56 8 26	-56 0 26	-55 52 26	-55 43 26	21 48
	15	55 55 26	55 47 26	55 39 26	55 31 26	55 22 26	55 14 26	21 45
	18	55 25 26	55 17 26	55 9 26	55 1 26	54 52 26	54 44 26	21 42
	21	54 54 26	54 46 26	54 38 26	54 30 26	54 22 26	54 14 26	21 39
	24	54 23 26	54 15 26	54 7 26	53 59 26	53 51 26	53 43 26	21 36
2	27	-63 51 27	-63 43 27	-63 35 27	-63 27 27	-63 19 27	-63 11 27	21 33
	30	53 18 27	53 11 27	53 3 27	52 55 27	52 47 27	52 39 27	21 30
	33	52 48 27	52 38 27	52 29 27	52 22 27	52 14 27	52 7 27	21 27
	36	52 12 27	52 4 27	51 56 27	51 49 27	51 41 27	51 33 27	21 24
	39	51 38 27	51 30 27	51 22 27	51 15 27	51 7 27	51 0 27	21 21
2	42	-51 3 27	-50 55 27	-50 48 27	-50 41 27	-50 33 27	-50 25 27	21 18
	45	50 28 27	50 20 27	50 13 27	50 6 27	49 58 27	49 51 27	21 15
	48	49 52 27	49 45 27	49 37 27	49 30 27	49 23 27	49 15 27	21 12
	51	49 16 27	49 9 27	49 1 27	48 54 27	48 47 27	48 40 27	21 9
	54	48 39 27	48 32 27	48 25 27	48 18 27	48 10 27	48 3 27	21 6
2	57	-48 2 27	-47 55 27	-47 48 27	-47 41 27	-47 34 27	-47 26 27	21 3
3	0	47 24 27	47 17 27	47 10 27	47 3 27	46 56 27	46 49 27	21 0
	3	46 46 27	46 39 27	46 32 27	46 25 27	46 18 27	46 11 27	20 57
	6	46 7 27	46 0 27	45 54 27	45 47 27	45 40 27	45 33 27	20 54
	9	45 28 27	45 21 27	45 15 27	45 8 27	45 1 27	44 54 27	20 51
3	12	-44 48 28	-44 42 28	-44 36 28	-44 28 28	-44 22 28	-44 15 28	20 48
	15	44 8 28	44 2 28	43 56 28	43 49 28	43 42 28	43 36 28	20 45
	18	43 27 28	43 21 28	43 15 28	43 8 28	43 2 28	42 56 28	20 42
	21	42 46 28	42 40 28	42 34 28	42 28 28	42 21 28	42 15 28	20 39
	24	42 5 28	41 59 28	41 53 28	41 46 28	41 40 28	41 34 28	20 36
3	27	-41 17 28	-41 11 28	-41 11 28	-41 5 28	-40 59 28	-40 53 28	20 33
	30	40 41 28	40 35 28	40 29 28	40 23 28	40 17 28	40 11 28	20 30
	33	39 58 28	39 52 28	39 46 28	39 40 28	39 34 28	39 29 28	20 27
	36	39 15 28	39 9 28	39 3 28	38 57 28	38 52 28	38 46 28	20 24
	39	38 31 28	38 26 28	38 20 28	38 14 28	38 8 28	38 3 28	20 21
3	42	-37 47 28	-37 42 28	-37 36 28	-37 31 28	-37 25 28	-37 20 28	20 18
	45	37 3 28	36 57 28	36 52 28	36 47 28	36 41 28	36 36 28	20 15
	48	36 18 28	36 13 28	36 7 28	36 2 28	35 57 28	35 52 28	20 12
	51	35 33 28	35 28 28	35 22 28	35 17 28	35 12 28	35 7 28	20 9
	54	34 47 28	34 42 28	34 37 28	34 32 28	34 27 28	34 22 28	20 6
3	57	-34 2 28	-33 57 28	-33 52 28	-33 47 28	-33 42 28	-33 37 28	20 3
4	0	33 15 28	33 11 28	33 6 28	33 1 28	32 56 28	32 51 28	20 0
	3	32 29 28	32 24 28	32 19 28	32 15 28	32 10 28	32 5 28	19 57
	6	31 42 28	31 37 28	31 33 28	31 28 28	31 24 28	31 19 28	19 54
	9	-30 55 28	-30 50 28	-30 46 28	-30 41 28	-30 37 28	-30 32 28	19 51



FOR FINDING THE LATITUDE BY AN OBSERVED ALTITUDE OF POLARIS, &c.

Decl.		88° 52' 30''	88° 52' 40''	88° 52' 50''	88° 53' 0''	88° 53' 10''	88° 53' 20''	Dist.
H. A.								H.
h	m	''	''	''	''	''	''	h
7	6	+19 47	+19 44	+19 41	+19 38	+19 35	+19 32	16 54
	9	20 37	20 34	20 31	20 28	20 25	20 22	16 51
	12	21 28	21 24	21 21	21 18	21 15	21 11	16 48
	15	22 18	22 14	22 11	22 8	22 4	22 1	16 45
	18	23 7	23 4	23 0	22 57	22 53	22 50	16 42
7	21	+23 57	+23 53	+23 50	+23 46	+23 42	+23 39	16 39
	24	24 46	24 42	24 39	24 35	24 31	24 28	16 36
	27	25 35	25 31	25 28	25 24	25 20	25 16	16 33
	30	26 24	26 20	26 16	26 12	26 8	26 4	16 30
	33	27 12	27 8	27 4	27 0	26 56	26 52	16 27
7	36	+28 1	+27 56	+27 52	+27 48	+27 44	+27 40	16 24
	39	28 49	28 44	28 40	28 36	28 31	28 27	16 21
	42	29 36	29 32	29 27	29 23	29 18	29 14	16 18
	45	30 23	30 19	30 14	30 10	30 5	30 1	16 15
	48	31 10	31 6	31 1	30 56	30 52	30 47	16 12
7	51	+31 57	+31 52	+31 47	+31 43	+31 38	+31 33	16 9
	54	32 43	32 38	32 33	32 29	32 24	32 19	16 6
	57	33 29	33 24	33 19	33 14	33 9	33 4	16 3
8	0	34 15	34 10	34 5	34 0	33 54	33 49	16 0
	3	35 0	34 55	34 50	34 45	34 39	34 34	15 57
8	6	+35 45	+35 40	+35 34	+35 29	+35 24	+35 18	15 54
	9	36 30	36 24	36 19	36 13	36 8	36 2	15 51
	12	37 14	37 8	37 3	36 57	36 52	36 46	15 48
	15	37 58	37 52	37 46	37 41	37 35	37 29	15 45
	18	38 41	38 35	38 29	38 24	38 18	38 12	15 42
8	21	+39 24	+39 18	+39 12	+39 7	+39 1	+38 55	15 39
	24	40 7	40 1	39 55	39 49	39 43	39 37	15 36
	27	40 49	40 43	40 37	40 31	40 24	40 18	15 33
	30	41 31	41 25	41 18	41 12	41 6	41 0	15 30
	33	42 12	42 6	41 59	41 53	41 47	41 41	15 27
8	36	+42 53	+42 47	+42 40	+42 34	+42 27	+42 21	15 24
	39	43 33	43 27	43 20	43 14	43 7	43 1	15 21
	42	44 13	44 7	44 0	43 54	43 47	43 40	15 18
	45	44 53	44 46	44 40	44 33	44 26	44 19	15 15
	48	45 32	45 25	45 19	45 12	45 5	44 58	15 12
8	51	+46 11	+46 4	+45 57	+45 50	+45 43	+45 36	15 9
	54	46 49	46 42	46 35	46 28	46 21	46 14	15 6
	57	47 27	47 20	47 13	47 5	46 58	46 51	15 3
9	0	48 4	47 57	47 50	47 42	47 35	47 28	15 0
	3	48 41	48 33	48 26	48 19	48 12	48 4	14 57
9	6	+49 17	+49 9	+49 2	+48 55	+48 47	+48 40	14 54
	9	49 53	49 45	49 38	49 30	49 23	49 15	14 51
	12	50 28	50 20	50 13	50 5	49 58	49 50	14 48
	15	51 2	50 55	50 47	50 40	50 32	50 24	14 45
	18	51 37	51 29	51 21	51 14	51 6	50 58	14 42
9	21	+52 10	+52 2	+51 55	+51 47	+51 39	+51 31	14 39
	24	52 43	52 35	52 28	52 20	52 12	52 4	14 36
	27	53 16	53 8	53 0	52 52	52 44	52 36	14 33
	30	53 48	53 40	53 32	53 24	53 16	53 8	14 30
	33	54 19	54 11	54 3	53 55	53 47	53 39	14 27
9	36	+54 50	+54 42	+54 34	+54 26	+54 18	+54 10	14 24
	39	55 21	55 12	55 4	54 56	54 48	54 40	14 21
	42	55 51	55 42	55 34	55 26	55 17	55 9	14 18
	45	56 20	56 11	56 3	55 55	55 46	55 38	14 15
	48	56 49	56 40	56 32	56 23	56 15	56 6	14 12
9	51	+57 17	+57 8	+57 0	+56 51	+56 43	+56 34	14 9
	54	57 44	57 36	57 27	57 18	57 10	57 1	14 6
	57	58 11	58 3	57 54	57 45	57 37	57 28	14 3
10	0	58 37	58 29	58 20	58 11	58 3	57 54	14 0
10	3	+59 3	+58 54	+58 46	+58 37	+58 28	+58 19	13 57

# TABLE I.

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FOR FINDING THE LATITUDE BY AN OBSERVED ALTITUDE OF POLARIS, 1920.

Decl.		88° 52' 30"	88° 52' 40"	88° 52' 50"	88° 53' 0"	88° 53' 10"	88° 53' 20"	Decl.	
H. A.								H. A.	
h	m	' "	' "	' "	' "	' "	' "	' "	h m
10	3	+59 3 <sup>28</sup>	+58 54 <sup>25</sup>	+58 46 <sup>25</sup>	+58 37 <sup>26</sup>	+58 28 <sup>25</sup>	+58 19 <sup>25</sup>	+58 19 <sup>25</sup>	13 57
	6	59 23 <sup>26</sup>	59 19 <sup>25</sup>	59 11 <sup>24</sup>	59 2 <sup>26</sup>	58 53 <sup>25</sup>	58 44 <sup>24</sup>	58 44 <sup>24</sup>	54
	9	59 53 <sup>24</sup>	59 44 <sup>24</sup>	59 35 <sup>24</sup>	59 28 <sup>24</sup>	59 17 <sup>24</sup>	59 8 <sup>24</sup>	59 8 <sup>24</sup>	51
	12	60 17 <sup>24</sup>	60 8 <sup>24</sup>	59 59 <sup>24</sup>	59 50 <sup>24</sup>	59 41 <sup>24</sup>	59 32 <sup>24</sup>	59 32 <sup>24</sup>	48
	15	60 40 <sup>23</sup>	60 31 <sup>23</sup>	60 22 <sup>23</sup>	60 13 <sup>23</sup>	60 4 <sup>23</sup>	59 55 <sup>23</sup>	59 55 <sup>23</sup>	45
10	18	+61 3 <sup>22</sup>	+60 54 <sup>22</sup>	+60 45 <sup>22</sup>	+60 36 <sup>22</sup>	+60 27 <sup>22</sup>	+60 18 <sup>22</sup>	+60 18 <sup>22</sup>	13 42
	21	61 25 <sup>21</sup>	61 16 <sup>21</sup>	61 7 <sup>21</sup>	60 58 <sup>21</sup>	60 49 <sup>21</sup>	60 40 <sup>21</sup>	60 40 <sup>21</sup>	39
	24	61 46 <sup>21</sup>	61 37 <sup>21</sup>	61 28 <sup>21</sup>	61 19 <sup>21</sup>	61 10 <sup>21</sup>	61 1 <sup>21</sup>	61 1 <sup>21</sup>	36
	27	62 7 <sup>21</sup>	61 58 <sup>21</sup>	61 49 <sup>21</sup>	61 40 <sup>21</sup>	61 31 <sup>21</sup>	61 21 <sup>20</sup>	61 21 <sup>20</sup>	33
	30	62 28 <sup>19</sup>	62 18 <sup>20</sup>	62 9 <sup>20</sup>	62 0 <sup>19</sup>	61 51 <sup>19</sup>	61 41 <sup>20</sup>	61 41 <sup>20</sup>	30
10	33	+62 47 <sup>19</sup>	+62 38 <sup>19</sup>	+62 29 <sup>18</sup>	+62 19 <sup>19</sup>	+62 10 <sup>19</sup>	+62 1 <sup>18</sup>	+62 1 <sup>18</sup>	13 27
	36	63 6 <sup>18</sup>	62 57 <sup>18</sup>	62 47 <sup>18</sup>	62 38 <sup>18</sup>	62 29 <sup>18</sup>	62 19 <sup>18</sup>	62 19 <sup>18</sup>	24
	39	63 24 <sup>18</sup>	63 15 <sup>18</sup>	63 6 <sup>17</sup>	62 56 <sup>18</sup>	62 47 <sup>18</sup>	62 37 <sup>18</sup>	62 37 <sup>18</sup>	21
	42	63 42 <sup>17</sup>	63 33 <sup>18</sup>	63 23 <sup>17</sup>	63 14 <sup>18</sup>	63 4 <sup>17</sup>	62 55 <sup>18</sup>	62 55 <sup>18</sup>	18
	45	63 59 <sup>17</sup>	63 50 <sup>16</sup>	63 40 <sup>17</sup>	63 31 <sup>17</sup>	63 21 <sup>16</sup>	63 12 <sup>17</sup>	63 12 <sup>16</sup>	15
10	48	+64 16 <sup>15</sup>	+64 6 <sup>16</sup>	+63 57 <sup>15</sup>	+63 47 <sup>16</sup>	+63 37 <sup>16</sup>	+63 28 <sup>15</sup>	+63 28 <sup>15</sup>	13 12
	51	64 31 <sup>15</sup>	64 22 <sup>16</sup>	64 12 <sup>15</sup>	64 3 <sup>16</sup>	63 53 <sup>16</sup>	63 43 <sup>15</sup>	63 43 <sup>15</sup>	9
	54	64 46 <sup>15</sup>	64 37 <sup>16</sup>	64 27 <sup>15</sup>	64 18 <sup>15</sup>	64 8 <sup>14</sup>	63 58 <sup>15</sup>	63 58 <sup>15</sup>	6
10	57	65 1 <sup>14</sup>	64 51 <sup>14</sup>	64 42 <sup>13</sup>	64 32 <sup>14</sup>	64 22 <sup>14</sup>	64 13 <sup>15</sup>	64 13 <sup>15</sup>	3
11	0	65 15 <sup>13</sup>	65 5 <sup>13</sup>	64 55 <sup>13</sup>	64 46 <sup>13</sup>	64 36 <sup>13</sup>	64 26 <sup>13</sup>	64 26 <sup>13</sup>	13 0
11	3	+65 28 <sup>12</sup>	+65 18 <sup>13</sup>	+65 8 <sup>13</sup>	+64 59 <sup>12</sup>	+64 49 <sup>12</sup>	+64 39 <sup>13</sup>	+64 39 <sup>13</sup>	12 57
	6	65 40 <sup>12</sup>	65 31 <sup>11</sup>	65 21 <sup>12</sup>	65 11 <sup>12</sup>	65 1 <sup>12</sup>	64 52 <sup>11</sup>	64 52 <sup>11</sup>	54
	9	65 52 <sup>11</sup>	65 42 <sup>11</sup>	65 33 <sup>11</sup>	65 23 <sup>11</sup>	65 13 <sup>11</sup>	65 3 <sup>11</sup>	65 3 <sup>11</sup>	51
	12	66 3 <sup>11</sup>	65 53 <sup>11</sup>	65 44 <sup>10</sup>	65 34 <sup>10</sup>	65 24 <sup>10</sup>	65 14 <sup>11</sup>	65 14 <sup>11</sup>	48
	15	66 14 <sup>10</sup>	66 4 <sup>10</sup>	65 54 <sup>10</sup>	65 44 <sup>10</sup>	65 34 <sup>10</sup>	65 25 <sup>9</sup>	65 25 <sup>9</sup>	45
11	18	+66 24 <sup>9</sup>	+66 14 <sup>9</sup>	+66 4 <sup>9</sup>	+65 54 <sup>9</sup>	+65 44 <sup>9</sup>	+65 34 <sup>9</sup>	+65 34 <sup>9</sup>	12 42
	21	66 33 <sup>8</sup>	66 23 <sup>8</sup>	66 13 <sup>8</sup>	66 3 <sup>8</sup>	65 53 <sup>9</sup>	65 43 <sup>9</sup>	65 43 <sup>9</sup>	39
	24	66 41 <sup>8</sup>	66 31 <sup>8</sup>	66 21 <sup>8</sup>	66 11 <sup>8</sup>	66 2 <sup>7</sup>	65 52 <sup>7</sup>	65 52 <sup>7</sup>	36
	27	66 49 <sup>7</sup>	66 39 <sup>8</sup>	66 29 <sup>8</sup>	66 19 <sup>8</sup>	66 9 <sup>7</sup>	65 59 <sup>7</sup>	65 59 <sup>7</sup>	33
	30	66 56 <sup>6</sup>	66 46 <sup>7</sup>	66 36 <sup>7</sup>	66 26 <sup>7</sup>	66 16 <sup>7</sup>	66 6 <sup>7</sup>	66 6 <sup>7</sup>	30
11	33	+67 2 <sup>6</sup>	+66 52 <sup>6</sup>	+66 43 <sup>5</sup>	+66 33 <sup>5</sup>	+66 23 <sup>5</sup>	+66 13 <sup>6</sup>	+66 13 <sup>6</sup>	12 27
	36	67 8 <sup>5</sup>	66 58 <sup>5</sup>	66 48 <sup>5</sup>	66 38 <sup>5</sup>	66 28 <sup>5</sup>	66 19 <sup>5</sup>	66 19 <sup>5</sup>	24
	39	67 13 <sup>5</sup>	67 3 <sup>5</sup>	66 53 <sup>5</sup>	66 43 <sup>5</sup>	66 33 <sup>5</sup>	66 24 <sup>4</sup>	66 24 <sup>4</sup>	21
	42	67 18 <sup>5</sup>	67 8 <sup>5</sup>	66 58 <sup>5</sup>	66 48 <sup>5</sup>	66 38 <sup>5</sup>	66 28 <sup>4</sup>	66 28 <sup>4</sup>	18
	45	67 21 <sup>3</sup>	67 12 <sup>4</sup>	67 2 <sup>4</sup>	66 52 <sup>4</sup>	66 42 <sup>3</sup>	66 32 <sup>3</sup>	66 32 <sup>3</sup>	15
11	48	+67 24 <sup>3</sup>	+67 15 <sup>2</sup>	+67 5 <sup>2</sup>	+66 55 <sup>2</sup>	+66 45 <sup>2</sup>	+66 35 <sup>2</sup>	+66 35 <sup>2</sup>	12 12
	51	67 27 <sup>2</sup>	67 17 <sup>2</sup>	67 7 <sup>2</sup>	66 57 <sup>2</sup>	66 47 <sup>2</sup>	66 37 <sup>2</sup>	66 37 <sup>2</sup>	9
	54	67 29 <sup>1</sup>	67 19 <sup>1</sup>	67 9 <sup>1</sup>	66 59 <sup>1</sup>	66 49 <sup>1</sup>	66 39 <sup>1</sup>	66 39 <sup>1</sup>	6
11	57	67 30 <sup>0</sup>	67 20 <sup>0</sup>	67 10 <sup>0</sup>	67 0 <sup>0</sup>	66 50 <sup>0</sup>	66 40 <sup>0</sup>	66 40 <sup>0</sup>	3
12	0	+67 30 <sup>0</sup>	+67 20 <sup>0</sup>	+67 10 <sup>0</sup>	+67 0 <sup>0</sup>	+66 50 <sup>0</sup>	+66 40 <sup>0</sup>	+66 40 <sup>0</sup>	12 0

## TABLE Ia.

Table I has been computed for an altitude of 45°. For other altitudes, corrections taken from the following table may be applied when the desired degree of accuracy requires it.

Altitude.		10°	20°	30°	40°	50°	60°	70°	Altitude.	
H. A.									H. A.	
h	h	"	"	"	"	"	"	"	h	h
0	12	0	0	0	0	0	0	0	12	24
1	11	- 2	- 2	- 1	0	+ 1	+ 2	+ 5	13	23
2	10	8	6	4	- 2	2	7	17	14	22
3	9	16	12	8	3	4	14	34	15	21
4	8	24	19	12	5	6	22	51	16	20
5	7	30	23	15	6	7	27	64	17	19
6	6	-32	-25	-17	-6	+8	+29	+69	18	18

## SIDEREAL INTO MEAN SOLAR TIME.

TO BE SUBTRACTED FROM A SIDEREAL TIME INTERVAL.

Sidereal.	0 <sup>h</sup>	1 <sup>h</sup>	2 <sup>h</sup>	3 <sup>h</sup>	4 <sup>h</sup>	5 <sup>h</sup>	6 <sup>h</sup>	7 <sup>h</sup>	For Seconds
m	m s	m s	m s	m s	m s	m s	m s	m s	s s
0	0 0.000	0 9.890	0 19.659	0 29.489	0 39.318	0 49.148	0 58.977	1 8.807	0 0.00
1	0 0.164	0 9.993	0 19.823	0 29.653	0 39.482	0 49.312	0 59.141	1 8.971	1 0.05
2	0 0.328	0 10.157	0 19.987	0 29.816	0 39.646	0 49.475	0 59.305	1 9.135	2 0.05
3	0 0.491	0 10.321	0 20.151	0 29.980	0 39.810	0 49.639	0 59.469	1 9.298	3 0.05
4	0 0.655	0 10.485	0 20.314	0 30.144	0 39.974	0 49.803	0 59.633	1 9.462	4 0.05
5	0 0.819	0 10.649	0 20.478	0 30.308	0 40.137	0 49.967	0 59.796	1 9.626	5 0.05
6	0 0.983	0 10.813	0 20.642	0 30.472	0 40.301	0 50.131	0 59.960	1 9.790	6 0.05
7	0 1.147	0 10.976	0 20.806	0 30.635	0 40.465	0 50.295	1 0.124	1 9.954	7 0.05
8	0 1.311	0 11.140	0 20.970	0 30.799	0 40.629	0 50.458	1 0.288	1 10.118	8 0.05
9	0 1.474	0 11.304	0 21.134	0 30.963	0 40.793	0 50.622	1 0.452	1 10.281	9 0.05
10	0 1.638	0 11.468	0 21.297	0 31.127	0 40.956	0 50.786	1 0.616	1 10.445	10 0.05
11	0 1.802	0 11.632	0 21.461	0 31.291	0 41.120	0 50.950	1 0.779	1 10.609	11 0.05
12	0 1.966	0 11.795	0 21.625	0 31.455	0 41.284	0 51.114	1 0.943	1 10.773	12 0.05
13	0 2.130	0 11.959	0 21.789	0 31.618	0 41.448	0 51.278	1 1.107	1 10.937	13 0.05
14	0 2.294	0 12.123	0 21.953	0 31.782	0 41.612	0 51.441	1 1.271	1 11.100	14 0.05
15	0 2.457	0 12.287	0 22.117	0 31.946	0 41.776	0 51.605	1 1.435	1 11.264	15 0.05
16	0 2.621	0 12.451	0 22.280	0 32.110	0 41.939	0 51.769	1 1.599	1 11.428	16 0.05
17	0 2.785	0 12.615	0 22.444	0 32.274	0 42.103	0 51.933	1 1.762	1 11.592	17 0.05
18	0 2.949	0 12.778	0 22.608	0 32.438	0 42.267	0 52.097	1 1.926	1 11.756	18 0.05
19	0 3.113	0 12.942	0 22.772	0 32.601	0 42.431	0 52.260	1 2.090	1 11.920	19 0.05
20	0 3.277	0 13.106	0 22.936	0 32.765	0 42.595	0 52.424	1 2.254	1 12.083	20 0.05
21	0 3.440	0 13.270	0 23.099	0 32.929	0 42.759	0 52.588	1 2.418	1 12.247	21 0.05
22	0 3.604	0 13.434	0 23.263	0 33.093	0 42.922	0 52.752	1 2.582	1 12.411	22 0.05
23	0 3.768	0 13.598	0 23.427	0 33.257	0 43.086	0 52.916	1 2.745	1 12.575	23 0.05
24	0 3.932	0 13.761	0 23.591	0 33.420	0 43.250	0 53.080	1 2.909	1 12.739	24 0.05
25	0 4.096	0 13.925	0 23.755	0 33.584	0 43.414	0 53.243	1 3.073	1 12.903	25 0.05
26	0 4.259	0 14.089	0 23.919	0 33.748	0 43.578	0 53.407	1 3.237	1 13.066	26 0.05
27	0 4.423	0 14.253	0 24.082	0 33.912	0 43.742	0 53.571	1 3.401	1 13.230	27 0.05
28	0 4.587	0 14.417	0 24.246	0 34.076	0 43.905	0 53.735	1 3.564	1 13.394	28 0.05
29	0 4.751	0 14.581	0 24.410	0 34.240	0 44.069	0 53.899	1 3.728	1 13.558	29 0.05
30	0 4.915	0 14.744	0 24.574	0 34.403	0 44.233	0 54.063	1 3.892	1 13.722	30 0.05
31	0 5.079	0 14.908	0 24.738	0 34.567	0 44.397	0 54.226	1 4.056	1 13.886	31 0.05
32	0 5.242	0 15.072	0 24.902	0 34.731	0 44.561	0 54.390	1 4.220	1 14.049	32 0.05
33	0 5.406	0 15.236	0 25.065	0 34.895	0 44.724	0 54.554	1 4.384	1 14.213	33 0.05
34	0 5.570	0 15.400	0 25.229	0 35.059	0 44.888	0 54.718	1 4.547	1 14.377	34 0.05
35	0 5.734	0 15.563	0 25.393	0 35.223	0 45.052	0 54.882	1 4.711	1 14.541	35 0.05
36	0 5.898	0 15.727	0 25.557	0 35.386	0 45.216	0 55.046	1 4.875	1 14.705	36 0.05
37	0 6.062	0 15.891	0 25.721	0 35.550	0 45.380	0 55.209	1 5.039	1 14.868	37 0.05
38	0 6.225	0 16.055	0 25.885	0 35.714	0 45.544	0 55.373	1 5.203	1 15.032	38 0.05
39	0 6.389	0 16.219	0 26.048	0 35.878	0 45.707	0 55.537	1 5.367	1 15.196	39 0.05
40	0 6.553	0 16.383	0 26.212	0 36.042	0 45.871	0 55.701	1 5.530	1 15.360	40 0.10
41	0 6.717	0 16.546	0 26.376	0 36.206	0 46.035	0 55.865	1 5.694	1 15.524	41 0.10
42	0 6.881	0 16.710	0 26.540	0 36.369	0 46.199	0 56.028	1 5.858	1 15.688	42 0.15
43	0 7.045	0 16.874	0 26.704	0 36.533	0 46.363	0 56.192	1 6.022	1 15.851	43 0.15
44	0 7.208	0 17.038	0 26.867	0 36.697	0 46.527	0 56.356	1 6.186	1 16.015	44 0.15
45	0 7.372	0 17.202	0 27.031	0 36.861	0 46.690	0 56.520	1 6.350	1 16.179	45 0.15
46	0 7.536	0 17.366	0 27.195	0 37.025	0 46.854	0 56.684	1 6.513	1 16.343	46 0.15
47	0 7.700	0 17.529	0 27.359	0 37.188	0 47.018	0 56.848	1 6.677	1 16.507	47 0.15
48	0 7.864	0 17.693	0 27.523	0 37.352	0 47.182	0 57.011	1 6.841	1 16.671	48 0.15
49	0 8.027	0 17.857	0 27.687	0 37.516	0 47.346	0 57.175	1 7.005	1 16.834	49 0.15
50	0 8.191	0 18.021	0 27.850	0 37.680	0 47.510	0 57.339	1 7.169	1 16.998	50 0.15
51	0 8.355	0 18.185	0 28.014	0 37.844	0 47.673	0 57.503	1 7.332	1 17.162	51 0.15
52	0 8.519	0 18.349	0 28.178	0 38.008	0 47.837	0 57.667	1 7.496	1 17.326	52 0.15
53	0 8.683	0 18.512	0 28.342	0 38.171	0 48.001	0 57.831	1 7.660	1 17.490	53 0.15
54	0 8.847	0 18.676	0 28.506	0 38.335	0 48.165	0 57.994	1 7.824	1 17.654	54 0.15
55	0 9.010	0 18.840	0 28.670	0 38.499	0 48.329	0 58.158	1 7.988	1 17.817	55 0.15
56	0 9.174	0 19.004	0 28.833	0 38.663	0 48.492	0 58.322	1 8.152	1 17.981	56 0.15
57	0 9.338	0 19.168	0 28.997	0 38.827	0 48.656	0 58.486	1 8.315	1 18.145	57 0.15
58	0 9.502	0 19.331	0 29.161	0 38.991	0 48.820	0 58.650	1 8.479	1 18.309	58 0.15
59	0 9.666	0 19.495	0 29.325	0 39.154	0 48.984	0 58.814	1 8.643	1 18.473	59 0.15



SIDEREAL INTO MEAN SOLAR TIME.

TO BE SUBTRACTED FROM A SIDEREAL TIME INTERVAL.

Sidereal.	8 <sup>h</sup>	9 <sup>h</sup>	10 <sup>h</sup>	11 <sup>h</sup>	12 <sup>h</sup>	13 <sup>h</sup>	14 <sup>h</sup>	15 <sup>h</sup>	For Seconds.
0	1 18.686	1 28.466	1 38.206	1 48.125	1 57.955	2 7.784	2 17.614	2 27.443	0 0.000
1	1 18.800	1 28.680	1 38.459	1 48.289	1 58.119	2 7.948	2 17.778	2 27.607	1 0.003
2	1 18.964	1 28.794	1 38.623	1 48.453	1 58.282	2 8.112	2 17.941	2 27.771	2 0.005
3	1 19.128	1 28.958	1 38.787	1 48.617	1 58.446	2 8.276	2 18.105	2 27.935	3 0.008
4	1 19.292	1 29.121	1 38.951	1 48.780	1 58.610	2 8.440	2 18.269	2 28.099	4 0.011
5	1 19.456	1 29.285	1 39.115	1 48.944	1 58.774	2 8.603	2 18.433	2 28.263	5 0.014
6	1 19.619	1 29.449	1 39.279	1 49.108	1 58.938	2 8.767	2 18.597	2 28.426	6 0.016
7	1 19.783	1 29.613	1 39.442	1 49.272	1 59.101	2 8.931	2 18.761	2 28.590	7 0.019
8	1 19.947	1 29.777	1 39.606	1 49.436	1 59.265	2 9.095	2 18.924	2 28.754	8 0.022
9	1 20.111	1 29.940	1 39.770	1 49.600	1 59.429	2 9.259	2 19.088	2 28.918	9 0.025
10	1 20.275	1 30.104	1 39.934	1 49.763	1 59.592	2 9.423	2 19.252	2 29.082	10 0.027
11	1 20.439	1 30.268	1 40.098	1 49.927	1 59.757	2 9.586	2 19.416	2 29.245	11 0.030
12	1 20.602	1 30.432	1 40.261	1 50.091	1 59.921	2 9.750	2 19.580	2 29.409	12 0.033
13	1 20.766	1 30.596	1 40.425	1 50.255	2 0.084	2 9.914	2 19.744	2 29.573	13 0.035
14	1 20.930	1 30.760	1 40.589	1 50.419	2 0.248	2 10.078	2 19.907	2 29.737	14 0.038
15	1 21.094	1 30.923	1 40.753	1 50.583	2 0.412	2 10.242	2 20.071	2 29.901	15 0.041
16	1 21.258	1 31.087	1 40.917	1 50.746	2 0.576	2 10.405	2 20.235	2 30.065	16 0.044
17	1 21.422	1 31.251	1 41.081	1 50.910	2 0.740	2 10.569	2 20.399	2 30.228	17 0.046
18	1 21.585	1 31.415	1 41.244	1 51.074	2 0.904	2 10.733	2 20.563	2 30.392	18 0.049
19	1 21.749	1 31.579	1 41.408	1 51.238	2 1.067	2 10.897	2 20.727	2 30.556	19 0.052
20	1 21.913	1 31.743	1 41.572	1 51.402	2 1.231	2 11.061	2 20.890	2 30.720	20 0.055
21	1 22.077	1 31.906	1 41.736	1 51.565	2 1.395	2 11.225	2 21.054	2 30.884	21 0.057
22	1 22.241	1 32.070	1 41.900	1 51.729	2 1.559	2 11.388	2 21.218	2 31.048	22 0.060
23	1 22.404	1 32.234	1 42.064	1 51.893	2 1.723	2 11.552	2 21.382	2 31.212	23 0.063
24	1 22.568	1 32.398	1 42.227	1 52.057	2 1.887	2 11.716	2 21.546	2 31.375	24 0.066
25	1 22.732	1 32.562	1 42.391	1 52.221	2 2.050	2 11.880	2 21.709	2 31.539	25 0.068
26	1 22.896	1 32.726	1 42.555	1 52.385	2 2.214	2 12.044	2 21.873	2 31.703	26 0.071
27	1 23.060	1 32.890	1 42.719	1 52.548	2 2.378	2 12.208	2 22.037	2 31.867	27 0.074
28	1 23.224	1 33.054	1 42.883	1 52.712	2 2.542	2 12.371	2 22.201	2 32.031	28 0.076
29	1 23.387	1 33.217	1 43.047	1 52.876	2 2.706	2 12.535	2 22.365	2 32.194	29 0.079
30	1 23.551	1 33.381	1 43.210	1 53.040	2 2.869	2 12.699	2 22.529	2 32.358	30 0.082
31	1 23.715	1 33.545	1 43.374	1 53.204	2 3.033	2 12.863	2 22.692	2 32.522	31 0.085
32	1 23.879	1 33.708	1 43.538	1 53.368	2 3.197	2 13.027	2 22.856	2 32.686	32 0.087
33	1 24.043	1 33.872	1 43.702	1 53.531	2 3.361	2 13.191	2 23.020	2 32.850	33 0.090
34	1 24.207	1 34.036	1 43.866	1 53.695	2 3.525	2 13.354	2 23.184	2 33.013	34 0.093
35	1 24.370	1 34.200	1 44.029	1 53.859	2 3.689	2 13.518	2 23.348	2 33.177	35 0.096
36	1 24.534	1 34.364	1 44.193	1 54.023	2 3.852	2 13.682	2 23.512	2 33.341	36 0.098
37	1 24.698	1 34.528	1 44.357	1 54.187	2 4.016	2 13.846	2 23.675	2 33.505	37 0.101
38	1 24.862	1 34.691	1 44.521	1 54.351	2 4.180	2 14.010	2 23.839	2 33.669	38 0.104
39	1 25.026	1 34.855	1 44.685	1 54.514	2 4.344	2 14.173	2 24.003	2 33.833	39 0.106
40	1 25.190	1 35.019	1 44.849	1 54.678	2 4.508	2 14.337	2 24.167	2 33.996	40 0.109
41	1 25.353	1 35.183	1 45.012	1 54.842	2 4.672	2 14.501	2 24.331	2 34.160	41 0.112
42	1 25.517	1 35.347	1 45.176	1 55.006	2 4.835	2 14.665	2 24.495	2 34.324	42 0.115
43	1 25.681	1 35.511	1 45.340	1 55.170	2 4.999	2 14.829	2 24.658	2 34.488	43 0.117
44	1 25.845	1 35.674	1 45.504	1 55.333	2 5.163	2 14.993	2 24.822	2 34.652	44 0.120
45	1 26.009	1 35.838	1 45.668	1 55.497	2 5.327	2 15.156	2 24.986	2 34.816	45 0.123
46	1 26.172	1 36.002	1 45.832	1 55.661	2 5.491	2 15.320	2 25.150	2 34.979	46 0.126
47	1 26.336	1 36.166	1 45.995	1 55.825	2 5.655	2 15.484	2 25.314	2 35.143	47 0.128
48	1 26.500	1 36.330	1 46.159	1 55.989	2 5.818	2 15.648	2 25.477	2 35.307	48 0.131
49	1 26.664	1 36.493	1 46.323	1 56.153	2 5.982	2 15.812	2 25.641	2 35.471	49 0.134
50	1 26.828	1 36.657	1 46.487	1 56.316	2 6.146	2 15.976	2 25.805	2 35.635	50 0.137
51	1 26.992	1 36.821	1 46.651	1 56.480	2 6.310	2 16.139	2 25.969	2 35.798	51 0.139
52	1 27.155	1 36.985	1 46.815	1 56.644	2 6.474	2 16.303	2 26.133	2 35.962	52 0.142
53	1 27.319	1 37.149	1 46.978	1 56.808	2 6.637	2 16.467	2 26.297	2 36.126	53 0.145
54	1 27.483	1 37.313	1 47.142	1 56.972	2 6.801	2 16.631	2 26.460	2 36.290	54 0.147
55	1 27.647	1 37.476	1 47.306	1 57.136	2 6.965	2 16.795	2 26.624	2 36.454	55 0.150
56	1 27.811	1 37.640	1 47.470	1 57.299	2 7.129	2 16.959	2 26.788	2 36.618	56 0.153
57	1 27.975	1 37.804	1 47.634	1 57.463	2 7.293	2 17.123	2 26.952	2 36.781	57 0.156
58	1 28.138	1 37.968	1 47.797	1 57.627	2 7.457	2 17.286	2 27.116	2 36.945	58 0.158
59	1 28.302	1 38.132	1 47.961	1 57.791	2 7.620	2 17.450	2 27.280	2 37.109	59 0.161



MEAN SOLAR INTO SIDEREAL TIME.  
TO BE ADDED TO A MEAN TIME INTERVAL.

Mean Solar.	0 <sup>h</sup>	1 <sup>h</sup>	2 <sup>h</sup>	3 <sup>h</sup>	4 <sup>h</sup>	5 <sup>h</sup>	6 <sup>h</sup>	7 <sup>h</sup>	For Seconds.
m	m s	m s	m s	m s	m s	m s	m s	m s	s s
0	0 0.000	0 9.856	0 19.713	0 29.569	0 39.426	0 49.282	0 59.139	1 8.995	0 0.000
1	0 0.164	0 10.021	0 19.877	0 29.734	0 39.590	0 49.447	0 59.303	1 9.160	1 0.003
2	0 0.329	0 10.185	0 20.041	0 29.898	0 39.754	0 49.611	0 59.467	1 9.324	2 0.005
3	0 0.493	0 10.349	0 20.206	0 30.062	0 39.919	0 49.775	0 59.632	1 9.488	3 0.008
4	0 0.657	0 10.514	0 20.370	0 30.227	0 40.083	0 49.939	0 59.796	1 9.652	4 0.011
5	0 0.821	0 10.678	0 20.534	0 30.391	0 40.247	0 50.104	0 59.960	1 9.817	5 0.014
6	0 0.986	0 10.842	0 20.699	0 30.555	0 40.412	0 50.268	1 0.124	1 9.981	6 0.016
7	0 1.150	0 11.006	0 20.863	0 30.719	0 40.576	0 50.432	1 0.289	1 10.145	7 0.019
8	0 1.314	0 11.171	0 21.027	0 30.884	0 40.740	0 50.597	1 0.453	1 10.310	8 0.022
9	0 1.478	0 11.335	0 21.191	0 31.048	0 40.904	0 50.761	1 0.617	1 10.474	9 0.025
10	0 1.643	0 11.499	0 21.356	0 31.212	0 41.069	0 50.925	1 0.782	1 10.638	10 0.027
11	0 1.807	0 11.663	0 21.520	0 31.376	0 41.233	0 51.089	1 0.946	1 10.802	11 0.030
12	0 1.971	0 11.828	0 21.684	0 31.541	0 41.397	0 51.254	1 1.110	1 10.967	12 0.033
13	0 2.136	0 11.992	0 21.849	0 31.705	0 41.561	0 51.418	1 1.274	1 11.131	13 0.036
14	0 2.300	0 12.156	0 22.013	0 31.869	0 41.726	0 51.582	1 1.439	1 11.295	14 0.038
15	0 2.464	0 12.321	0 22.177	0 32.034	0 41.890	0 51.746	1 1.603	1 11.459	15 0.041
16	0 2.628	0 12.485	0 22.341	0 32.198	0 42.054	0 51.911	1 1.767	1 11.624	16 0.044
17	0 2.793	0 12.649	0 22.506	0 32.362	0 42.219	0 52.075	1 1.932	1 11.788	17 0.047
18	0 2.957	0 12.813	0 22.670	0 32.526	0 42.383	0 52.239	1 2.096	1 11.952	18 0.049
19	0 3.121	0 12.978	0 22.834	0 32.691	0 42.547	0 52.404	1 2.260	1 12.117	19 0.052
20	0 3.285	0 13.142	0 22.998	0 32.855	0 42.711	0 52.568	1 2.424	1 12.281	20 0.055
21	0 3.450	0 13.306	0 23.163	0 33.019	0 42.876	0 52.732	1 2.589	1 12.445	21 0.057
22	0 3.614	0 13.471	0 23.327	0 33.183	0 43.040	0 52.896	1 2.753	1 12.609	22 0.060
23	0 3.778	0 13.635	0 23.491	0 33.348	0 43.204	0 53.061	1 2.917	1 12.774	23 0.063
24	0 3.943	0 13.799	0 23.656	0 33.512	0 43.368	0 53.225	1 3.081	1 12.938	24 0.066
25	0 4.107	0 13.963	0 23.820	0 33.676	0 43.533	0 53.389	1 3.246	1 13.102	25 0.068
26	0 4.271	0 14.128	0 23.984	0 33.841	0 43.697	0 53.554	1 3.410	1 13.266	26 0.071
27	0 4.435	0 14.292	0 24.148	0 34.005	0 43.861	0 53.718	1 3.574	1 13.431	27 0.074
28	0 4.600	0 14.456	0 24.313	0 34.169	0 44.026	0 53.882	1 3.739	1 13.595	28 0.077
29	0 4.764	0 14.620	0 24.477	0 34.333	0 44.190	0 54.046	1 3.903	1 13.759	29 0.079
30	0 4.928	0 14.785	0 24.641	0 34.498	0 44.354	0 54.211	1 4.067	1 13.924	30 0.082
31	0 5.093	0 14.949	0 24.805	0 34.662	0 44.518	0 54.375	1 4.231	1 14.088	31 0.085
32	0 5.257	0 15.113	0 24.970	0 34.826	0 44.683	0 54.539	1 4.396	1 14.252	32 0.088
33	0 5.421	0 15.278	0 25.134	0 34.990	0 44.847	0 54.703	1 4.560	1 14.416	33 0.090
34	0 5.585	0 15.442	0 25.298	0 35.155	0 45.011	0 54.868	1 4.724	1 14.581	34 0.093
35	0 5.750	0 15.606	0 25.463	0 35.319	0 45.176	0 55.032	1 4.888	1 14.745	35 0.096
36	0 5.914	0 15.770	0 25.627	0 35.483	0 45.340	0 55.196	1 5.053	1 14.909	36 0.099
37	0 6.078	0 15.935	0 25.791	0 35.648	0 45.504	0 55.361	1 5.217	1 15.073	37 0.101
38	0 6.242	0 16.099	0 25.955	0 35.812	0 45.668	0 55.525	1 5.381	1 15.238	38 0.104
39	0 6.407	0 16.263	0 26.120	0 35.976	0 45.833	0 55.689	1 5.546	1 15.402	39 0.107
40	0 6.571	0 16.427	0 26.284	0 36.140	0 45.997	0 55.853	1 5.710	1 15.566	40 0.110
41	0 6.735	0 16.592	0 26.448	0 36.305	0 46.161	0 56.018	1 5.874	1 15.731	41 0.112
42	0 6.900	0 16.756	0 26.612	0 36.469	0 46.325	0 56.182	1 6.038	1 15.895	42 0.115
43	0 7.064	0 16.920	0 26.777	0 36.633	0 46.490	0 56.346	1 6.203	1 16.059	43 0.118
44	0 7.228	0 17.085	0 26.941	0 36.798	0 46.654	0 56.510	1 6.367	1 16.223	44 0.120
45	0 7.392	0 17.249	0 27.105	0 36.962	0 46.818	0 56.675	1 6.531	1 16.388	45 0.123
46	0 7.557	0 17.413	0 27.270	0 37.126	0 46.983	0 56.839	1 6.695	1 16.552	46 0.126
47	0 7.721	0 17.577	0 27.434	0 37.290	0 47.147	0 57.003	1 6.860	1 16.716	47 0.129
48	0 7.885	0 17.742	0 27.598	0 37.455	0 47.311	0 57.168	1 7.024	1 16.881	48 0.131
49	0 8.049	0 17.906	0 27.762	0 37.619	0 47.475	0 57.332	1 7.188	1 17.045	49 0.134
50	0 8.214	0 18.070	0 27.927	0 37.783	0 47.640	0 57.496	1 7.353	1 17.209	50 0.137
51	0 8.378	0 18.234	0 28.091	0 37.947	0 47.804	0 57.660	1 7.517	1 17.373	51 0.140
52	0 8.542	0 18.399	0 28.255	0 38.112	0 47.968	0 57.825	1 7.681	1 17.538	52 0.142
53	0 8.707	0 18.563	0 28.420	0 38.276	0 48.132	0 57.989	1 7.845	1 17.702	53 0.145
54	0 8.871	0 18.727	0 28.584	0 38.440	0 48.297	0 58.153	1 8.010	1 17.866	54 0.148
55	0 9.035	0 18.892	0 28.748	0 38.605	0 48.461	0 58.317	1 8.174	1 18.030	55 0.151
56	0 9.199	0 19.056	0 28.912	0 38.769	0 48.625	0 58.482	1 8.338	1 18.195	56 0.153
57	0 9.364	0 19.220	0 29.077	0 38.933	0 48.790	0 58.646	1 8.502	1 18.359	57 0.156
58	0 9.528	0 19.384	0 29.241	0 39.097	0 48.954	0 58.810	1 8.667	1 18.523	58 0.159
59	0 9.692	0 19.549	0 29.405	0 39.262	0 49.118	0 58.975	1 8.831	1 18.688	59 0.162





AZIMUTH OF POLARIS AT ALL HOUR ANGLES, 1920.

[For hour angles 0<sup>h</sup> to 12<sup>h</sup> the star is west of north, and for hour angles 12<sup>h</sup> to 24<sup>h</sup> it is east of north.]

Lat.		10°	15°	20°	22°	24°	26°	28°	30°	32°	Lat.
H. A.											
h m		°	′	″	°	′	″	°	′	″	h m
0 0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	24 0
10	0	3.0	3.0	3.1	3.2	3.2	3.3	3.3	3.4	3.5	23 5
20	0	6.0	6.1	6.3	6.4	6.5	6.6	6.7	6.8	7.0	23 4
0 30	0	8.9	9.1	9.4	9.5	9.7	9.8	10.0	10.2	10.4	23 1
40	0	11.9	12.1	12.5	12.7	12.9	13.1	13.3	13.6	13.9	23 0
50	0	14.8	15.1	15.6	15.8	16.0	16.3	16.6	17.0	17.3	22 59
1 0	0	17.7	18.1	18.6	18.9	19.2	19.5	19.9	20.3	20.7	22 58
10	0	20.5	21.0	21.6	21.9	22.3	22.7	23.1	23.6	24.1	22 57
20	0	23.4	23.9	24.6	24.9	25.3	25.8	26.2	26.8	27.4	22 56
1 30	0	26.2	26.7	27.5	27.9	28.3	28.8	29.3	30.0	30.6	22 55
40	0	28.9	29.5	30.4	30.8	31.3	31.8	32.4	33.1	33.8	22 54
50	0	31.6	32.2	33.2	33.6	34.2	34.7	35.4	36.1	36.9	22 53
2 0	0	34.2	34.9	35.9	36.4	37.0	37.6	38.3	39.1	40.0	22 52
10	0	36.7	37.5	38.6	39.1	39.7	40.4	41.2	42.0	42.9	22 51
20	0	39.2	40.0	41.2	41.8	42.4	43.1	44.0	44.8	45.8	22 50
2 30	0	41.6	42.5	43.7	44.3	45.0	45.8	46.6	47.6	48.6	22 49
40	0	43.9	44.8	46.1	46.8	47.5	48.3	49.2	50.2	51.3	22 48
50	0	46.1	47.1	48.5	49.2	49.9	50.8	51.7	52.8	53.9	22 47
3 0	0	48.3	49.3	50.7	51.4	52.2	53.1	54.1	55.2	56.4	22 46
10	0	50.3	51.4	52.9	53.6	54.5	55.4	56.4	57.5	58.8	22 45
20	0	52.3	53.4	54.9	55.7	56.6	57.5	58.6	59.8	1 1.1	22 44
3 30	0	54.2	55.3	56.9	57.7	58.6	59.6	1 0.7	1 1.9	1 3.2	22 43
40	0	55.9	57.1	58.7	59.5	1 0.5	1 1.5	1 2.6	1 3.9	1 5.3	22 42
50	0	57.6	58.7	1 0.4	1 1.3	1 2.2	1 3.3	1 4.4	1 5.7	1 7.2	22 41
4 0	0	59.1	1 0.3	1 2.0	1 2.9	1 3.9	1 4.9	1 6.1	1 7.5	1 8.9	22 40
10	1	0.5	1 1.8	1 3.5	1 4.4	1 5.4	1 6.5	1 7.7	1 9.1	1 10.6	22 39
20	1	1.8	1 3.1	1 4.9	1 5.8	1 6.8	1 7.9	1 9.2	1 10.5	1 12.1	22 38
4 30	1	3.0	1 4.3	1 6.1	1 7.0	1 8.1	1 9.2	1 10.5	1 11.9	1 13.4	22 37
40	1	4.1	1 5.4	1 7.2	1 8.2	1 9.2	1 10.4	1 11.7	1 13.1	1 14.6	22 36
50	1	5.0	1 6.3	1 8.2	1 9.2	1 10.2	1 11.4	1 12.7	1 14.1	1 15.7	22 35
5 0	1	5.9	1 7.2	1 9.1	1 10.0	1 11.1	1 12.3	1 13.6	1 15.0	1 16.6	22 34
10	1	6.6	1 7.9	1 9.8	1 10.7	1 11.8	1 13.0	1 14.3	1 15.8	1 17.4	22 33
20	1	7.1	1 8.5	1 10.4	1 11.3	1 12.4	1 13.6	1 14.9	1 16.4	1 18.1	22 32
5 30	1	7.6	1 8.9	1 10.9	1 11.8	1 12.9	1 14.1	1 15.4	1 16.9	1 18.6	22 31
40	1	7.9	1 9.2	1 11.2	1 12.1	1 13.2	1 14.4	1 15.7	1 17.2	1 18.9	22 30
50	1	8.1	1 9.4	1 11.3	1 12.3	1 13.4	1 14.6	1 15.9	1 17.4	1 19.1	22 29
6 0	1	8.1	1 9.5	1 11.4	1 12.4	1 13.4	1 14.6	1 16.0	1 17.5	1 19.1	22 28
10	1	8.0	1 9.4	1 11.3	1 12.3	1 13.3	1 14.5	1 15.9	1 17.4	1 19.0	22 27
20	1	7.8	1 9.2	1 11.1	1 12.0	1 13.1	1 14.3	1 15.6	1 17.1	1 18.7	22 26
6 30	1	7.5	1 8.8	1 10.7	1 11.7	1 12.7	1 13.9	1 15.2	1 16.7	1 18.3	22 25
40	1	7.0	1 8.3	1 10.2	1 11.2	1 12.2	1 13.4	1 14.7	1 16.1	1 17.7	22 24
50	1	6.4	1 7.7	1 9.6	1 10.5	1 11.6	1 12.7	1 14.0	1 15.4	1 17.0	22 23
7 0	1	5.7	1 7.0	1 8.8	1 9.7	1 10.8	1 11.9	1 13.2	1 14.6	1 16.2	22 22
10	1	4.9	1 6.1	1 7.9	1 8.8	1 9.9	1 11.0	1 12.2	1 13.6	1 15.2	22 21
20	1	3.9	1 5.1	1 6.9	1 7.8	1 8.8	1 9.9	1 11.1	1 12.5	1 14.0	22 20
7 30	1	2.8	1 4.0	1 5.8	1 6.6	1 7.6	1 8.7	1 9.9	1 11.3	1 12.7	22 19
40	1	1.6	1 2.8	1 4.5	1 5.3	1 6.3	1 7.4	1 8.6	1 9.9	1 11.3	22 18
50	1	0.3	1 1.5	1 3.1	1 3.9	1 4.9	1 5.9	1 6.1	1 8.4	1 9.8	22 17
8 0	0	58.9	1 0.0	1 1.6	1 2.4	1 3.3	1 4.3	1 5.5	1 6.7	1 8.1	22 16
10	0	57.3	0 58.4	1 0.0	1 0.8	1 1.6	1 2.6	1 3.7	1 4.9	1 6.3	22 15
20	0	55.7	0 56.7	0 58.2	0 59.0	0 59.9	1 0.8	1 1.9	1 3.0	1 4.4	22 14
8 30	0	53.9	0 54.9	0 56.4	0 57.1	0 58.0	0 58.9	0 59.9	1 1.0	1 2.3	22 13
40	0	52.1	0 53.0	0 54.4	0 55.1	0 55.9	0 56.8	0 57.8	0 58.9	1 0.1	22 12
50	0	50.1	0 51.0	0 52.4	0 53.1	0 53.8	0 54.7	0 55.6	0 56.7	0 57.8	22 11
9 0	0	48.0	0 48.9	0 50.2	0 50.9	0 51.6	0 52.4	0 53.3	0 54.3	0 55.5	22 10

# TABLE IV.

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## AZIMUTH OF POLARIS AT ALL HOUR ANGLES, 1920.

For hour angles 0<sup>h</sup> to 12<sup>h</sup> the star is west of north, and for hour angles 12<sup>h</sup> to 24<sup>h</sup> it is east of north.]

Lat.		10°	15°	20°	22°	24°	26°	28°	30°	32°	Lat.		
A.												H. A.	
h	m	°	'	°	'	°	'	°	'	°	'	h	m
9	0	0 48.0	0 48.9	0 50.2	0 50.9	0 51.6	0 52.4	0 53.3	0 54.3	0 55.5		15	0
	10	0 45.9	0 46.7	0 48.0	0 48.6	0 49.3	0 50.1	0 50.9	0 51.9	0 53.0		14	50
	20	0 43.7	0 44.5	0 45.6	0 46.2	0 46.9	0 47.6	0 48.4	0 49.4	0 50.4			40
9	30	0 41.4	0 42.1	0 43.2	0 43.8	0 44.4	0 45.1	0 45.9	0 46.7	0 47.7		14	30
	40	0 39.0	0 39.7	0 40.7	0 41.2	0 41.8	0 42.5	0 43.2	0 44.0	0 44.9			20
	50	0 36.5	0 37.2	0 38.1	0 38.6	0 39.2	0 39.8	0 40.5	0 41.2	0 42.1			10
10	0	0 34.0	0 34.6	0 35.5	0 35.9	0 36.4	0 37.0	0 37.7	0 38.3	0 39.1		14	0
	10	0 31.4	0 31.9	0 32.8	0 33.2	0 33.6	0 34.2	0 34.8	0 35.4	0 36.1		13	50
	20	0 28.7	0 29.2	0 30.0	0 30.4	0 30.8	0 31.3	0 31.8	0 32.4	0 33.1			40
10	30	0 26.0	0 26.4	0 27.1	0 27.5	0 27.9	0 28.3	0 28.8	0 29.3	0 29.9		13	30
	40	0 23.2	0 23.6	0 24.2	0 24.6	0 24.9	0 25.3	0 25.7	0 26.2	0 26.7			20
	50	0 20.4	0 20.8	0 21.3	0 21.6	0 21.9	0 22.2	0 22.6	0 23.0	0 23.5			10
11	0	0 17.6	0 17.9	0 18.3	0 18.6	0 18.8	0 19.1	0 19.5	0 19.8	0 20.2		13	0
	10	0 14.7	0 15.0	0 15.3	0 15.5	0 15.8	0 16.0	0 16.3	0 16.6	0 16.9		12	50
	20	0 11.8	0 12.0	0 12.3	0 12.5	0 12.7	0 12.8	0 13.1	0 13.3	0 13.6			40
11	30	0 8.9	0 9.0	0 9.3	0 9.4	0 9.5	0 9.6	0 9.8	0 10.0	0 10.2		12	30
	40	0 5.9	0 6.0	0 6.2	0 6.3	0 6.4	0 6.4	0 6.6	0 6.7	0 6.8			20
	50	0 3.0	0 3.0	0 3.1	0 3.1	0 3.2	0 3.2	0 3.3	0 3.3	0 3.4			10
12	0	0 0.0	0 0.0	0 0.0	0 0.0	0 0.0	0 0.0	0 0.0	0 0.0	0 0.0		12	0

Lat.		32°	34°	36°	38°	40°	42°	44°	46°	48°	Lat.		
A.												H. A.	
h	m	°	'	°	'	°	'	°	'	°	'	h	m
0	0	0 0.0	0 0.0	0 0.0	0 0.0	0 0.0	0 0.0	0 0.0	0 0.0	0 0.0		24	0
	10	0 3.5	0 3.6	0 3.7	0 3.8	0 3.9	0 4.0	0 4.1	0 4.3	0 4.5		23	50
	20	0 7.0	0 7.1	0 7.3	0 7.5	0 7.8	0 8.0	0 8.3	0 8.6	0 8.9			40
0	30	0 10.4	0 10.7	0 11.0	0 11.3	0 11.6	0 12.0	0 12.4	0 12.9	0 13.4		23	30
	40	0 13.9	0 14.2	0 14.6	0 15.0	0 15.5	0 16.0	0 16.5	0 17.1	0 17.8			20
	50	0 17.3	0 17.7	0 18.2	0 18.7	0 19.3	0 19.9	0 20.6	0 21.3	0 22.2			10
1	0	0 20.7	0 21.2	0 21.8	0 22.4	0 23.1	0 23.8	0 24.6	0 25.5	0 26.5		23	0
	10	0 24.1	0 24.6	0 25.3	0 26.0	0 26.8	0 27.6	0 28.6	0 29.6	0 30.8		22	50
	20	0 27.4	0 28.0	0 28.8	0 29.5	0 30.4	0 31.4	0 32.5	0 33.7	0 35.0			40
1	30	0 30.6	0 31.3	0 32.2	0 33.0	0 34.0	0 35.1	0 36.3	0 37.7	0 39.2		22	30
	40	0 33.8	0 34.6	0 35.5	0 36.5	0 37.6	0 38.8	0 40.1	0 41.6	0 43.2			20
	50	0 36.9	0 37.8	0 38.8	0 39.9	0 41.0	0 42.3	0 43.8	0 45.4	0 47.2			10
2	0	0 40.0	0 40.9	0 42.0	0 43.1	0 44.4	0 45.8	0 47.4	0 49.2	0 51.1		22	0
	10	0 42.9	0 44.0	0 45.1	0 46.3	0 47.7	0 49.2	0 50.9	0 52.8	0 54.9		21	50
	20	0 45.8	0 46.9	0 48.1	0 49.4	0 50.9	0 52.5	0 54.3	0 56.3	0 58.5			40
2	30	0 48.6	0 49.8	0 51.1	0 52.5	0 54.0	0 55.7	0 57.6	0 59.7	1 2.1		21	30
	40	0 51.3	0 52.5	0 53.9	0 55.4	0 57.0	0 58.8	1 0.8	1 3.0	1 5.5			20
	50	0 53.9	0 55.2	0 56.6	0 58.2	0 59.9	1 1.8	1 3.9	1 6.2	1 8.8			10
3	0	0 56.4	0 57.8	0 59.2	1 0.8	1 2.6	1 4.6	1 6.8	1 9.3	1 12.0		21	0
	10	0 58.8	1 0.2	1 1.7	1 3.4	1 5.3	1 7.3	1 9.6	1 12.2	1 15.0		20	50
	20	1 1.1	1 2.5	1 4.1	1 5.9	1 7.8	1 9.9	1 12.3	1 14.9	1 17.9			40
3	30	1 3.2	1 4.7	1 6.4	1 8.2	1 10.2	1 12.4	1 14.8	1 17.5	1 20.6		20	30
	40	1 5.3	1 6.8	1 8.5	1 10.4	1 12.4	1 14.7	1 17.2	1 20.0	1 23.1			20
	50	1 7.2	1 8.7	1 10.5	1 12.4	1 14.5	1 16.9	1 19.4	1 22.3	1 25.5			10
4	0	1 8.9	1 10.5	1 12.3	1 14.3	1 16.5	1 18.9	1 21.5	1 24.5	1 27.8		20	0
	10	1 10.6	1 12.2	1 14.0	1 16.0	1 18.3	1 20.7	1 23.4	1 26.5	1 29.8		19	50
	20	1 12.1	1 13.7	1 15.6	1 17.6	1 19.9	1 22.4	1 25.2	1 28.3	1 31.7			40
4	30	1 13.4	1 15.1	1 17.0	1 19.1	1 21.4	1 23.9	1 26.8	1 29.9	1 33.4		19	30
	40	1 14.6	1 16.4	1 18.3	1 20.4	1 22.7	1 25.3	1 28.2	1 31.4	1 34.9			20
	50	1 15.7	1 17.5	1 19.4	1 21.5	1 23.9	1 26.5	1 29.4	1 32.7	1 36.2			10
5	0	1 16.6	1 18.4	1 20.4	1 22.5	1 24.9	1 27.6	1 30.5	1 33.8	1 37.4		19	0

AZIMUTH OF POLARIS AT ALL HOUR ANGLES, 1920.

[For hour angles 0<sup>h</sup> to 12<sup>h</sup> the star is west of north, and for hour angles 12<sup>h</sup> to 24<sup>h</sup> it is east of north]

Lat.		32°	34°	36°	38°	40°	42°	44°	46°	48°	Lat.	
H. A.											E	
h	m	.	.	.	.	.	.	.	.	.	h	m
5	0	1 16.6	1 18.4	1 20.4	1 22.5	1 24.9	1 27.6	1 30.5	1 33.8	1 37.4	19	0
	10	1 17.4	1 19.2	1 21.2	1 23.4	1 25.8	1 28.5	1 31.4	1 34.7	1 38.3	18	50
	20	1 18.1	1 19.9	1 21.9	1 24.1	1 26.5	1 29.2	1 32.1	1 35.4	1 39.1	18	40
5	30	1 18.6	1 20.4	1 22.4	1 24.6	1 27.0	1 29.7	1 32.7	1 36.0	1 39.7	18	30
	40	1 18.9	1 20.7	1 22.7	1 24.9	1 27.4	1 30.1	1 33.1	1 36.4	1 40.1	18	20
	50	1 19.1	1 20.9	1 22.9	1 25.1	1 27.6	1 30.3	1 33.3	1 36.6	1 40.2	18	10
6	0	1 19.1	1 20.9	1 22.9	1 25.1	1 27.6	1 30.3	1 33.3	1 36.6	1 40.2	18	0
	10	1 19.0	1 20.8	1 22.8	1 25.0	1 27.4	1 30.1	1 33.1	1 36.4	1 40.0	17	50
	20	1 18.7	1 20.5	1 22.5	1 24.7	1 27.1	1 29.8	1 32.7	1 36.0	1 39.7	17	40
6	30	1 18.3	1 20.1	1 22.1	1 24.2	1 26.6	1 29.3	1 32.2	1 35.5	1 39.1	17	30
	40	1 17.7	1 19.5	1 21.5	1 23.6	1 26.0	1 28.6	1 31.5	1 34.8	1 38.3	17	20
	50	1 17.0	1 18.8	1 20.7	1 22.8	1 25.2	1 27.8	1 30.7	1 33.9	1 37.4	17	10
7	0	1 16.2	1 17.9	1 19.8	1 21.9	1 24.2	1 26.8	1 29.6	1 32.8	1 36.3	17	0
	10	1 15.2	1 16.9	1 18.7	1 20.8	1 23.1	1 25.6	1 28.4	1 31.5	1 35.0	16	50
	20	1 14.0	1 15.7	1 17.5	1 19.6	1 21.8	1 24.3	1 27.1	1 30.1	1 33.5	16	40
7	30	1 12.7	1 14.4	1 16.2	1 18.2	1 20.4	1 22.8	1 25.5	1 28.5	1 31.8	16	30
	40	1 11.3	1 12.9	1 14.7	1 16.7	1 18.8	1 21.2	1 23.8	1 26.8	1 30.0	16	20
	50	1 9.8	1 11.3	1 13.1	1 15.0	1 17.1	1 19.4	1 22.0	1 24.9	1 28.0	16	10
8	0	1 8.1	1 9.6	1 11.3	1 13.2	1 15.2	1 17.5	1 20.0	1 22.8	1 25.9	16	0
	10	1 6.3	1 7.8	1 9.4	1 11.2	1 13.2	1 15.4	1 17.9	1 20.6	1 23.6	15	50
	20	1 4.4	1 5.8	1 7.4	1 9.1	1 11.1	1 13.2	1 15.6	1 18.2	1 21.1	15	40
8	30	1 2.3	1 3.7	1 5.2	1 6.9	1 8.8	1 10.9	1 13.2	1 15.7	1 18.5	15	30
	40	1 0.1	1 1.5	1 3.0	1 4.6	1 6.4	1 8.4	1 10.6	1 13.0	1 15.7	15	20
	50	0 57.8	0 59.1	1 0.6	1 2.1	1 3.9	1 5.8	1 7.9	1 10.2	1 12.8	15	10
9	0	0 55.5	0 56.7	0 58.1	0 59.6	1 1.2	1 3.0	1 5.1	1 7.3	1 9.8	15	0
	10	0 53.0	0 54.1	0 55.4	0 56.9	0 58.5	1 0.2	1 2.1	1 4.3	1 6.7	14	50
	20	0 50.4	0 51.5	0 52.7	0 54.1	0 55.6	0 57.3	0 59.1	1 1.2	1 3.4	14	40
9	30	0 47.7	0 48.8	0 49.9	0 51.2	0 52.6	0 54.2	0 55.9	0 57.9	1 0.0	14	30
	40	0 44.9	0 45.9	0 47.0	0 48.2	0 49.6	0 51.1	0 52.7	0 54.5	0 56.5	14	20
	50	0 42.1	0 43.0	0 44.0	0 45.1	0 46.4	0 47.8	0 49.3	0 51.0	0 52.9	14	10
10	0	0 39.1	0 40.0	0 41.0	0 42.0	0 43.2	0 44.5	0 45.9	0 47.4	0 49.2	14	0
	10	0 36.1	0 36.9	0 37.8	0 38.8	0 39.9	0 41.1	0 42.4	0 43.8	0 45.4	13	50
	20	0 33.1	0 33.8	0 34.6	0 35.5	0 36.5	0 37.6	0 38.8	0 40.1	0 41.6	13	40
10	30	0 29.9	0 30.6	0 31.3	0 32.1	0 33.0	0 34.0	0 35.1	0 36.3	0 37.6	13	30
	40	0 26.7	0 27.3	0 28.0	0 28.7	0 29.5	0 30.4	0 31.4	0 32.4	0 33.6	13	20
	50	0 23.5	0 24.0	0 24.6	0 25.2	0 25.9	0 26.7	0 27.6	0 28.5	0 29.5	13	10
11	0	0 20.2	0 20.7	0 21.2	0 21.7	0 22.3	0 23.0	0 23.7	0 24.5	0 25.4	13	0
	10	0 16.9	0 17.3	0 17.7	0 18.2	0 18.7	0 19.2	0 19.8	0 20.5	0 21.3	12	50
	20	0 13.6	0 13.9	0 14.2	0 14.6	0 15.0	0 15.4	0 15.9	0 16.5	0 17.1	12	40
11	30	0 10.2	0 10.4	0 10.7	0 11.0	0 11.3	0 11.6	0 12.0	0 12.4	0 12.8	12	30
	40	0 6.8	0 7.0	0 7.1	0 7.3	0 7.5	0 7.7	0 8.0	0 8.3	0 8.6	12	20
	50	0 3.4	0 3.5	0 3.6	0 3.7	0 3.8	0 3.9	0 4.0	0 4.1	0 4.3	12	10
12	0	0 0.0	0 0.0	0 0.0	0 0.0	0 0.0	0 0.0	0 0.0	0 0.0	0 0.0	12	0

Lat.		48°	50°	52°	54°	56°	58°	60°	61°	62°	Lat.	
H. A.											H. A.	
h	m	.	.	.	.	.	.	.	.	.	h	m
0	0	0 0.0	0 0.0	0 0.0	0 0.0	0 0.0	0 0.0	0 0.0	0 0.0	0 0.0	24	0
	10	0 4.5	0 4.7	0 4.9	0 5.1	0 5.4	0 5.7	0 6.1	0 6.3	0 6.5	23	50
	20	0 8.9	0 9.3	0 9.7	0 10.2	0 10.8	0 11.4	0 12.1	0 12.5	0 12.9	23	40
0	30	0 13.4	0 14.0	0 14.6	0 15.3	0 16.1	0 17.1	0 18.1	0 18.7	0 19.4	23	30
	40	0 17.8	0 18.6	0 19.4	0 20.4	0 21.4	0 22.7	0 24.1	0 24.9	0 25.8	23	20
	50	0 22.2	0 23.1	0 24.2	0 25.4	0 26.7	0 28.3	0 30.0	0 31.0	0 32.1	23	10
1	0	0 26.5	0 27.6	0 28.9	0 30.3	0 31.9	0 33.8	0 35.9	0 37.1	0 38.3	23	0



# TABLE IV.

## AZIMUTH OF POLARIS AT ALL HOUR ANGLES, 1920.

For hour angles 0<sup>h</sup> to 12<sup>h</sup> the star is west of north, and for hour angles 12<sup>h</sup> to 24<sup>h</sup> it is east of north.]

Lat.		48°	50°	52°	54°	56°	58°	60°	61°	62°	Lat.	
H. A.											H. A.	
1	0	0 26.5	0 27.6	0 28.9	0 30.3	0 31.9	0 33.8	0 35.9	0 37.1	0 38.3	23	0
	10	0 30.8	0 32.1	0 33.6	0 35.2	0 37.1	0 39.2	0 41.7	0 43.1	0 44.5	22	50
	20	0 35.0	0 36.5	0 38.2	0 40.1	0 42.2	0 44.6	0 47.4	0 49.0	0 50.6		40
1	30	0 39.2	0 40.8	0 42.7	0 44.8	0 47.2	0 49.9	0 53.0	0 54.7	0 56.3	22	30
	40	0 43.2	0 45.1	0 47.1	0 49.4	0 52.1	0 55.1	0 58.5	1 0.4	1 2.5		20
	50	0 47.2	0 49.2	0 51.5	0 54.0	0 56.9	1 0.1	1 3.9	1 5.9	1 8.2		10
2	0	0 51.1	0 53.2	0 55.7	0 58.4	1 1.5	1 5.1	1 9.1	1 11.3	1 13.8	22	0
	10	0 54.9	0 57.2	0 59.8	1 2.7	1 6.1	1 9.9	1 14.2	1 16.6	1 19.2	21	50
	20	0 58.5	1 1.0	1 3.8	1 6.9	1 10.5	1 14.5	1 19.1	1 21.7	1 24.5		40
2	30	1 2.1	1 4.7	1 7.7	1 11.0	1 14.8	1 19.0	1 23.9	1 26.6	1 29.6	21	30
	40	1 5.5	1 8.3	1 11.4	1 14.9	1 18.9	1 23.4	1 28.5	1 31.4	1 34.5		20
	50	1 8.8	1 11.7	1 15.0	1 18.6	1 22.8	1 27.5	1 33.0	1 36.0	1 39.2		10
3	0	1 12.0	1 15.0	1 18.4	1 22.2	1 26.6	1 31.5	1 37.2	1 40.3	1 43.7	21	0
	10	1 15.0	1 18.2	1 21.7	1 25.7	1 30.2	1 35.3	1 41.2	1 44.5	1 48.0	20	50
	20	1 17.9	1 21.2	1 24.8	1 29.0	1 33.6	1 38.9	1 45.0	1 48.4	1 52.1		40
3	30	1 20.6	1 24.0	1 27.8	1 32.1	1 36.9	1 42.4	1 48.7	1 52.2	1 55.9	20	30
	40	1 23.1	1 26.6	1 30.6	1 35.0	1 39.9	1 45.6	1 52.1	1 55.7	1 59.5		20
	50	1 25.5	1 29.1	1 33.2	1 37.7	1 42.8	1 48.6	1 55.2	1 58.9	2 2.9		10
4	0	1 27.8	1 31.4	1 35.6	1 40.2	1 45.4	1 51.3	1 58.2	2 1.9	2 6.0	20	0
	10	1 29.8	1 33.6	1 37.8	1 42.5	1 47.8	1 53.9	2 0.9	2 4.7	2 8.9	19	50
	20	1 31.7	1 35.5	1 39.8	1 44.6	1 50.0	1 56.2	2 3.3	2 7.3	2 11.5		40
4	30	1 33.4	1 37.3	1 41.6	1 46.5	1 52.0	1 58.3	2 5.5	2 9.6	2 13.8	19	30
	40	1 34.9	1 38.8	1 43.2	1 48.2	1 53.8	2 0.2	2 7.5	2 11.6	2 15.9		20
	50	1 36.2	1 40.2	1 44.7	1 49.7	1 55.4	2 1.8	2 9.2	2 13.3	2 17.7		10
5	0	1 37.4	1 41.4	1 45.9	1 51.0	1 56.7	2 3.2	2 10.7	2 14.8	2 19.3	19	0
	10	1 38.3	1 42.4	1 46.9	1 52.0	1 57.8	2 4.4	2 11.9	2 16.1	2 20.6	18	50
	20	1 39.1	1 43.2	1 47.8	1 52.9	1 58.7	2 5.3	2 12.9	2 17.1	2 21.6		40
5	30	1 39.7	1 43.8	1 48.4	1 53.5	1 59.4	2 6.0	2 13.6	2 17.8	2 22.3	18	30
	40	1 40.1	1 44.2	1 48.8	1 53.9	1 59.8	2 6.4	2 14.0	2 18.2	2 22.7		20
	50	1 40.2	1 44.4	1 49.0	1 54.1	2 0.0	2 6.6	2 14.2	2 18.4	2 22.9		10
6	0	1 40.2	1 44.3	1 48.9	1 54.1	1 59.9	2 6.5	2 14.1	2 18.3	2 22.8	18	0
	10	1 40.0	1 44.1	1 48.7	1 53.9	1 59.7	2 6.2	2 13.8	2 18.0	2 22.5	17	50
	20	1 39.7	1 43.7	1 48.3	1 53.4	1 59.2	2 5.7	2 13.2	2 17.4	2 21.8		40
6	30	1 39.1	1 43.1	1 47.7	1 52.7	1 58.5	2 5.0	2 12.4	2 16.5	2 20.9	17	30
	40	1 38.3	1 42.3	1 46.8	1 51.8	1 57.5	2 4.0	2 11.3	2 15.4	2 19.8		20
	50	1 37.4	1 41.4	1 45.8	1 50.8	1 56.4	2 2.7	2 10.0	2 14.0	2 18.3		10
7	0	1 36.3	1 40.2	1 44.6	1 49.5	1 55.0	2 1.3	2 8.4	2 12.4	2 16.7	17	0
	10	1 35.0	1 38.8	1 43.1	1 47.9	1 53.4	1 59.6	2 6.6	2 10.5	2 14.7	16	50
	20	1 33.5	1 37.3	1 41.5	1 46.2	1 51.6	1 57.7	2 4.6	2 8.4	2 12.6		40
7	30	1 31.8	1 35.6	1 39.7	1 44.3	1 49.6	1 55.5	2 2.3	2 6.1	2 10.1	16	30
	40	1 30.0	1 33.7	1 37.7	1 42.3	1 47.4	1 53.2	1 59.9	2 3.5	2 7.5		20
	50	1 28.0	1 31.6	1 35.5	1 40.0	1 45.0	1 50.7	1 57.2	2 0.7	2 4.6		10
8	0	1 25.9	1 29.3	1 33.2	1 37.5	1 42.4	1 47.9	1 54.2	1 57.7	2 1.5	16	0
	10	1 23.6	1 26.9	1 30.7	1 34.9	1 39.6	1 45.0	1 51.1	1 54.5	1 58.1	15	50
	20	1 21.1	1 24.3	1 28.0	1 32.1	1 36.7	1 41.9	1 47.8	1 51.1	1 54.6		40
8	30	1 18.5	1 21.6	1 25.1	1 29.1	1 33.5	1 38.6	1 44.3	1 47.4	1 50.9	15	30
	40	1 15.7	1 18.8	1 22.1	1 25.9	1 30.2	1 35.1	1 40.6	1 43.6	1 46.9		20
	50	1 12.8	1 15.8	1 19.0	1 22.6	1 26.7	1 31.4	1 36.7	1 39.6	1 42.8		10
9	0	1 9.8	1 12.6	1 15.7	1 19.2	1 23.1	1 27.6	1 32.7	1 35.5	1 38.5	15	0
	10	1 6.7	1 9.3	1 12.3	1 15.6	1 19.3	1 23.6	1 28.5	1 31.1	1 34.0	14	50
	20	1 3.4	1 5.9	1 8.7	1 11.9	1 15.4	1 19.5	1 24.1	1 26.6	1 29.3		40
9	30	1 0.0	1 2.4	1 5.1	1 8.0	1 11.4	1 15.2	1 19.5	1 21.9	1 24.5	14	30
	40	0 56.5	0 58.7	1 1.3	1 4.1	1 7.3	1 10.8	1 14.9	1 17.1	1 19.6		20
	50	0 52.9	0 55.0	0 57.4	1 0.0	1 2.9	1 6.3	1 10.1	1 12.2	1 14.5		10
10	0	0 49.2	0 51.2	0 53.3	0 55.3	0 58.5	1 1.6	1 5.2	1 7.2	1 9.3	14	0

AZIMUTH OF POLARIS AT ALL HOUR ANGLES, 1920.

[For hour angles 0° to 12° the star is west of north, and for hour angles 12° to 24° it is east of north]

Lat.		48°	50°	52°	54°	56°	58°	60°	61°	62°	Lat.
H. A.											H. A.
h m											h m
10 0	0 49.2	0 51.2	0 53.3	0 55.8	0 58.5	1 1.6	1 5.2	1 7.2	1 9.3	14 0	
10 10	0 45.4	0 47.2	0 49.2	0 51.5	0 54.0	0 56.9	1 0.1	1 2.0	1 3.9	13 50	
20	0 41.6	0 43.2	0 45.0	0 47.1	0 49.4	0 52.0	0 55.0	0 56.7	0 58.4	13 40	
10 30	0 37.6	0 39.1	0 40.8	0 42.6	0 44.7	0 47.1	0 49.8	0 51.3	0 52.9	13 30	
40	0 33.6	0 34.9	0 36.4	0 38.1	0 40.0	0 42.1	0 44.5	0 45.8	0 47.2	13 20	
50	0 29.5	0 30.7	0 32.0	0 33.5	0 35.1	0 37.0	0 39.1	0 40.2	0 41.5	13 10	
11 0	0 25.4	0 26.4	0 27.5	0 28.8	0 30.2	0 31.8	0 33.6	0 34.6	0 35.7	13 0	
10	0 21.3	0 22.1	0 23.0	0 24.1	0 25.3	0 26.6	0 28.1	0 28.9	0 29.9	12 50	
20	0 17.1	0 17.7	0 18.5	0 19.3	0 20.3	0 21.3	0 22.5	0 23.2	0 24.0	12 40	
11 30	0 12.8	0 13.3	0 13.9	0 14.5	0 15.2	0 16.0	0 16.9	0 17.5	0 18.0	12 30	
40	0 8.6	0 8.9	0 9.3	0 9.7	0 10.2	0 10.7	0 11.3	0 11.7	0 12.0	12 20	
50	0 4.3	0 4.5	0 4.7	0 4.9	0 5.1	0 5.4	0 5.7	0 5.8	0 6.0	12 10	
12 0	0 0.0	0 0.0	0 0.0	0 0.0	0 0.0	0 0.0	0 0.0	0 0.0	0 0.0	12 0	

Lat.		62°	63°	64°	65°	66°	67°	68°	69°	70°	Lat.
H. A.											H. A.
h m											h m
0 0	0 0.0	0 0.0	0 0.0	0 0.0	0 0.0	0 0.0	0 0.0	0 0.0	0 0.0	0 0.0	24 0
10	0 6.5	0 6.7	0 7.0	0 7.2	0 7.5	0 7.9	0 8.2	0 8.6	0 9.1	23 50	
20	0 12.9	0 13.4	0 13.9	0 14.4	0 15.0	0 15.7	0 16.4	0 17.2	0 18.1	23 40	
0 30	0 19.4	0 20.1	0 20.8	0 21.6	0 22.5	0 23.5	0 24.5	0 25.7	0 27.0	23 30	
40	0 25.8	0 26.7	0 27.7	0 28.8	0 29.9	0 31.2	0 32.6	0 34.2	0 35.9	23 20	
50	0 32.1	0 33.2	0 34.5	0 35.8	0 37.3	0 38.9	0 40.7	0 42.6	0 44.8	23 10	
1 0	0 38.3	0 39.7	0 41.2	0 42.8	0 44.6	0 46.5	0 48.6	0 50.9	0 53.5	23 0	
10	0 44.5	0 46.1	0 47.8	0 49.7	0 51.8	0 54.0	0 56.4	0 59.1	1 2.1	22 50	
20	0 50.6	0 52.4	0 54.4	0 56.5	0 58.8	1 1.4	1 4.2	1 7.2	1 10.6	22 40	
1 30	0 56.6	0 58.6	1 0.8	1 3.2	1 5.8	1 8.6	1 11.7	1 15.1	1 19.0	22 30	
40	1 2.5	1 4.7	1 7.1	1 9.7	1 12.6	1 15.7	1 19.2	1 22.9	1 27.1	22 20	
50	1 8.2	1 10.6	1 13.8	1 16.1	1 19.2	1 22.6	1 26.4	1 30.5	1 35.1	22 10	
2 0	1 13.8	1 16.4	1 19.8	1 22.3	1 25.7	1 29.4	1 33.4	1 37.9	1 42.8	22 0	
10	1 19.2	1 22.0	1 25.1	1 28.4	1 32.0	1 36.0	1 40.3	1 45.1	1 50.3	21 50	
20	1 24.5	1 27.5	1 30.7	1 34.3	1 38.1	1 42.3	1 46.9	1 52.0	1 57.6	21 40	
2 30	1 29.6	1 32.8	1 36.2	1 39.9	1 44.0	1 48.4	1 53.3	1 58.7	2 4.7	21 30	
40	1 34.5	1 37.8	1 41.5	1 45.4	1 49.7	1 54.3	1 59.5	2 5.2	2 11.4	21 20	
50	1 39.2	1 42.7	1 46.5	1 50.6	1 55.1	2 0.0	2 5.4	2 11.8	2 17.9	21 10	
3 0	1 43.7	1 47.4	1 51.3	1 55.6	2 0.3	2 5.4	2 11.0	2 17.2	2 24.1	21 0	
10	1 48.0	1 51.8	1 55.9	2 0.4	2 5.3	2 10.6	2 16.4	2 22.9	2 30.0	20 50	
20	1 52.1	1 56.0	2 0.3	2 4.9	2 10.0	2 15.5	2 21.5	2 28.2	2 35.5	20 40	
3 30	1 55.9	2 0.0	2 4.4	2 9.2	2 14.4	2 20.1	2 26.3	2 33.2	2 40.8	20 30	
40	1 59.5	2 3.7	2 8.8	2 13.2	2 18.5	2 24.4	2 30.8	2 37.9	2 45.7	20 20	
50	2 2.9	2 7.2	2 11.9	2 16.9	2 22.4	2 28.4	2 35.0	2 42.2	2 50.2	20 10	
4 0	2 6.0	2 10.4	2 15.2	2 20.3	2 26.0	2 32.1	2 38.8	2 46.2	2 54.4	20 0	
10	2 8.9	2 13.4	2 18.2	2 23.5	2 29.2	2 35.5	2 42.4	2 49.9	2 58.3	19 50	
20	2 11.5	2 16.1	2 21.0	2 26.4	2 32.2	2 38.6	2 45.6	2 53.3	3 1.8	19 40	
4 30	2 13.8	2 18.5	2 23.5	2 29.0	2 34.9	2 41.4	2 48.5	2 56.3	3 4.9	19 30	
40	2 15.9	2 20.6	2 25.7	2 31.3	2 37.3	2 43.8	2 51.0	2 58.9	3 7.6	19 20	
50	2 17.7	2 22.5	2 27.7	2 33.3	2 39.3	2 45.9	2 53.2	3 1.2	3 10.0	19 10	
5 0	2 19.3	2 24.1	2 29.3	2 34.9	2 41.0	2 47.7	2 55.0	3 3.1	3 12.0	19 0	
10	2 20.6	2 25.4	2 30.6	2 36.3	2 42.5	2 49.2	2 56.5	3 4.6	3 13.6	18 50	
20	2 21.6	2 26.4	2 31.7	2 37.4	2 43.6	2 50.3	2 57.7	3 5.8	3 14.8	18 40	
5 30	2 22.3	2 27.2	2 32.4	2 38.1	2 44.4	2 51.1	2 58.5	3 6.6	3 15.6	18 30	
40	2 22.7	2 27.6	2 32.9	2 38.6	2 44.6	2 51.6	2 59.0	3 7.1	3 16.1	18 20	
50	2 22.9	2 27.8	2 33.1	2 38.8	2 45.0	2 51.8	2 59.2	3 7.3	3 16.2	18 10	
6 0	2 22.8	2 27.7	2 32.9	2 38.6	2 44.8	2 51.6	2 58.9	3 7.0	3 15.9	18 0	

AZIMUTH OF POLARIS AT ALL HOUR ANGLES, 1920.

For hour angles 0<sup>h</sup> to 12<sup>h</sup> the star is west of north, and for hour angles 12<sup>h</sup> to 24<sup>h</sup> it is east of north.]

Lat.		62°	63°	64°	65°	66°	67°	68°	69°	70°	Lat.		
A.												H. A.	
h	m	'	'	'	'	'	'	'	'	'	'	h	m
6	0	2 22.8	2 27.7	2 32.9	2 38.6	2 44.8	2 51.6	2 58.9	3 7.0	3 15.9		18	0
	10	2 22.5	2 27.3	2 32.5	2 38.2	2 44.4	2 51.1	2 58.4	3 6.4	3 15.3		17	50
	20	2 21.8	2 26.6	2 31.8	2 37.5	2 43.6	2 50.2	2 57.5	3 5.5	3 14.3		17	40
6	30	2 20.9	2 25.7	2 30.9	2 36.4	2 42.5	2 49.1	2 56.3	3 4.2	3 12.9		17	30
	40	2 19.8	2 24.5	2 29.6	2 35.1	2 41.1	2 47.6	2 54.8	3 2.6	3 11.2		17	20
	50	2 18.3	2 23.0	2 28.0	2 33.5	2 39.4	2 45.8	2 52.9	3 0.6	3 9.1		17	10
7	0	2 16.7	2 21.3	2 26.2	2 31.6	2 37.4	2 43.8	2 50.7	2 58.3	3 6.7		17	0
	10	2 14.7	2 19.3	2 24.1	2 29.4	2 35.2	2 41.4	2 48.2	2 55.7	3 3.9		16	50
	20	2 12.6	2 17.0	2 21.8	2 27.0	2 32.6	2 38.7	2 45.4	2 52.8	3 0.8		16	40
7	30	2 10.1	2 14.5	2 19.2	2 24.3	2 29.8	2 35.8	2 42.3	2 49.5	2 57.4		16	30
	40	2 7.5	2 11.7	2 16.3	2 21.3	2 26.7	2 32.6	2 39.0	2 46.0	2 53.7		16	20
	50	2 4.6	2 8.7	2 13.2	2 18.1	2 23.3	2 29.1	2 35.3	2 42.1	2 49.7		16	10
8	0	2 1.5	2 5.5	2 9.9	2 14.6	2 19.7	2 25.3	2 31.4	2 38.0	2 45.3		16	0
	10	1 58.1	2 2.1	2 6.3	2 10.9	2 15.8	2 21.3	2 27.2	2 33.6	2 40.7		15	50
	20	1 54.6	1 58.4	2 2.5	2 6.9	2 11.7	2 17.0	2 22.7	2 28.9	2 35.8		15	40
8	30	1 50.9	1 54.5	1 58.5	2 2.8	2 7.4	2 12.5	2 18.0	2 24.0	2 30.6		15	30
	40	1 46.9	1 50.5	1 54.3	1 58.4	2 2.8	2 7.7	2 13.0	2 18.8	2 25.2		15	20
	50	1 42.8	1 46.2	1 49.8	1 53.8	1 58.1	2 2.7	2 7.8	2 13.4	2 19.5		15	10
9	0	1 38.5	1 41.7	1 45.2	1 49.0	1 53.1	1 57.5	2 2.4	2 7.7	2 13.6		15	0
	10	1 34.0	1 37.1	1 40.4	1 44.0	1 47.9	1 52.2	1 56.8	2 1.9	2 7.4		14	50
	20	1 29.3	1 32.3	1 35.4	1 38.8	1 42.5	1 46.6	1 51.0	1 55.8	2 1.1		14	40
9	30	1 24.5	1 27.3	1 30.3	1 33.5	1 37.0	1 40.8	1 45.0	1 49.5	1 54.5		14	30
	40	1 19.6	1 22.2	1 25.0	1 28.0	1 31.3	1 34.9	1 38.8	1 43.1	1 47.8		14	20
	50	1 14.5	1 16.9	1 19.5	1 22.4	1 25.5	1 28.8	1 32.4	1 36.4	1 40.8		14	10
10	0	1 9.3	1 11.5	1 14.0	1 16.6	1 19.5	1 22.6	1 25.9	1 29.6	1 33.7		14	0
	10	1 3.9	1 6.0	1 8.3	1 10.7	1 13.3	1 16.2	1 19.3	1 22.7	1 26.4		13	50
	20	0 58.4	1 0.4	1 2.4	1 4.6	1 7.0	1 9.6	1 12.5	1 15.6	1 19.0		13	40
10	30	0 52.9	0 54.6	0 56.5	0 58.5	1 0.7	1 3.0	1 5.6	1 8.4	1 11.5		13	30
	40	0 47.2	0 48.8	0 50.5	0 52.3	0 54.2	0 56.3	0 58.6	1 1.1	1 3.9		13	20
	50	0 41.5	0 42.9	0 44.3	0 45.9	0 47.6	0 49.5	0 51.5	0 53.7	0 56.1		13	10
11	0	0 35.7	0 36.9	0 38.1	0 39.5	0 41.0	0 42.6	0 44.3	0 46.2	0 48.3		13	0
	10	0 29.9	0 30.8	0 31.9	0 33.0	0 34.3	0 35.6	0 37.0	0 38.6	0 40.3		12	50
	20	0 24.0	0 24.7	0 25.6	0 26.5	0 27.5	0 28.5	0 29.7	0 31.0	0 32.4		12	40
11	30	0 18.0	0 18.6	0 19.2	0 19.9	0 20.6	0 21.4	0 22.3	0 23.2	0 24.3		12	30
	40	0 12.0	0 12.4	0 12.8	0 13.3	0 13.8	0 14.3	0 14.9	0 15.5	0 16.2		12	20
	50	0 6.0	0 6.2	0 6.4	0 6.7	0 6.9	0 7.2	0 7.5	0 7.8	0 8.1		12	10
12	0	0 0.0	0 0.0	0 0.0	0 0.0	0 0.0	0 0.0	0 0.0	0 0.0	0 0.0		12	0

TABLE IVa.

Table IV has been computed for a declination of 88° 52' 55". For other declinations of Polaris the corrections given below should be applied to the Azimuth taken from Table IV.

Decl.	Azimuth.											Decl.
	0'	20'	40'	60'	80'	100'	120'	140'	160'	180'	200'	
88 52 30	0.0	+0.1	+0.2	+0.4	+0.5	+0.6	+0.7	+0.9	+1.0	+1.1	+1.2	88 52 30
88 52 35	0.0	0.1	0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9	1.0	88 52 35
88 52 40	0.0	+0.1	0.1	0.2	0.3	0.4	0.4	0.5	0.6	0.7	0.7	88 52 40
88 52 45	0.0	0.0	+0.1	0.1	0.2	0.2	0.3	0.3	0.4	0.4	0.5	88 52 45
88 52 50	0.0	0.0	0.0	+0.1	+0.1	+0.1	+0.1	+0.2	+0.2	+0.2	+0.2	88 52 50
88 52 55	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	88 52 55
88 53 0	0.0	0.0	0.0	-0.1	-0.1	-0.1	-0.1	-0.2	-0.2	-0.2	-0.2	88 53 0
88 53 5	0.0	0.0	-0.1	-0.1	-0.2	-0.2	-0.3	-0.3	-0.4	-0.4	-0.5	88 53 5
88 53 10	0.0	-0.1	0.1	0.2	0.3	0.4	0.4	0.5	0.6	0.7	0.7	88 53 10
88 53 15	0.0	0.1	0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9	1.0	88 53 15
88 53 20	0.0	-0.1	-0.2	-0.4	-0.5	-0.6	-0.7	-0.9	-1.0	-1.1	-1.2	88 53 20

AZIMUTH OF POLARIS AT ELONGATION, 1920.

Deci. Lat.							Variation in	
	88° 52' 30"	88° 52' 40"	88° 52' 50"	88° 53' 0"	88° 53' 10"	88° 53' 20"	' of Lat.	" of
10 0	1 8 32.5	1 8 22.3	1 8 12.2	1 8 2.1	1 7 51.9	1 7 41.7	+0.21	-11
10 20	1 8 36.8	1 8 26.6	1 8 16.4	1 8 6.3	1 7 56.1	1 7 45.9	0.22	11
10 40	1 8 41.2	1 8 31.0	1 8 20.9	1 8 10.7	1 8 0.5	1 7 50.3	0.23	11
11 0	1 8 45.8	1 8 35.6	1 8 25.4	1 8 15.3	1 8 5.1	1 7 54.9	0.23	11
11 20	1 8 50.6	1 8 40.4	1 8 30.2	1 8 20.0	1 8 9.8	1 7 59.6	0.24	11
11 40	1 8 55.5	1 8 45.2	1 8 35.0	1 8 24.8	1 8 14.6	1 8 4.4	+0.24	-11
12 0	1 9 0.5	1 8 50.3	1 8 40.0	1 8 29.8	1 8 19.6	1 8 9.4	0.25	11
12 20	1 9 5.7	1 8 55.5	1 8 45.2	1 8 35.0	1 8 24.7	1 8 14.5	0.26	11
12 40	1 9 11.0	1 9 0.8	1 8 50.5	1 8 40.3	1 8 30.0	1 8 19.8	0.27	11
13 0	1 9 16.5	1 9 6.3	1 8 56.0	1 8 45.8	1 8 35.5	1 8 25.2	0.28	11
13 20	1 9 22.2	1 9 11.9	1 9 1.6	1 8 51.4	1 8 41.1	1 8 30.8	+0.28	-11
13 40	1 9 28.0	1 9 17.7	1 9 7.4	1 8 57.2	1 8 46.9	1 8 36.6	0.29	11
14 0	1 9 34.0	1 9 23.7	1 9 13.4	1 9 3.1	1 8 52.8	1 8 42.5	0.30	11
14 20	1 9 40.1	1 9 29.8	1 9 19.5	1 9 9.2	1 8 58.9	1 8 48.5	0.31	11
14 40	1 9 46.4	1 9 36.1	1 9 25.8	1 9 15.4	1 9 5.1	1 8 54.7	0.32	11
15 0	1 9 52.9	1 9 42.5	1 9 32.2	1 9 21.8	1 9 11.5	1 9 1.1	+0.32	-11
15 20	1 9 59.5	1 9 49.1	1 9 38.8	1 9 28.4	1 9 18.0	1 9 7.7	0.33	11
15 40	1 10 6.3	1 9 55.9	1 9 45.5	1 9 35.1	1 9 24.7	1 9 14.4	0.34	11
16 0	1 10 13.2	1 10 2.8	1 9 52.4	1 9 42.0	1 9 31.6	1 9 21.2	0.35	11
16 20	1 10 20.3	1 10 9.9	1 9 59.5	1 9 49.1	1 9 38.7	1 9 28.2	0.36	11
16 40	1 10 27.6	1 10 17.2	1 10 6.8	1 9 56.3	1 9 45.9	1 9 35.4	+0.37	-11
17 0	1 10 35.1	1 10 24.6	1 10 14.2	1 10 3.7	1 9 53.3	1 9 42.8	0.37	11
17 20	1 10 42.7	1 10 32.2	1 10 21.7	1 10 11.3	1 10 0.8	1 9 50.3	0.38	11
17 40	1 10 50.5	1 10 40.0	1 10 29.5	1 10 19.0	1 10 8.5	1 9 58.0	0.39	11
18 0	1 10 58.5	1 10 47.9	1 10 37.4	1 10 26.9	1 10 16.4	1 10 5.9	0.40	11
18 20	1 11 6.6	1 10 56.1	1 10 45.5	1 10 35.0	1 10 24.5	1 10 13.9	+0.41	-11
18 40	1 11 14.9	1 11 4.4	1 10 53.8	1 10 43.2	1 10 32.7	1 10 22.1	0.42	11
19 0	1 11 23.4	1 11 12.8	1 11 2.2	1 10 51.7	1 10 41.1	1 10 30.5	0.43	11
19 20	1 11 32.1	1 11 21.5	1 11 10.9	1 11 0.3	1 10 49.7	1 10 39.1	0.44	11
19 40	1 11 40.9	1 11 30.3	1 11 19.7	1 11 9.1	1 10 58.5	1 10 47.8	0.44	11
20 0	1 11 50.0	1 11 39.3	1 11 28.7	1 11 18.0	1 11 7.4	1 10 56.7	+0.45	-11
20 20	1 11 59.2	1 11 48.5	1 11 37.8	1 11 27.2	1 11 16.5	1 11 5.8	0.46	11
20 40	1 12 8.6	1 11 57.9	1 11 47.2	1 11 36.5	1 11 25.8	1 11 15.1	0.47	11
21 0	1 12 18.2	1 12 7.5	1 11 56.8	1 11 46.0	1 11 35.3	1 11 24.6	0.48	11
21 20	1 12 28.0	1 12 17.2	1 12 6.5	1 11 55.8	1 11 45.0	1 11 34.3	0.49	11
21 40	1 12 37.9	1 12 27.2	1 12 16.4	1 12 5.7	1 11 54.9	1 11 44.1	+0.50	-11
22 0	1 12 48.1	1 12 37.3	1 12 26.5	1 12 15.8	1 12 5.0	1 11 54.2	0.51	11
22 20	1 12 58.5	1 12 47.7	1 12 36.9	1 12 26.0	1 12 15.2	1 12 4.4	0.52	11
22 40	1 13 9.0	1 12 58.2	1 12 47.4	1 12 36.5	1 12 25.7	1 12 14.9	0.53	11
23 0	1 13 19.8	1 13 8.9	1 12 58.1	1 12 47.2	1 12 36.4	1 12 26.5	0.54	11
23 20	1 13 30.8	1 13 19.9	1 13 9.0	1 12 58.1	1 12 47.2	1 12 36.3	+0.55	-11
23 40	1 13 42.0	1 13 31.0	1 13 20.1	1 13 9.2	1 12 58.3	1 12 47.4	0.56	11
24 0	1 13 53.3	1 13 42.4	1 13 31.4	1 13 20.5	1 13 9.5	1 12 58.6	0.57	11
24 20	1 14 4.9	1 13 53.9	1 13 43.0	1 13 32.0	1 13 21.0	1 13 10.0	0.58	11
24 40	1 14 16.7	1 14 5.7	1 13 54.7	1 13 43.7	1 13 32.7	1 13 21.7	0.59	11
25 0	1 14 28.7	1 14 17.7	1 14 6.7	1 13 55.6	1 13 44.6	1 13 33.6	+0.60	-11
25 20	1 14 41.0	1 14 29.9	1 14 18.8	1 14 7.8	1 13 56.7	1 13 45.7	0.61	11
25 40	1 14 53.4	1 14 42.3	1 14 31.2	1 14 20.1	1 14 9.0	1 13 58.0	0.62	11
26 0	1 15 6.1	1 14 55.0	1 14 43.8	1 14 32.7	1 14 21.6	1 14 10.5	0.64	11
26 20	1 15 19.0	1 15 7.8	1 14 56.7	1 14 45.5	1 14 34.4	1 14 23.2	0.65	11
26 40	1 15 32.1	1 15 20.9	1 15 9.8	1 14 58.6	1 14 47.4	1 14 36.2	+0.66	-11
27 0	1 15 45.5	1 15 34.3	1 15 23.1	1 15 11.8	1 15 0.6	1 14 49.4	0.67	11
27 20	1 15 59.1	1 15 47.8	1 15 36.6	1 15 25.3	1 15 14.1	1 15 2.8	0.68	11
27 40	1 16 12.9	1 16 1.6	1 15 50.3	1 15 39.0	1 15 27.8	1 15 16.5	0.69	11
28 0	1 16 27.0	1 16 15.7	1 16 4.3	1 15 53.0	1 15 41.7	1 15 30.4	0.71	11
28 20	1 16 41.3	1 16 29.9	1 16 18.6	1 16 7.2	1 15 55.9	1 15 44.5	+0.72	-11
28 40	1 16 55.9	1 16 44.5	1 16 33.1	1 16 21.7	1 16 10.3	1 15 58.9	0.73	11
29 0	1 17 10.7	1 16 59.2	1 16 47.8	1 16 36.4	1 16 24.9	1 16 13.5	0.74	11
29 20	1 17 25.7	1 17 14.3	1 17 2.8	1 16 51.3	1 16 39.8	1 16 28.4	0.75	11
29 40	1 17 41.0	1 17 29.5	1 17 18.0	1 17 6.5	1 16 55.0	1 16 43.5	0.77	11
30 0	1 17 56.6	1 17 45.1	1 17 33.5	1 17 22.0	1 17 10.4	1 16 58.9	+0.78	-11

TABLE V.

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Decl. t.	88° 52' 30"	88° 52' 40"	88° 52' 50"	88° 53' 0"	88° 53' 10"	88° 53' 20"	Variation for—	
							1' of Lat.	1" of s.
30 0	1 17 56.6	1 17 45.1	1 17 33.5	1 17 22.0	1 17 10.4	1 16 58.9	+0.78	-1.15
30 10	1 18 4.5	1 17 53.0	1 17 41.4	1 17 29.8	1 17 18.3	1 17 6.7	0.79	1.16
30 20	1 18 12.5	1 18 0.9	1 17 49.3	1 17 37.7	1 17 26.1	1 17 14.6	0.80	1.16
30 30	1 18 20.5	1 18 8.9	1 17 57.8	1 17 45.7	1 17 34.1	1 17 22.5	0.80	1.16
30 40	1 18 28.6	1 18 17.0	1 18 5.3	1 17 53.7	1 17 42.1	1 17 30.5	0.81	1.16
30 50	1 18 36.8	1 18 25.1	1 18 13.5	1 18 1.8	1 17 50.2	1 17 38.5	+0.81	-1.17
31 0	1 18 45.0	1 18 33.3	1 18 21.6	1 18 10.0	1 17 58.3	1 17 46.6	0.82	1.17
31 10	1 18 53.3	1 18 41.6	1 18 29.9	1 18 18.2	1 18 6.5	1 17 54.8	0.83	1.17
31 20	1 19 1.6	1 18 49.9	1 18 38.2	1 18 26.5	1 18 14.8	1 18 3.1	0.83	1.17
31 30	1 19 10.1	1 18 58.3	1 18 46.6	1 18 34.9	1 18 23.2	1 18 11.4	0.84	1.17
31 40	1 19 18.6	1 19 6.8	1 18 55.1	1 18 43.3	1 18 31.6	1 18 19.8	+0.85	-1.18
31 50	1 19 27.2	1 19 15.4	1 19 3.6	1 18 51.8	1 18 40.1	1 18 28.3	0.85	1.18
32 0	1 19 35.8	1 19 24.0	1 19 12.2	1 19 0.4	1 18 48.6	1 18 36.8	0.86	1.18
32 10	1 19 44.5	1 19 32.7	1 19 20.9	1 19 9.1	1 18 57.3	1 18 45.4	0.87	1.18
32 20	1 19 53.3	1 19 41.5	1 19 29.6	1 19 17.8	1 19 6.0	1 18 54.1	0.87	1.18
32 30	1 20 2.2	1 19 50.3	1 19 38.4	1 19 26.6	1 19 14.7	1 19 2.9	+0.88	-1.19
32 40	1 20 11.1	1 19 59.2	1 19 47.3	1 19 35.5	1 19 23.6	1 19 11.7	0.89	1.19
32 50	1 20 20.1	1 20 8.2	1 19 56.3	1 19 44.4	1 19 32.5	1 19 20.6	0.90	1.19
33 0	1 20 29.2	1 20 17.3	1 20 5.4	1 19 53.4	1 19 41.5	1 19 29.6	0.91	1.19
33 10	1 20 38.4	1 20 26.4	1 20 14.5	1 20 2.5	1 19 50.6	1 19 38.6	0.92	1.20
33 20	1 20 47.6	1 20 35.6	1 20 23.7	1 20 11.7	1 19 59.7	1 19 47.8	+0.92	-1.20
33 30	1 20 56.9	1 20 44.9	1 20 32.9	1 20 20.9	1 20 8.9	1 19 57.0	0.93	1.20
33 40	1 21 6.3	1 20 54.3	1 20 42.3	1 20 30.3	1 20 18.2	1 20 6.2	0.94	1.20
33 50	1 21 15.8	1 21 3.7	1 20 51.7	1 20 39.7	1 20 27.6	1 20 15.6	0.94	1.20
34 0	1 21 25.3	1 21 13.3	1 21 1.2	1 20 49.1	1 20 37.1	1 20 25.0	0.95	1.21
34 10	1 21 34.9	1 21 22.9	1 21 10.8	1 20 58.7	1 20 46.6	1 20 34.5	+0.96	-1.21
34 20	1 21 44.6	1 21 32.5	1 21 20.4	1 21 8.3	1 20 56.2	1 20 44.1	0.97	1.21
34 30	1 21 54.4	1 21 42.3	1 21 30.2	1 21 18.0	1 21 5.9	1 20 53.8	0.98	1.21
34 40	1 22 4.3	1 21 52.2	1 21 40.0	1 21 27.8	1 21 15.7	1 21 3.5	0.98	1.22
34 50	1 22 14.3	1 22 2.1	1 21 49.9	1 21 37.7	1 21 25.5	1 21 13.3	0.99	1.22
35 0	1 22 24.3	1 22 12.1	1 21 59.9	1 21 47.7	1 21 35.5	1 21 23.2	+1.00	-1.22
35 10	1 22 34.4	1 22 22.2	1 22 9.9	1 21 57.7	1 21 45.5	1 21 33.2	1.01	1.22
35 20	1 22 44.6	1 22 32.3	1 22 20.1	1 22 7.8	1 21 55.6	1 21 43.3	1.02	1.23
35 30	1 22 54.9	1 22 42.6	1 22 30.3	1 22 18.0	1 22 5.7	1 21 53.5	1.02	1.23
35 40	1 23 5.3	1 22 52.9	1 22 40.6	1 22 28.3	1 22 16.0	1 22 3.7	1.03	1.23
35 50	1 23 15.7	1 23 3.4	1 22 51.0	1 22 38.7	1 22 26.4	1 22 14.0	+1.04	-1.23
36 0	1 23 26.2	1 23 13.9	1 23 1.5	1 22 49.2	1 22 36.8	1 22 24.4	1.05	1.24
36 10	1 23 36.9	1 23 24.5	1 23 12.1	1 22 59.7	1 22 47.3	1 22 34.9	1.06	1.24
36 20	1 23 47.6	1 23 35.2	1 23 22.8	1 23 10.3	1 22 57.9	1 22 45.5	1.07	1.24
36 30	1 23 58.4	1 23 45.9	1 23 33.5	1 23 21.1	1 23 8.6	1 22 56.2	1.08	1.24
36 40	1 24 9.3	1 23 56.8	1 23 44.3	1 23 31.9	1 23 19.4	1 23 6.9	+1.09	-1.25
36 50	1 24 20.2	1 24 7.8	1 23 55.3	1 23 42.8	1 23 30.3	1 23 17.8	1.10	1.25
37 0	1 24 31.3	1 24 18.8	1 24 6.3	1 23 53.8	1 23 41.2	1 23 28.7	1.10	1.25
37 10	1 24 42.5	1 24 29.9	1 24 17.4	1 24 4.8	1 23 52.3	1 23 39.7	1.11	1.26
37 20	1 24 53.8	1 24 41.2	1 24 28.6	1 24 16.0	1 24 3.4	1 23 50.9	1.12	1.26
37 30	1 25 5.1	1 24 52.5	1 24 39.9	1 24 27.3	1 24 14.7	1 24 2.1	+1.13	-1.26
37 40	1 25 16.5	1 25 3.9	1 24 51.3	1 24 38.6	1 24 26.0	1 24 13.4	1.14	1.26
37 50	1 25 28.1	1 25 15.4	1 25 2.8	1 24 50.1	1 24 37.4	1 24 24.8	1.15	1.27
38 0	1 25 39.7	1 25 27.0	1 25 14.3	1 25 1.6	1 24 49.0	1 24 36.3	1.16	1.27
38 10	1 25 51.5	1 25 38.7	1 25 26.0	1 25 13.3	1 25 0.8	1 24 47.9	1.17	1.27
38 20	1 26 3.3	1 25 50.5	1 25 37.8	1 25 25.0	1 25 12.3	1 24 59.5	+1.18	-1.28
38 30	1 26 15.2	1 26 2.4	1 25 49.7	1 25 36.9	1 25 24.1	1 25 11.3	1.19	1.28
38 40	1 26 27.2	1 26 14.4	1 26 1.6	1 25 48.8	1 25 36.0	1 25 23.2	1.20	1.28
38 50	1 26 39.4	1 26 26.5	1 26 13.7	1 26 0.9	1 25 48.0	1 25 35.2	1.21	1.28
39 0	1 26 51.6	1 26 38.7	1 26 25.9	1 26 13.0	1 26 0.1	1 25 47.3	1.22	1.29
39 10	1 27 3.9	1 26 51.0	1 26 38.1	1 26 25.2	1 26 12.3	1 25 59.4	+1.23	-1.29
39 20	1 27 16.4	1 27 3.4	1 26 50.5	1 26 37.6	1 26 24.6	1 26 11.7	1.24	1.29
39 30	1 27 28.9	1 27 15.9	1 27 3.0	1 26 50.0	1 26 37.1	1 26 24.1	1.25	1.30
39 40	1 27 41.5	1 27 28.5	1 27 15.5	1 27 2.6	1 26 49.6	1 26 36.6	1.26	1.30
39 50	1 27 54.3	1 27 41.3	1 27 28.2	1 27 15.2	1 27 2.2	1 26 49.2	1.27	1.30
40 0	1 28 7.1	1 27 54.1	1 27 41.0	1 27 28.0	1 27 14.9	1 27 1.9	+1.28	-1.31

## AZIMUTH OF POLARIS AT ELONGATION, 1920.

Decl. Lat.							Variation in-	
	88° 52' 30"	88° 52' 40"	88° 52' 50"	88° 53' 0"	88° 53' 10"	88° 53' 20"	1' of Lat.	1" of
40 0	1 28 7.1	1 27 54.1	1 27 41.0	1 27 28.0	1 27 14.9	1 27 1.9	+1.28	-1.5
40 10	1 28 20.1	1 28 7.0	1 27 53.9	1 27 40.8	1 27 27.8	1 27 14.7	1.29	1.5
40 20	1 28 33.2	1 28 20.0	1 28 6.9	1 27 53.8	1 27 40.7	1 27 27.6	1.30	1.5
40 30	1 28 46.4	1 28 33.2	1 28 20.0	1 28 6.9	1 27 53.7	1 27 40.6	1.32	1.5
40 40	1 28 59.6	1 28 46.5	1 28 33.3	1 28 20.1	1 28 6.9	1 27 53.7	1.33	1.5
40 50	1 29 13.0	1 28 59.8	1 28 46.6	1 28 33.4	1 28 20.2	1 28 7.0	+1.34	-1.5
41 0	1 29 26.6	1 29 13.3	1 29 0.1	1 28 46.8	1 28 33.6	1 28 20.3	1.35	1.5
41 10	1 29 40.2	1 29 26.9	1 29 13.6	1 29 0.3	1 28 47.1	1 28 33.8	1.36	1.5
41 20	1 29 53.9	1 29 40.6	1 29 27.3	1 29 14.0	1 29 0.7	1 28 47.3	1.37	1.5
41 30	1 30 7.8	1 29 54.4	1 29 41.1	1 29 27.7	1 29 14.4	1 29 1.0	1.38	1.5
41 40	1 30 21.8	1 30 8.4	1 29 55.0	1 29 41.6	1 29 28.2	1 29 14.8	+1.39	-1.5
41 50	1 30 35.9	1 30 22.5	1 30 9.0	1 29 55.6	1 29 42.2	1 29 28.8	1.41	1.5
42 0	1 30 50.1	1 30 36.6	1 30 23.2	1 30 9.7	1 29 56.3	1 29 42.8	1.42	1.5
42 10	1 31 4.4	1 30 50.9	1 30 37.4	1 30 24.0	1 30 10.5	1 29 57.0	1.43	1.5
42 20	1 31 18.9	1 31 5.4	1 30 51.8	1 30 38.3	1 30 24.8	1 30 11.3	1.44	1.5
42 30	1 31 33.5	1 31 19.9	1 31 6.3	1 30 52.8	1 30 39.2	1 30 25.7	+1.46	-1.5
42 40	1 31 48.2	1 31 34.6	1 31 21.0	1 31 7.4	1 30 53.8	1 30 40.2	1.47	1.5
42 50	1 32 3.0	1 31 49.4	1 31 35.7	1 31 22.1	1 31 8.5	1 30 54.8	1.48	1.5
43 0	1 32 18.0	1 32 4.3	1 31 50.6	1 31 37.0	1 31 23.3	1 31 9.6	1.49	1.5
43 10	1 32 33.1	1 32 19.4	1 32 5.6	1 31 51.9	1 31 38.2	1 31 24.5	1.51	1.5
43 20	1 32 48.3	1 32 34.5	1 32 20.8	1 32 7.0	1 31 58.3	1 31 39.6	+1.52	-1.5
43 30	1 33 3.6	1 32 49.9	1 32 36.1	1 32 22.3	1 32 8.5	1 31 54.7	1.53	1.5
43 40	1 33 19.1	1 33 5.3	1 32 51.5	1 32 37.7	1 32 23.8	1 32 10.0	1.54	1.5
43 50	1 33 34.7	1 33 20.9	1 33 7.0	1 32 53.2	1 32 39.3	1 32 25.4	1.56	1.5
44 0	1 33 50.5	1 33 36.6	1 33 22.7	1 33 8.8	1 32 54.9	1 32 41.0	1.57	1.5
44 10	1 34 6.4	1 33 52.4	1 33 38.5	1 33 24.6	1 33 10.6	1 32 56.7	+1.58	-1.5
44 20	1 34 22.4	1 34 8.4	1 33 54.4	1 33 40.5	1 33 26.5	1 33 12.5	1.60	1.5
44 30	1 34 38.6	1 34 24.6	1 34 10.5	1 33 56.5	1 33 42.5	1 33 28.5	1.61	1.5
44 40	1 34 54.9	1 34 40.8	1 34 26.8	1 34 12.7	1 33 58.6	1 33 44.6	1.63	1.5
44 50	1 35 11.3	1 34 57.2	1 34 43.1	1 34 29.0	1 34 14.9	1 34 0.8	1.64	1.5
45 0	1 35 27.9	1 35 13.8	1 34 59.6	1 34 45.5	1 34 31.4	1 34 17.2	+1.66	-1.5
45 10	1 35 44.7	1 35 30.5	1 35 16.3	1 35 2.1	1 34 47.9	1 34 33.7	1.67	1.5
45 20	1 36 1.6	1 35 47.3	1 35 33.1	1 35 18.9	1 35 4.6	1 34 50.4	1.69	1.5
45 30	1 36 18.6	1 36 4.3	1 35 50.1	1 35 35.8	1 35 21.5	1 35 7.2	1.70	1.5
45 40	1 36 35.8	1 36 21.5	1 36 7.2	1 35 52.8	1 35 38.5	1 35 24.2	1.71	1.5
45 50	1 36 53.1	1 36 38.8	1 36 24.4	1 36 10.0	1 35 55.7	1 35 41.3	+1.73	-1.5
46 0	1 37 10.6	1 36 56.2	1 36 41.8	1 36 27.4	1 36 13.0	1 35 58.6	1.75	1.5
46 10	1 37 28.3	1 37 13.8	1 36 59.4	1 36 44.9	1 36 30.5	1 36 16.0	1.76	1.5
46 20	1 37 46.1	1 37 31.6	1 37 17.1	1 37 2.6	1 36 48.1	1 36 33.6	1.78	1.5
46 30	1 38 4.0	1 37 49.5	1 37 35.0	1 37 20.4	1 37 5.9	1 36 51.4	1.79	1.5
46 40	1 38 22.1	1 38 7.6	1 37 53.0	1 37 38.4	1 37 23.8	1 37 9.3	+1.81	-1.5
46 50	1 38 40.4	1 38 25.8	1 38 11.2	1 37 56.6	1 37 41.9	1 37 27.3	1.82	1.5
47 0	1 38 58.9	1 38 44.2	1 38 29.5	1 38 14.9	1 38 0.2	1 37 45.5	1.84	1.5
47 10	1 39 17.5	1 39 2.8	1 38 48.0	1 38 33.3	1 38 18.6	1 38 3.9	1.86	1.5
47 20	1 39 36.3	1 39 21.5	1 39 6.7	1 38 52.0	1 38 37.2	1 38 22.5	1.88	1.5
47 30	1 39 55.2	1 39 40.4	1 39 25.6	1 39 10.8	1 38 56.0	1 38 41.2	+1.89	-1.5
47 40	1 40 14.3	1 39 59.5	1 39 44.6	1 39 29.8	1 39 14.9	1 39 0.1	1.91	1.5
47 50	1 40 33.6	1 40 18.7	1 40 3.8	1 39 48.9	1 39 34.0	1 39 19.1	1.93	1.5
48 0	1 40 53.1	1 40 38.2	1 40 23.2	1 40 8.3	1 39 53.3	1 39 38.4	1.95	1.5
48 10	1 41 12.8	1 40 57.8	1 40 42.8	1 40 27.8	1 40 12.8	1 39 57.8	1.96	1.5
48 20	1 41 32.6	1 41 17.5	1 41 2.5	1 40 47.4	1 40 32.4	1 40 17.4	+1.98	-1.5
48 30	1 41 52.6	1 41 37.5	1 41 22.4	1 41 7.3	1 40 52.2	1 40 37.1	2.00	1.5
48 40	1 42 12.8	1 41 57.7	1 41 42.5	1 41 27.4	1 41 12.2	1 40 57.1	2.02	1.5
48 50	1 42 33.2	1 42 18.0	1 42 2.8	1 41 47.6	1 41 32.4	1 41 17.2	2.04	1.5
49 0	1 42 53.8	1 42 38.5	1 42 23.3	1 42 8.0	1 41 52.8	1 41 37.5	2.05	1.5
49 10	1 43 14.5	1 42 59.2	1 42 43.9	1 42 28.6	1 42 13.3	1 41 58.0	+2.07	-1.5
49 20	1 43 35.5	1 43 20.1	1 43 4.8	1 42 49.4	1 42 34.1	1 42 18.7	2.09	1.5
49 30	1 43 56.6	1 43 41.2	1 43 25.8	1 43 10.4	1 42 55.0	1 42 39.6	2.11	1.5
49 40	1 44 18.0	1 44 2.5	1 43 47.1	1 43 31.6	1 43 16.1	1 43 0.7	2.13	1.5
49 50	1 44 39.5	1 44 24.0	1 44 8.5	1 43 53.0	1 43 37.5	1 43 22.0	2.15	1.5
50 0	1 45 1.3	1 44 45.7	1 44 30.1	1 44 14.6	1 43 59.0	1 43 43.4	+2.17	-1.5

# TABLE V.

## AZIMUTH OF POLARIS AT ELONGATION, 1920.

Decl. at.	88° 52' 30''	88° 52' 40''	88° 52' 50''	88° 53' 0''	88° 53' 10''	88° 53' 20''	Variation for—	
							1' of Lat.	1" of s.
50 0	1 45 1.3	1 44 45.7	1 44 30.1	1 44 14.6	1 43 59.0	1 43 43.4	+2.17	-1.56
50 10	1 45 23.2	1 45 7.6	1 44 52.0	1 44 36.4	1 44 20.8	1 44 5.1	2.19	1.56
50 20	1 45 45.4	1 45 29.7	1 45 14.0	1 44 58.4	1 44 42.7	1 44 27.0	2.21	1.57
50 30	1 46 7.7	1 45 52.0	1 45 36.3	1 45 20.6	1 45 4.8	1 44 49.1	2.23	1.57
50 40	1 46 30.3	1 46 14.5	1 45 58.8	1 45 43.0	1 45 27.2	1 45 11.4	2.26	1.58
50 50	1 46 53.1	1 46 37.3	1 46 21.5	1 46 5.6	1 45 49.8	1 45 33.9	+2.28	-1.58
51 0	1 47 16.1	1 47 0.2	1 46 44.4	1 46 28.5	1 46 12.6	1 45 56.7	2.30	1.59
51 10	1 47 39.4	1 47 23.4	1 47 7.5	1 46 51.5	1 46 35.6	1 46 19.6	2.32	1.60
51 20	1 48 2.9	1 47 46.8	1 47 30.8	1 47 14.8	1 46 58.8	1 46 42.8	2.34	1.60
51 30	1 48 26.5	1 48 10.5	1 47 54.4	1 47 38.3	1 47 22.3	1 47 6.2	2.37	1.61
51 40	1 48 50.4	1 48 34.3	1 48 18.2	1 48 2.1	1 47 45.9	1 47 29.8	+2.39	-1.61
51 50	1 49 14.6	1 48 58.4	1 48 42.2	1 48 26.0	1 48 9.8	1 47 53.7	2.41	1.62
52 0	1 49 39.0	1 49 22.7	1 49 6.5	1 48 50.2	1 48 34.0	1 48 17.8	2.44	1.62
52 10	1 50 3.6	1 49 47.3	1 49 31.0	1 49 14.7	1 48 58.4	1 48 42.1	2.46	1.63
52 20	1 50 28.5	1 50 12.1	1 49 55.7	1 49 39.4	1 49 23.0	1 49 6.8	2.48	1.64
52 30	1 50 53.6	1 50 37.1	1 50 20.7	1 50 4.3	1 49 47.9	1 49 31.4	+2.51	-1.64
52 40	1 51 18.9	1 51 2.4	1 50 45.9	1 50 29.5	1 50 13.0	1 49 56.5	2.53	1.65
52 50	1 51 44.5	1 51 28.0	1 51 11.4	1 50 54.9	1 50 38.3	1 50 21.8	2.56	1.65
53 0	1 52 10.4	1 51 53.8	1 51 37.2	1 51 20.5	1 51 3.9	1 50 47.3	2.58	1.66
53 10	1 52 36.5	1 52 19.8	1 52 3.2	1 51 46.5	1 51 29.8	1 51 13.1	2.61	1.67
53 20	1 53 2.9	1 52 46.1	1 52 29.4	1 52 12.7	1 51 55.9	1 51 39.2	+2.63	-1.67
53 30	1 53 29.6	1 53 12.7	1 52 55.9	1 52 39.1	1 52 22.3	1 52 5.5	2.66	1.68
53 40	1 53 56.5	1 53 39.6	1 53 22.7	1 53 5.8	1 52 46.9	1 52 32.0	2.69	1.69
53 50	1 54 23.7	1 54 6.7	1 53 49.8	1 53 32.8	1 53 16.8	1 52 58.9	2.72	1.70
54 0	1 54 51.1	1 54 34.1	1 54 17.1	1 54 0.1	1 53 43.0	1 53 26.0	2.74	1.70
54 10	1 55 18.8	1 55 1.8	1 54 44.7	1 54 27.6	1 54 10.5	1 53 53.4	+2.77	-1.71
54 20	1 55 46.9	1 55 29.7	1 55 12.6	1 54 55.4	1 54 38.2	1 54 21.1	2.80	1.72
54 30	1 56 15.2	1 55 58.0	1 55 40.7	1 55 23.5	1 55 6.3	1 54 49.1	2.83	1.72
54 40	1 56 43.8	1 56 26.5	1 56 9.2	1 55 51.9	1 55 34.6	1 55 17.3	2.86	1.73
54 50	1 57 12.7	1 56 55.3	1 56 38.0	1 56 20.6	1 56 3.2	1 55 45.8	2.89	1.74
55 0	1 57 41.9	1 57 24.4	1 57 7.0	1 56 49.6	1 56 32.1	1 56 14.7	+2.91	-1.74
55 10	1 58 11.4	1 57 53.9	1 57 36.3	1 57 18.8	1 57 1.3	1 56 43.8	2.94	1.75
55 20	1 58 41.2	1 58 23.6	1 58 6.0	1 57 48.4	1 57 30.8	1 57 13.3	2.98	1.76
55 30	1 59 11.4	1 58 53.7	1 58 36.0	1 58 18.3	1 58 0.7	1 57 43.0	3.02	1.77
55 40	1 59 41.8	1 59 24.0	1 59 6.3	1 58 48.5	1 58 30.8	1 58 18.1	3.04	1.77
55 50	2 0 12.5	1 59 54.7	1 59 36.9	1 59 19.1	1 59 1.3	1 58 43.5	+3.07	-1.78
56 0	2 0 43.6	2 0 25.7	2 0 7.8	1 59 49.9	1 59 32.1	1 59 14.2	3.10	1.79
56 10	2 1 15.0	2 0 57.0	2 0 39.1	2 0 21.1	2 0 3.2	1 59 46.2	3.14	1.80
56 20	2 1 46.8	2 1 28.7	2 1 10.7	2 0 52.6	2 0 34.6	2 0 16.5	3.17	1.81
56 30	2 2 18.9	2 2 0.7	2 1 42.6	2 1 24.5	2 1 6.4	2 0 48.2	3.21	1.81
56 40	2 2 51.3	2 2 33.1	2 2 14.9	2 1 56.7	2 1 38.5	2 1 20.3	+3.24	-1.82
56 50	2 3 24.1	2 3 5.8	2 2 47.5	2 2 29.2	2 2 11.0	2 1 52.7	3.28	1.83
57 0	2 3 57.2	2 3 38.9	2 3 20.5	2 3 2.1	2 2 43.8	2 2 26.4	3.31	1.84
57 10	2 4 30.8	2 4 12.3	2 3 53.9	2 3 35.4	2 3 17.0	2 2 58.5	3.35	1.85
57 20	2 5 4.6	2 4 46.1	2 4 27.6	2 4 9.0	2 3 50.5	2 3 32.0	3.38	1.85
57 30	2 5 38.9	2 5 20.3	2 5 1.8	2 4 43.0	2 4 24.4	2 4 5.8	+3.42	-1.86
57 40	2 6 13.5	2 5 54.8	2 5 36.1	2 5 17.4	2 4 58.7	2 4 40.0	3.46	1.87
57 50	2 6 48.5	2 6 29.7	2 6 11.0	2 5 52.2	2 5 33.4	2 5 14.6	3.50	1.88
58 0	2 7 23.9	2 7 5.1	2 6 46.2	2 6 27.3	2 6 8.4	2 5 49.5	3.54	1.89
58 10	2 7 59.7	2 7 40.8	2 7 21.8	2 7 2.8	2 6 43.8	2 6 24.9	3.58	1.90
58 20	2 8 35.9	2 8 16.9	2 7 57.8	2 7 38.8	2 7 19.7	2 7 0.6	+3.62	-1.91
58 30	2 9 12.6	2 8 53.4	2 8 34.2	2 8 15.1	2 7 56.0	2 7 36.8	3.66	1.92
58 40	2 9 49.6	2 9 30.3	2 9 11.1	2 8 51.9	2 8 32.6	2 8 13.4	3.70	1.92
58 50	2 10 27.0	2 10 7.7	2 9 48.4	2 9 29.0	2 9 9.7	2 8 50.4	3.74	1.93
59 0	2 11 4.9	2 10 45.5	2 10 26.0	2 10 6.6	2 9 47.2	2 9 27.8	3.78	1.94
59 10	2 11 43.2	2 11 23.7	2 11 4.2	2 10 44.6	2 10 25.1	2 10 5.0	+3.83	-1.95
59 20	2 12 22.0	2 12 2.4	2 11 42.7	2 11 28.1	2 11 3.5	2 10 43.9	3.87	1.96
59 30	2 13 1.2	2 12 41.5	2 12 21.7	2 12 2.0	2 11 42.3	2 11 22.6	3.91	1.97
59 40	2 13 40.3	2 13 21.0	2 13 1.2	2 12 41.4	2 12 21.6	2 12 1.8	3.96	1.98
59 50	2 14 21.0	2 14 1.1	2 13 41.1	2 13 21.2	2 13 1.3	2 12 41.4	4.01	1.99
60 0	2 15 1.6	2 14 41.6	2 14 21.5	2 14 1.5	2 13 41.5	2 13 21.5	+4.06	-2.00





FOR REDUCING TO ELONGATION OBSERVATIONS MADE NEAR ELONGATION.

Azimuth at Elong.		1° 0'	1° 10'	1° 20'	1° 30'	1° 40'	1° 50'	2° 0'	2° 10'	Azimuth at Elong.	
* Time.											Time.*
m	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	m	0
	1	0.6	0.0	0.0	+ 0.1	+ 0.1	+ 0.1	+ 0.1	+ 0.1		1
	2	+ 0.1	+ 0.2	+ 0.2	0.2	0.2	0.3	0.3	0.3		2
	3	0.3	0.4	0.4	0.5	0.5	0.6	0.6	0.7		3
	4	0.5	0.6	0.7	0.8	0.9	1.0	1.1	1.2		4
	5	+ 0.9	+ 1.0	+ 1.1	+ 1.3	+ 1.4	+ 1.6	+ 1.7	+ 1.9		5
	6	1.2	1.4	1.6	1.8	2.1	2.3	2.5	2.7		6
	7	1.7	2.0	2.2	2.5	2.8	3.1	3.4	3.7		7
	8	2.2	2.6	2.9	3.3	3.7	4.0	4.4	4.8		8
	9	2.8	3.2	3.7	4.2	4.6	5.1	5.6	6.0		9
	10	+ 3.4	+ 4.0	+ 4.6	+ 5.1	+ 5.7	+ 6.3	+ 6.9	+ 7.4		10
	11	4.1	4.8	5.5	6.2	6.9	7.6	8.3	9.0		11
	12	4.9	5.8	6.6	7.4	8.2	9.0	9.9	10.7		12
	13	5.8	6.8	7.7	8.7	9.7	10.6	11.6	12.6		13
	14	6.7	7.8	9.0	10.1	11.2	12.3	13.4	14.6		14
	15	+ 7.7	+ 9.0	+10.3	+11.6	+12.8	+14.1	+15.4	+16.7		15
	16	8.8	10.2	11.7	13.2	14.6	16.1	17.5	19.0		16
	17	9.9	11.5	13.2	14.9	16.5	18.2	19.8	21.5		17
	18	11.1	12.9	14.8	16.7	18.5	20.4	22.2	24.1		18
	19	12.4	14.4	16.5	18.6	20.6	22.7	24.7	26.8		19
	20	+13.7	+16.0	+18.3	+20.6	+22.8	+25.1	+27.4	+29.7		20
	21	15.1	17.6	20.1	22.7	25.2	27.7	30.2	32.7		21
	22	16.6	19.3	22.1	24.9	27.6	30.4	33.2	35.9		22
	23	18.1	21.1	24.2	27.2	30.2	33.2	36.2	39.3		23
	24	19.7	23.0	26.3	29.6	32.9	36.2	39.5	42.8		24
	25	+21.4	+26.0	+28.5	+32.1	+35.7	+39.2	+42.8	+46.4		25

Azimuth at Elong.		2° 10'	2° 20'	2° 30'	2° 40'	2° 50'	3° 0'	3° 10'	3° 20'	Azimuth at Elong.	
* Time.											Time.*
m	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	m	0
	1	+ 0.1	+ 0.1	+ 0.1	+ 0.1	+ 0.1	+ 0.1	+ 0.1	+ 0.1		1
	2	0.3	0.3	0.4	0.4	0.4	0.4	0.4	0.5		2
	3	0.7	0.7	0.8	0.8	0.9	0.9	1.0	1.0		3
	4	1.2	1.3	1.4	1.5	1.6	1.6	1.7	1.8		4
	5	+ 1.9	+ 2.0	+ 2.1	+ 2.3	+ 2.4	+ 2.6	+ 2.7	+ 2.9		5
	6	2.7	2.9	3.1	3.3	3.5	3.7	3.9	4.1		6
	7	3.7	3.9	4.2	4.5	4.8	5.0	5.3	5.6		7
	8	4.8	5.1	5.5	5.9	6.2	6.6	7.0	7.3		8
	9	6.0	6.5	7.0	7.4	7.9	8.3	8.8	9.3		9
	10	+ 7.4	+ 8.0	+ 8.6	+ 9.2	+ 9.7	+10.3	+10.9	+11.4		10
	11	9.0	9.7	10.4	11.1	11.8	12.4	13.1	13.8		11
	12	10.7	11.5	12.3	13.2	14.0	14.8	15.6	16.5		12
	13	12.6	13.5	14.5	15.4	16.4	17.4	18.4	19.3		13
	14	14.6	15.7	16.8	17.9	19.0	20.2	21.3	22.4		14
	15	+16.7	+18.0	+19.3	+20.6	+21.9	+23.1	+24.4	+25.7		15
	16	19.0	20.5	21.9	23.4	24.9	26.3	27.8	29.3		16
	17	21.5	23.1	24.8	26.4	28.1	29.7	31.4	33.0		17
	18	24.1	25.9	27.8	29.6	31.5	33.3	35.2	37.0		18
	19	26.8	28.9	30.9	33.0	35.1	37.1	39.2	41.3		19
	20	+29.7	+32.0	+34.3	+36.6	+38.8	+41.1	+43.4	+45.7		20
	21	32.7	35.3	37.8	40.3	42.8	45.3	47.9	50.4		21
	22	35.9	38.7	41.5	44.2	47.0	49.8	52.5	55.3		22
	23	39.3	42.3	45.3	48.3	51.4	54.4	57.4	60.4		23
	24	42.8	46.0	49.3	52.6	55.9	59.2	62.5	65.8		24
	25	+46.4	+49.9	+53.5	+57.1	+60.7	+64.2	+67.8	+71.4		25

\* Sidereal time from elongation.

FOR FINDING THE TIMES OF UPPER AND LOWER CULMINATION OF POLARIS 1920, FROM THE OBSERVED TIMES WHEN THE STAR IS ON THE SAME VERTICAL CIRCLE WITH THE STARS  $\zeta$  URSE MAJORIS (MIZAR) *SUB POLO* AND  $\delta$  CASSIOPELE *SUB POLO*, RESPECTIVELY.

Except at high latitudes, the pole star at either upper or lower culmination furnishes a simple and convenient method for laying down a meridian line on the earth's surface at points in the northern hemisphere. When the local time is unknown and accurate astronomical instruments are not available, the time of culmination of Polaris may be found by observing the instant when Polaris is vertically above (has the same azimuth as)  $\zeta$  Urse Majoris (Mizar) below the pole, or  $\delta$  Cassiopeie below the pole. In the former case, for the year 1920, Polaris is approaching upper culmination and in the latter case it is approaching lower culmination. The mean time interval which elapses between either of the observed times above mentioned and upper or lower culmination, as the case may be, is given at ten-day intervals in the following table. This method can not be used at places south of 30° north latitude.

$\zeta$ URSE MAJORIS (MIZAR). (Upper culmination of Polaris.)						$\delta$ CASSIOPELE. (Lower culmination of Polaris.)							
Date.	Lat.	40°	45°	50°	55°	60°	Date.	Lat.	35°	40°	45°	50°	55°
		m s	m s	m s	m s	m s			m s	m s	m s	m s	m s
Jan.	1	11 11	11 9	11 6	11 3	10 59	Jan.	1	12 21	12 23	12 26	12 29	12 32
	11	11 1	10 59	10 56	10 53	10 49		11	12 11	12 13	12 15	12 18	12 21
	21	10 50	10 48	10 45	10 42	10 38		21	12 0	12 2	12 4	12 7	12 10
	31	10 39	10 37	10 35	10 32	10 28	Feb.	31	11 49	11 51	11 53	11 56	11 59
Feb.	10	10 29	10 27	10 24	10 21	10 18		10	11 38	11 40	11 42	11 45	11 48
	20	10 19	10 17	10 15	10 12	10 8		20	11 29	11 31	11 33	11 35	11 38
Mar.	1	10 11	10 9	10 7	10 4	10 0	Mar.	1	11 21	11 22	11 24	11 27	11 30
								11	11 14	11 15	11 17	11 20	11 23
June	29	10 52	10 50	10 47	10 44	10 40		21	11 9	11 11	11 13	11 15	11 18
July	9	11 3	11 1	10 58	10 55	10 51	Apr.	31	11 6	11 8	11 10	11 12	11 15
	19	11 14	11 12	11 9	11 6	11 2		10	11 5	11 7	11 9	11 12	11 15
	29	11 25	11 23	11 20	11 17	11 13		20	11 7	11 9	11 11	11 13	11 16
Aug.	8	11 36	11 34	11 31	11 28	11 24	May	30	11 10	11 12	11 14	11 16	11 19
	18	11 46	11 43	11 41	11 37	11 33		10	11 15	11 17	11 19	11 22	11 25
	28	11 54	11 52	11 49	11 46	11 42		20	11 22	11 24	11 26	11 29	11 32
Sept.	7	12 2	12 0	11 57	11 54	11 50	June	30	11 31	11 33	11 35	11 37	11 40
	17	12 9	12 7	12 4	12 1	11 56		9	11 40	11 42	11 44	11 47	11 50
	27	12 14	12 12	12 9	12 6	12 1		19	11 51	11 53	11 55	11 57	12 1
Oct.	7	12 18	12 16	12 13	12 9	12 5	July	29	12 2	12 4	12 6	12 8	12 11
	17	12 20	12 18	12 15	12 11	12 7		9	12 13	12 15	12 17	12 20	12 23
	27	12 21	12 18	12 15	12 12	12 8		19	12 24	12 26	12 29	12 31	12 35
Nov.	6	12 19	12 17	12 14	12 10	12 6		29	12 36	12 38	12 40	12 43	12 46
	16	12 16	12 14	12 11	12 7	12 3	Nov.	26	13 23	13 25	13 28	13 31	13 34
	26	12 11	12 9	12 6	12 3	11 58							
Dec.	6	12 5	12 2	12 0	11 56	11 52	Dec.	6	13 16	13 19	13 21	13 24	13 28
	16	11 57	11 54	11 52	11 48	11 44		16	13 8	13 11	13 13	13 16	13 20
	26	11 47	11 45	11 42	11 39	11 35		26	12 59	13 1	13 3	13 6	13 10
	31	11 42	11 40	11 37	11 34	11 30		31	12 54	12 56	12 58	13 1	13 5

APPARENT PLACE, TIME OF UPPER CULMINATION, AND TIME INTERVAL BETWEEN UPPER CULMINATION AND ELONGATION EAST OR WEST, OF POLARIS, 1920.

The local mean time of culmination on any meridian for a given date is found by taking from the following table the *Mean Time* of the nearest Greenwich culmination, and applying to it the product of the *Var. per Day* by the integral number of intervening days, this product being numerically additive for an earlier date and subtractive for a later date than that given in the table; and by applying also the product of the *Var. per Hour* by the longitude from Greenwich expressed in hours and fractions of an hour, this product being numerically additive for East longitudes and subtractive for West longitudes.

The time interval between upper and lower culmination is 12<sup>h</sup> diminished by one-half the numerical value of the *Var. per Day*.

The last column below applies to all meridians.

Date.	Upper Culmination, Meridian of Greenwich.					Latitude.	Mean Time Interval, Elongation minus Upper Culm.		
	Apparent Right Ascension.	Apparent Declination.	Mean Time.	Var. per Day.	Var. per Hour.		W.	E.	
	h m s 1 31	+88 52	h m s	m s	W. E.	°	h m E.		
Jan. 1	86	61.7	6 51 54	-3 56.9	-9.87+	10	+5 58.2-		
11	75	62.7	6 12 25	3 57.0	9.87	12	5 58.1		
21	64	63.0	5 32 55	3 57.0	9.87	14	5 57.9		
31	54	62.7	4 53 25	3 57.0	9.87	16	5 57.7		
Feb. 10	43	61.7	4 13 56	3 56.9	9.87	18	5 57.6		
20	34	60.1	3 34 27	-3 56.8	-9.87+	20	+5 57.4-		
Mar. 1	25	58.0	2 55 0	3 56.7	9.86	22	5 57.2		
11	19	55.5	2 15 34	3 56.5	9.85	24	5 57.0		
21	14	52.6	1 36 10	3 56.3	9.85	26	5 56.8		
31	11	49.6	0 56 48	3 56.1	9.84	28	5 56.6		
Apr. 10	10	46.4	0 17 28	-3 55.9	-9.83+	30	+5 56.4-		
19	12	43.3	23 38 11	3 55.7	9.82	32	5 56.2		
29	15	40.3	22 58 55	3 55.5	9.81	34	5 56.0		
May 9	20	37.5	22 19 41	3 55.3	9.80	36	5 55.8		
19	27	35.1	21 40 29	3 55.1	9.80	38	5 55.5		
29	35	33.1	21 1 18	-3 55.0	-9.79+	40	+5 55.3-		
June 8	45	31.6	20 22 8	3 54.9	9.79	42	5 55.0		
18	55	30.6	19 43 0	3 54.8	9.78	44	5 54.7		
28	66	30.2	19 3 52	3 54.8	9.78	46	5 54.4		
July 8	78	30.2	18 24 44	3 54.8	9.78	48	5 54.1		
18	89	30.8	17 45 36	-3 54.8	-9.78+	50	+5 53.7-		
28	100	32.0	17 6 28	3 54.8	9.78	52	5 53.3		
Aug. 7	111	33.6	16 27 20	3 54.9	9.79	54	5 52.9		
17	121	35.7	15 48 11	3 54.9	9.79	56	5 52.4		
27	131	38.3	15 9 1	3 55.0	9.79	58	5 51.9		
Sept. 6	139	41.2	14 29 50	-3 55.2	-9.80+	60	+5 51.3-		
16	146	44.4	13 50 38	3 55.3	9.80	62	5 50.6		
26	151	47.8	13 11 24	3 55.4	9.81	64	5 49.9		
Oct. 6	155	51.4	12 32 9	3 55.6	9.82	66	5 49.0		
16	158	55.2	11 52 53	3 55.8	9.82	68	5 48.0		
26	158	58.9	11 13 34	-3 55.9	-9.83+	70	+5 46.8-		
Nov. 5	157	62.6	10 34 14	3 56.1	9.84				
15	154	66.1	9 54 52	3 56.3	9.85				
25	150	69.4	9 15 29	3 56.5	9.85				
Dec. 5	143	72.3	8 36 3	3 56.6	9.86				
15	136	74.8	7 56 36	-3 56.8	-9.87+				
25	126	76.7	7 17 8	-3 56.9	-9.87+				

LOCAL ASTRONOMICAL MEAN TIME OF SUNRISE (SUN'S UPPER LIMB) MERIDIAN OF GREENWICH, 1920.

To obtain civil time, subtract 12 hours, mark the result A. M., and add one to the day.

To obtain the standard time at any station, increase the local time by the number of minutes the station is west of the standard meridian, or decrease the local time by the number of minutes the station is east of the standard meridian.

For sunrise in southern latitudes see page 728.

Lat.	0°	+10°	+20°	+30°	+35°	+40°	+45°	+50°	+52°	+54°	+56°	+58°	+60°
Date.	h m	h m	h m	h m	h m	h m	h m	h m	h m	h m	h m	h m	h m
Jan.	0	18 0	18 17	18 35	18 56	19 8	19 22	19 39	19 59	20 8	20 20	20 32	20 46
	1	18 0	18 17	18 35	18 56	19 8	19 23	19 39	19 59	20 8	20 19	20 32	20 46
	2	18 0	18 17	18 36	18 56	19 8	19 22	19 39	19 59	20 8	20 19	20 31	20 46
	3	18 1	18 18	18 36	18 57	19 9	19 22	19 39	19 59	20 8	20 19	20 31	20 45
	4	18 1	18 18	18 36	18 57	19 9	19 22	19 38	19 58	20 8	20 19	20 31	20 45
	5	18 2	18 18	18 36	18 57	19 9	19 22	19 38	19 58	20 8	20 18	20 30	20 44
	6	18 2	18 19	18 37	18 57	19 9	19 22	19 38	19 58	20 7	20 18	20 30	20 43
	7	18 3	18 19	18 37	18 57	19 9	19 22	19 38	19 58	20 7	20 17	20 29	20 43
	8	18 3	18 20	18 37	18 57	19 9	19 22	19 38	19 57	20 6	20 17	20 28	20 42
	9	18 3	18 20	18 37	18 57	19 9	19 22	19 38	19 57	20 6	20 16	20 28	20 41
	10	18 4	18 20	18 37	18 57	19 9	19 22	19 37	19 56	20 5	20 15	20 27	20 40
	11	18 4	18 20	18 38	18 57	19 9	19 22	19 37	19 56	20 5	20 15	20 26	20 39
	12	18 5	18 21	18 38	18 57	19 9	19 21	19 37	19 55	20 4	20 14	20 25	20 38
	13	18 5	18 21	18 38	18 57	19 8	19 21	19 36	19 55	20 3	20 13	20 24	20 37
	14	18 5	18 21	18 38	18 58	19 8	19 21	19 36	19 54	20 3	20 12	20 23	20 35
	15	18 6	18 21	18 38	18 57	19 8	19 20	19 35	19 53	20 2	20 11	20 22	20 34
	16	18 6	18 22	18 38	18 57	19 8	19 20	19 35	19 52	20 1	20 10	20 21	20 33
	17	18 7	18 22	18 38	18 57	19 7	19 20	19 34	19 52	20 0	20 9	20 20	20 31
	18	18 7	18 22	18 38	18 56	19 7	19 19	19 33	19 51	19 59	20 8	20 18	20 30
	19	18 7	18 22	18 38	18 56	19 7	19 19	19 32	19 50	19 58	20 7	20 17	20 29
	20	18 8	18 22	18 38	18 56	19 6	19 18	19 32	19 49	19 57	20 6	20 15	20 27
	21	18 8	18 22	18 38	18 56	19 6	19 17	19 31	19 48	19 56	20 4	20 14	20 25
	22	18 8	18 23	18 38	18 55	19 5	19 17	19 30	19 47	19 55	20 3	20 13	20 24
	23	18 8	18 23	18 38	18 55	19 5	19 16	19 30	19 46	19 53	20 2	20 11	20 22
24	18 9	18 23	18 38	18 55	19 4	19 16	19 29	19 45	19 52	20 0	20 10	20 20	
25	18 9	18 23	18 37	18 54	19 4	19 15	19 28	19 43	19 51	19 59	20 8	20 19	
26	18 9	18 23	18 37	18 54	19 3	19 14	19 27	19 42	19 49	19 57	20 6	20 17	
27	18 9	18 23	18 37	18 53	19 3	19 13	19 26	19 41	19 48	19 56	20 5	20 15	
28	18 9	18 23	18 37	18 53	19 2	19 13	19 25	19 40	19 47	19 54	20 3	20 13	
29	18 10	18 23	18 37	18 52	19 1	19 12	19 24	19 38	19 45	19 53	20 1	20 11	
30	18 10	18 23	18 36	18 52	19 1	19 11	19 23	19 37	19 44	19 51	19 59	20 9	
31	18 10	18 23	18 36	18 51	19 0	19 10	19 22	19 36	19 42	19 50	19 58	20 7	
Feb.	1	18 10	18 23	18 36	18 51	18 59	19 9	19 21	19 34	19 41	19 48	19 56	20 5
	2	18 10	18 22	18 35	18 50	18 59	19 8	19 19	19 33	19 39	19 46	19 54	20 3
	3	18 10	18 22	18 35	18 50	18 58	19 7	19 18	19 32	19 38	19 44	19 52	20 1
	4	18 10	18 22	18 35	18 49	18 57	19 6	19 17	19 30	19 36	19 42	19 50	19 58
	5	18 10	18 22	18 34	18 48	18 56	19 5	19 16	19 28	19 34	19 41	19 48	19 56
	6	18 11	18 22	18 34	18 47	18 55	19 4	19 14	19 27	19 33	19 39	19 46	19 54
	7	18 11	18 22	18 34	18 47	18 54	19 3	19 13	19 25	19 31	19 37	19 44	19 52
	8	18 11	18 21	18 33	18 46	18 53	19 2	19 12	19 24	19 29	19 35	19 42	19 49
	9	18 11	18 21	18 33	18 45	18 52	19 1	19 10	19 22	19 27	19 33	19 40	19 47
	10	18 11	18 21	18 32	18 44	18 52	19 0	19 9	19 20	19 25	19 31	19 37	19 45
	11	18 11	18 21	18 32	18 44	18 51	18 58	19 8	19 18	19 24	19 29	19 35	19 42
	12	18 11	18 21	18 31	18 43	18 50	18 57	19 6	19 17	19 22	19 27	19 33	19 40
	13	18 11	18 20	18 31	18 42	18 49	18 56	19 5	19 15	19 20	19 25	19 31	19 37
	14	18 11	18 20	18 30	18 41	18 48	18 55	19 3	19 13	19 18	19 23	19 29	19 35
	15	18 11	18 20	18 30	18 40	18 47	18 53	19 2	19 11	19 16	19 21	19 26	19 32

# TABLE VIII.

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## LOCAL ASTRONOMICAL MEAN TIME OF SUNSET (SUN'S UPPER LIMB), MERIDIAN OF GREENWICH, 1920.

To obtain civil time, write P. M. after the astronomical time.

To obtain the standard time at any station, increase the local time by the number of minutes the station is west of the standard meridian, or decrease the local time by the number of minutes the station is east of the standard meridian.

For sunset in southern latitudes see page 728.

Date.	Lat.	0°	+10°	+20°	+30°	+35°	+40°	+45°	+50°	+52°	+54°	+56°	+58°	+60°
		h m	h m	h m	h m	h m	h m	h m	h m	h m	h m	h m	h m	h m
Jan.	1	6 7	5 50	5 32	5 11	4 59	4 45	4 28	4 8	3 58	3 47	3 35	3 21	3 4
	2	6 7	5 50	5 32	5 11	4 59	4 45	4 29	4 9	3 59	3 48	3 36	3 22	3 5
	3	6 8	5 51	5 33	5 12	5 0	4 46	4 30	4 10	4 0	3 49	3 37	3 23	3 6
	4	6 8	5 51	5 34	5 13	5 1	4 47	4 31	4 11	4 1	3 51	3 39	3 25	3 8
	5	6 9	5 52	5 34	5 14	5 2	4 48	4 32	4 12	4 3	3 52	3 40	3 26	3 10
	6	6 9	5 53	5 35	5 14	5 2	4 49	4 33	4 13	4 4	3 53	3 41	3 28	3 11
	7	6 10	5 53	5 35	5 15	5 3	4 50	4 34	4 14	4 5	3 55	3 43	3 29	3 13
	8	6 10	5 54	5 36	5 16	5 4	4 51	4 35	4 16	4 6	3 56	3 44	3 31	3 15
	9	6 11	5 54	5 37	5 17	5 5	4 52	4 36	4 17	4 8	3 57	3 46	3 32	3 17
	10	6 11	5 55	5 37	5 17	5 6	4 53	4 37	4 18	4 9	3 59	3 47	3 34	3 19
	11	6 11	5 55	5 38	5 18	5 7	4 54	4 38	4 19	4 10	4 0	3 49	3 36	3 21
	12	6 12	5 56	5 39	5 19	5 8	4 55	4 39	4 21	4 12	4 2	3 51	3 38	3 23
	13	6 12	5 56	5 39	5 20	5 9	4 56	4 41	4 22	4 13	4 4	3 52	3 40	3 25
	14	6 12	5 57	5 40	5 21	5 10	4 57	4 42	4 24	4 15	4 5	3 54	3 42	3 27
	15	6 13	5 57	5 41	5 22	5 11	4 58	4 43	4 25	4 16	4 7	3 56	3 44	3 29
	16	6 13	5 58	5 41	5 22	5 11	4 59	4 44	4 26	4 18	4 8	3 58	3 46	3 31
	17	6 14	5 58	5 42	5 23	5 12	5 0	4 46	4 28	4 19	4 10	4 0	3 48	3 34
	18	6 14	5 59	5 43	5 24	5 13	5 1	4 47	4 29	4 21	4 12	4 2	3 50	3 36
	19	6 14	5 59	5 43	5 25	5 14	5 2	4 48	4 31	4 23	4 14	4 3	3 52	3 38
	20	6 14	6 0	5 44	5 26	5 15	5 4	4 50	4 33	4 24	4 16	4 5	3 54	3 41
	21	6 15	6 0	5 45	5 27	5 16	5 5	4 51	4 34	4 26	4 17	4 7	3 56	3 43
	22	6 15	6 0	5 45	5 28	5 17	5 6	4 52	4 36	4 28	4 19	4 9	3 58	3 46
	23	6 15	6 1	5 46	5 28	5 18	5 7	4 54	4 37	4 29	4 21	4 11	4 1	3 48
	24	6 16	6 1	5 46	5 29	5 20	5 8	4 55	4 39	4 31	4 23	4 14	4 3	3 51
	25	6 16	6 2	5 47	5 30	5 20	5 9	4 56	4 40	4 33	4 25	4 16	4 5	3 53
	26	6 16	6 2	5 48	5 31	5 22	5 11	4 58	4 42	4 35	4 27	4 18	4 7	3 56
	27	6 16	6 3	5 48	5 32	5 23	5 12	4 59	4 44	4 37	4 29	4 20	4 10	3 58
	28	6 17	6 3	5 49	5 33	5 24	5 13	5 1	4 45	4 38	4 31	4 22	4 12	4 1
	29	6 17	6 4	5 50	5 34	5 25	5 14	5 2	4 47	4 40	4 33	4 24	4 14	4 3
	30	6 17	6 4	5 50	5 35	5 26	5 15	5 3	4 49	4 42	4 35	4 26	4 17	4 6
Feb.	31	6 17	6 4	5 51	5 35	5 27	5 16	5 5	4 50	4 44	4 37	4 28	4 19	4 8
	1	6 17	6 5	5 51	5 36	5 28	5 18	5 6	4 52	4 46	4 39	4 30	4 21	4 11
	2	6 17	6 5	5 52	5 37	5 29	5 19	5 8	4 54	4 48	4 41	4 33	4 24	4 14
	3	6 17	6 5	5 53	5 38	5 30	5 20	5 9	4 56	4 49	4 43	4 35	4 26	4 16
	4	6 18	6 6	5 53	5 39	5 31	5 21	5 10	4 57	4 51	4 45	4 37	4 29	4 19
	5	6 18	6 6	5 54	5 40	5 32	5 22	5 12	4 59	4 53	4 47	4 39	4 31	4 22
	6	6 18	6 6	5 54	5 40	5 33	5 24	5 13	5 1	4 55	4 49	4 41	4 33	4 24
	7	6 18	6 7	5 55	5 41	5 34	5 25	5 15	5 2	4 57	4 51	4 44	4 36	4 27
	8	6 18	6 7	5 55	5 42	5 35	5 26	5 16	5 4	4 59	4 53	4 46	4 38	4 29
	9	6 18	6 7	5 56	5 43	5 36	5 27	5 18	5 6	5 1	4 55	4 48	4 40	4 32
	10	6 18	6 7	5 56	5 44	5 37	5 29	5 19	5 8	5 2	4 57	4 50	4 43	4 35
	11	6 18	6 8	5 57	5 45	5 38	5 30	5 20	5 9	5 4	4 59	4 52	4 45	4 37
	12	6 18	6 8	5 57	5 45	5 39	5 31	5 22	5 11	5 6	5 1	4 55	4 48	4 40
	13	6 18	6 8	5 58	5 46	5 40	5 32	5 23	5 13	5 8	5 3	4 57	4 50	4 43
	14	6 18	6 8	5 58	5 47	5 41	5 33	5 25	5 14	5 10	5 5	4 59	4 52	4 45
15	6 18	6 9	5 59	5 48	5 42	5 34	5 26	5 16	5 12	5 7	5 1	4 55	4 48	
16	6 18	6 9	5 59	5 49	5 43	5 36	5 28	5 18	5 14	5 9	5 3	4 57	4 51	

LOCAL ASTRONOMICAL MEAN TIME OF SUNRISE (SUN'S UPPER LIMB.  
MERIDIAN OF GREENWICH, 1920.

To obtain civil time, subtract 12 hours, mark the result A. M., and add one to the day.

To obtain the standard time at any station, increase the local time by the number of minutes the station is west of the standard meridian, or decrease the local time by the number of minutes the station is east of the standard meridian.

For sunrise in southern latitudes see page 728.

Date.	Lat.	0°	+10°	+20°	+30°	+35°	+40°	+45°	+50°	+52°	+54°	+56°	+58°	+60°
Feb. 15		h m	h m	h m	h m	h m	h m	h m	h m	h m	h m	h m	h m	h m
16		18 11	18 20	18 30	18 40	18 47	18 53	19 0	19 11	19 16	19 21	19 26	19 32	19 38
17		18 11	18 20	18 29	18 39	18 46	18 52	19 0	19 10	19 14	19 19	19 24	19 30	19 36
18		18 11	18 19	18 28	18 39	18 44	18 51	18 59	19 8	19 12	19 17	19 22	19 27	19 33
19		18 11	18 19	18 28	18 38	18 43	18 50	18 57	19 6	19 10	19 14	19 19	19 25	19 31
20		18 11	18 19	18 27	18 37	18 42	18 48	18 56	19 4	19 8	19 12	19 17	19 22	19 28
21		18 10	18 18	18 26	18 36	18 41	18 47	18 54	19 2	19 6	19 10	19 15	19 20	19 26
22		18 10	18 18	18 26	18 35	18 40	18 45	18 52	19 0	19 4	19 8	19 12	19 17	19 23
23		18 10	18 18	18 25	18 34	18 39	18 44	18 51	18 58	19 2	19 6	19 10	19 15	19 21
24		18 10	18 17	18 24	18 33	18 38	18 43	18 49	18 56	19 0	19 3	19 7	19 12	19 18
25		18 10	18 17	18 24	18 32	18 36	18 41	18 47	18 54	18 58	19 1	19 5	19 9	19 14
26		18 10	18 16	18 23	18 31	18 35	18 40	18 46	18 52	18 55	18 59	19 3	19 7	19 11
27		18 10	18 16	18 22	18 30	18 34	18 38	18 44	18 50	18 53	18 57	19 0	19 4	19 8
28		18 9	18 15	18 21	18 28	18 31	18 35	18 41	18 46	18 49	18 52	18 55	18 59	19 0
29		18 9	18 15	18 20	18 26	18 30	18 34	18 39	18 44	18 47	18 50	18 53	18 56	19 0
Mar. 1		18 9	18 14	18 19	18 25	18 29	18 33	18 37	18 42	18 45	18 47	18 50	18 53	18 56
2		18 9	18 14	18 19	18 24	18 28	18 31	18 35	18 40	18 42	18 45	18 48	18 50	18 53
3		18 9	18 13	18 18	18 23	18 26	18 30	18 34	18 38	18 40	18 42	18 45	18 48	18 51
4		18 8	18 13	18 17	18 22	18 25	18 28	18 32	18 36	18 38	18 40	18 42	18 45	18 48
5		18 8	18 12	18 16	18 21	18 24	18 26	18 30	18 34	18 36	18 38	18 40	18 42	18 45
6		18 8	18 12	18 15	18 20	18 22	18 25	18 28	18 32	18 33	18 35	18 37	18 40	18 43
7		18 8	18 11	18 15	18 19	18 21	18 23	18 26	18 30	18 31	18 33	18 35	18 37	18 40
8		18 7	18 11	18 14	18 18	18 20	18 22	18 25	18 28	18 29	18 30	18 32	18 34	18 37
9		18 7	18 10	18 13	18 16	18 18	18 20	18 23	18 25	18 27	18 28	18 30	18 31	18 33
10		18 7	18 10	18 12	18 15	18 17	18 19	18 21	18 23	18 24	18 25	18 27	18 28	18 30
11		18 7	18 9	18 11	18 14	18 16	18 17	18 19	18 21	18 22	18 23	18 24	18 26	18 28
12		18 6	18 8	18 10	18 13	18 14	18 16	18 17	18 19	18 20	18 21	18 22	18 23	18 25
13		18 6	18 8	18 10	18 12	18 13	18 14	18 15	18 17	18 17	18 18	18 19	18 20	18 22
14		18 6	18 7	18 9	18 10	18 11	18 12	18 13	18 15	18 15	18 16	18 16	18 17	18 19
15		18 5	18 7	18 8	18 9	18 10	18 11	18 12	18 12	18 13	18 13	18 14	18 14	18 16
16		18 5	18 6	18 7	18 8	18 9	18 9	18 10	18 10	18 11	18 11	18 11	18 12	18 13
17		18 5	18 6	18 6	18 7	18 7	18 8	18 8	18 8	18 8	18 8	18 9	18 9	18 9
18		18 5	18 5	18 5	18 6	18 6	18 6	18 6	18 6	18 6	18 6	18 6	18 6	18 6
19		18 4	18 4	18 4	18 4	18 4	18 4	18 4	18 4	18 4	18 3	18 3	18 3	18 3
20		18 4	18 4	18 4	18 3	18 3	18 3	18 2	18 2	18 1	18 1	18 1	18 0	18 0
21		18 4	18 3	18 3	18 2	18 2	18 1	18 0	17 59	17 59	17 58	17 58	17 58	17 57
22		18 3	18 3	18 2	18 1	18 0	17 59	17 58	17 57	17 57	17 56	17 56	17 55	17 54
23		18 3	18 2	18 1	18 0	17 59	17 58	17 57	17 55	17 54	17 54	17 53	17 52	17 51
24		18 3	18 2	18 0	17 58	17 57	17 56	17 55	17 53	17 52	17 51	17 50	17 49	17 48
25		18 2	18 1	17 59	17 57	17 56	17 55	17 53	17 51	17 50	17 49	17 48	17 46	17 45
26		18 2	18 0	17 58	17 56	17 55	17 53	17 51	17 48	17 47	17 46	17 45	17 43	17 42
27		18 2	18 0	17 57	17 55	17 53	17 51	17 49	17 46	17 45	17 44	17 42	17 40	17 39
28		18 2	17 59	17 57	17 53	17 52	17 50	17 47	17 44	17 43	17 41	17 39	17 38	17 37
29		18 1	17 59	17 56	17 52	17 50	17 48	17 45	17 42	17 41	17 39	17 37	17 35	17 34
30		18 1	17 58	17 55	17 51	17 49	17 46	17 43	17 40	17 38	17 36	17 34	17 32	17 31
31		18 1	17 58	17 54	17 50	17 48	17 45	17 42	17 38	17 36	17 34	17 32	17 29	17 28
Apr. 1		18 0	17 57	17 53	17 49	17 46	17 43	17 40	17 35	17 34	17 31	17 29	17 26	17 25

# TABLE VIII.

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## LOCAL ASTRONOMICAL MEAN TIME OF SUNSET (SUN'S UPPER LIMB), MERIDIAN OF GREENWICH, 1920.

To obtain civil time, write P. M. after the astronomical time.

To obtain the standard time at any station, increase the local time by the number of minutes the station is west of the standard meridian, or decrease the local time by the number of minutes the station is east of the standard meridian.

For sunset in southern latitudes see page 728.

Date.	Lat.	0°	+10°	+20°	+30°	+35°	+40°	+45°	+50°	+52°	+54°	+56°	+58°	+60°
Feb. 16		h m	h m	h m	h m	h m	h m	h m	h m	h m	h m	h m	h m	h m
17		6 18	6 9	5 59	5 49	5 43	5 36	5 28	5 18	5 14	5 9	5 3	4 57	4 51
18		6 18	6 9	6 0	5 49	5 43	5 37	5 29	5 20	5 15	5 11	5 5	5 0	4 53
19		6 18	6 9	6 0	5 50	5 45	5 38	5 30	5 21	5 17	5 13	5 8	5 2	4 56
20		6 17	6 9	6 1	5 51	5 45	5 39	5 32	5 23	5 19	5 15	5 10	5 4	4 58
		6 17	6 9	6 1	5 52	5 46	5 40	5 33	5 25	5 21	5 17	5 12	5 7	5 1
21		6 17	6 10	6 2	5 52	5 47	5 41	5 35	5 26	5 23	5 19	5 14	5 9	5 4
22		6 17	6 10	6 2	5 53	5 48	5 43	5 36	5 28	5 25	5 21	5 16	5 12	5 6
23		6 17	6 10	6 2	5 54	5 49	5 44	5 37	5 30	5 27	5 23	5 19	5 14	5 9
24		6 17	6 10	6 3	5 55	5 50	5 45	5 39	5 32	5 28	5 25	5 21	5 16	5 11
25		6 17	6 10	6 3	5 55	5 51	5 46	5 40	5 33	5 30	5 27	5 23	5 18	5 14
26		6 17	6 10	6 4	5 56	5 52	5 47	5 42	5 35	5 32	5 29	5 25	5 21	5 16
27		6 16	6 10	6 4	5 57	5 53	5 48	5 43	5 37	5 34	5 31	5 27	5 23	5 19
28		6 16	6 10	6 4	5 58	5 54	5 49	5 44	5 38	5 36	5 33	5 29	5 26	5 22
29		6 16	6 11	6 5	5 58	5 55	5 50	5 46	5 40	5 38	5 35	5 31	5 28	5 24
Mar. 1		6 16	6 11	6 5	5 59	5 56	5 52	5 47	5 42	5 39	5 37	5 34	5 30	5 27
2		6 16	6 11	6 5	6 0	5 56	5 53	5 48	5 43	5 41	5 38	5 36	5 33	5 29
3		6 15	6 11	6 6	6 0	5 57	5 54	5 50	5 45	5 43	5 40	5 38	5 35	5 32
4		6 15	6 11	6 6	6 1	5 58	5 55	5 51	5 47	5 45	5 42	5 40	5 37	5 34
5		6 15	6 11	6 6	6 2	5 59	5 56	5 52	5 48	5 46	5 44	5 42	5 39	5 37
6		6 15	6 11	6 7	6 2	6 0	5 57	5 54	5 50	5 48	5 46	5 44	5 42	5 39
7		6 15	6 11	6 7	6 3	6 1	5 58	5 55	5 51	5 50	5 48	5 46	5 44	5 42
8		6 14	6 11	6 7	6 4	6 2	5 59	5 56	5 53	5 52	5 50	5 48	5 46	5 44
9		6 14	6 11	6 8	6 4	6 2	6 0	5 58	5 55	5 53	5 52	5 50	5 49	5 47
10		6 14	6 11	6 8	6 5	6 3	6 1	5 59	5 56	5 55	5 54	5 52	5 51	5 49
11		6 14	6 11	6 8	6 6	6 4	6 2	6 0	5 58	5 57	5 56	5 55	5 53	5 52
12		6 13	6 11	6 9	6 6	6 5	6 3	6 2	6 0	5 59	5 58	5 57	5 55	5 54
13		6 13	6 11	6 9	6 7	6 6	6 4	6 3	6 1	6 0	6 0	5 59	5 58	5 56
14		6 13	6 11	6 9	6 8	6 7	6 5	6 4	6 3	6 2	6 2	6 1	6 0	5 59
15		6 12	6 11	6 10	6 8	6 7	6 6	6 6	6 4	6 4	6 3	6 3	6 2	6 1
16		6 12	6 11	6 10	6 9	6 8	6 7	6 7	6 6	6 6	6 5	6 5	6 4	6 4
17		6 12	6 11	6 10	6 9	6 9	6 8	6 8	6 8	6 7	6 7	6 7	6 7	6 6
18		6 12	6 11	6 10	6 10	6 10	6 10	6 9	6 9	6 9	6 9	6 9	6 9	6 9
19		6 11	6 11	6 11	6 11	6 11	6 11	6 11	6 11	6 11	6 11	6 11	6 11	6 11
20		6 11	6 11	6 11	6 11	6 12	6 12	6 12	6 12	6 13	6 13	6 13	6 13	6 14
21		6 11	6 11	6 11	6 12	6 12	6 13	6 13	6 14	6 14	6 15	6 15	6 16	6 16
22		6 10	6 11	6 12	6 13	6 13	6 14	6 15	6 16	6 16	6 17	6 17	6 18	6 19
23		6 10	6 11	6 12	6 13	6 14	6 15	6 16	6 17	6 18	6 18	6 19	6 20	6 21
24		6 10	6 11	6 12	6 14	6 15	6 16	6 17	6 19	6 20	6 20	6 21	6 22	6 23
25		6 9	6 11	6 12	6 14	6 15	6 17	6 18	6 20	6 21	6 22	6 23	6 25	6 26
26		6 9	6 11	6 13	6 15	6 16	6 18	6 20	6 22	6 23	6 24	6 25	6 27	6 28
27		6 9	6 11	6 13	6 16	6 17	6 19	6 21	6 23	6 25	6 26	6 27	6 29	6 31
28		6 8	6 11	6 13	6 16	6 18	6 20	6 22	6 25	6 26	6 28	6 29	6 31	6 33
29		6 8	6 11	6 13	6 17	6 19	6 21	6 23	6 27	6 28	6 30	6 31	6 33	6 36
30		6 8	6 11	6 14	6 17	6 20	6 22	6 25	6 28	6 30	6 32	6 34	6 36	6 38
31		6 8	6 11	6 14	6 18	6 20	6 23	6 26	6 30	6 31	6 33	6 36	6 38	6 40
Apr. 1		6 7	6 11	6 14	6 19	6 21	6 24	6 27	6 31	6 33	6 35	6 38	6 40	6 43
2		6 7	6 11	6 14	6 19	6 22	6 25	6 28	6 33	6 35	6 37	6 40	6 42	6 45

LOCAL ASTRONOMICAL MEAN TIME OF SUNRISE (SUN'S UPPER LIMB),  
MERIDIAN OF GREENWICH, 1920.

To obtain civil time, subtract 12 hours, mark the result A. M., and add one to the day.

To obtain the standard time at any station, increase the local time by the number of minutes the station is west of the standard meridian, or decrease the local time by the number of minutes the station is east of the standard meridian.

For sunrise in southern latitudes see page 728.

Date.	Lat.	0°	+10°	+20°	+30°	+35°	+40°	+45°	+50°	+52°	+54°	+56°	+58°	+60°
Apr.	1	h m	h m	h m	h m	h m	h m	h m	h m	h m	h m	h m	h m	h m
	2	18 0	17 57	17 53	17 49	17 46	17 43	17 40	17 35	17 34	17 31	17 29	17 26	17 23
	3	18 0	17 56	17 52	17 47	17 45	17 42	17 38	17 33	17 31	17 29	17 26	17 24	17 20
	4	17 59	17 55	17 51	17 45	17 42	17 38	17 34	17 29	17 27	17 24	17 21	17 18	17 14
	5	17 59	17 55	17 50	17 44	17 41	17 37	17 32	17 27	17 24	17 22	17 19	17 15	17 11
	6	17 59	17 54	17 49	17 43	17 39	17 35	17 30	17 25	17 22	17 19	17 16	17 12	17 8
	7	17 59	17 54	17 48	17 42	17 38	17 34	17 29	17 23	17 20	17 17	17 13	17 10	17 5
	8	17 58	17 53	17 47	17 40	17 37	17 32	17 27	17 20	17 18	17 14	17 11	17 7	17 2
	9	17 58	17 52	17 46	17 39	17 35	17 31	17 25	17 18	17 15	17 12	17 8	17 4	16 59
	10	17 58	17 52	17 46	17 38	17 34	17 29	17 23	17 16	17 13	17 10	17 6	17 1	16 56
	11	17 57	17 51	17 45	17 37	17 33	17 27	17 21	17 14	17 11	17 7	17 3	16 58	16 53
	12	17 57	17 51	17 44	17 36	17 31	17 26	17 20	17 12	17 9	17 5	17 0	16 56	16 50
	13	17 57	17 50	17 43	17 35	17 30	17 24	17 18	17 10	17 6	17 2	16 58	16 53	16 47
	14	17 57	17 50	17 42	17 34	17 29	17 23	17 16	17 8	17 4	17 0	16 55	16 50	16 44
	15	17 56	17 49	17 41	17 33	17 27	17 21	17 14	17 6	17 2	16 58	16 53	16 48	16 41
	16	17 56	17 49	17 41	17 31	17 26	17 20	17 13	17 4	17 0	16 55	16 50	16 45	16 39
	17	17 56	17 48	17 40	17 30	17 25	17 18	17 11	17 2	16 58	16 53	16 48	16 42	16 36
	18	17 56	17 48	17 39	17 29	17 24	17 17	17 9	17 0	16 56	16 51	16 45	16 40	16 33
	19	17 56	17 47	17 39	17 28	17 22	17 16	17 8	16 58	16 53	16 48	16 43	16 37	16 30
	20	17 55	17 47	17 38	17 27	17 21	17 14	17 6	16 56	16 51	16 46	16 40	16 34	16 27
	21	17 55	17 46	17 37	17 26	17 20	17 13	17 4	16 54	16 49	16 44	16 38	16 31	16 24
	22	17 55	17 46	17 36	17 25	17 19	17 11	17 2	16 52	16 47	16 42	16 36	16 29	16 21
	23	17 55	17 45	17 36	17 24	17 17	17 10	17 1	16 50	16 45	16 39	16 33	16 26	16 18
	24	17 55	17 45	17 35	17 23	17 16	17 8	16 59	16 48	16 43	16 37	16 31	16 24	16 16
	25	17 54	17 45	17 34	17 22	17 15	17 7	16 58	16 46	16 41	16 35	16 28	16 21	16 13
	26	17 54	17 44	17 34	17 21	17 14	17 6	16 56	16 44	16 39	16 33	16 26	16 18	16 10
	27	17 54	17 44	17 33	17 20	17 13	17 4	16 54	16 42	16 37	16 31	16 24	16 16	16 7
	28	17 54	17 44	17 32	17 19	17 12	17 3	16 53	16 41	16 35	16 28	16 21	16 13	16 4
	29	17 54	17 43	17 32	17 18	17 11	17 2	16 51	16 39	16 33	16 26	16 19	16 11	16 2
	30	17 54	17 43	17 31	17 18	17 10	17 1	16 50	16 37	16 31	16 24	16 17	16 8	15 59
May	1	17 54	17 42	17 30	17 17	17 8	16 59	16 48	16 35	16 29	16 22	16 14	16 6	15 56
	2	17 53	17 42	17 30	17 16	17 8	16 58	16 47	16 34	16 27	16 20	16 12	16 4	15 53
	3	17 53	17 42	17 29	17 15	17 6	16 57	16 45	16 32	16 25	16 18	16 10	16 1	15 51
	4	17 53	17 41	17 29	17 14	17 6	16 56	16 44	16 30	16 24	16 16	16 8	15 59	15 48
	5	17 53	17 41	17 28	17 13	17 4	16 54	16 43	16 28	16 22	16 14	16 6	15 56	15 45
	6	17 53	17 41	17 28	17 12	17 3	16 53	16 41	16 27	16 20	16 12	16 4	15 54	15 43
	7	17 53	17 40	17 27	17 12	17 3	16 52	16 40	16 25	16 18	16 10	16 1	15 52	15 40
	8	17 53	17 40	17 27	17 11	17 2	16 51	16 39	16 23	16 16	16 8	15 59	15 49	15 38
	9	17 53	17 40	17 26	17 10	17 1	16 50	16 37	16 22	16 15	16 6	15 57	15 47	15 35
	10	17 53	17 40	17 26	17 9	17 0	16 49	16 36	16 20	16 13	16 5	15 55	15 45	15 33
	11	17 53	17 40	17 25	17 9	16 59	16 48	16 35	16 19	16 11	16 3	15 53	15 43	15 30
	12	17 53	17 39	17 25	17 8	16 58	16 47	16 34	16 17	16 10	16 1	15 51	15 40	15 28
	13	17 53	17 39	17 24	17 7	16 57	16 46	16 32	16 16	16 8	15 59	15 50	15 38	15 25
	14	17 53	17 39	17 24	17 7	16 57	16 45	16 31	16 14	16 6	15 58	15 48	15 36	15 23
	15	17 53	17 39	17 24	17 6	16 56	16 44	16 30	16 13	16 5	15 56	15 46	15 34	15 21
16	17 53	17 39	17 23	17 6	16 55	16 43	16 29	16 12	16 3	15 54	15 44	15 32	15 18	
17	17 53	17 38	17 23	17 5	16 54	16 42	16 28	16 10	16 2	15 53	15 42	15 30	15 16	



# TABLE VIII.

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## LOCAL ASTRONOMICAL MEAN TIME OF SUNSET (SUN'S UPPER LIMB), MERIDIAN OF GREENWICH, 1920.

To obtain civil time, write P. M. after the astronomical time.

To obtain the standard time at any station, increase the local time by the number of minutes the station is west of the standard meridian, or decrease the local time by the number of minutes the station is east of the standard meridian.

For sunset in southern latitudes see page 728.

Lat. rate.		0°	+10°	+20°	+30°	+35°	+40°	+45°	+50°	+52°	+54°	+56°	+58°	+60°
		h m	h m	h m	h m	h m	h m	h m	h m	h m	h m	h m	h m	h m
Apr.	2	6 7	6 11	6 14	6 19	6 22	6 25	6 28	6 33	6 35	6 37	6 40	6 42	6 45
	3	6 7	6 11	6 15	6 20	6 23	6 26	6 30	6 34	6 37	6 39	6 42	6 44	6 48
	4	6 6	6 11	6 15	6 20	6 23	6 27	6 31	6 36	6 38	6 41	6 44	6 47	6 50
	5	6 6	6 11	6 15	6 21	6 24	6 28	6 32	6 37	6 40	6 43	6 46	6 49	6 53
	6	6 6	6 10	6 16	6 22	6 25	6 29	6 34	6 39	6 42	6 45	6 48	6 51	6 55
	7	6 6	6 10	6 16	6 22	6 26	6 30	6 35	6 41	6 43	6 46	6 50	6 53	6 58
	8	6 5	6 10	6 16	6 23	6 27	6 31	6 36	6 42	6 45	6 48	6 52	6 56	7 0
	9	6 5	6 10	6 16	6 23	6 27	6 32	6 37	6 44	6 47	6 50	6 54	6 58	7 2
	10	6 5	6 10	6 17	6 24	6 28	6 33	6 39	6 45	6 49	6 52	6 56	7 0	7 5
	11	6 5	6 10	6 17	6 25	6 29	6 34	6 40	6 47	6 50	6 54	6 58	7 2	7 7
	12	6 4	6 10	6 17	6 25	6 30	6 35	6 41	6 48	6 52	6 56	7 0	7 4	7 10
	13	6 4	6 10	6 18	6 26	6 31	6 36	6 42	6 50	6 54	6 57	7 2	7 7	7 12
	14	6 4	6 10	6 18	6 26	6 31	6 37	6 44	6 51	6 55	6 59	7 4	7 9	7 15
	15	6 3	6 10	6 18	6 27	6 32	6 38	6 45	6 53	6 57	7 1	7 6	7 11	7 17
	16	6 3	6 10	6 18	6 28	6 33	6 39	6 46	6 56	6 59	7 3	7 8	7 13	7 20
	17	6 3	6 10	6 19	6 28	6 34	6 40	6 47	6 56	7 0	7 5	7 10	7 16	7 22
18	6 3	6 11	6 19	6 29	6 35	6 41	6 49	6 58	7 2	7 7	7 12	7 18	7 25	
19	6 3	6 11	6 19	6 29	6 35	6 42	6 50	6 59	7 4	7 9	7 14	7 20	7 27	
20	6 2	6 11	6 20	6 30	6 36	6 43	6 51	7 1	7 6	7 10	7 16	7 22	7 29	
21	6 2	6 11	6 20	6 31	6 37	6 44	6 52	7 2	7 7	7 12	7 18	7 25	7 32	
22	6 2	6 11	6 20	6 31	6 38	6 45	6 54	7 4	7 9	7 14	7 20	7 27	7 34	
23	6 2	6 11	6 21	6 32	6 39	6 46	6 55	7 6	7 11	7 16	7 22	7 29	7 37	
24	6 2	6 11	6 21	6 33	6 39	6 47	6 56	7 7	7 12	7 18	7 24	7 31	7 39	
25	6 1	6 11	6 21	6 33	6 40	6 48	6 58	7 9	7 14	7 20	7 26	7 34	7 42	
26	6 1	6 11	6 22	6 34	6 41	6 49	6 59	7 10	7 16	7 22	7 28	7 36	7 44	
27	6 1	6 11	6 22	6 34	6 42	6 50	7 0	7 12	7 17	7 24	7 30	7 38	7 47	
28	6 1	6 11	6 22	6 35	6 43	6 51	7 1	7 13	7 19	7 25	7 32	7 40	7 49	
29	6 1	6 11	6 23	6 36	6 43	6 52	7 2	7 15	7 21	7 27	7 34	7 42	7 52	
30	6 1	6 11	6 23	6 36	6 44	6 53	7 4	7 16	7 22	7 29	7 36	7 45	7 54	
May	1	6 1	6 12	6 23	6 37	6 45	6 54	7 5	7 18	7 24	7 31	7 38	7 47	7 57
2	6 0	6 12	6 24	6 38	6 46	6 55	7 6	7 19	7 26	7 33	7 40	7 49	7 59	
3	6 0	6 12	6 24	6 38	6 47	6 56	7 7	7 21	7 27	7 35	7 42	7 51	8 2	
4	6 0	6 12	6 24	6 39	6 48	6 57	7 9	7 22	7 29	7 36	7 44	7 54	8 4	
5	6 0	6 12	6 25	6 40	6 48	6 58	7 10	7 24	7 31	7 38	7 46	7 56	8 7	
6	6 0	6 12	6 25	6 40	6 49	6 59	7 11	7 25	7 32	7 40	7 48	7 58	8 9	
7	6 0	6 12	6 26	6 41	6 50	7 0	7 12	7 27	7 34	7 42	7 50	8 0	8 12	
8	6 0	6 12	6 26	6 42	6 51	7 1	7 14	7 28	7 36	7 43	7 52	8 2	8 14	
9	6 0	6 13	6 26	6 42	6 52	7 2	7 15	7 30	7 37	7 45	7 54	8 5	8 16	
10	6 0	6 13	6 27	6 43	6 52	7 3	7 16	7 31	7 39	7 47	7 56	8 7	8 19	
11	6 0	6 13	6 27	6 43	6 53	7 4	7 17	7 33	7 40	7 49	7 58	8 9	8 21	
12	6 0	6 13	6 28	6 44	6 54	7 5	7 18	7 34	7 42	7 51	8 0	8 11	8 24	
13	6 0	6 13	6 28	6 45	6 55	7 6	7 19	7 36	7 44	7 52	8 2	8 13	8 26	
14	6 0	6 13	6 28	6 45	6 56	7 7	7 21	7 37	7 45	7 54	8 4	8 15	8 28	
15	6 0	6 14	6 29	6 46	6 56	7 8	7 22	7 39	7 47	7 56	8 6	8 17	8 31	
16	6 0	6 14	6 29	6 47	6 57	7 9	7 23	7 40	7 48	7 57	8 8	8 19	8 33	
17	6 0	6 14	6 30	6 47	6 58	7 10	7 24	7 41	7 50	7 59	8 9	8 22	8 35	
18	6 0	6 14	6 30	6 48	6 59	7 11	7 25	7 43	7 51	8 1	8 11	8 24	8 38	

LOCAL ASTRONOMICAL MEAN TIME OF SUNRISE (SUN'S UPPER LIMB),  
MERIDIAN OF GREENWICH, 1920.

To obtain civil time, subtract 12 hours, mark the result A. M., and add one to the day.

To obtain the standard time at any station, increase the local time by the number of minutes the station is west of the standard meridian, or decrease the local time by the number of minutes the station is east of the standard meridian.

For sunrise in southern latitudes see page 728.

Lat. Data.	0°	+10°	+20°	+30°	+35°	+40°	+45°	+50°	+52°	+54°	+56°	+58°	+60°
	h m	h m	h m	h m	h m	h m	h m	h m	h m	h m	h m	h m	h m
May 17	17 53	17 38	17 23	17 5	16 54	16 42	16 28	16 10	16 2	15 53	15 42	15 30	15 16
18	17 53	17 38	17 23	17 4	16 54	16 42	16 27	16 9	16 1	15 51	15 40	15 28	15 14
19	17 53	17 38	17 22	17 4	16 53	16 41	16 26	16 8	15 59	15 50	15 39	15 26	15 12
20	17 53	17 38	17 22	17 3	16 52	16 40	16 25	16 7	15 58	15 48	15 37	15 24	15 9
21	17 53	17 38	17 22	17 3	16 52	16 39	16 24	16 6	15 57	15 47	15 36	15 23	15 7
22	17 53	17 38	17 21	17 2	16 51	16 38	16 23	16 4	15 56	15 45	15 34	15 21	15 5
23	17 53	17 38	17 21	17 2	16 51	16 38	16 22	16 3	15 54	15 44	15 32	15 19	15 3
24	17 53	17 38	17 21	17 2	16 50	16 37	16 21	16 2	15 53	15 43	15 31	15 17	15 1
25	17 53	17 38	17 21	17 1	16 50	16 36	16 21	16 1	15 52	15 42	15 30	15 16	15 0
26	17 53	17 38	17 21	17 1	16 49	16 36	16 20	16 0	15 51	15 40	15 28	15 14	14 58
27	17 54	17 38	17 20	17 0	16 49	16 35	16 19	15 59	15 50	15 39	15 27	15 13	14 56
28	17 54	17 38	17 20	17 0	16 48	16 35	16 18	15 58	15 49	15 38	15 26	15 11	14 54
29	17 54	17 38	17 20	17 0	16 48	16 34	16 18	15 58	15 48	15 37	15 24	15 10	14 53
30	17 54	17 38	17 20	17 0	16 48	16 34	16 17	15 57	15 47	15 36	15 23	15 8	14 51
31	17 54	17 38	17 20	16 59	16 47	16 33	16 17	15 56	15 46	15 35	15 22	15 7	14 49
June 1	17 54	17 38	17 20	16 59	16 47	16 33	16 16	15 55	15 45	15 34	15 21	15 6	14 48
2	17 54	17 38	17 20	16 59	16 47	16 32	16 16	15 55	15 44	15 33	15 20	15 5	14 47
3	17 54	17 38	17 20	16 59	16 46	16 32	16 15	15 54	15 44	15 32	15 19	15 4	14 45
4	17 55	17 38	17 20	16 59	16 46	16 32	16 15	15 53	15 43	15 32	15 18	15 3	14 44
5	17 55	17 38	17 20	16 58	16 46	16 31	16 14	15 53	15 42	15 31	15 17	15 2	14 43
6	17 55	17 38	17 20	16 58	16 46	16 31	16 14	15 52	15 42	15 30	15 17	15 1	14 42
7	17 55	17 38	17 20	16 58	16 46	16 31	16 14	15 52	15 41	15 30	15 16	15 0	14 41
8	17 55	17 38	17 20	16 58	16 45	16 31	16 13	15 51	15 41	15 29	15 15	14 59	14 40
9	17 55	17 38	17 20	16 58	16 45	16 31	16 13	15 51	15 40	15 29	15 15	14 58	14 39
10	17 56	17 38	17 20	16 58	16 45	16 30	16 13	15 51	15 40	15 28	15 14	14 58	14 38
11	17 56	17 39	17 20	16 58	16 45	16 30	16 13	15 50	15 40	15 28	15 14	14 57	14 38
12	17 56	17 39	17 20	16 58	16 45	16 30	16 13	15 50	15 40	15 27	15 13	14 57	14 37
13	17 56	17 39	17 20	16 58	16 45	16 30	16 13	15 50	15 39	15 27	15 13	14 56	14 36
14	17 57	17 39	17 20	16 58	16 45	16 30	16 12	15 50	15 39	15 27	15 13	14 56	14 36
15	17 57	17 39	17 20	16 58	16 45	16 30	16 12	15 50	15 39	15 27	15 13	14 56	14 36
16	17 57	17 39	17 20	16 59	16 45	16 30	16 12	15 50	15 39	15 27	15 12	14 56	14 35
17	17 57	17 40	17 21	16 59	16 46	16 30	16 13	15 50	15 39	15 27	15 12	14 56	14 35
18	17 57	17 40	17 21	16 59	16 46	16 31	16 13	15 50	15 39	15 27	15 12	14 56	14 35
19	17 58	17 40	17 21	16 59	16 46	16 31	16 13	15 50	15 39	15 27	15 12	14 56	14 35
20	17 58	17 40	17 21	16 59	16 46	16 31	16 13	15 50	15 39	15 27	15 12	14 56	14 35
21	17 58	17 40	17 21	16 59	16 46	16 31	16 13	15 51	15 40	15 27	15 13	14 56	14 36
22	17 58	17 41	17 22	17 0	16 47	16 31	16 13	15 51	15 40	15 27	15 13	14 56	14 36
23	17 58	17 41	17 22	17 0	16 47	16 32	16 14	15 51	15 40	15 28	15 14	14 57	14 36
24	17 59	17 41	17 22	17 0	16 47	16 32	16 14	15 51	15 41	15 28	15 14	14 57	14 37
25	17 59	17 41	17 22	17 0	16 47	16 32	16 14	15 52	15 41	15 29	15 14	14 58	14 37
26	17 59	17 42	17 23	17 1	16 48	16 33	16 15	15 52	15 41	15 29	15 15	14 58	14 38
27	17 59	17 42	17 23	17 1	16 48	16 33	16 15	15 53	15 42	15 30	15 16	14 59	14 39
28	17 59	17 42	17 23	17 1	16 48	16 34	16 16	15 53	15 43	15 30	15 16	15 0	14 40
29	18 0	17 42	17 24	17 2	16 49	16 34	16 16	15 54	15 43	15 31	15 17	15 0	14 40
30	18 0	17 42	17 24	17 2	16 49	16 34	16 17	15 54	15 44	15 32	15 18	15 1	14 41
July 1	18 0	17 43	17 24	17 2	16 50	16 35	16 17	15 55	15 44	15 32	15 19	15 2	14 42
2	18 0	17 43	17 24	17 3	16 50	16 35	16 18	15 56	15 45	15 33	15 20	15 3	14 44

# TABLE VIII.

## LOCAL ASTRONOMICAL MEAN TIME OF SUNSET (SUN'S UPPER LIMB), MERIDIAN OF GREENWICH, 1920.

To obtain civil time, write P. M. after the astronomical time.

To obtain the standard time at any station, increase the local time by the number of minutes the station is west of the standard meridian, or decrease the local time by the number of minutes the station is east of the standard meridian.

For sunset in southern latitudes see page 728.

Date.	Lat.	0°	+10°	+20°	+30°	+35°	+40°	+45°	+50°	+52°	+54°	+56°	+58°	+60°
		h m	h m	h m	h m	h m	h m	h m	h m	h m	h m	h m	h m	h m
May	18	6 0	6 14	6 30	6 48	6 59	7 11	7 25	7 43	7 51	8 1	8 11	8 24	8 38
	19	6 0	6 15	6 30	6 49	6 59	7 12	7 26	7 44	7 53	8 2	8 13	8 26	8 40
	20	6 0	6 15	6 31	6 49	7 0	7 13	7 27	7 45	7 54	8 4	8 15	8 27	8 42
	21	6 0	6 15	6 31	6 50	7 1	7 13	7 28	7 47	7 56	8 5	8 17	8 29	8 44
	22	6 0	6 15	6 32	6 51	7 2	7 14	7 29	7 48	7 57	8 7	8 18	8 31	8 47
	23	6 0	6 16	6 32	6 51	7 2	7 15	7 30	7 49	7 58	8 8	8 20	8 33	8 49
	24	6 0	6 16	6 32	6 52	7 3	7 16	7 31	7 51	8 0	8 10	8 22	8 35	8 51
	25	6 0	6 16	6 33	6 52	7 4	7 17	7 32	7 52	8 1	8 11	8 23	8 37	8 53
	26	6 0	6 16	6 33	6 53	7 4	7 18	7 33	7 53	8 2	8 13	8 25	8 39	8 55
	27	6 1	6 17	6 34	6 54	7 5	7 19	7 34	7 54	8 4	8 14	8 27	8 41	8 57
	28	6 1	6 17	6 34	6 54	7 6	7 19	7 35	7 55	8 5	8 16	8 28	8 42	8 59
	29	6 1	6 17	6 34	6 55	7 6	7 20	7 36	7 57	8 6	8 17	8 30	8 44	9 1
30	6 1	6 17	6 35	6 55	7 7	7 21	7 37	7 58	8 7	8 18	8 31	8 46	9 3	
31	6 1	6 17	6 35	6 56	7 8	7 22	7 38	7 59	8 9	8 20	8 32	8 47	9 5	
June	1	6 1	6 18	6 35	6 56	7 8	7 22	7 39	8 0	8 10	8 21	8 34	8 49	9 7
	2	6 1	6 18	6 36	6 57	7 9	7 23	7 40	8 1	8 11	8 22	8 35	8 50	9 8
	3	6 2	6 18	6 36	6 57	7 10	7 24	7 41	8 2	8 12	8 23	8 36	8 52	9 10
	4	6 2	6 19	6 37	6 58	7 10	7 24	7 41	8 3	8 13	8 24	8 38	8 53	9 12
	5	6 2	6 19	6 37	6 58	7 11	7 25	7 42	8 4	8 14	8 25	8 39	8 54	9 13
	6	6 2	6 19	6 37	6 59	7 11	7 26	7 43	8 4	8 15	8 26	8 40	8 56	9 15
	7	6 2	6 19	6 38	6 59	7 12	7 26	7 44	8 5	8 16	8 27	8 41	8 57	9 16
	8	6 2	6 20	6 38	7 0	7 12	7 27	7 44	8 6	8 17	8 28	8 42	8 58	9 17
	9	6 3	6 20	6 39	7 0	7 13	7 27	7 45	8 7	8 17	8 29	8 43	8 59	9 19
	10	6 3	6 20	6 39	7 0	7 13	7 28	7 46	8 8	8 18	8 30	8 44	9 0	9 20
	11	6 3	6 20	6 39	7 1	7 14	7 28	7 46	8 8	8 19	8 31	8 45	9 1	9 21
	12	6 3	6 21	6 39	7 1	7 14	7 29	7 47	8 9	8 20	8 32	8 46	9 2	9 22
13	6 4	6 21	6 40	7 2	7 14	7 29	7 47	8 9	8 20	8 32	8 46	9 3	9 23	
14	6 4	6 21	6 40	7 2	7 15	7 30	7 48	8 10	8 21	8 33	8 47	9 4	9 24	
15	6 4	6 21	6 40	7 2	7 15	7 30	7 48	8 11	8 21	8 34	8 48	9 5	9 25	
16	6 4	6 22	6 41	7 2	7 16	7 31	7 48	8 11	8 22	8 34	8 48	9 5	9 26	
17	6 4	6 22	6 41	7 3	7 16	7 31	7 49	8 11	8 22	8 35	8 49	9 6	9 26	
18	6 5	6 22	6 41	7 3	7 16	7 31	7 49	8 12	8 23	8 35	8 49	9 6	9 27	
19	6 5	6 22	6 41	7 3	7 17	7 32	7 50	8 12	8 23	8 35	8 50	9 7	9 27	
20	6 5	6 23	6 42	7 4	7 17	7 32	7 50	8 12	8 23	8 36	8 50	9 7	9 27	
21	6 5	6 23	6 42	7 4	7 17	7 32	7 50	8 13	8 24	8 36	8 50	9 7	9 28	
22	6 5	6 23	6 42	7 4	7 17	7 32	7 50	8 13	8 24	8 36	8 51	9 7	9 28	
23	6 6	6 23	6 42	7 4	7 17	7 32	7 50	8 13	8 24	8 36	8 51	9 7	9 28	
24	6 6	6 23	6 42	7 5	7 18	7 33	7 51	8 13	8 24	8 36	8 51	9 8	9 28	
25	6 6	6 24	6 43	7 5	7 18	7 33	7 51	8 13	8 24	8 36	8 51	9 8	9 28	
26	6 6	6 24	6 43	7 5	7 18	7 33	7 51	8 13	8 24	8 36	8 51	9 7	9 28	
27	6 6	6 24	6 43	7 5	7 18	7 33	7 51	8 13	8 24	8 36	8 50	9 7	9 27	
28	6 7	6 24	6 43	7 5	7 18	7 33	7 51	8 13	8 24	8 36	8 50	9 7	9 27	
29	6 7	6 24	6 43	7 5	7 18	7 33	7 51	8 13	8 24	8 36	8 50	9 6	9 27	
30	6 7	6 24	6 43	7 5	7 18	7 33	7 50	8 13	8 23	8 35	8 49	9 6	9 26	
July	1	6 7	6 25	6 43	7 5	7 18	7 33	7 50	8 13	8 23	8 35	8 49	9 6	9 25
2	6 8	6 25	6 43	7 5	7 18	7 33	7 50	8 12	8 23	8 35	8 49	9 5	9 25	
3	6 8	6 25	6 43	7 5	7 18	7 32	7 50	8 12	8 22	8 34	8 48	9 4	9 24	

LOCAL ASTRONOMICAL MEAN TIME OF SUNRISE (SUN'S UPPER LMB MERIDIAN OF GREENWICH, 1920.

To obtain civil time, subtract 12 hours, mark the result A. M., and add one to the day.

To obtain the standard time at any station, increase the local time by the number of minutes the station is west of the standard meridian, or decrease the local time by the number of minutes the station is east of the standard meridian.

For sunrise in southern latitudes see page 728.

Date.	Lat.	Longitude												
		0°	+10°	+20°	+30°	+35°	+40°	+45°	+50°	+52°	+54°	+56°	+58°	+60°
July	1	18 0	17 43	17 24	17 2	16 50	16 35	16 17	15 55	15 44	15 32	15 19	15 2	14 44
	2	18 0	17 43	17 24	17 3	16 50	16 35	16 18	15 56	15 45	15 33	15 20	15 3	14 44
	3	18 0	17 43	17 25	17 3	16 51	16 36	16 18	15 57	15 46	15 34	15 20	15 4	14 44
	4	18 1	17 44	17 25	17 4	16 51	16 37	16 19	15 57	15 47	15 35	15 21	15 6	14 44
	5	18 1	17 44	17 25	17 4	16 51	16 37	16 20	15 58	15 48	15 36	15 22	15 7	14 44
	6	18 1	17 44	17 26	17 5	16 52	16 38	16 20	15 59	15 49	15 37	15 24	15 8	14 44
	7	18 1	17 44	17 26	17 5	16 53	16 38	16 21	16 0	15 50	15 38	15 25	15 9	14 43
	8	18 1	17 45	17 27	17 5	16 53	16 39	16 22	16 1	15 51	15 39	15 26	15 10	14 43
	9	18 1	17 45	17 27	17 6	16 54	16 40	16 23	16 2	15 52	15 40	15 27	15 12	14 43
	10	18 2	17 45	17 27	17 7	16 54	16 40	16 24	16 3	15 53	15 41	15 28	15 13	14 43
	11	18 2	17 45	17 28	17 7	16 55	16 41	16 24	16 4	15 54	15 43	15 30	15 15	14 43
	12	18 2	17 46	17 28	17 8	16 56	16 42	16 25	16 5	15 55	15 44	15 31	15 16	14 43
	13	18 2	17 46	17 28	17 8	16 56	16 42	16 26	16 6	15 56	15 45	15 33	15 18	14 43
	14	18 2	17 46	17 29	17 9	16 57	16 43	16 27	16 7	15 57	15 46	15 34	15 20	14 43
	15	18 2	17 46	17 29	17 9	16 57	16 44	16 28	16 8	15 58	15 48	15 36	15 21	14 43
	16	18 2	17 47	17 29	17 10	16 58	16 45	16 29	16 9	16 0	15 49	15 37	15 23	14 43
	17	18 2	17 47	17 30	17 10	16 59	16 46	16 30	16 10	16 1	15 50	15 39	15 25	14 43
	18	18 2	17 47	17 30	17 11	16 59	16 46	16 31	16 11	16 2	15 52	15 40	15 27	14 43
	19	18 3	17 47	17 31	17 11	17 0	16 47	16 32	16 13	16 3	15 53	15 42	15 28	14 43
	20	18 3	17 47	17 31	17 12	17 1	16 48	16 33	16 14	16 5	15 55	15 43	15 30	14 43
	21	18 3	17 48	17 31	17 13	17 2	16 49	16 34	16 15	16 6	15 56	15 45	15 32	14 43
	22	18 3	17 48	17 32	17 13	17 2	16 50	16 35	16 16	16 8	15 58	15 47	15 34	14 43
	23	18 3	17 48	17 32	17 14	17 3	16 51	16 36	16 18	16 9	15 59	15 48	15 36	14 43
	24	18 3	17 48	17 32	17 14	17 4	16 51	16 37	16 19	16 10	16 1	15 50	15 38	14 43
	25	18 3	17 48	17 33	17 15	17 4	16 52	16 38	16 20	16 12	16 3	15 52	15 40	14 43
	26	18 3	17 49	17 33	17 15	17 5	16 53	16 39	16 22	16 13	16 4	15 54	15 42	14 43
	27	18 3	17 49	17 34	17 16	17 6	16 54	16 40	16 23	16 15	16 6	15 55	15 44	14 43
	28	18 3	17 49	17 34	17 17	17 7	16 55	16 41	16 25	16 17	16 8	15 57	15 46	14 43
	29	18 3	17 49	17 34	17 17	17 7	16 56	16 42	16 26	16 18	16 9	15 59	15 48	14 43
	30	18 3	17 49	17 35	17 18	17 8	16 57	16 43	16 27	16 19	16 11	16 1	15 50	14 43
Aug.	31	18 3	17 49	17 35	17 18	17 9	16 58	16 45	16 28	16 21	16 12	16 3	15 52	14 43
	1	18 3	17 50	17 35	17 19	17 9	16 59	16 46	16 30	16 22	16 14	16 5	15 54	14 43
	2	18 3	17 50	17 36	17 20	17 10	17 0	16 47	16 31	16 24	16 16	16 7	15 56	14 43
	3	18 2	17 50	17 36	17 20	17 11	17 0	16 48	16 33	16 25	16 17	16 8	15 58	14 43
	4	18 2	17 50	17 36	17 21	17 12	17 1	16 49	16 34	16 27	16 19	16 10	16 0	14 43
	5	18 2	17 50	17 37	17 22	17 12	17 2	16 50	16 36	16 29	16 21	16 12	16 3	14 43
	6	18 2	17 50	17 37	17 22	17 13	17 3	16 51	16 37	16 30	16 23	16 14	16 5	14 43
	7	18 2	17 50	17 37	17 23	17 14	17 4	16 53	16 38	16 32	16 24	16 16	16 7	14 43
	8	18 2	17 50	17 38	17 23	17 15	17 5	16 54	16 40	16 33	16 26	16 18	16 9	14 43
	9	18 2	17 50	17 38	17 24	17 16	17 6	16 55	16 42	16 35	16 28	16 20	16 11	14 43
	10	18 2	17 51	17 38	17 25	17 16	17 7	16 56	16 43	16 37	16 30	16 22	16 13	14 43
	11	18 2	17 51	17 39	17 25	17 17	17 8	16 57	16 44	16 38	16 32	16 24	16 16	14 43
	12	18 1	17 51	17 39	17 26	17 18	17 9	16 59	16 46	16 40	16 33	16 26	16 18	14 43
	13	18 1	17 51	17 39	17 26	17 19	17 10	17 0	16 47	16 42	16 35	16 28	16 20	14 43
	14	18 1	17 51	17 40	17 27	17 19	17 11	17 1	16 49	16 43	16 37	16 30	16 22	14 43
	15	18 1	17 51	17 40	17 28	17 20	17 12	17 2	16 50	16 45	16 39	16 32	16 24	14 43
16	18 1	17 51	17 40	17 28	17 21	17 13	17 3	16 52	16 48	16 40	16 34	16 26	14 43	

# TABLE VIII.

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## LOCAL ASTRONOMICAL MEAN TIME OF SUNSET (SUN'S UPPER LIMB), MERIDIAN OF GREENWICH, 1920.

To obtain civil time, write P. M. after the astronomical time.

To obtain the standard time at any station, increase the local time by the number of minutes the station is west of the standard meridian, or decrease the local time by the number of minutes the station is east of the standard meridian.

For sunset in southern latitudes see page 728.

Date.	Lat.	0°	+10°	+20°	+30°	+35°	+40°	+45°	+50°	+52°	+54°	+56°	+58°	+60°
		h m	h m	h m	h m	h m	h m	h m	h m	h m	h m	h m	h m	h m
July	2	6 8	6 25	6 43	7 5	7 18	7 33	7 50	8 12	8 23	8 35	8 49	9 5	9 25
	3	6 8	6 25	6 43	7 5	7 18	7 32	7 50	8 12	8 22	8 34	8 48	9 4	9 24
	4	6 8	6 25	6 43	7 5	7 17	7 32	7 50	8 11	8 22	8 34	8 47	9 3	9 23
	5	6 8	6 25	6 43	7 5	7 17	7 32	7 49	8 11	8 21	8 33	8 47	9 3	9 22
	6	6 8	6 25	6 43	7 5	7 17	7 32	7 49	8 11	8 21	8 33	8 46	9 2	9 21
	7	6 8	6 25	6 43	7 4	7 17	7 31	7 49	8 10	8 20	8 32	8 45	9 1	9 20
	8	6 8	6 25	6 43	7 4	7 17	7 31	7 48	8 9	8 20	8 31	8 44	9 0	9 18
	9	6 9	6 25	6 43	7 4	7 16	7 31	7 48	8 9	8 19	8 30	8 44	8 59	9 17
	10	6 9	6 25	6 43	7 4	7 16	7 30	7 47	8 8	8 18	8 29	8 42	8 58	9 16
	11	6 9	6 25	6 43	7 4	7 16	7 30	7 47	8 7	8 17	8 29	8 41	8 56	9 14
	12	6 9	6 25	6 43	7 3	7 16	7 29	7 46	8 7	8 16	8 28	8 40	8 55	9 13
	13	6 9	6 25	6 43	7 3	7 15	7 29	7 45	8 6	8 16	8 27	8 39	8 54	9 11
	14	6 9	6 25	6 43	7 3	7 15	7 28	7 45	8 5	8 15	8 26	8 38	8 52	9 10
	15	6 9	6 25	6 43	7 3	7 14	7 28	7 44	8 4	8 14	8 25	8 37	8 51	9 8
	16	6 9	6 25	6 42	7 2	7 14	7 27	7 43	8 3	8 13	8 23	8 35	8 49	9 6
	17	6 10	6 25	6 42	7 2	7 13	7 27	7 43	8 2	8 12	8 22	8 34	8 48	9 4
	18	6 10	6 25	6 42	7 1	7 13	7 26	7 42	8 1	8 10	8 21	8 33	8 46	9 3
	19	6 10	6 25	6 42	7 1	7 12	7 25	7 41	8 0	8 9	8 20	8 31	8 45	9 1
	20	6 10	6 25	6 41	7 0	7 12	7 25	7 40	7 59	8 8	8 18	8 30	8 43	8 59
	21	6 10	6 25	6 41	7 0	7 11	7 24	7 39	7 58	8 7	8 17	8 28	8 41	8 57
	22	6 10	6 25	6 41	7 0	7 11	7 23	7 38	7 57	8 6	8 15	8 27	8 39	8 55
	23	6 10	6 24	6 40	6 59	7 10	7 22	7 37	7 56	8 4	8 14	8 25	8 37	8 52
	24	6 10	6 24	6 40	6 58	7 9	7 22	7 36	7 54	8 3	8 13	8 23	8 36	8 50
	25	6 10	6 24	6 40	6 58	7 9	7 21	7 35	7 53	8 1	8 11	8 22	8 34	8 48
	26	6 10	6 24	6 40	6 57	7 8	7 20	7 34	7 52	8 0	8 9	8 20	8 32	8 46
	27	6 10	6 24	6 39	6 57	7 7	7 19	7 33	7 50	7 58	8 8	8 18	8 30	8 44
	28	6 10	6 24	6 39	6 56	7 6	7 18	7 32	7 49	7 57	8 6	8 16	8 28	8 41
	29	6 10	6 24	6 38	6 55	7 6	7 17	7 31	7 48	7 55	8 4	8 14	8 26	8 39
	30	6 10	6 23	6 38	6 55	7 5	7 16	7 30	7 46	7 54	8 3	8 12	8 23	8 36
	31	6 10	6 23	6 37	6 54	7 4	7 15	7 28	7 45	7 52	8 1	8 11	8 21	8 34
	Aug.	1	6 9	6 23	6 37	6 53	7 3	7 14	7 27	7 43	7 51	7 59	8 9	8 19
2		6 9	6 22	6 36	6 53	7 2	7 13	7 26	7 42	7 49	7 57	8 7	8 17	8 29
3		6 9	6 22	6 36	6 52	7 1	7 12	7 24	7 40	7 47	7 55	8 4	8 15	8 26
4		6 9	6 22	6 35	6 51	7 0	7 11	7 23	7 38	7 45	7 53	8 2	8 12	8 24
5		6 9	6 22	6 35	6 50	6 59	7 10	7 22	7 37	7 44	7 52	8 0	8 10	8 21
6		6 9	6 21	6 34	6 49	6 58	7 8	7 20	7 35	7 42	7 50	7 58	8 8	8 19
7		6 9	6 21	6 34	6 49	6 57	7 7	7 19	7 33	7 40	7 48	7 56	8 5	8 16
8		6 9	6 21	6 33	6 48	6 56	7 6	7 18	7 32	7 38	7 45	7 54	8 3	8 13
9		6 9	6 20	6 33	6 47	6 55	7 5	7 16	7 30	7 36	7 44	7 52	8 0	8 11
10		6 8	6 20	6 32	6 46	6 54	7 4	7 15	7 28	7 34	7 41	7 49	7 58	8 8
11		6 8	6 19	6 31	6 45	6 53	7 2	7 13	7 26	7 32	7 39	7 47	7 56	8 5
12		6 8	6 19	6 31	6 44	6 52	7 1	7 12	7 25	7 30	7 37	7 45	7 53	8 3
13		6 8	6 19	6 30	6 43	6 51	7 0	7 10	7 23	7 29	7 35	7 42	7 51	8 0
14		6 8	6 18	6 29	6 42	6 50	6 59	7 9	7 21	7 27	7 33	7 40	7 48	7 57
15		6 8	6 18	6 29	6 41	6 49	6 57	7 7	7 19	7 25	7 31	7 38	7 46	7 54
16		6 7	6 17	6 28	6 40	6 48	6 56	7 5	7 17	7 23	7 29	7 35	7 43	7 51
17		6 7	6 17	6 27	6 39	6 46	6 54	7 4	7 15	7 21	7 27	7 33	7 40	7 49

LOCAL ASTRONOMICAL MEAN TIME OF SUNRISE (SUN'S UPPER LIMB),  
MERIDIAN OF GREENWICH, 1920.

To obtain civil time, subtract 12 hours, mark the result A. M., and add one to the day.

To obtain the standard time at any station, increase the local time by the number of minutes the station is west of the standard meridian, or decrease the local time by the number of minutes the station is east of the standard meridian.

For sunrise in southern latitudes see page 728.

Date.	Lat.	0°	+10°	+20°	+30°	+35°	+40°	+45°	+50°	+52°	+54°	+56°	+58°	+60°
		h m	h m	h m	h m	h m	h m	h m	h m	h m	h m	h m	h m	h m
Aug.	16	18 1	17 51	17 40	17 28	17 21	17 13	17 3	16 52	16 46	16 40	16 34	16 26	16 18
	17	18 0	17 51	17 41	17 28	17 22	17 14	17 5	16 53	16 48	16 42	16 36	16 29	16 20
	18	18 0	17 51	17 41	17 29	17 22	17 15	17 6	16 55	16 50	16 44	16 38	16 31	16 23
	19	18 0	17 51	17 41	17 30	17 23	17 16	17 7	16 56	16 51	16 46	16 40	16 33	16 25
	20	18. 0	17 51	17 41	17 30	17 24	17 17	17 8	16 58	16 53	16 48	16 42	16 35	16 28
	21	17 59	17 51	17 42	17 31	17 25	17 18	17 9	16 59	16 55	16 49	16 44	16 37	16 30
	22	17 59	17 51	17 42	17 32	17 25	17 19	17 10	17 1	16 56	16 51	16 46	16 39	16 32
	23	17 59	17 51	17 42	17 32	17 26	17 19	17 12	17 2	16 58	16 53	16 47	16 41	16 35
	24	17 58	17 51	17 42	17 33	17 27	17 20	17 13	17 4	16 59	16 55	16 49	16 44	16 37
	25	17 58	17 51	17 43	17 33	17 28	17 21	17 14	17 5	17 1	16 57	16 51	16 46	16 39
	26	17 58	17 51	17 43	17 34	17 28	17 22	17 15	17 7	17 3	16 58	16 53	16 48	16 42
	27	17 58	17 51	17 43	17 34	17 29	17 23	17 16	17 8	17 4	17 0	16 55	16 50	16 44
	28	17 58	17 51	17 43	17 35	17 30	17 24	17 18	17 10	17 6	17 2	16 57	16 52	16 47
	29	17 57	17 51	17 44	17 36	17 31	17 25	17 19	17 11	17 8	17 4	16 59	16 54	16 49
	30	17 57	17 51	17 44	17 36	17 31	17 26	17 20	17 13	17 9	17 5	17 1	16 57	16 51
Sept.	31	17 57	17 51	17 44	17 37	17 32	17 27	17 21	17 14	17 11	17 7	17 3	16 59	16 54
	1	17 56	17 51	17 44	17 37	17 33	17 28	17 22	17 16	17 12	17 9	17 5	17 1	16 56
	2	17 56	17 51	17 45	17 38	17 34	17 29	17 24	17 17	17 14	17 11	17 7	17 3	16 58
	3	17 56	17 50	17 45	17 38	17 34	17 30	17 25	17 19	17 16	17 13	17 9	17 5	17 1
	4	17 55	17 50	17 45	17 39	17 35	17 31	17 26	17 20	17 17	17 14	17 11	17 7	17 3
	5	17 55	17 50	17 45	17 39	17 36	17 32	17 27	17 22	17 19	17 16	17 13	17 9	17 5
	6	17 55	17 50	17 46	17 40	17 37	17 33	17 28	17 23	17 21	17 18	17 15	17 12	17 8
	7	17 54	17 50	17 46	17 40	17 37	17 34	17 30	17 25	17 22	17 20	17 17	17 14	17 10
	8	17 54	17 50	17 46	17 41	17 38	17 35	17 31	17 26	17 24	17 22	17 19	17 16	17 13
	9	17 54	17 50	17 46	17 42	17 39	17 36	17 32	17 28	17 26	17 23	17 21	17 18	17 15
	10	17 53	17 50	17 46	17 42	17 39	17 37	17 33	17 29	17 27	17 25	17 23	17 20	17 17
	11	17 53	17 50	17 47	17 43	17 40	17 38	17 34	17 31	17 29	17 27	17 25	17 22	17 20
	12	17 53	17 50	17 47	17 43	17 41	17 38	17 36	17 32	17 30	17 29	17 27	17 24	17 22
	13	17 52	17 50	17 47	17 44	17 42	17 39	17 37	17 33	17 32	17 30	17 29	17 27	17 24
	14	17 52	17 50	17 47	17 44	17 42	17 40	17 38	17 35	17 34	17 32	17 31	17 29	17 27
	15	17 52	17 50	17 47	17 45	17 43	17 41	17 39	17 37	17 35	17 34	17 33	17 31	17 29
	16	17 51	17 50	17 48	17 45	17 44	17 42	17 40	17 38	17 37	17 36	17 35	17 33	17 31
	17	17 51	17 49	17 48	17 46	17 45	17 43	17 42	17 40	17 39	17 38	17 36	17 35	17 34
	18	17 51	17 49	17 48	17 46	17 45	17 44	17 43	17 41	17 40	17 39	17 38	17 37	17 36
	19	17 50	17 49	17 48	17 47	17 46	17 45	17 44	17 43	17 42	17 41	17 40	17 39	17 38
	20	17 50	17 49	17 48	17 47	17 47	17 46	17 45	17 44	17 44	17 43	17 42	17 42	17 41
	21	17 50	17 49	17 49	17 48	17 48	17 47	17 46	17 46	17 45	17 45	17 44	17 44	17 43
	22	17 49	17 49	17 49	17 49	17 48	17 48	17 48	17 47	17 47	17 47	17 46	17 46	17 46
	23	17 49	17 49	17 49	17 49	17 49	17 49	17 49	17 49	17 48	17 48	17 48	17 48	17 48
	24	17 48	17 49	17 49	17 50	17 50	17 50	17 50	17 50	17 50	17 50	17 50	17 50	17 50
	25	17 48	17 49	17 50	17 50	17 50	17 51	17 51	17 52	17 52	17 52	17 52	17 52	17 53
	26	17 48	17 49	17 50	17 51	17 51	17 52	17 52	17 53	17 54	17 54	17 54	17 55	17 55
	27	17 47	17 49	17 50	17 51	17 52	17 53	17 54	17 55	17 55	17 56	17 56	17 57	17 57
	28	17 47	17 49	17 50	17 52	17 53	17 54	17 55	17 56	17 57	17 57	17 58	17 59	18 0
	29	17 47	17 49	17 51	17 53	17 54	17 55	17 56	17 58	17 58	17 59	18 0	18 1	18 2
Oct.	30	17 46	17 49	17 51	17 53	17 54	17 56	17 57	17 59	18 0	18 1	18 2	18 3	18 4
	1	17 46	17 49	17 51	17 54	17 55	17 57	17 59	18 1	18 2	18 3	18 4	18 5	18 7

# TABLE VIII.

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## LOCAL ASTRONOMICAL MEAN TIME OF SUNSET (SUN'S UPPER LIMB), MERIDIAN OF GREENWICH, 1920.

To obtain civil time, write P. M. after the astronomical time.

To obtain the standard time at any station, increase the local time by the number of minutes the station is west of the standard meridian, or decrease the local time by the number of minutes the station is east of the standard meridian.

For sunset in southern latitudes see page 728.

Date.	Lat.	0°	+10°	+20°	+30°	+35°	+40°	+45°	+50°	+52°	+54°	+56°	+58°	+60°
Aug.	17	6 7	6 17	6 27	6 39	6 46	6 54	7 4	7 15	7 21	7 27	7 33	7 40	7 49
	18	6 7	6 16	6 27	6 38	6 45	6 53	7 2	7 13	7 18	7 24	7 31	7 38	7 46
	19	6 7	6 16	6 26	6 37	6 44	6 52	7 0	7 11	7 16	7 22	7 28	7 35	7 43
	20	6 7	6 15	6 25	6 36	6 43	6 50	6 59	7 9	7 14	7 20	7 26	7 33	7 40
	21	6 6	6 15	6 24	6 35	6 42	6 49	6 57	7 7	7 12	7 17	7 23	7 30	7 37
	22	6 6	6 14	6 24	6 34	6 40	6 47	6 56	7 6	7 10	7 15	7 21	7 27	7 34
	23	6 6	6 14	6 23	6 33	6 39	6 46	6 54	7 4	7 8	7 13	7 18	7 25	7 31
	24	6 6	6 13	6 22	6 32	6 38	6 44	6 52	7 1	7 6	7 11	7 16	7 22	7 28
	25	6 5	6 13	6 21	6 31	6 37	6 43	6 50	6 59	7 4	7 8	7 13	7 19	7 26
	26	6 5	6 12	6 20	6 30	6 35	6 41	6 49	6 57	7 1	7 6	7 11	7 16	7 23
	27	6 5	6 12	6 20	6 29	6 34	6 40	6 47	6 55	6 59	7 4	7 8	7 14	7 20
	28	6 4	6 11	6 19	6 28	6 33	6 38	6 45	6 53	6 57	7 1	7 6	7 11	7 17
	29	6 4	6 11	6 18	6 26	6 31	6 37	6 43	6 51	6 55	6 59	7 3	7 8	7 14
	30	6 4	6 10	6 17	6 25	6 30	6 35	6 42	6 49	6 53	6 56	7 1	7 6	7 11
31	6 4	6 10	6 16	6 24	6 29	6 34	6 40	6 47	6 50	6 54	6 58	7 3	7 8	
Sept.	1	6 3	6 9	6 15	6 23	6 27	6 32	6 38	6 45	6 48	6 52	6 56	7 0	7 5
	2	6 3	6 8	6 15	6 22	6 26	6 31	6 36	6 43	6 46	6 49	6 53	6 57	7 2
	3	6 2	6 8	6 14	6 20	6 24	6 29	6 34	6 41	6 44	6 47	6 50	6 54	6 59
	4	6 2	6 7	6 13	6 19	6 23	6 27	6 32	6 38	6 41	6 44	6 48	6 52	6 56
	5	6 2	6 7	6 12	6 18	6 22	6 26	6 30	6 36	6 39	6 42	6 45	6 49	6 53
	6	6 2	6 6	6 11	6 17	6 20	6 24	6 29	6 34	6 37	6 39	6 43	6 46	6 50
	7	6 1	6 5	6 10	6 16	6 19	6 23	6 27	6 32	6 34	6 37	6 40	6 43	6 47
	8	6 1	6 5	6 9	6 14	6 17	6 21	6 25	6 30	6 32	6 35	6 37	6 40	6 44
	9	6 0	6 4	6 8	6 13	6 16	6 19	6 23	6 28	6 30	6 32	6 35	6 38	6 41
	10	6 0	6 4	6 7	6 12	6 15	6 18	6 21	6 25	6 27	6 30	6 32	6 35	6 38
	11	6 0	6 3	6 7	6 11	6 13	6 16	6 19	6 23	6 25	6 27	6 29	6 32	6 35
	12	5 59	6 2	6 6	6 9	6 12	6 14	6 17	6 21	6 23	6 25	6 27	6 29	6 31
	13	5 59	6 2	6 5	6 8	6 10	6 13	6 15	6 19	6 20	6 22	6 24	6 26	6 28
	14	5 59	6 1	6 4	6 7	6 9	6 11	6 14	6 17	6 18	6 20	6 21	6 23	6 25
	15	5 58	6 1	6 3	6 6	6 7	6 9	6 12	6 15	6 16	6 17	6 19	6 20	6 22
16	5 58	6 0	6 2	6 5	6 6	6 8	6 10	6 12	6 13	6 15	6 16	6 18	6 19	
17	5 58	5 59	6 1	6 3	6 5	6 6	6 8	6 10	6 11	6 12	6 13	6 15	6 16	
18	5 57	5 59	6 0	6 2	6 3	6 4	6 6	6 8	6 9	6 10	6 11	6 12	6 13	
19	5 57	5 58	5 59	6 1	6 2	6 3	6 4	6 6	6 6	6 7	6 8	6 9	6 10	
20	5 57	5 57	5 58	6 0	6 0	6 1	6 2	6 4	6 4	6 5	6 5	6 6	6 7	
21	5 56	5 57	5 57	5 58	5 59	6 0	6 0	6 1	6 2	6 2	6 3	6 3	6 4	
22	5 56	5 56	5 57	5 57	5 57	5 58	5 58	5 59	5 59	6 0	6 0	6 1	6 1	
23	5 56	5 56	5 56	5 56	5 56	5 56	5 56	5 57	5 57	5 57	5 57	5 57	5 58	
24	5 55	5 55	5 55	5 55	5 55	5 55	5 55	5 55	5 55	5 55	5 55	5 55	5 55	
25	5 55	5 54	5 54	5 53	5 53	5 53	5 53	5 52	5 52	5 52	5 52	5 52	5 52	
26	5 55	5 54	5 53	5 52	5 52	5 51	5 51	5 50	5 50	5 50	5 49	5 49	5 49	
27	5 54	5 53	5 52	5 51	5 50	5 50	5 49	5 48	5 48	5 47	5 47	5 46	5 46	
28	5 54	5 52	5 51	5 50	5 49	5 48	5 47	5 46	5 46	5 45	5 45	5 44	5 43	
29	5 54	5 52	5 50	5 48	5 47	5 46	5 45	5 44	5 44	5 43	5 42	5 42	5 41	
30	5 53	5 51	5 49	5 47	5 46	5 45	5 43	5 41	5 41	5 40	5 39	5 38	5 37	
Oct.	1	5 53	5 51	5 48	5 46	5 44	5 43	5 41	5 39	5 38	5 37	5 36	5 35	5 34
	2	5 53	5 50	5 47	5 45	5 43	5 41	5 39	5 37	5 36	5 35	5 34	5 32	5 31

LOCAL ASTRONOMICAL MEAN TIME OF SUNRISE (SUN'S UPPER LIMB),  
MERIDIAN OF GREENWICH, 1920.

To obtain civil time, subtract 12 hours, mark the result A. M., and add one to the day.

To obtain the standard time at any station, increase the local time by the number of minutes the station is west of the standard meridian, or decrease the local time by the number of minutes the station is east of the standard meridian.

For sunrise in southern latitudes see page 728.

Date.	Lat.	0°	+10°	+20°	+30°	+35°	+40°	+45°	+50°	+52°	+54°	+56°	+58°	+60°
Oct.	1	h m	h m	h m	h m	h m	h m	h m	h m	h m	h m	h m	h m	h m
	2	17 46	17 49	17 51	17 54	17 55	17 57	17 59	18 1	18 2	18 3	18 4	18 5	18 7
	3	17 46	17 49	17 51	17 54	17 55	17 57	17 59	18 0	18 2	18 3	18 5	18 6	18 8
	4	17 46	17 48	17 52	17 55	17 57	17 59	18 1	18 4	18 5	18 7	18 8	18 10	18 12
	5	17 45	17 48	17 52	17 55	17 57	17 58	18 1	18 4	18 7	18 8	18 10	18 12	18 14
	6	17 45	17 48	17 52	17 57	17 59	18 2	18 5	18 9	18 10	18 12	18 14	18 16	18 19
	7	17 44	17 48	17 53	17 57	18 0	18 3	18 6	18 10	18 12	18 14	18 16	18 18	18 21
	8	17 44	17 48	17 53	17 58	18 1	18 4	18 7	18 12	18 14	18 16	18 18	18 21	18 24
	9	17 44	17 48	17 53	17 58	18 1	18 5	18 9	18 13	18 15	18 18	18 20	18 23	18 26
	10	17 44	17 48	17 53	17 59	18 2	18 6	18 10	18 15	18 17	18 20	18 22	18 25	18 28
	11	17 44	17 48	17 54	18 0	18 3	18 7	18 11	18 17	18 19	18 21	18 24	18 27	18 31
	12	17 43	17 48	17 54	18 0	18 4	18 8	18 13	18 18	18 21	18 23	18 26	18 30	18 33
	13	17 43	17 48	17 54	18 1	18 5	18 9	18 14	18 20	18 22	18 25	18 28	18 32	18 36
	14	17 43	17 49	17 55	18 2	18 6	18 10	18 15	18 21	18 24	18 27	18 30	18 34	18 38
	15	17 42	17 49	17 55	18 2	18 6	18 11	18 16	18 23	18 26	18 29	18 32	18 36	18 41
	16	17 42	17 49	17 55	18 3	18 7	18 12	18 18	18 24	18 28	18 31	18 35	18 39	18 43
	17	17 42	17 49	17 56	18 4	18 8	18 13	18 19	18 26	18 29	18 33	18 37	18 41	18 46
	18	17 42	17 49	17 56	18 4	18 9	18 14	18 20	18 28	18 31	18 35	18 39	18 43	18 48
	19	17 42	17 49	17 56	18 5	18 10	18 15	18 22	18 29	18 33	18 37	18 41	18 46	18 51
	20	17 41	17 49	17 57	18 6	18 11	18 16	18 23	18 31	18 35	18 39	18 43	18 48	18 53
	21	17 41	17 49	17 57	18 6	18 12	18 18	18 24	18 33	18 36	18 40	18 45	18 50	18 56
	22	17 41	17 49	17 58	18 7	18 12	18 19	18 26	18 34	18 38	18 42	18 47	18 52	18 58
	23	17 41	17 49	17 58	18 8	18 13	18 20	18 27	18 36	18 40	18 44	18 49	18 55	19 1
	24	17 41	17 49	17 58	18 8	18 14	18 21	18 28	18 38	18 42	18 46	18 51	18 57	19 3
	25	17 41	17 49	17 59	18 9	18 15	18 22	18 30	18 39	18 43	18 48	18 53	18 59	19 6
	26	17 41	17 50	17 59	18 10	18 16	18 23	18 31	18 41	18 45	18 50	18 56	19 2	19 8
	27	17 41	17 50	18 0	18 11	18 17	18 24	18 32	18 42	18 47	18 52	18 58	19 4	19 11
	28	17 40	17 50	18 0	18 11	18 18	18 25	18 34	18 44	18 49	18 54	19 0	19 6	19 13
	29	17 40	17 50	18 0	18 12	18 19	18 26	18 35	18 46	18 50	18 56	19 2	19 9	19 16
	30	17 40	17 50	18 1	18 13	18 20	18 27	18 37	18 47	18 52	18 58	19 4	19 11	19 19
Nov.	31	17 40	17 51	18 1	18 14	18 21	18 29	18 39	18 49	18 54	19 0	19 6	19 13	19 21
	1	17 40	17 51	18 2	18 14	18 22	18 30	18 39	18 51	18 56	19 2	19 8	19 16	19 24
	2	17 40	17 51	18 2	18 15	18 23	18 31	18 41	18 52	18 58	19 4	19 10	19 18	19 26
	3	17 40	17 51	18 3	18 16	18 23	18 32	18 42	18 54	19 0	19 6	19 13	19 20	19 29
	4	17 40	17 51	18 3	18 17	18 24	18 33	18 43	18 56	19 1	19 8	19 15	19 23	19 31
	5	17 40	17 52	18 4	18 18	18 25	18 34	18 45	18 57	19 3	19 10	19 17	19 25	19 34
	6	17 40	17 52	18 4	18 18	18 26	18 36	18 46	18 59	19 5	19 12	19 19	19 27	19 37
	7	17 40	17 52	18 5	18 19	18 27	18 37	18 48	19 1	19 7	19 14	19 21	19 30	19 39
	8	17 41	17 53	18 5	18 20	18 28	18 38	18 49	19 2	19 9	19 15	19 23	19 32	19 42
	9	17 41	17 53	18 6	18 21	18 29	18 39	18 50	19 4	19 10	19 17	19 25	19 34	19 44
	10	17 41	17 53	18 7	18 22	18 30	18 40	18 52	19 6	19 12	19 19	19 27	19 37	19 47
	11	17 41	17 54	18 7	18 22	18 31	18 41	18 53	19 7	19 14	19 21	19 30	19 39	19 49
	12	17 41	17 54	18 8	18 23	18 32	18 42	18 54	19 9	19 16	19 23	19 32	19 41	19 52
	13	17 41	17 54	18 8	18 24	18 33	18 44	18 56	19 11	19 18	19 25	19 34	19 43	19 55
	14	17 41	17 55	18 9	18 25	18 34	18 45	18 57	19 12	19 19	19 27	19 36	19 46	19 57
	15	17 41	17 55	18 9	18 26	18 35	18 46	18 59	19 14	19 21	19 29	19 38	19 48	20 0
16	17 42	17 55	18 10	18 27	18 36	18 47	19 0	19 16	19 23	19 31	19 40	19 50	20 2	



# TABLE VIII.

## SYDICAL ASTRONOMICAL MEAN TIME OF SUNSET (SUN'S UPPER LIMB), MERIDIAN OF GREENWICH, 1920.

To obtain civil time, write P. M. after the astronomical time.

To obtain the standard time at any station, increase the local time by the number of minutes the station is west of the standard meridian, or decrease the local time by the number of minutes the station is east of the standard meridian.

For sunset in southern latitudes see page 728.

Lat. Sta.	0°	+10°	+20°	+30°	+35°	+40°	+45°	+50°	+52°	+54°	+56°	+58°	+60°
Oct.	2	5 53	5 50	5 47	5 45	5 43	5 41	5 39	5 37	5 36	5 35	5 34	5 32
	3	5 52	5 49	5 47	5 44	5 42	5 40	5 38	5 35	5 34	5 32	5 31	5 29
	4	5 52	5 49	5 46	5 42	5 40	5 38	5 36	5 33	5 31	5 30	5 28	5 27
	5	5 52	5 48	5 45	5 41	5 39	5 37	5 34	5 31	5 29	5 28	5 26	5 24
	6	5 51	5 48	5 44	5 40	5 38	5 35	5 32	5 28	5 27	5 25	5 23	5 21
	7	5 51	5 47	5 43	5 39	5 36	5 33	5 30	5 26	5 25	5 23	5 21	5 18
	8	5 51	5 47	5 42	5 38	5 35	5 32	5 28	5 24	5 22	5 20	5 18	5 16
	9	5 51	5 46	5 42	5 37	5 34	5 30	5 27	5 23	5 20	5 18	5 16	5 13
	10	5 50	5 46	5 41	5 35	5 32	5 29	5 25	5 20	5 18	5 15	5 13	5 10
	11	5 50	5 45	5 40	5 34	5 31	5 27	5 23	5 18	5 16	5 13	5 10	5 7
	12	5 50	5 45	5 39	5 33	5 30	5 26	5 21	5 16	5 13	5 11	5 8	5 5
	13	5 50	5 44	5 38	5 32	5 28	5 24	5 19	5 14	5 11	5 8	5 5	5 2
14	5 49	5 44	5 38	5 31	5 27	5 23	5 18	5 12	5 9	5 6	5 3	4 59	
15	5 49	5 43	5 37	5 30	5 26	5 21	5 16	5 10	5 7	5 4	5 0	4 56	
16	5 49	5 43	5 36	5 29	5 24	5 20	5 14	5 8	5 5	5 1	4 58	4 54	
17	5 49	5 42	5 35	5 27	5 23	5 18	5 12	5 6	5 2	4 59	4 55	4 51	
18	5 49	5 42	5 35	5 26	5 22	5 17	5 11	5 4	5 0	4 57	4 53	4 48	
19	5 48	5 41	5 34	5 25	5 21	5 15	5 9	5 2	4 58	4 54	4 50	4 46	
20	5 48	5 41	5 33	5 24	5 19	5 14	5 7	5 0	4 56	4 52	4 48	4 43	
21	5 48	5 40	5 32	5 23	5 18	5 12	5 6	4 58	4 54	4 50	4 46	4 40	
22	5 48	5 40	5 32	5 22	5 17	5 11	5 4	4 56	4 52	4 48	4 43	4 38	
23	5 48	5 40	5 31	5 21	5 16	5 10	5 2	4 54	4 50	4 45	4 41	4 35	
24	5 48	5 39	5 30	5 20	5 15	5 8	5 1	4 52	4 48	4 43	4 38	4 33	
25	5 48	5 39	5 30	5 19	5 14	5 7	4 59	4 50	4 46	4 41	4 36	4 30	
26	5 47	5 38	5 29	5 18	5 12	5 6	4 58	4 48	4 44	4 39	4 34	4 28	
27	5 47	5 38	5 29	5 18	5 11	5 4	4 56	4 46	4 42	4 37	4 31	4 25	
28	5 47	5 38	5 28	5 17	5 10	5 3	4 55	4 45	4 40	4 35	4 29	4 23	
29	5 47	5 37	5 27	5 16	5 9	5 2	4 53	4 43	4 38	4 33	4 27	4 20	
30	5 47	5 37	5 27	5 15	5 8	5 1	4 52	4 41	4 36	4 31	4 25	4 18	
31	5 47	5 37	5 26	5 14	5 7	4 59	4 50	4 39	4 34	4 29	4 22	4 15	
Nov.	1	5 47	5 37	5 26	5 13	5 6	4 58	4 49	4 38	4 32	4 27	4 20	
	2	5 47	5 36	5 25	5 13	5 5	4 57	4 47	4 36	4 30	4 25	4 18	
	3	5 47	5 36	5 25	5 12	5 4	4 56	4 46	4 34	4 29	4 23	4 16	
	4	5 47	5 36	5 24	5 11	5 3	4 55	4 45	4 33	4 27	4 21	4 14	
	5	5 47	5 36	5 24	5 10	5 2	4 54	4 43	4 31	4 25	4 19	4 12	
	6	5 47	5 36	5 23	5 10	5 2	4 53	4 42	4 29	4 23	4 17	4 10	
	7	5 47	5 35	5 23	5 9	5 1	4 51	4 41	4 28	4 22	4 15	4 8	
	8	5 47	5 35	5 23	5 8	5 0	4 50	4 39	4 26	4 20	4 13	4 6	
	9	5 47	5 35	5 22	5 8	4 59	4 49	4 38	4 25	4 18	4 12	4 4	
	10	5 47	5 35	5 22	5 7	4 58	4 49	4 37	4 23	4 17	4 10	4 2	
	11	5 48	5 35	5 21	5 6	4 58	4 48	4 36	4 22	4 15	4 8	4 0	
	12	5 48	5 35	5 21	5 6	4 57	4 47	4 35	4 20	4 14	4 6	3 58	
13	5 48	5 35	5 21	5 5	4 56	4 46	4 34	4 19	4 12	4 5	3 56		
14	5 48	5 35	5 21	5 5	4 55	4 45	4 33	4 18	4 11	4 3	3 55		
15	5 48	5 35	5 20	5 4	4 55	4 44	4 32	4 16	4 9	4 2	3 53		
16	5 48	5 35	5 20	5 4	4 54	4 43	4 31	4 15	4 8	4 0	3 51		
17	5 49	5 35	5 20	5 3	4 54	4 43	4 30	4 14	4 7	3 58	3 49		

LOCAL ASTRONOMICAL MEAN TIME OF SUNRISE (SUN'S UPPER LIMB),  
MERIDIAN OF GREENWICH, 1920.

To obtain civil time, subtract 12 hours, mark the result A. M., and add one to the day.

To obtain the standard time at any station, increase the local time by the number of minutes the station is west of the standard meridian, or decrease the local time by the number of minutes the station is east of the standard meridian.

For sunrise in southern latitudes see page 728.

Date.	Lat.	0°	+10°	+20°	+30°	+35°	+40°	+45°	+50°	+52°	+54°	+56°	+58°	+60°	
Nov.	16	h m 17 42	h m 17 55	h m 18 10	h m 18 27	h m 18 36	h m 18 47	h m 19 0	h m 19 16	h m 19 23	h m 19 31	h m 19 40	h m 19 50	h m 20 2	
	17	17 42	17 56	18 11	18 27	18 37	18 48	19 1	19 17	19 25	19 33	19 42	19 52	20 5	
	18	17 42	17 56	18 11	18 28	18 38	18 49	19 3	19 19	19 26	19 35	19 44	19 55	20 7	
	19	17 42	17 57	18 12	18 29	18 39	18 51	19 4	19 20	19 28	19 36	19 46	19 57	20 10	
	20	17 42	17 57	18 12	18 30	18 40	18 52	19 5	19 22	19 30	19 38	19 48	19 59	20 12	
	21	17 43	17 58	18 13	18 31.	18 41	18 53	19 7	19 23	19 31	19 40	19 50	20 1	20 14	
	22	17 43	17 58	18 14	18 32	18 42	18 54	19 8	19 25	19 33	19 42	19 52	20 3	20 17	
	23	17 43	17 58	18 14	18 32	18 43	18 55	19 9	19 26	19 35	19 44	19 54	20 5	20 19	
	24	17 43	17 59	18 15	18 33	18 44	18 56	19 10	19 28	19 36	19 45	19 56	20 8	20 22	
	25	17 44	17 59	18 15	18 34	18 45	18 57	19 12	19 29	19 38	19 47	19 57	20 10	20 24	
	26	17 44	18 0	18 16	18 35	18 46	18 58	19 13	19 31	19 39	19 49	19 59	20 12	20 26	
	27	17 44	18 0	18 17	18 36	18 47	18 59	19 14	19 32	19 41	19 50	20 1	20 14	20 28	
	28	17 45	18 1	18 17	18 36	18 48	19 0	19 15	19 34	19 42	19 52	20 3	20 15	20 30	
	29	17 45	18 1	18 18	18 37	18 48	19 1	19 17	19 35	19 44	19 54	20 5	20 17	20 32	
	30	17 45	18 2	18 19	18 38	18 49	19 2	19 18	19 36	19 45	19 55	20 6	20 19	20 34	
	Dec.	1	17 46	18 2	18 19	18 39	18 50	19 3	19 19	19 38	19 47	19 57	20 8	20 21	20 36
		2	17 46	18 3	18 20	18 40	18 51	19 4	19 20	19 39	19 48	19 58	20 10	20 23	20 38
		3	17 47	18 3	18 21	18 41	18 52	19 5	19 21	19 40	19 49	20 0	20 11	20 25	20 40
		4	17 47	18 4	18 21	18 41	18 53	19 6	19 22	19 41	19 51	20 1	20 13	20 26	20 42
		5	17 47	18 4	18 22	18 42	18 54	19 7	19 23	19 43	19 52	20 2	20 14	20 28	20 44
		6	17 48	18 5	18 22	18 43	18 55	19 8	19 24	19 44	19 53	20 4	20 16	20 29	20 46
		7	17 48	18 5	18 23	18 44	18 55	19 9	19 25	19 45	19 54	20 5	20 17	20 31	20 47
		8	17 49	18 6	18 24	18 44	18 56	19 10	19 26	19 46	19 56	20 6	20 18	20 32	20 49
		9	17 49	18 6	18 24	18 45	18 57	19 11	19 27	19 47	19 57	20 7	20 20	20 34	20 50
		10	17 50	18 7	18 25	18 46	18 58	19 12	19 28	19 48	19 58	20 9	20 21	20 35	20 52
		11	17 50	18 7	18 25	18 46	18 58	19 12	19 29	19 49	19 59	20 10	20 22	20 36	20 53
		12	17 51	18 8	18 26	18 47	18 59	19 13	19 30	19 50	20 0	20 11	20 23	20 38	20 55
		13	17 51	18 8	18 27	18 48	19 0	19 14	19 31	19 51	20 1	20 12	20 24	20 39	20 56
		14	17 52	18 9	18 27	18 48	19 1	19 15	19 31	19 52	20 2	20 13	20 25	20 40	20 57
		15	17 52	18 9	18 28	18 49	19 1	19 15	19 32	19 53	20 3	20 13	20 26	20 41	20 58
16		17 52	18 10	18 28	18 50	19 2	19 16	19 33	19 53	20 3	20 14	20 27	20 42	20 59	
17		17 53	18 10	18 29	18 50	19 2	19 17	19 33	19 54	20 4	20 15	20 28	20 43	21 0	
18		17 53	18 11	18 29	18 51	19 3	19 17	19 34	19 55	20 5	20 16	20 29	20 43	21 1	
19		17 54	18 11	18 30	18 51	19 4	19 18	19 35	19 55	20 5	20 16	20 29	20 44	21 2	
20		17 54	18 12	18 30	18 52	19 4	19 18	19 35	19 56	20 6	20 17	20 30	20 45	21 2	
21		17 55	18 12	18 31	18 52	19 5	19 19	19 36	19 56	20 6	20 18	20 30	20 45	21 3	
22		17 55	18 13	18 31	18 53	19 5	19 19	19 36	19 57	20 7	20 18	20 31	20 46	21 3	
23		17 56	18 13	18 32	18 53	19 6	19 20	19 37	19 57	20 7	20 18	20 31	20 46	21 4	
24		17 57	18 14	18 32	18 54	19 6	19 20	19 37	19 58	20 8	20 19	20 31	20 46	21 4	
25		17 57	18 14	18 33	18 54	19 6	19 21	19 37	19 58	20 8	20 19	20 32	20 46	21 4	
26		17 57	18 15	18 33	18 54	19 7	19 21	19 38	19 58	20 8	20 19	20 32	20 47	21 4	
27		17 58	18 15	18 34	18 55	19 7	19 21	19 38	19 58	20 8	20 19	20 32	20 47	21 4	
28		17 58	18 16	18 34	18 55	19 7	19 21	19 38	19 59	20 8	20 19	20 32	20 47	21 4	
29		17 59	18 16	18 34	18 56	19 8	19 22	19 38	19 59	20 8	20 20	20 32	20 46	21 4	
30		17 59	18 17	18 35	18 56	19 8	19 22	19 38	19 59	20 8	20 19	20 32	20 46	21 3	
31		18 0	18 17	18 35	18 56	19 8	19 22	19 38	19 59	20 8	20 19	20 32	20 46	21 3	

# TABLE VIII.

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## LOCAL ASTRONOMICAL MEAN TIME OF SUNSET (SUN'S UPPER LIMB), MERIDIAN OF GREENWICH, 1920.

To obtain civil time, write P. M. after the astronomical time.

To obtain the standard time at any station, increase the local time by the number of minutes the station is west of the standard meridian, or decrease the local time by the number of minutes the station is east of the standard meridian.

For sunset in southern latitudes see page 728.

Data.	Lat.	0°	+10°	+20°	+30°	+35°	+40°	+45°	+50°	+52°	+54°	+56°	+58°	+60°
		h m	h m	h m	h m	h m	h m	h m	h m	h m	h m	h m	h m	h m
Nov.	17	5 49	5 35	5 20	5 3	4 54	4 43	4 30	4 14	4 7	3 58	3 49	3 39	3 27
	18	5 49	5 35	5 20	5 3	4 53	4 42	4 29	4 13	4 5	3 57	3 48	3 37	3 25
	19	5 49	5 35	5 20	5 2	4 52	4 41	4 28	4 12	4 4	3 56	3 46	3 35	3 23
	20	5 49	5 35	5 20	5 2	4 52	4 41	4 27	4 11	4 3	3 54	3 45	3 34	3 21
	21	5 50	5 35	5 19	5 2	4 52	4 40	4 26	4 10	4 2	3 53	3 43	3 32	3 19
	22	5 50	5 35	5 19	5 1	4 51	4 39	4 25	4 8	4 0	3 52	3 42	3 30	3 17
	23	5 50	5 35	5 19	5 1	4 51	4 39	4 25	4 8	3 59	3 50	3 40	3 29	3 15
	24	5 50	5 35	5 19	5 1	4 50	4 38	4 24	4 7	3 58	3 49	3 39	3 27	3 14
	25	5 51	5 35	5 19	5 0	4 50	4 38	4 23	4 6	3 57	3 48	3 38	3 26	3 12
	26	5 51	5 35	5 19	5 0	4 50	4 37	4 23	4 5	3 56	3 47	3 37	3 24	3 10
	27	5 51	5 36	5 19	5 0	4 49	4 37	4 22	4 4	3 56	3 46	3 35	3 23	3 9
	28	5 52	5 36	5 19	5 0	4 49	4 37	4 22	4 3	3 55	3 45	3 34	3 22	3 7
	29	5 52	5 36	5 19	5 0	4 49	4 36	4 21	4 3	3 54	3 44	3 33	3 21	3 6
	30	5 52	5 36	5 19	5 0	4 49	4 36	4 21	4 2	3 53	3 43	3 32	3 19	3 4
Dec.	1	5 53	5 36	5 19	5 0	4 48	4 36	4 20	4 1	3 52	3 43	3 31	3 18	3 3
	2	5 53	5 37	5 20	5 0	4 48	4 35	4 20	4 1	3 52	3 42	3 30	3 17	3 2
	3	5 54	5 37	5 20	5 0	4 48	4 35	4 20	4 0	3 51	3 41	3 30	3 16	3 1
	4	5 54	5 37	5 20	5 0	4 48	4 35	4 19	4 0	3 51	3 40	3 29	3 15	3 0
	5	5 54	5 38	5 20	5 0	4 48	4 35	4 19	3 59	3 50	3 40	3 28	3 15	2 59
	6	5 55	5 38	5 20	5 0	4 48	4 35	4 19	3 59	3 50	3 39	3 28	3 14	2 58
	7	5 55	5 38	5 20	5 0	4 48	4 35	4 19	3 59	3 49	3 39	3 27	3 13	2 57
	8	5 56	5 39	5 21	5 0	4 48	4 35	4 18	3 59	3 49	3 38	3 26	3 13	2 56
	9	5 56	5 39	5 21	5 0	4 48	4 35	4 18	3 58	3 49	3 38	3 26	3 12	2 55
	10	5 57	5 39	5 21	5 1	4 49	4 35	4 18	3 58	3 49	3 38	3 26	3 12	2 55
	11	5 57	5 40	5 22	5 1	4 49	4 35	4 18	3 58	3 49	3 38	3 25	3 11	2 54
	12	5 58	5 40	5 22	5 1	4 49	4 35	4 19	3 58	3 49	3 38	3 25	3 11	2 54
	13	5 58	5 41	5 22	5 1	4 49	4 35	4 19	3 58	3 49	3 38	3 25	3 11	2 54
	14	5 58	5 41	5 23	5 2	4 50	4 35	4 19	3 58	3 49	3 38	3 25	3 10	2 53
	15	5 59	5 42	5 23	5 2	4 50	4 36	4 19	3 59	3 49	3 38	3 25	3 10	2 53
	16	5 59	5 42	5 24	5 2	4 50	4 36	4 19	3 59	3 49	3 38	3 25	3 10	2 53
	17	6 0	5 42	5 24	5 3	4 50	4 36	4 20	3 59	3 49	3 38	3 25	3 11	2 53
	18	6 0	5 43	5 24	5 3	4 51	4 37	4 20	3 59	3 49	3 38	3 25	3 11	2 53
	19	6 0	5 43	5 25	5 4	4 51	4 37	4 20	4 0	3 50	3 38	3 26	3 11	2 53
	20	6 1	5 44	5 25	5 4	4 52	4 38	4 21	4 0	3 50	3 39	3 26	3 11	2 54
	21	6 2	5 44	5 26	5 5	4 52	4 38	4 21	4 0	3 50	3 39	3 27	3 12	2 54
	22	6 2	5 45	5 26	5 5	4 53	4 39	4 22	4 1	3 51	3 40	3 27	3 12	2 55
	23	6 3	5 45	5 27	5 6	4 53	4 39	4 22	4 1	3 51	3 40	3 28	3 13	2 55
	24	6 3	5 46	5 27	5 6	4 54	4 40	4 23	4 2	3 52	3 41	3 28	3 13	2 56
	25	6 4	5 47	5 28	5 7	4 54	4 40	4 23	4 3	3 53	3 42	3 29	3 14	2 57
	26	6 4	5 47	5 29	5 7	4 55	4 41	4 24	4 3	3 53	3 42	3 30	3 15	2 58
	27	6 5	5 48	5 29	5 8	4 56	4 41	4 25	4 4	3 54	3 43	3 30	3 16	2 58
	28	6 5	5 48	5 30	5 8	4 56	4 42	4 25	4 5	3 55	3 44	3 31	3 17	2 59
	29	6 6	5 49	5 30	5 9	4 57	4 43	4 26	4 6	3 56	3 45	3 32	3 18	3 1
	30	6 6	5 49	5 31	5 10	4 58	4 44	4 27	4 7	3 57	3 46	3 33	3 19	3 2
	31	6 7	5 50	5 31	5 10	4 58	4 44	4 28	4 8	3 58	3 47	3 34	3 20	3 3
	32	6 7	5 50	5 32	5 11	4 59	4 45	4 29	4 8	3 59	3 48	3 36	3 21	3 5

TABLE IX.

SUNRISE AND SUNSET FOR SOUTHERN LATITUDES, 1920.

In the case of a southern latitude the time of sunrise or sunset is taken from Table VIII with the corresponding northern latitude, not for the given date but for a date about six months earlier or later, which is to be found in the following table. The time taken from Table VIII, whether of sunrise or of sunset, must be corrected by the quantity given in Table IX on the same line with the given date.

*Example.*—May 10, 1920, civil date, in latitude  $-38^\circ$ , required the time of sunrise and sunset.

The astronomical date is May 9 for sunrise and May 10 for sunset; Table IX gives November 11 and 12 as the corresponding dates, northern latitude, while the correction is  $+12^m$  in each case.

		Sunrise.		Sunset.
		d h m		d h m
Table VIII, Lat. $+38^\circ$	Nov.	11 18 37		Nov. 12 4 51
Table IX	May	9 + 12		May 10 + 12
Local astronomical mean time	May	9 18 49		May 10 5 3
Civil time	May	10 6 49 A. M.		May 10 5 3 P. M.

Given Date.	Corresponding Date, Northern Latitude.	Correc-tion.	Given Date.	Corresponding Date, Northern Latitude.	Correc-tion.	Given Date.	Corresponding Date, Northern Latitude.	Correc-tion.	Given Date.	Corresponding Date, Northern Latitude.	Correc-tion.
Jan. 0	July 1	m	Feb. 5	Aug. 8	m	Mar. 12	Sept. 14	m	Apr. 17	Oct. 20	m
1	2	-1	6	9	+ 9	13	15	+14	18	21	+15
2	3	0	7	10	9	14	16	15	19	22	15
3	4	0	8	11	9	15	17	15	20	23	14
4	5	0	9	12	10	16	18	15	21	24	14
5	6	+1	10	13	+10	17	19	+15	22	25	+14
6	7	1	11	14	10	18	20	15	23	26	14
7	8	1	12	15	10	19	21	15	24	27	14
8	9	2	13	16	10	20	22	15	25	28	14
9	10	2	14	17	10	21	23	15	26	29	14
10	11	+2	15	18	+11	22	24	+15	27	30	+14
11	12	2	16	19	11	23	25	15	28	31	14
12	13	3	17	20	11	24	26	15	29	Nov. 1	14
13	14	3	18	21	11	25	27	15	30	2	13
14	15	3	19	23	12	26	29	16	May 1	3	13
15	16	+4	20	24	+12	27	30	+16	2	4	+13
16	18	4	21	25	12	28	Oct. 1	16	3	5	13
17	19	4	22	26	12	29	2	16	4	6	13
18	20	4	23	27	12	30	3	16	5	7	13
19	21	4	24	28	12	31	4	16	6	8	13
20	22	+5	25	29	+13	Apr. 1	5	+16	7	9	+12
21	23	5	26	30	13	2	6	16	8	10	12
22	24	5	27	31	13	3	7	16	9	11	12
23	25	6	28	Sept. 1	13	4	8	15	10	12	12
24	26	6	29	2	13	5	9	15	11	13	12
25	27	+6	Mar. 1	3	+13	6	9	+15	12	14	+12
26	28	6	2	4	13	7	10	15	13	15	11
27	29	7	3	5	14	8	11	15	14	16	11
28	30	7	4	6	14	9	12	15	15	16	11
29	31	7	5	7	14	10	13	15	16	17	11
30	Aug. 1	+7	6	8	+14	11	14	+15	17	18	+11
31	3	8	7	9	14	12	15	15	18	19	11
Feb. 1	4	8	8	10	14	13	16	15	19	20	10
2	5	8	9	11	14	14	17	15	20	21	10
3	6	8	10	12	14	15	18	15	21	22	10
4	7	+8	11	13	+14	16	19	+15	22	23	+10

TABLE IX.

SUNRISE AND SUNSET FOR SOUTHERN LATITUDES, 1920.

Given Date.	Corresponding Date, Northern Latitude.	Correc-tion.	Given Date.	Corre-sponding Date, Northern Latitude.	Correc-tion.	Given Date.	Corre-sponding Date, Northern Latitude.	Correc-tion.	Given Date.	Corre-sponding Date, Northern Latitude.	Correc-tion.
May 23	Nov. 24	+10	July 18	Jan. 16	- 4	Sept. 12	Mar. 10	-14	Nov. 7	May 5	-13
24	25	10	19	17	4	13	11	14	8	6	13
25	26	9	20	18	4	14	12	14	9	7	12
26	27	9	21	19	4	15	13	14	10	8	12
27	28	9	22	20	5	16	14	15	11	9	12
28	29	+ 9	23	21	- 5	17	15	-15	12	10	-12
29	30	8	24	22	5	18	16	15	13	11	12
30	Dec. 1	8	25	23	6	19	17	15	14	12	12
31	2	8	26	24	6	20	18	15	15	13	11
June 1	3	8	27	25	6	21	19	15	16	15	11
2	4	+ 8	28	26	- 6	22	20	-15	17	16	-11
3	4	8	29	27	7	23	21	15	18	17	11
4	5	7	30	28	7	24	22	15	19	18	11
5	6	7	31	29	7	25	23	15	20	19	10
6	7	7	Aug. 1	30	7	26	24	15	21	20	10
7	8	+ 6	2	31	- 8	27	25	-15	22	21	-10
8	9	6	3	31	8	28	26	15	23	22	10
9	10	6	4	Feb. 1	8	29	26	16	24	23	10
10	11	6	5	2	8	30	27	16	25	24	10
11	12	5	6	3	8	Oct. 1	28	16	26	25	9
12	13	+ 5	7	4	- 8	2	29	-16	27	26	- 9
13	14	5	8	5	9	3	30	16	28	27	9
14	15	5	9	6	9	4	31	16	29	28	9
15	16	4	10	7	9	5	Apr. 1	16	30	29	8
16	17	4	11	8	9	6	2	16	Dec. 1	30	8
17	18	+ 4	12	9	-10	7	3	-16	2	31	- 8
18	19	4	13	10	10	8	4	15	3	June 1	8
19	19	4	14	11	10	9	5	15	4	2	8
20	20	3	15	12	10	10	7	15	5	4	7
21	21	3	16	13	10	11	8	15	6	5	7
22	22	+ 3	17	14	-10	12	9	-15	7	6	- 7
23	23	3	18	15	11	13	10	15	8	7	6
24	24	2	19	16	11	14	11	15	9	8	6
25	25	2	20	17	11	15	12	15	10	9	6
26	26	2	21	18	11	16	13	15	11	10	6
27	27	+ 2	22	18	-12	17	14	-15	12	11	- 5
28	28	1	23	19	12	18	15	15	13	12	5
29	29	1	24	20	12	19	16	15	14	13	5
30	30	+ 1	25	21	12	20	17	15	15	14	5
July 1	Dec. 31	0	26	22	12	21	18	15	16	15	4
2	Jan. 1	0	27	23	-12	22	19	-15	17	16	- 4
3	2	0	28	24	12	23	20	14	18	17	4
4	3	0	29	25	13	24	21	14	19	18	4
5	4	0	30	26	13	25	22	14	20	20	3
6	5	- 1	31	27	13	26	23	14	21	21	3
7	6	- 1	Sept. 1	28	-13	27	24	-14	22	22	- 3
8	7	1	2	29	13	28	25	14	23	23	3
9	8	2	3	Mar. 1	13	29	26	14	24	24	2
10	9	2	4	2	13	30	27	14	25	25	2
11	10	2	5	3	14	31	28	14	26	26	2
12	11	- 2	6	4	-14	Nov. 1	29	-14	27	27	- 2
13	12	3	7	5	14	2	30	13	28	28	1
14	13	3	8	6	14	3	May 1	18	29	29	1
15	14	3	9	7	14	4	2	13	30	30	- 1
16	15	4	10	8	14	5	8	13	31	July 1	0
17	15	- 4	11	9	-14	6	4	-13	32	2	0

LOCAL ASTRONOMICAL MEAN TIME OF MOONRISE (MOON'S UPPER LIMB)  
MERIDIAN OF GREENWICH, 1920.

To obtain civil time, write P. M. after the astronomical time if it is less than twelve hours, if greater than twelve hours, subtract twelve hours from it, mark the result A. M., and add one to the day.

To obtain standard time, see directions on page 712.

For other longitudes and for southern latitudes see page 746.

Lat.	0°	+10°	+20°	+30°	+35°	+40°	+45°	+50°	+52°	+54°	+56°	+58°	+60°
Jan. 0	h m	h m	h m	h m	h m	h m	h m	h m	h m	h m	h m	h m	h m
1	0 56	0 47	0 38	0 27	0 21	0 13	0 5	...	...	...	...	...	23 58
2	1 51	1 39	1 26	1 12	1 3	0 54	0 42	0 29	0 23	0 16	0 8	0 0	...
3	2 50	2 35	2 20	2 2	1 52	1 40	1 27	1 10	1 2	0 54	0 44	0 33	0 2
4	3 51	3 35	3 19	2 59	2 48	2 35	2 20	2 1	1 52	1 43	1 32	1 19	1 4
5	4 54	4 38	4 21	4 2	3 51	3 38	3 22	3 3	2 54	2 44	2 33	2 20	2 5
6	5 57	5 42	5 26	5 9	4 58	4 46	4 32	4 15	4 7	3 58	3 48	3 36	3 2
7	6 56	6 44	6 31	6 16	6 8	5 58	5 46	5 32	5 25	5 18	5 10	5 0	4 59
8	7 52	7 43	7 34	7 23	7 16	7 9	7 1	6 50	6 46	6 40	6 34	6 28	6 23
9	8 44	8 39	8 33	8 28	8 23	8 18	8 13	8 7	8 4	8 1	7 57	7 54	7 49
10	9 34	9 32	9 30	9 27	9 26	9 24	9 23	9 21	9 20	9 18	9 17	9 16	9 14
11	10 20	10 22	10 24	10 26	10 27	10 28	10 30	10 31	10 32	10 33	10 34	10 35	10 37
12	11 6	11 11	11 16	11 22	11 26	11 29	11 34	11 40	11 42	11 45	11 48	11 52	11 56
13	11 50	11 58	12 7	12 17	12 22	12 29	12 37	12 46	12 50	12 55	13 0	13 6	13 12
14	12 35	12 46	12 58	13 11	13 18	13 27	13 38	13 50	13 56	14 2	14 9	14 17	14 27
15	13 21	13 34	13 48	14 4	14 13	14 24	14 36	14 52	14 59	15 7	15 15	15 26	15 38
16	14 8	14 22	14 38	14 56	15 7	15 19	15 33	15 51	15 59	16 8	16 19	16 30	16 44
17	14 55	15 11	15 28	15 47	15 58	16 11	16 27	16 45	16 54	17 4	17 15	17 28	17 44
18	15 44	16 0	16 16	16 36	16 47	17 0	17 16	17 35	17 44	17 54	18 5	18 18	18 33
19	16 32	16 47	17 4	17 22	17 33	17 46	18 0	18 18	18 26	18 36	18 46	18 58	19 12
20	17 21	17 35	17 49	18 6	18 16	18 27	18 40	18 56	19 3	19 11	19 20	19 31	19 43
21	18 9	18 20	18 33	18 47	18 55	19 4	19 15	19 28	19 34	19 41	19 48	19 57	20 6
22	18 56	19 5	19 14	19 25	19 31	19 38	19 47	19 56	20 1	20 6	20 11	20 18	20 24
23	19 42	19 48	19 54	20 2	20 6	20 10	20 16	20 22	20 25	20 28	20 31	20 36	20 40
24	20 29	20 31	20 34	20 37	20 39	20 41	20 43	20 46	20 47	20 48	20 50	20 52	20 54
25	21 15	21 14	21 13	21 12	21 11	21 10	21 10	21 9	21 9	21 8	21 8	21 8	21 7
26	22 3	21 58	21 54	21 49	21 46	21 42	21 38	21 34	21 32	21 29	21 27	21 24	21 21
27	22 52	22 45	22 36	22 27	22 22	22 16	22 9	22 0	21 56	21 52	21 48	21 42	21 37
28	23 44	23 34	23 22	23 9	23 1	22 53	22 43	22 31	22 25	22 19	22 12	22 5	21 56
29	...	...	...	23 56	23 46	23 35	23 23	23 7	23 0	22 52	22 44	22 34	22 22
30	0 40	0 26	0 12	...	...	...	...	23 52	23 44	23 35	23 24	23 12	22 58
31	1 38	1 22	1 6	0 48	0 37	0 24	0 10	...	...	...	...	...	23 49
Feb. 1	2 38	2 22	2 5	1 46	1 34	1 21	1 6	0 47	0 38	0 28	0 17	0 4	...
2	3 38	3 23	3 7	2 48	2 37	2 25	2 10	1 52	1 43	1 34	1 23	1 11	0 56
3	4 38	4 25	4 10	3 54	3 44	3 33	3 20	3 5	2 57	2 49	2 40	2 29	2 17
4	5 36	5 25	5 13	5 0	4 53	4 44	4 34	4 22	4 16	4 9	4 2	3 54	3 45
5	6 30	6 22	6 14	6 5	6 0	5 54	5 47	5 39	5 35	5 30	5 26	5 21	5 15
6	7 21	7 17	7 13	7 8	7 6	7 3	6 59	6 55	6 53	6 50	6 48	6 46	6 43
7	8 10	8 10	8 9	8 9	8 9	8 9	8 9	8 8	8 8	8 8	8 8	8 8	8 8
8	8 57	9 0	9 4	9 8	9 10	9 13	9 16	9 19	9 21	9 23	9 25	9 28	9 30
9	9 43	9 50	9 57	10 5	10 9	10 14	10 21	10 28	10 32	10 35	10 40	10 44	10 50
10	10 29	10 38	10 49	11 0	11 7	11 15	11 24	11 34	11 40	11 45	11 52	11 58	12 6
11	11 15	11 28	11 40	11 54	12 3	12 13	12 24	12 38	12 45	12 52	13 0	13 10	13 20
12	12 2	12 16	12 30	12 48	12 58	13 9	13 22	13 39	13 47	13 55	14 5	14 16	14 29
13	12 49	13 4	13 20	13 39	13 50	14 3	14 17	14 35	14 44	14 54	15 4	15 17	15 31
14	13 37	13 53	14 10	14 29	14 40	14 53	15 8	15 27	15 36	15 46	15 57	16 10	16 25
15	14 26	14 41	14 57	15 16	15 27	15 40	15 55	16 13	16 22	16 31	16 42	16 54	17 9
16	15 14	15 28	15 43	16 1	16 11	16 23	16 36	16 53	17 1	17 9	17 19	17 30	17 42
17	16 2	16 14	16 28	16 43	16 52	17 2	17 13	17 28	17 34	17 41	17 50	18 0	18 9

LOCAL ASTRONOMICAL MEAN TIME OF MOONSET (MOON'S UPPER LIMB),  
MERIDIAN OF GREENWICH, 1920.

To obtain civil time, write P. M. after the astronomical time if it is less than twelve hours; if greater than twelve hours, subtract twelve hours from it, mark the result A. M., and add one to the day.

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For other longitudes and for southern latitudes see page 746.

Date.	Lat.													
	0°	+10°	+20°	+30°	+35°	+40°	+45°	+50°	+52°	+54°	+56°	+58°	+60°	
Jan.	0	13 22	13 33	13 44	13 57	14 4	14 13	14 23	14 35	14 41	14 47	14 54	15 2	15 11
	1	14 18	14 32	14 46	15 3	15 12	15 23	15 36	15 52	15 59	16 7	16 16	16 26	16 39
	2	15 18	15 34	15 50	16 9	16 20	16 32	16 48	17 6	17 14	17 24	17 35	17 47	18 2
	3	16 21	16 37	16 54	17 14	17 25	17 36	17 54	18 13	18 22	18 32	18 43	18 56	19 12
	4	17 24	17 39	17 56	18 14	18 25	18 38	18 52	19 10	19 19	19 28	19 38	19 50	20 4
	5	18 25	18 39	18 53	19 9	19 19	19 29	19 42	19 57	20 4	20 12	20 21	20 30	20 42
	6	19 23	19 34	19 45	19 58	20 5	20 14	20 23	20 35	20 40	20 46	20 52	21 0	21 8
	7	20 18	20 25	20 32	20 41	20 46	20 52	20 58	21 6	21 10	21 13	21 18	21 22	21 28
	8	21 8	21 12	21 16	21 20	21 23	21 26	21 29	21 33	21 34	21 36	21 38	21 41	21 43
	9	21 56	21 56	21 57	21 57	21 57	21 57	21 57	21 57	21 57	21 57	21 57	21 57	21 57
	10	22 42	22 39	22 36	22 32	22 29	22 27	22 24	22 20	22 19	22 17	22 15	22 13	22 10
	11	23 27	23 21	23 14	23 6	23 2	22 51	22 44	22 37	22 40	22 37	22 33	22 29	22 24
	12	.....	.....	23 53	23 42	23 35	23 28	23 19	23 9	23 4	22 59	22 53	22 46	22 39
	13	0 12	0 3	.....	.....	.....	.....	23 50	23 36	23 30	23 23	23 16	23 7	22 57
	14	0 58	0 46	0 38	0 19	0 10	0 1	.....	.....	.....	23 52	23 43	23 32	23 20
	15	1 44	1 30	1 15	0 58	0 48	0 37	0 24	0 8	0 1	.....	.....	.....	23 50
	16	2 31	2 16	1 59	1 41	1 30	1 17	1 3	0 45	0 36	0 27	0 16	0 4	.....
	17	3 19	3 3	2 46	2 27	2 15	2 2	1 47	1 28	1 19	1 9	0 57	0 44	0 29
	18	4 7	3 52	3 35	3 16	3 4	2 52	2 36	2 18	2 9	1 59	1 48	1 35	1 20
19	4 56	4 41	4 26	4 8	3 57	3 45	3 31	3 14	3 5	2 56	2 46	2 34	2 20	
20	5 44	5 31	5 18	5 2	4 53	4 42	4 30	4 15	4 8	4 0	3 51	3 41	3 30	
21	6 32	6 21	6 10	5 57	5 50	5 42	5 32	5 20	5 14	5 8	5 1	4 53	4 44	
22	7 18	7 11	7 3	6 54	6 48	6 42	6 35	6 27	6 23	6 18	6 14	6 8	6 2	
23	8 5	8 0	7 56	7 51	7 48	7 44	7 40	7 35	7 33	7 30	7 28	7 25	7 21	
24	8 51	8 50	8 49	8 48	8 47	8 47	8 46	8 45	8 44	8 44	8 43	8 43	8 42	
25	9 38	9 40	9 43	9 46	9 48	9 50	9 53	9 56	9 57	9 59	10 0	10 2	10 4	
26	10 26	10 32	10 39	10 46	10 51	10 56	11 1	11 8	11 11	11 15	11 19	11 23	11 28	
27	11 17	11 26	11 36	11 48	11 54	12 2	12 11	12 22	12 27	12 32	12 38	12 45	12 53	
28	12 10	12 23	12 36	12 51	13 0	13 10	13 22	13 36	13 42	13 50	13 58	14 8	14 19	
29	13 7	13 21	13 37	13 55	14 5	14 17	14 31	14 48	14 56	15 5	15 16	15 27	15 40	
30	14 6	14 23	14 39	14 58	15 9	15 22	15 37	15 56	16 5	16 15	16 26	16 39	16 54	
31	15 7	15 22	15 39	15 58	16 10	16 22	16 37	16 56	17 5	17 14	17 25	17 38	17 52	
Feb.	1	16 7	16 22	16 37	16 55	17 5	17 16	17 30	17 47	17 54	18 3	18 13	18 24	18 36
	2	17 6	17 18	17 31	17 46	17 54	18 3	18 15	18 28	18 34	18 41	18 49	18 58	19 7
	3	18 2	18 11	18 20	18 31	18 37	18 45	18 53	19 3	19 7	19 12	19 18	19 24	19 30
	4	18 54	19 0	19 6	19 13	19 17	19 21	19 26	19 32	19 34	19 38	19 41	19 44	19 48
	5	19 44	19 47	19 49	19 51	19 52	19 54	19 56	19 58	19 59	20 0	20 1	20 2	20 4
	6	20 33	20 31	20 30	20 28	20 27	20 25	20 24	20 22	20 22	20 21	20 20	20 19	20 18
	7	21 19	21 14	21 9	21 3	21 0	20 56	20 52	20 46	20 44	20 41	20 38	20 35	20 32
	8	22 5	21 57	21 49	21 39	21 34	21 27	21 20	21 11	21 7	21 3	20 58	20 52	20 46
	9	22 51	22 41	22 29	22 16	22 9	22 0	21 50	21 38	21 33	21 27	21 20	21 12	21 4
	10	23 38	23 25	23 11	22 55	22 46	22 36	22 23	22 9	22 2	21 54	21 46	21 36	21 25
	11	.....	.....	23 55	23 37	23 26	23 15	23 0	22 44	22 36	22 27	22 16	22 5	21 52
	12	0 25	0 10	.....	.....	.....	23 57	23 42	23 24	23 16	23 6	22 55	22 42	22 28
	13	1 12	0 57	0 40	0 21	0 10	.....	.....	.....	.....	23 52	23 41	23 28	23 13
14	2 1	1 45	1 28	1 9	0 58	0 45	0 30	0 11	0 2	.....	.....	.....	.....	
15	2 49	2 34	2 18	2 0	1 49	1 36	1 22	1 4	0 56	0 46	0 36	0 23	0 9	
16	3 37	3 24	3 9	2 53	2 43	2 32	2 19	2 3	1 55	1 47	1 38	1 27	1 15	

LOCAL ASTRONOMICAL MEAN TIME OF MOONRISE (MOON'S UPPER LIMB),  
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To obtain standard time, see directions on page 712.

For other longitudes and for southern latitudes see page 746.

Date.	Lat.	0°	+10°	+20°	+30°	+35°	+40°	+45°	+50°	+52°	+54°	+56°	+58°	+60°
Feb.	16	h m	h m	h m	h m	h m	h m	h m	h m	h m	h m	h m	h m	h m
	17	16 2	16 14	16 28	16 43	16 52	17 2	17 13	17 23	17 34	17 41	17 50	17 59	18 9
	18	16 50	17 0	17 10	17 23	17 30	17 37	17 47	17 58	18 3	18 9	18 15	18 22	18 30
	19	17 37	17 44	17 52	18 0	18 5	18 11	18 17	18 25	18 29	18 32	18 37	18 42	18 47
	20	18 24	18 28	18 32	18 37	18 40	18 43	18 46	18 50	18 52	18 54	18 56	18 59	19 3
	21	19 12	19 12	19 13	19 13	19 14	19 14	19 14	19 15	19 15	19 15	19 15	19 16	19 16
	22	20 0	19 57	19 54	19 50	19 49	19 46	19 43	19 40	19 38	19 36	19 34	19 32	19 30
	23	20 50	20 43	20 36	20 28	20 24	20 19	20 13	20 6	20 3	20 0	19 55	19 51	19 46
	24	21 42	21 32	21 21	21 10	21 2	20 55	20 46	20 35	20 30	20 25	20 19	20 12	20 5
	25	22 36	22 23	22 10	21 55	21 46	21 36	21 24	21 10	21 4	20 57	20 48	20 39	20 29
	26	23 32	23 18	23 2	22 44	22 34	22 22	22 9	21 52	21 44	21 35	21 26	21 14	21 3
	27	0 30	0 15	23 58	23 39	23 28	23 15	23 0	22 42	22 33	22 24	22 13	22 0	21 46
	28	1 29	1 14	0 58	0 38	0 28	0 15	0 0	23 42	23 33	23 23	23 12	23 0	22 46
	29	2 28	2 13	1 58	1 41	1 31	1 19	1 6	0 49	0 41	0 33	0 23	0 12	23 39
Mar.	1	3 24	3 12	2 59	2 45	2 36	2 27	2 16	2 2	1 55	1 48	1 40	1 31	1 21
	2	4 18	4 9	4 0	3 49	3 42	3 35	3 27	3 17	3 12	3 7	3 1	2 55	2 48
	3	5 10	5 4	4 58	4 52	4 48	4 43	4 38	4 32	4 29	4 26	4 22	4 19	4 14
	4	5 59	5 57	5 55	5 53	5 51	5 49	5 48	5 46	5 45	5 44	5 42	5 41	5 39
	5	6 47	6 48	6 50	6 52	6 53	6 54	6 56	6 58	6 58	6 59	7 0	7 1	7 3
	6	7 34	7 39	7 44	7 50	7 54	7 58	8 2	8 8	8 10	8 13	8 16	8 20	8 24
	7	8 21	8 29	8 37	8 47	8 53	8 59	9 7	9 16	9 20	9 25	9 30	9 36	9 43
	8	9 7	9 18	9 30	9 42	9 50	9 59	10 9	10 22	10 28	10 34	10 41	10 49	10 59
	9	9 54	10 7	10 21	10 37	10 46	10 57	11 9	11 25	11 32	11 40	11 48	11 59	12 10
	10	10 42	10 56	11 12	11 30	11 40	11 52	12 6	12 23	12 32	12 41	12 51	13 3	13 16
	11	11 30	11 45	12 1	12 20	12 31	12 44	12 59	13 17	13 26	13 36	13 46	13 59	14 14
	12	12 18	12 33	12 49	13 8	13 19	13 32	13 47	14 5	14 14	14 24	14 34	14 47	15 1
	13	13 6	13 20	13 36	13 54	14 4	14 16	14 30	14 48	14 56	15 4	15 15	15 26	15 39
	14	13 54	14 7	14 21	14 37	14 47	14 57	15 9	15 24	15 31	15 39	15 48	15 58	16 9
	15	14 41	14 52	15 4	15 17	15 25	15 34	15 44	15 56	16 2	16 8	16 15	16 23	16 32
	16	15 28	15 37	15 46	15 56	16 2	16 8	16 16	16 25	16 29	16 34	16 39	16 44	16 51
	17	16 16	16 21	16 26	16 33	16 36	16 41	16 46	16 51	16 54	16 56	17 0	17 3	17 7
	18	17 3	17 5	17 7	17 10	17 11	17 12	17 14	17 16	17 17	17 18	17 19	17 21	17 22
	19	17 52	17 50	17 49	17 47	17 46	17 44	17 43	17 41	17 41	17 40	17 39	17 38	17 37
	20	18 42	18 37	18 32	18 25	18 22	18 18	18 14	18 8	18 6	18 3	18 0	17 56	17 53
	21	19 35	19 26	19 17	19 7	19 1	18 54	18 47	18 33	18 33	18 28	18 24	18 18	18 11
	22	20 30	20 18	20 6	19 52	19 44	19 35	19 24	19 11	19 5	18 59	18 52	18 44	18 34
	23	21 27	21 13	20 58	20 42	20 32	20 21	20 8	19 52	19 44	19 36	19 27	19 17	19 5
	24	22 26	22 10	21 54	21 36	21 25	21 12	20 58	20 40	20 32	20 22	20 12	20 0	19 46
	25	23 25	23 9	22 53	22 34	22 23	22 10	21 55	21 37	21 28	21 19	21 8	20 56	20 41
	26	.....	.....	23 53	23 35	23 25	23 13	22 59	22 42	22 34	22 25	22 15	22 3	21 50
	27	0 23	0 8	.....	.....	.....	.....	.....	23 52	23 45	23 38	23 29	23 20	23 9
	28	1 19	1 6	0 53	0 38	0 29	0 19	0 7	.....	.....	.....	.....	.....	.....
	29	2 12	2 3	1 52	1 40	1 33	1 25	1 16	1 5	1 0	0 54	0 47	0 40	0 32
	30	3 4	2 57	2 50	2 42	2 37	2 32	2 25	2 18	2 14	2 11	2 6	2 2	1 56
	31	3 52	3 49	3 46	3 42	3 39	3 37	3 34	3 30	3 28	3 27	3 25	3 23	3 20
Apr.	1	4 40	4 40	4 40	4 41	4 41	4 41	4 41	4 41	4 41	4 42	4 42	4 42	4 43
	2	5 27	5 30	5 34	5 38	5 41	5 44	5 47	5 51	5 53	5 55	5 57	5 59	6 3



LOCAL ASTRONOMICAL MEAN TIME OF MOONSET (MOON'S UPPER LIMB),  
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To obtain standard time, see directions on page 712.

For other longitudes and for southern latitudes see page 746.

Date.	Lat.												
	0°	+10°	+20°	+30°	+35°	+40°	+45°	+50°	+52°	+54°	+56°	+58°	+60°
Feb. 16	h m	h m	h m	h m	h m	h m	h m	h m	h m	h m	h m	h m	h m
17	3 37	3 24	3 9	2 53	2 43	2 32	2 19	2 3	1 55	1 47	1 38	1 27	1 15
18	4 25	4 14	4 2	3 48	3 40	3 30	3 20	3 6	3 0	2 53	2 46	2 37	2 27
19	5 13	5 4	4 55	4 44	4 38	4 31	4 23	4 13	4 8	4 3	3 57	3 51	3 44
20	6 0	5 54	5 48	5 42	5 38	5 33	5 28	5 22	5 19	5 16	5 12	5 8	5 4
21	6 47	6 45	6 43	6 40	6 38	6 36	6 34	6 32	6 31	6 30	6 28	6 27	6 25
22	7 35	7 36	7 38	7 39	7 40	7 41	7 42	7 44	7 45	7 45	7 46	7 47	7 48
23	8 24	8 28	8 34	8 40	8 43	8 47	8 52	8 57	9 0	9 2	9 5	9 9	9 13
24	9 14	9 23	9 32	9 42	9 47	9 54	10 2	10 11	10 16	10 20	10 26	10 32	10 38
25	10 7	10 19	10 31	10 44	10 52	11 2	11 12	11 25	11 32	11 38	11 46	11 54	12 4
26	11 2	11 16	11 31	11 48	11 57	12 9	12 22	12 38	12 46	12 54	13 4	13 14	13 27
27	12 0	12 15	12 31	12 50	13 1	13 14	13 28	13 46	13 55	14 4	14 15	14 27	14 42
28	12 58	13 14	13 31	13 50	14 1	14 14	14 29	14 48	14 56	15 6	15 17	15 30	15 44
29	13 57	14 12	14 28	14 46	14 57	15 9	15 23	15 40	15 48	15 57	16 7	16 19	16 32
Mar. 1	14 55	15 8	15 22	15 37	15 46	15 57	16 9	16 24	16 31	16 38	16 46	16 56	17 7
2	15 50	16 0	16 12	16 24	16 31	16 39	16 49	17 0	17 5	17 11	17 18	17 25	17 33
3	16 48	16 50	16 58	17 6	17 11	17 17	17 23	17 31	17 35	17 38	17 42	17 47	17 52
4	17 33	17 37	17 41	17 46	17 48	17 51	17 54	17 58	18 0	18 2	18 4	18 6	18 9
5	18 22	18 22	18 23	18 23	18 23	18 23	18 23	18 23	18 24	18 24	18 24	18 24	18 24
6	19 10	19 6	19 3	18 59	18 57	18 54	18 51	18 48	18 46	18 45	18 43	18 40	18 38
7	19 56	19 50	19 43	19 35	19 31	19 26	19 20	19 13	19 10	19 6	19 2	18 58	18 53
8	20 43	20 34	20 24	20 12	20 6	19 58	19 50	19 40	19 35	19 29	19 24	19 17	19 10
9	21 30	21 18	21 6	20 51	20 43	20 33	20 22	20 9	20 3	19 56	19 48	19 39	19 30
10	22 17	22 4	21 49	21 32	21 22	21 11	20 58	20 42	20 35	20 26	20 17	20 7	19 55
11	23 5	22 50	22 34	22 16	22 5	21 53	21 38	21 21	21 12	21 3	20 52	20 41	20 27
12	23 53	23 38	23 21	23 2	22 51	22 38	22 23	22 5	21 56	21 46	21 35	21 23	21 8
13	.....	.....	.....	23 51	23 40	23 28	23 18	22 55	22 46	22 37	22 26	22 14	21 59
14	0 41	0 26	0 10	.....	.....	.....	.....	23 51	23 43	23 34	23 24	23 13	23 0
15	1 29	1 15	1 0	0 43	0 33	0 21	0 7	.....	.....	.....	.....	.....	.....
16	2 16	2 4	1 51	1 36	1 27	1 18	1 6	0 51	0 45	0 37	0 29	0 19	0 9
17	3 4	2 54	2 44	2 32	2 25	2 17	2 7	1 56	1 51	1 45	1 38	1 31	1 23
18	3 51	3 44	3 37	3 28	3 24	3 18	3 11	3 8	3 0	2 56	2 51	2 46	2 41
19	4 38	4 35	4 31	4 26	4 24	4 21	4 17	4 13	4 11	4 9	4 7	4 4	4 2
20	5 26	5 26	5 26	5 26	5 26	5 26	5 26	5 25	5 25	5 25	5 25	5 25	5 25
21	6 16	6 19	6 23	6 27	6 30	6 32	6 35	6 39	6 41	6 43	6 45	6 47	6 50
22	7 7	7 14	7 22	7 30	7 35	7 40	7 47	7 55	7 58	8 2	8 7	8 12	8 17
23	8 1	8 11	8 22	8 34	8 42	8 50	8 59	9 11	9 16	9 23	9 29	9 37	9 45
24	8 57	9 10	9 23	9 39	9 48	9 59	10 11	10 26	10 33	10 41	10 50	11 0	11 11
25	9 55	10 9	10 25	10 43	10 54	11 6	11 20	11 37	11 46	11 55	12 5	12 17	12 31
26	10 54	11 9	11 26	11 45	11 56	12 8	12 23	12 42	12 50	13 0	13 11	13 23	13 38
27	11 53	12 8	12 24	12 42	12 53	13 5	13 19	13 37	13 45	13 54	14 4	14 16	14 30
28	12 50	13 3	13 18	13 34	13 44	13 54	14 7	14 22	14 30	14 38	14 47	14 56	15 8
29	13 45	13 56	14 8	14 21	14 29	14 38	14 48	15 0	15 6	15 12	15 19	15 27	15 36
30	14 37	14 45	14 54	15 4	15 10	15 16	15 24	15 32	15 37	15 41	15 46	15 52	15 58
31	15 27	15 32	15 37	15 43	15 47	15 51	15 55	16 0	16 3	16 5	16 8	16 11	16 15
Apr. 1	16 15	16 17	16 19	16 20	16 22	16 23	16 24	16 26	16 26	16 27	16 28	16 29	16 30
2	17 2	17 1	16 59	16 56	16 55	16 54	16 52	16 50	16 49	16 48	16 47	16 46	16 44
3	17 49	17 44	17 38	17 32	17 29	17 25	17 20	17 15	17 12	17 9	17 6	17 3	16 59

LOCAL ASTRONOMICAL MEAN TIME OF MOONRISE (MOON'S UPPER LIMB),  
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To obtain standard time, see directions on page 712.

For other longitudes and for southern latitudes see page 746.

Date.	Lat.	0°	+10°	+20°	+30°	+35°	+40°	+45°	+50°	+52°	+54°	+56°	+58°	+60°
		h m	h m	h m	h m	h m	h m	h m	h m	h m	h m	h m	h m	h m
Apr.	1	4 40	4 40	4 40	4 41	4 41	4 41	4 41	4 41	4 41	4 42	4 42	4 42	4 42
	2	5 27	5 30	5 34	5 38	5 41	5 44	5 47	5 51	5 53	5 55	5 57	5 59	6 2
	3	6 13	6 20	6 27	6 35	6 40	6 45	6 52	6 59	7 3	7 7	7 11	7 16	7 21
	4	7 0	7 9	7 20	7 31	7 38	7 46	7 55	8 6	8 11	8 17	8 23	8 30	8 38
	5	7 47	7 59	8 12	8 26	8 35	8 45	8 56	9 10	9 17	9 24	9 32	9 42	9 52
	6	8 34	8 48	9 3	9 20	9 30	9 41	9 55	10 11	10 19	10 27	10 37	10 48	11 1
	7	9 22	9 37	9 53	10 12	10 22	10 35	10 49	11 7	11 16	11 25	11 36	11 48	12 2
	8	10 10	10 26	10 42	11 1	11 12	11 24	11 40	11 58	12 6	12 16	12 27	12 39	12 54
	9	10 58	11 13	11 29	11 47	11 58	12 10	12 25	12 42	12 50	13 0	13 10	13 22	13 36
	10	11 46	12 0	12 14	12 31	12 41	12 52	13 5	13 20	13 28	13 36	13 45	13 56	14 8
	11	12 33	12 45	12 57	13 12	13 20	13 30	13 41	13 54	14 0	14 7	14 15	14 24	14 33
	12	13 19	13 29	13 39	13 50	13 57	14 4	14 13	14 24	14 28	14 34	14 40	14 46	14 54
	13	14 6	14 12	14 19	14 27	14 32	14 37	14 43	14 50	14 54	14 57	15 1	15 6	15 11
	14	14 52	14 56	15 0	15 4	15 6	15 9	15 12	15 16	15 18	15 19	15 21	15 24	15 26
	15	15 40	15 40	15 40	15 40	15 40	15 41	15 41	15 41	15 41	15 41	15 41	15 41	15 41
	16	16 30	16 28	16 23	16 18	16 16	16 14	16 11	16 7	16 5	16 3	16 1	15 59	15 56
	17	17 22	17 15	17 8	16 59	16 54	16 49	16 43	16 35	16 32	16 28	16 24	16 19	16 14
	18	18 17	18 7	17 56	17 44	17 36	17 28	17 19	17 8	17 2	16 57	16 50	16 44	16 36
	19	19 15	19 2	18 48	18 32	18 23	18 13	18 1	17 46	17 39	17 32	17 24	17 14	17 4
	20	20 15	20 0	19 44	19 26	19 16	19 4	18 50	18 33	18 25	18 16	18 6	17 55	17 42
	21	21 16	21 0	20 44	20 25	20 14	20 2	19 47	19 29	19 20	19 10	19 0	18 48	18 33
	22	22 18	22 1	21 46	21 27	21 17	21 5	20 50	20 33	20 25	20 16	20 5	19 53	19 40
	23	23 14	23 1	22 47	22 31	22 22	22 11	21 58	21 43	21 36	21 28	21 19	21 9	20 57
	24	.....	23 58	23 47	23 34	23 27	23 18	23 8	22 56	22 50	22 44	22 37	22 29	22 20
	25	0 9	.....	.....	.....	.....	.....	.....	.....	.....	.....	23 56	23 50	23 44
	26	1 1	0 54	0 45	0 36	0 31	0 25	0 18	0 9	0 5	0 1	.....	.....	.....
	27	1 50	1 46	1 41	1 36	1 33	1 30	1 26	1 21	1 19	1 16	1 14	1 11	1 7
	28	2 37	2 36	2 35	2 34	2 34	2 33	2 32	2 31	2 31	2 30	2 30	2 29	2 28
	29	3 23	3 26	3 28	3 32	3 33	3 35	3 37	3 40	3 41	3 43	3 44	3 46	3 48
	30	4 9	4 15	4 21	4 28	4 32	4 36	4 42	4 48	4 51	4 54	4 58	5 2	5 6
May	1	4 55	5 4	5 13	5 23	5 29	5 36	5 44	5 54	5 59	6 4	6 9	6 16	6 23
	2	5 41	5 53	6 4	6 18	6 26	6 35	6 46	6 59	7 5	7 12	7 19	7 27	7 37
	3	6 29	6 42	6 56	7 12	7 22	7 32	7 45	8 1	8 8	8 16	8 25	8 36	8 48
	4	7 16	7 31	7 47	8 5	8 15	8 27	8 41	8 59	9 7	9 16	9 26	9 38	9 52
	5	8 5	8 20	8 36	8 55	9 6	9 18	9 33	9 51	10 0	10 10	10 20	10 33	10 47
	6	8 53	9 8	9 24	9 42	9 53	10 6	10 20	10 38	10 47	10 56	11 6	11 19	11 33
	7	9 40	9 54	10 10	10 27	10 37	10 49	11 2	11 19	11 26	11 35	11 45	11 56	12 8
	8	10 27	10 40	10 53	11 8	11 17	11 27	11 39	11 54	12 0	12 8	12 16	12 25	12 36
	9	11 13	11 23	11 35	11 47	11 55	12 3	12 13	12 24	12 30	12 36	12 42	12 50	12 58
	10	11 58	12 6	12 15	12 24	12 30	12 36	12 43	12 51	12 55	13 0	13 4	13 10	13 16
	11	12 44	12 49	12 54	13 0	13 3	13 7	13 11	13 17	13 19	13 22	13 24	13 28	13 31
	12	13 30	13 32	13 33	13 35	13 36	13 38	13 39	13 41	13 42	13 43	13 44	13 45	13 46
	13	14 13	14 16	14 14	14 12	14 10	14 9	14 8	14 6	14 5	14 4	14 3	14 2	14 1
	14	15 7	15 2	14 56	14 50	14 46	14 42	14 38	14 32	14 30	14 27	14 24	14 20	14 17
	15	16 0	15 52	15 42	15 32	15 26	15 19	15 11	15 2	14 58	14 53	14 48	14 42	14 36
	16	16 57	16 45	16 33	16 18	16 10	16 1	15 50	15 38	15 32	15 25	15 18	15 10	15 0
	17	17 57	17 43	17 28	17 11	17 1	16 50	16 37	16 21	16 13	16 5	15 56	15 45	15 33

# TABLE X.

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## LOCAL ASTRONOMICAL MEAN TIME OF MOONSET (MOON'S UPPER LIMB), MERIDIAN OF GREENWICH, 1920.

To obtain civil time, write P. M. after the astronomical time if it is less than twelve hours; if greater than twelve hours, subtract twelve hours from it, mark the result A. M., and add one to the day.

To obtain standard time, see directions on page 712.

For other longitudes and for southern latitudes see page 746.

Date.	Lat.	0°	+10°	+20°	+30°	+35°	+40°	+45°	+50°	+52°	+54°	+56°	+58°	+60°	
Apr.	1	17 2	17 1	16 59	16 56	16 55	16 54	16 52	16 50	16 49	16 48	16 47	16 46	16 44	
	2	17 49	17 44	17 38	17 32	17 29	17 25	17 20	17 15	17 12	17 9	17 6	17 3	16 59	
	3	18 36	18 27	18 19	18 9	18 4	17 57	17 50	17 41	17 36	17 32	17 27	17 21	17 15	
	4	19 22	19 12	19 0	18 47	18 40	18 31	18 21	18 9	18 3	17 57	17 50	17 43	17 34	
	5	20 10	19 57	19 43	19 27	19 18	19 8	18 55	18 41	18 34	18 26	18 18	18 8	17 57	
	6	20 58	20 43	20 28	20 10	20 0	19 48	19 34	19 18	19 9	19 0	18 51	18 40	18 26	
	7	21 46	21 30	21 14	20 56	20 44	20 32	20 17	19 59	19 51	19 41	19 31	19 18	19 4	
	8	22 34	22 19	22 2	21 44	21 33	21 20	21 5	20 47	20 39	20 29	20 18	20 6	19 51	
	9	23 22	23 7	22 52	22 34	22 24	22 12	21 58	21 40	21 32	21 23	21 13	21 2	20 48	
	10	.....	23 56	23 42	23 26	23 17	23 6	22 54	22 38	22 31	22 23	22 14	22 4	21 53	
	11	0 9	.....	.....	.....	.....	.....	.....	23 58	23 40	23 35	23 28	23 21	23 13	23 4
	12	0 55	0 44	0 33	0 20	0 12	0 3	.....	.....	.....	.....	.....	.....	.....	.....
	13	1 42	1 33	1 25	1 15	1 9	1 2	0 55	0 45	0 41	0 36	0 31	0 25	0 18	
	14	2 28	2 23	2 17	2 11	2 8	2 3	1 59	1 53	1 50	1 47	1 44	1 40	1 36	
	15	3 15	3 13	3 12	3 9	3 8	3 6	3 5	3 3	3 2	3 1	3 0	2 58	2 57	
16	4 4	4 5	4 7	4 9	4 10	4 12	4 14	4 15	4 16	4 17	4 18	4 19	4 21		
17	4 54	5 0	5 5	5 12	5 15	5 20	5 25	5 30	5 33	5 36	5 40	5 43	5 47		
18	5 48	5 56	6 6	6 16	6 23	6 30	6 38	6 48	6 52	6 57	7 3	7 9	7 16		
19	6 44	6 56	7 8	7 23	7 31	7 41	7 52	8 6	8 12	8 19	8 27	8 36	8 46		
20	7 43	7 57	8 12	8 29	8 39	8 51	9 4	9 21	9 29	9 37	9 47	9 58	10 11		
21	8 44	8 59	9 16	9 34	9 45	9 58	10 12	10 30	10 39	10 48	10 59	11 11	11 26		
22	9 45	10 0	10 16	10 35	10 46	10 58	11 13	11 31	11 39	11 48	11 59	12 11	12 25		
23	10 44	10 58	11 13	11 30	11 40	11 51	12 4	12 21	12 28	12 36	12 46	12 56	13 8		
24	11 41	11 53	12 5	12 20	12 28	12 37	12 48	13 1	13 8	13 14	13 22	13 30	13 40		
25	12 34	12 43	12 53	13 4	13 10	13 17	13 25	13 35	13 40	13 45	13 50	13 56	14 3		
26	13 25	13 31	13 37	13 44	13 48	13 52	13 58	14 4	14 7	14 10	14 14	14 17	14 22		
27	14 13	14 16	14 18	14 21	14 23	14 25	14 27	14 30	14 31	14 33	14 34	14 36	14 38		
28	15 0	14 59	14 58	14 57	14 57	14 56	14 55	14 54	14 54	14 54	14 53	14 52	14 52		
29	15 45	15 41	15 37	15 32	15 29	15 26	15 23	15 18	15 16	15 14	15 12	15 9	15 6		
30	16 31	16 24	16 17	16 8	16 3	15 57	15 51	15 43	15 40	15 36	15 31	15 27	15 21		
May	1	17 17	17 8	16 57	16 45	16 38	16 30	16 21	16 10	16 5	16 0	15 54	15 47	15 39	
	2	18 4	17 52	17 39	17 24	17 16	17 6	16 54	16 41	16 34	16 27	16 19	16 10	16 0	
	3	18 52	18 38	18 23	18 6	17 56	17 45	17 32	17 16	17 8	17 0	16 50	16 39	16 27	
	4	19 40	19 25	19 9	18 51	18 40	18 27	18 13	17 55	17 47	17 38	17 27	17 15	17 1	
	5	20 28	20 13	19 57	19 38	19 27	19 14	18 59	18 41	18 33	18 23	18 12	18 0	17 45	
	6	21 16	21 1	20 45	20 27	20 16	20 4	19 50	19 32	19 24	19 15	19 4	18 52	18 39	
	7	22 3	21 50	21 35	21 18	21 9	20 58	20 45	20 29	20 21	20 13	20 3	19 53	19 40	
	8	22 50	22 38	22 25	22 11	22 3	21 53	21 42	21 28	21 22	21 15	21 7	20 58	20 48	
	9	23 35	23 26	23 16	23 5	22 58	22 51	22 42	22 31	22 26	22 21	22 15	22 8	22 0	
	10	.....	.....	.....	23 59	23 55	23 49	23 43	23 36	23 33	23 29	23 25	23 20	23 15	
	11	0 20	0 14	0 7	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	
	12	1 6	1 3	0 59	0 55	0 53	0 50	0 47	0 43	0 42	0 40	0 38	0 35	0 33	
	13	1 52	1 53	1 53	1 53	1 53	1 53	1 53	1 53	1 53	1 53	1 53	1 53	1 53	
	14	2 41	2 44	2 48	2 53	2 55	2 58	3 1	3 5	3 7	3 9	3 11	3 13	3 16	
	15	3 32	3 39	3 47	3 55	4 0	4 6	4 12	4 20	4 24	4 28	4 33	4 37	4 43	
16	4 27	4 37	4 48	5 0	5 8	5 16	5 26	5 38	5 43	5 49	5 56	6 4	6 12		
17	5 25	5 38	5 52	6 8	6 17	6 27	6 40	6 55	7 3	7 10	7 19	7 30	7 41		

LOCAL ASTRONOMICAL MEAN TIME OF MOONRISE (MOON'S UPPER LIMB),  
MERIDIAN OF GREENWICH, 1920.

To obtain civil time, write P. M. after the astronomical time if it is less than twelve hours; if greater than twelve hours, subtract twelve hours from it, mark the result A. M., and add one to the day.

To obtain standard time, see directions on page 712.

For other longitudes and for southern latitudes see page 746.

Lat.		0°	+10°	+20°	+30°	+35°	+40°	+45°	+50°	+52°	+54°	+56°	+58°	+60°	
Date.															
May	17	17 57	17 43	17 28	17 11	17 1	16 50	16 37	16 21	16 13	16 5	15 56	15 45	15 33	
	18	18 59	18 44	18 28	18 9	17 58	17 46	17 31	17 13	17 5	16 56	16 45	16 33	16 19	
	19	20 2	19 47	19 31	19 12	19 1	18 49	18 34	18 16	18 8	17 53	17 47	17 35	17 21	
	20	21 3	20 50	20 34	20 17	20 8	19 56	19 43	19 27	19 19	19 10	19 0	18 50	18 37	
	21	22 2	21 50	21 38	21 24	21 15	21 6	20 55	20 41	20 35	20 28	20 20	20 12	20 2	
	22	22 56	22 46	22 36	22 28	22 22	22 15	22 8	21 57	21 52	21 47	21 42	21 35	21 28	
	23	23 47	23 42	23 36	23 30	23 26	23 22	23 17	23 11	23 8	23 5	23 1	22 58	22 54	
	24	...	...	...	...	...	...	...	...	...	...	...	...	...	...
	25	0 36	0 34	0 32	0 29	0 28	0 26	0 24	0 22	0 21	0 20	0 19	0 18	0 16	
	26	1 22	1 24	1 25	1 27	1 28	1 29	1 30	1 32	1 33	1 33	1 34	1 35	1 37	
	27	2 8	2 12	2 17	2 22	2 26	2 30	2 34	2 40	2 42	2 45	2 48	2 51	2 55	
	28	2 53	3 1	3 9	3 18	3 24	3 30	3 37	3 46	3 50	3 54	4 0	4 5	4 11	
	29	3 39	3 49	4 0	4 13	4 20	4 29	4 39	4 50	4 56	5 2	5 9	5 17	5 26	
30	4 25	4 38	4 51	5 7	5 16	5 26	5 38	5 53	6 0	6 8	6 16	6 26	6 37		
31	5 13	5 27	5 42	6 0	6 10	6 22	6 35	6 52	7 0	7 9	7 19	7 30	7 44		
June	1	6 1	6 16	6 32	6 50	7 2	7 14	7 29	7 47	7 55	8 5	8 16	8 28	8 42	
	2	6 49	7 4	7 20	7 39	7 50	8 2	8 17	8 36	8 44	8 54	9 4	9 17	9 31	
	3	7 36	7 51	8 7	8 25	8 35	8 47	9 1	9 18	9 26	9 35	9 45	9 57	10 10	
	4	8 24	8 37	8 51	9 7	9 17	9 27	9 40	9 55	10 2	10 10	10 19	10 29	10 40	
	5	9 10	9 21	9 33	9 47	9 55	10 4	10 14	10 27	10 33	10 40	10 47	10 55	11 4	
	6	9 55	10 4	10 13	10 24	10 30	10 37	10 45	10 55	11 0	11 4	11 9	11 16	11 23	
	7	10 40	10 46	10 52	10 59	11 4	11 8	11 14	11 20	11 23	11 27	11 30	11 34	11 39	
	8	11 24	11 27	11 30	11 34	11 36	11 38	11 41	11 44	11 46	11 47	11 49	11 51	11 53	
	9	12 10	12 10	12 9	12 9	12 9	12 8	12 8	12 8	12 8	12 8	12 8	12 8	12 7	
	10	12 57	12 54	12 50	12 45	12 43	12 40	12 37	12 33	12 31	12 29	12 27	12 25	12 22	
	11	13 47	13 40	13 32	13 24	13 19	13 14	13 8	13 0	12 56	12 53	12 48	12 44	12 39	
	12	14 40	14 30	14 19	14 7	14 0	13 52	13 43	13 31	13 26	13 20	13 14	13 7	13 0	
	13	15 37	15 24	15 11	14 55	14 46	14 36	14 24	14 10	14 3	13 55	13 47	13 38	13 27	
14	16 38	16 24	16 8	15 50	15 39	15 28	15 13	14 56	14 48	14 40	14 29	14 18	14 5		
15	17 41	17 26	17 10	16 51	16 40	16 27	16 12	15 54	15 45	15 36	15 25	15 13	14 58		
16	18 45	18 30	18 14	17 56	17 46	17 34	17 19	17 2	16 54	16 44	16 34	16 22	16 9		
17	19 46	19 34	19 20	19 4	18 55	18 44	18 33	18 17	18 10	18 2	17 53	17 43	17 32		
18	20 45	20 35	20 24	20 12	20 4	19 56	19 46	19 35	19 30	19 24	19 17	19 10	19 1		
19	21 39	21 32	21 25	21 17	21 12	21 7	21 0	20 52	20 49	20 45	20 41	20 36	20 30		
20	22 30	22 27	22 24	22 20	22 17	22 14	22 11	22 8	22 6	22 4	22 2	22 0	21 57		
21	23 19	23 19	23 19	23 19	23 19	23 20	23 20	23 20	23 20	23 20	23 20	23 20	23 21		
22	...	...	...	...	...	...	...	...	...	...	...	...	...		
23	0 6	0 9	0 18	0 17	0 20	0 22	0 26	0 30	0 32	0 34	0 36	0 38	0 41		
24	0 51	0 58	1 5	1 13	1 18	1 23	1 30	1 37	1 41	1 45	1 49	1 54	1 59		
25	1 37	1 47	1 57	2 8	2 15	2 23	2 32	2 43	2 48	2 53	3 0	3 6	3 14		
26	2 23	2 35	2 48	3 2	3 11	3 21	3 32	3 46	3 52	3 59	4 8	4 17	4 27		
27	3 10	3 24	3 39	3 55	4 5	4 16	4 30	4 46	4 54	5 2	5 12	5 23	5 35		
28	3 58	4 13	4 28	4 47	4 58	5 10	5 24	5 42	5 50	6 0	6 10	6 22	6 36		
29	4 46	5 1	5 17	5 36	5 47	6 0	6 15	6 33	6 41	6 51	7 2	7 14	7 29		
30	5 34	5 49	6 4	6 23	6 34	6 46	7 0	7 18	7 26	7 35	7 46	7 58	8 11		
July	1	6 21	6 36	6 50	7 6	7 16	7 28	7 41	7 57	8 4	8 12	8 22	8 33	8 45	
	2	7 8	7 20	7 33	7 47	7 56	8 6	8 17	8 30	8 37	8 44	8 52	9 0	9 10	

# TABLE X.

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## LOCAL ASTRONOMICAL MEAN TIME OF MOONSET (MOON'S UPPER LIMB), MERIDIAN OF GREENWICH, 1920.

To obtain civil time, write P. M. after the astronomical time if it is less than twelve hours; if greater than twelve hours, subtract twelve hours from it, mark the result A. M., and add one to the day.

To obtain standard time, see directions on page 712.

For other longitudes and for southern latitudes see page 746.

Data.	Lat.	0°	+10°	+20°	+30°	+35°	+40°	+45°	+50°	+52°	+54°	+56°	+58°	+60°
May	17	5 25	5 38	5 52	6 8	6 17	6 27	6 40	6 55	7 3	7 10	7 19	7 30	7 41
	18	6 26	6 41	6 57	7 15	7 26	7 38	7 52	8 10	8 18	8 27	8 37	8 49	9 3
	19	7 29	7 45	8 1	8 20	8 31	8 44	8 58	9 17	9 25	9 35	9 45	9 58	10 12
	20	8 32	8 46	9 2	9 20	9 30	9 42	9 56	10 13	10 21	10 30	10 40	10 51	11 4
	21	9 32	9 44	9 58	10 14	10 23	10 33	10 45	10 59	11 6	11 13	11 21	11 31	11 41
	22	10 28	10 38	10 49	11 1	11 8	11 16	11 26	11 37	11 42	11 47	11 53	12 0	12 8
	23	11 21	11 28	11 35	11 44	11 49	11 54	12 0	12 8	12 11	12 15	12 19	12 24	12 29
	24	12 11	12 14	12 18	12 23	12 25	12 28	12 31	12 35	12 37	12 39	12 41	12 43	12 45
	25	12 58	12 58	12 59	12 59	12 59	12 59	13 0	13 0	13 0	13 0	13 0	13 0	13 0
	26	13 44	13 41	13 38	13 34	13 32	13 30	13 27	13 24	13 22	13 21	13 19	13 17	13 15
	27	14 30	14 23	14 17	14 10	14 5	14 0	13 55	13 48	13 45	13 42	13 38	13 34	13 29
	28	15 15	15 6	14 56	14 46	14 40	14 32	14 24	14 14	14 10	14 4	13 59	13 53	13 46
	29	16 1	15 50	15 38	15 24	15 16	15 7	14 56	14 43	14 37	14 30	14 23	14 15	14 5
	30	16 48	16 35	16 21	16 4	15 55	15 44	15 31	15 16	15 8	15 0	14 52	14 41	14 30
	31	17 36	17 21	17 6	16 48	16 37	16 25	16 11	15 54	15 46	15 36	15 26	15 15	15 1
June	1	18 24	18 9	17 52	17 34	17 23	17 10	16 55	16 37	16 28	16 19	16 8	15 56	15 41
	2	19 12	18 57	18 41	18 22	18 12	17 59	17 44	17 27	17 18	17 8	16 58	16 46	16 32
	3	20 0	19 45	19 30	19 13	19 3	18 51	18 38	18 21	18 13	18 4	17 55	17 43	17 30
	4	20 46	20 34	20 21	20 5	19 56	19 46	19 34	19 20	19 13	19 6	18 57	18 47	18 36
	5	21 32	21 22	21 11	20 58	20 51	20 43	20 33	20 21	20 16	20 10	20 3	19 55	19 47
	6	22 17	22 9	22 1	21 53	21 47	21 40	21 33	21 25	21 21	21 16	21 12	21 6	21 0
	7	23 1	22 57	22 52	22 46	22 43	22 39	22 35	22 30	22 28	22 25	22 22	22 19	22 15
	8	23 46	23 45	23 43	23 42	23 41	23 40	23 38	23 37	23 36	23 35	23 34	23 34	23 32
	9	0 32	0 34	0 36	0 39	0 40	0 42	0 44	0 46	0 47	0 48	0 49	0 50	0 52
	10	1 20	1 26	1 32	1 38	1 42	1 46	1 51	1 57	2 0	2 3	2 6	2 10	2 15
	11	2 12	2 21	2 30	2 40	2 47	2 54	3 2	3 12	3 16	3 21	3 27	3 33	3 40
	12	3 7	3 19	3 31	3 45	3 54	4 3	4 14	4 28	4 34	4 41	4 49	4 58	5 8
	13	4 6	4 20	4 35	4 52	5 2	5 13	5 27	5 43	5 51	6 0	6 10	6 20	6 33
	14	5 8	5 23	5 39	5 58	6 9	6 22	6 36	6 54	7 3	7 13	7 23	7 36	7 50
	15	6 12	6 27	6 43	7 2	7 13	7 25	7 40	7 57	8 6	8 15	8 26	8 38	8 52
16	7 14	7 28	7 43	8 0	8 10	8 21	8 34	8 50	8 58	9 6	9 15	9 25	9 37	
17	8 15	8 26	8 38	8 52	9 0	9 9	9 20	9 33	9 39	9 45	9 52	10 0	10 10	
18	9 11	9 20	9 28	9 39	9 44	9 51	9 59	10 8	10 12	10 17	10 22	10 27	10 34	
19	10 4	10 9	10 14	10 20	10 24	10 28	10 32	10 38	10 40	10 43	10 46	10 49	10 53	
20	10 54	10 55	10 57	10 59	11 0	11 1	11 2	11 4	11 5	11 6	11 6	11 8	11 9	
21	11 41	11 40	11 38	11 35	11 34	11 32	11 31	11 29	11 28	11 27	11 27	11 26	11 24	
22	12 28	12 23	12 17	12 11	12 8	12 3	11 59	11 53	11 51	11 48	11 45	11 42	11 38	
23	13 14	13 5	12 57	12 47	12 42	12 35	12 28	12 19	12 15	12 10	12 6	12 0	11 54	
24	14 0	13 49	13 37	13 24	13 17	13 9	12 58	12 47	12 41	12 35	12 28	12 21	12 12	
25	14 46	14 33	14 20	14 4	13 55	13 44	13 33	13 18	13 11	13 4	12 55	12 46	12 35	
26	15 33	15 19	15 4	14 46	14 36	14 24	14 10	13 54	13 46	13 37	13 27	13 16	13 3	
27	16 21	16 6	15 50	15 31	15 20	15 8	14 53	14 35	14 27	14 17	14 7	13 54	13 40	
28	17 9	16 54	16 38	16 19	16 8	15 55	15 41	15 22	15 14	15 4	14 53	14 41	14 27	
29	17 57	17 42	17 27	17 9	16 58	16 47	16 32	16 15	16 7	15 58	15 48	15 38	15 22	
30	18 44	18 31	18 17	18 1	17 51	17 41	17 28	17 13	17 6	16 58	16 48	16 38	16 26	
July	1	19 30	19 19	19 7	18 54	18 46	18 37	18 26	18 14	18 7	18 1	17 54	17 36	

LOCAL ASTRONOMICAL MEAN TIME OF MOONRISE (MOON'S UPPER LIMB).  
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For other longitudes and for southern latitudes see page 746.

Lat. Data	0°	+10°	+20°	+30°	+35°	+40°	+45°	+50°	+52°	+54°	+56°	+58°	+60°
July	h m	h m	h m	h m	h m	h m	h m	h m	h m	h m	h m	h m	h m
1	6 21	6 35	6 50	7 6	7 16	7 28	7 41	7 57	8 4	8 12	8 22	8 33	8 45
2	7 8	7 20	7 33	7 47	7 56	8 6	8 17	8 30	8 37	8 44	8 52	9 0	9 16
3	7 53	8 3	8 14	8 26	8 32	8 40	8 49	9 0	9 5	9 10	9 16	9 23	9 31
4	8 38	8 45	8 53	9 2	9 6	9 12	9 18	9 26	9 30	9 34	9 38	9 42	9 48
5	9 23	9 27	9 31	9 36	9 39	9 42	9 46	9 50	9 52	9 54	9 57	10 0	10 3
6	10 7	10 8	10 9	10 10	10 11	10 12	10 13	10 14	10 14	10 15	10 15	10 16	10 17
7	10 53	10 51	10 48	10 45	10 44	10 42	10 40	10 38	10 36	10 35	10 34	10 32	10 30
8	11 40	11 35	11 29	11 22	11 18	11 14	11 9	11 3	11 0	10 57	10 54	10 50	10 46
9	12 30	12 22	12 12	12 2	11 56	11 49	11 41	11 31	11 27	11 22	11 17	11 11	11 4
10	13 24	13 12	13 0	12 46	12 38	12 28	12 18	12 5	11 59	11 52	11 45	11 37	11 27
11	14 21	14 7	13 52	13 36	13 26	13 15	13 2	12 46	12 38	12 30	12 21	12 11	11 59
12	15 22	15 6	14 50	14 32	14 21	14 9	13 54	13 36	13 28	13 19	13 8	12 56	12 43
13	16 24	16 9	15 52	15 34	15 23	15 10	14 56	14 38	14 29	14 20	14 9	13 57	13 43
14	17 27	17 13	16 57	16 40	16 30	16 19	16 5	15 49	15 41	15 32	15 23	15 12	14 59
15	18 27	18 16	18 3	17 49	17 41	17 31	17 20	17 6	17 0	16 53	16 45	16 36	16 26
16	19 25	19 16	19 7	18 57	18 50	18 44	18 36	18 26	18 21	18 16	18 11	18 5	17 56
17	20 19	20 14	20 9	20 2	19 59	19 55	19 50	19 44	19 42	19 39	19 36	19 32	19 28
18	21 10	21 9	21 7	21 6	21 4	21 3	21 2	21 0	21 0	20 59	20 58	20 57	20 56
19	21 59	22 1	22 3	22 6	22 7	22 9	22 11	22 13	22 14	22 15	22 17	22 18	22 20
20	22 47	22 52	22 58	23 4	23 8	23 12	23 18	23 23	23 26	23 29	23 33	23 37	23 41
21	23 33	23 42	23 51	...	...	...	...	...	...	...	...	...	...
22	...	...	...	0 1	0 7	0 14	0 22	0 31	0 35	0 40	0 46	0 52	0 56
23	0 20	0 31	0 43	0 56	1 4	1 13	1 23	1 36	1 42	1 48	1 56	2 4	2 14
24	1 7	1 20	1 34	1 50	1 59	2 10	2 22	2 38	2 45	2 53	3 2	3 12	3 24
25	1 54	2 9	2 24	2 42	2 52	3 4	3 18	3 35	3 44	3 53	4 3	4 14	4 28
26	2 42	2 57	3 13	3 32	3 43	3 56	4 10	4 28	4 37	4 46	4 57	5 9	5 24
27	3 30	3 45	4 1	4 20	4 31	4 43	4 58	5 15	5 24	5 33	5 44	5 56	6 10
28	4 18	4 32	4 47	5 5	5 15	5 26	5 40	5 57	6 4	6 13	6 23	6 34	6 46
29	5 5	5 18	5 31	5 47	5 56	6 6	6 18	6 32	6 39	6 46	6 55	7 4	7 15
30	5 51	6 2	6 13	6 26	6 33	6 42	6 52	7 3	7 9	7 15	7 22	7 29	7 38
31	6 37	6 45	6 53	7 3	7 9	7 15	7 22	7 31	7 35	7 40	7 45	7 50	7 56
Aug.	7 22	7 27	7 32	7 38	7 42	7 46	7 51	7 56	7 59	8 2	8 5	8 8	8 12
1	8 7	8 9	8 11	8 13	8 15	8 16	8 18	8 20	8 21	8 22	8 24	8 25	8 26
2	8 7	8 9	8 11	8 13	8 15	8 16	8 18	8 20	8 21	8 22	8 24	8 25	8 26
3	8 52	8 51	8 49	8 48	8 47	8 46	8 45	8 44	8 44	8 43	8 42	8 41	8 40
4	9 38	9 34	9 29	9 24	9 21	9 18	9 14	9 9	9 7	9 4	9 2	8 59	8 56
5	10 27	10 19	10 11	10 2	9 57	9 51	9 44	9 36	9 32	9 28	9 23	9 18	9 12
6	11 18	11 7	10 56	10 43	10 36	10 28	10 18	10 7	10 1	9 55	9 49	9 41	9 34
7	12 12	11 59	11 45	11 30	11 20	11 10	10 58	10 44	10 37	10 29	10 21	10 11	10 1
8	13 9	12 55	12 39	12 21	12 11	11 59	11 45	11 28	11 20	11 12	11 2	10 50	10 38
9	14 9	13 54	13 37	13 19	13 8	12 55	12 41	12 23	12 14	12 5	11 54	11 42	11 28
10	15 9	14 55	14 40	14 21	14 11	13 59	13 45	13 27	13 19	13 10	13 0	12 48	12 35
11	16 10	15 57	15 43	15 27	15 18	15 8	14 55	14 40	14 33	14 25	14 16	14 6	13 55
12	17 8	16 58	16 47	16 34	16 27	16 19	16 9	15 58	15 52	15 46	15 40	15 32	15 23
13	18 4	17 57	17 50	17 41	17 36	17 31	17 24	17 18	17 13	17 9	17 4	17 0	16 54
14	18 57	18 54	18 50	18 46	18 44	18 41	18 38	18 33	18 32	18 31	18 28	18 26	18 24
15	19 48	19 48	19 48	19 49	19 49	19 49	19 50	19 50	19 50	19 50	19 50	19 51	19 51
16	20 38	20 41	20 45	20 50	20 52	20 55	20 59	21 3	21 5	21 7	21 10	21 12	21 15

LOCAL ASTRONOMICAL MEAN TIME OF MOONSET (MOON'S UPPER LIMB),  
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Lat.		0°	+10°	+20°	+30°	+35°	+40°	+45°	+50°	+52°	+54°	+56°	+58°	+60°
July	1	h m 18 44	h m 18 31	h m 18 17	h m 18 1	h m 17 51	h m 17 41	h m 17 28	h m 17 13	h m 17 6	h m 16 58	h m 16 48	h m 16 38	h m 16 26
	2	19 30	19 19	19 7	18 54	18 46	18 37	18 26	18 14	18 7	18 1	17 54	17 45	17 36
	3	20 15	20 7	19 58	19 47	19 41	19 34	19 26	19 16	19 12	19 7	19 2	18 55	18 48
	4	21 0	20 54	20 48	20 41	20 37	20 33	20 27	20 21	20 18	20 15	20 11	20 7	20 3
	5	21 44	21 42	21 39	21 36	21 34	21 32	21 30	21 27	21 25	21 24	21 22	21 21	21 19
	6	22 29	22 30	22 31	22 31	22 32	22 32	22 33	22 34	22 34	22 35	22 35	22 36	22 36
	7	23 15	23 20	23 24	23 29	23 31	23 35	23 38	23 43	23 45	23 47	23 50	23 52	23 55
	8	...	...	...	...	...	...	...	...	...	...	...	...	...
	9	0 4	0 11	0 19	0 28	0 33	0 39	0 46	0 54	0 58	1 2	1 6	1 12	1 17
	10	0 55	1 6	1 17	1 29	1 37	1 45	1 55	2 6	2 12	2 18	2 25	2 33	2 41
	11	1 51	2 4	2 17	2 38	2 42	2 53	3 5	3 20	3 27	3 35	3 44	3 54	4 6
	12	2 50	3 4	3 20	3 38	3 48	4 0	4 15	4 32	4 40	4 49	5 0	5 11	5 25
	13	3 51	4 6	4 23	4 42	4 53	5 5	5 20	5 38	5 47	5 56	6 7	6 19	6 34
	14	4 54	5 8	5 24	5 42	5 53	6 5	6 18	6 36	6 44	6 52	7 3	7 14	7 27
	15	5 56	6 8	6 22	6 38	6 47	6 57	7 9	7 24	7 31	7 38	7 46	7 56	8 6
	16	6 55	7 5	7 16	7 28	7 35	7 43	7 52	8 3	8 8	8 14	8 20	8 27	8 35
	17	7 51	7 58	8 5	8 13	8 18	8 23	8 29	8 37	8 40	8 44	8 48	8 52	8 57
	18	8 44	8 47	8 51	8 54	8 57	8 59	9 2	9 5	9 7	9 9	9 11	9 13	9 15
	19	9 34	9 34	9 33	9 33	9 33	9 32	9 32	9 32	9 32	9 32	9 31	9 31	9 31
	20	10 22	10 18	10 14	10 10	10 8	10 5	10 1	9 57	9 55	9 53	9 51	9 49	9 46
	21	11 9	11 2	10 55	10 47	10 42	10 37	10 30	10 23	10 20	10 16	10 12	10 7	10 2
	22	11 56	11 46	11 36	11 24	11 18	11 10	11 1	10 50	10 45	10 40	10 34	10 27	10 20
	23	12 43	12 31	12 18	12 3	11 55	11 45	11 34	11 21	11 14	11 7	11 0	10 51	10 41
	24	13 30	13 16	13 2	12 45	12 35	12 24	12 11	11 55	11 48	11 39	11 30	11 19	11 7
	25	14 18	14 3	13 47	13 29	13 18	13 6	12 52	12 34	12 26	12 17	12 6	11 54	11 41
	26	15 6	14 50	14 34	14 15	14 4	13 52	13 37	13 19	13 11	13 1	12 50	12 38	12 24
	27	15 53	15 39	15 23	15 5	14 54	14 42	14 27	14 10	14 2	13 52	13 42	13 30	13 16
	28	16 41	16 27	16 13	15 56	15 46	15 35	15 22	15 6	14 58	14 50	14 40	14 30	14 17
	29	17 28	17 16	17 3	16 49	16 40	16 31	16 19	16 6	15 59	15 52	15 44	15 35	15 25
	30	18 13	18 4	17 54	17 42	17 36	17 28	17 19	17 8	17 3	16 58	16 51	16 44	16 37
	Aug.	31	18 59	18 52	18 45	18 37	18 32	18 27	18 20	18 13	18 9	18 6	18 1	17 56
1		19 43	19 40	19 36	19 32	19 29	19 26	19 22	19 18	19 17	19 15	19 12	19 10	19 7
2		20 28	20 28	20 28	20 27	20 27	20 26	20 26	20 25	20 25	20 25	20 25	20 24	20 24
3		21 14	21 17	21 20	21 24	21 25	21 27	21 30	21 34	21 35	21 37	21 38	21 40	21 42
4		22 1	22 7	22 14	22 21	22 26	22 31	22 36	22 43	22 46	22 50	22 54	22 58	23 3
5		22 51	23 0	23 10	23 21	23 28	23 35	23 43	23 54	23 59	...	...	...	...
6		23 43	23 55	...	...	...	...	...	...	...	0 4	0 10	0 17	0 24
7		...	...	0 8	0 22	0 31	0 40	0 52	1 6	1 12	1 19	1 27	1 36	1 46
8		0 39	0 53	1 8	1 25	1 35	1 46	2 0	2 16	2 24	2 32	2 42	2 52	3 5
9		1 37	1 52	2 8	2 27	2 38	2 50	3 4	3 22	3 31	3 40	3 50	4 2	4 16
10		2 38	2 53	3 9	3 27	3 38	3 50	4 4	4 22	4 30	4 40	4 50	5 2	5 15
11		3 38	3 52	4 7	4 24	4 34	4 45	4 58	5 13	5 21	5 29	5 38	5 48	6 0
12		4 38	4 49	5 2	5 16	5 24	5 33	5 44	5 56	6 2	6 9	6 16	6 24	6 34
13		5 35	5 44	5 53	6 3	6 9	6 16	6 23	6 32	6 37	6 41	6 47	6 52	6 59
14		6 30	6 35	6 40	6 46	6 50	6 54	6 58	7 4	7 6	7 9	7 12	7 15	7 19
15	7 22	7 23	7 25	7 27	7 28	7 29	7 30	7 32	7 33	7 34	7 34	7 35	7 36	
16	8 12	8 10	8 8	8 5	8 4	8 2	8 1	7 59	7 57	7 56	7 55	7 54	7 52	

LOCAL ASTRONOMICAL MEAN TIME OF MOONRISE (MOON'S UPPER LIMB,  
MERIDIAN OF GREENWICH, 1920.

To obtain civil time, write P. M. after the astronomical time if it is less than twelve hours, if greater than twelve hours, subtract twelve hours from it, mark the result A. M., and add one to the day.

To obtain standard time, see directions on page 712.

For other longitudes and for southern latitudes see page 746.

Lat.	0°	+10°	+20°	+30°	+35°	+40°	+45°	+50°	+52°	+54°	+56°	+58°	+60°
Aug. 16	h m	h m	h m	h m	h m	h m	h m	h m	h m	h m	h m	h m	h m
17	20 38	20 41	20 45	20 50	20 52	20 55	20 59	21 3	21 5	21 7	21 10	21 12	21 15
18	21 26	21 33	21 40	21 49	21 54	21 59	22 6	22 14	22 17	22 21	22 26	22 31	22 36
19	22 14	22 23	22 34	22 46	22 53	23 1	23 10	23 21	23 26	23 32	23 39	23 46	23 54
20	23 1	23 13	23 26	23 41	23 50	0 0	0 11	0 25	0 32	0 39	0 48	0 57	1 7
21	0 0	0 8	0 18	0 35	0 44	0 56	1 9	1 25	1 33	1 42	1 51	2 2	2 15
22	0 37	0 52	1 8	1 26	1 36	1 49	2 3	2 20	2 29	2 38	2 49	3 0	3 14
23	1 25	1 40	1 56	2 14	2 25	2 38	2 52	3 10	3 18	3 28	3 38	3 50	4 4
24	2 13	2 27	2 43	3 0	3 11	3 23	3 37	3 53	4 1	4 10	4 20	4 32	4 45
25	3 0	3 13	3 27	3 44	3 58	4 4	4 16	4 32	4 38	4 46	4 55	5 5	5 16
26	3 47	3 58	4 10	4 24	4 32	4 41	4 52	5 4	5 10	5 17	5 24	5 32	5 42
27	4 33	4 42	4 51	5 2	5 8	5 16	5 24	5 34	5 38	5 43	5 49	5 55	6 2
28	5 18	5 25	5 31	5 39	5 43	5 48	5 54	6 0	6 3	6 7	6 10	6 15	6 19
29	6 4	6 7	6 10	6 14	6 16	6 19	6 22	6 27	6 27	6 28	6 30	6 32	6 34
30	6 50	6 50	6 50	6 50	6 50	6 50	6 49	6 49	6 49	6 49	6 49	6 49	6 49
Sept. 31	7 36	7 33	7 30	7 26	7 23	7 21	7 18	7 14	7 13	7 11	7 9	7 7	7 4
1	8 25	8 18	8 11	8 3	7 59	7 54	7 48	7 41	7 38	7 34	7 30	7 26	7 21
2	9 15	9 6	8 56	8 44	8 38	8 30	8 21	8 11	8 6	8 1	7 55	7 48	7 41
3	10 8	9 56	9 43	9 29	9 20	9 10	8 59	8 46	8 40	8 33	8 25	8 16	8 6
4	11 4	10 50	10 35	10 18	10 8	9 57	9 43	9 28	9 20	9 12	9 2	8 52	8 40
5	12 1	11 46	11 30	11 12	11 1	10 49	10 35	10 18	10 9	10 0	9 50	9 38	9 25
6	13 0	12 45	12 29	12 11	12 1	11 48	11 34	11 17	11 9	10 59	10 49	10 37	10 24
7	13 58	13 45	13 30	13 14	13 4	12 53	12 40	12 24	12 17	12 8	11 59	11 48	11 36
8	14 56	14 44	14 32	14 18	14 10	14 1	13 50	13 37	13 31	13 24	13 17	13 8	12 59
9	15 51	15 43	15 34	15 24	15 18	15 11	15 3	14 53	14 49	14 44	14 39	14 33	14 26
10	16 45	16 40	16 34	16 28	16 24	16 20	16 16	16 10	16 7	16 5	16 1	15 58	15 54
11	17 36	17 35	17 33	17 31	17 30	17 29	17 28	17 26	17 25	17 24	17 23	17 22	17 21
12	18 26	18 28	18 30	18 33	18 34	18 36	18 38	18 40	18 41	18 42	18 44	18 45	18 47
13	19 15	19 21	19 26	19 33	19 37	19 41	19 46	19 52	19 55	19 58	20 2	20 6	20 10
14	20 4	20 12	20 22	20 32	20 38	20 44	20 53	21 2	21 7	21 12	21 17	21 23	21 30
15	20 53	21 4	21 15	21 29	21 37	21 46	21 56	22 9	22 15	22 22	22 29	22 37	22 46
16	21 41	21 54	22 8	22 24	22 33	22 44	22 56	23 12	23 19	23 27	23 36	23 46	23 58
17	22 30	22 44	22 59	23 17	23 27	23 39	23 53	0 10	0 18	0 26	0 36	0 48	1 1
18	23 18	23 33	23 49	0 7	0 18	0 30	0 44	1 2	1 10	1 19	1 30	1 42	1 56
19	0 6	0 21	0 36	0 54	1 5	1 16	1 31	1 48	1 56	2 5	2 15	2 26	2 40
20	0 53	1 7	1 22	1 38	1 48	1 59	2 12	2 28	2 35	2 44	2 53	3 3	3 15
21	1 40	1 52	2 5	2 20	2 28	2 38	2 49	3 3	3 9	3 16	3 24	3 33	3 43
22	2 26	2 36	2 46	2 59	3 6	3 14	3 23	3 34	3 39	3 44	3 50	3 57	4 5
23	3 12	3 19	3 27	3 36	3 41	3 47	3 53	4 1	4 5	4 9	4 13	4 18	4 24
24	3 57	4 2	4 6	4 12	4 15	4 18	4 22	4 27	4 29	4 32	4 34	4 37	4 40
25	4 44	4 45	4 46	4 48	4 48	4 49	4 51	4 52	4 52	4 53	4 54	4 55	4 56
26	5 31	5 29	5 28	5 24	5 23	5 21	5 19	5 17	5 16	5 15	5 14	5 12	5 11
27	6 19	6 14	6 8	6 2	5 58	5 54	5 49	5 44	5 41	5 38	5 35	5 32	5 28
28	7 10	7 2	6 53	6 42	6 37	6 30	6 22	6 13	6 9	6 4	5 59	5 54	5 47
29	8 3	7 52	7 40	7 27	7 19	7 10	7 0	6 47	6 41	6 35	6 28	6 20	6 11
Oct. 1	8 59	8 46	8 31	8 15	8 6	7 55	7 43	7 28	7 20	7 12	7 4	6 54	6 42



TABLE X.

LOCAL ASTRONOMICAL MEAN TIME OF MOONSET (MOON'S UPPER LIMB),  
MERIDIAN OF GREENWICH, 1920.

To obtain civil time, write P. M. after the astronomical time if it is less than twelve hours; if greater than twelve hours, subtract twelve hours from it, mark the result A. M., and add one to the day.

To obtain standard time, see directions on page 712.

For other longitudes and for southern latitudes see page 746.

Lat. Data.	0°	+10°	+20°	+30°	+35°	+40°	+45°	+50°	+52°	+54°	+56°	+58°	+60°
Aug. 16	h m 8 12	h m 8 10	h m 8 8	h m 8 5	h m 8 4	h m 8 2	h m 8 1	h m 7 59	h m 7 57	h m 7 56	h m 7 55	h m 7 54	h m 7 52
17	9 1	8 55	8 50	8 43	8 40	8 35	8 31	8 25	8 22	8 19	8 16	8 13	8 9
18	9 49	9 40	9 32	9 22	9 16	9 9	9 2	8 52	8 48	8 43	8 38	8 33	8 26
19	10 37	10 26	10 14	10 1	9 53	9 44	9 34	9 22	9 16	9 10	9 3	8 55	8 47
20	11 24	11 12	10 58	10 42	10 33	10 22	10 10	9 55	9 48	9 41	9 32	9 22	9 11
21	12 12	11 58	11 43	11 25	11 15	11 3	10 49	10 33	10 25	10 16	10 6	9 55	9 42
22	13 0	12 45	12 29	12 11	12 0	11 48	11 33	11 16	11 7	10 58	10 48	10 36	10 22
23	13 48	13 33	13 18	12 59	12 48	12 36	12 22	12 4	11 56	11 46	11 36	11 24	11 10
24	14 36	14 22	14 7	13 50	13 40	13 28	13 14	12 58	12 50	12 41	12 32	12 20	12 8
25	15 23	15 10	14 57	14 42	14 33	14 23	14 11	13 56	13 50	13 42	13 33	13 24	13 13
26	16 9	15 59	15 48	15 35	15 28	15 20	15 10	14 58	14 52	14 46	14 39	14 32	14 23
27	16 55	16 47	16 39	16 30	16 24	16 18	16 11	16 2	15 58	15 53	15 48	15 43	15 36
28	17 40	17 36	17 30	17 25	17 21	17 18	17 13	17 8	17 5	17 3	17 0	16 56	16 52
29	18 26	18 24	18 23	18 21	18 20	18 18	18 17	18 15	18 14	18 13	18 12	18 11	18 10
30	19 12	19 14	19 16	19 18	19 19	19 20	19 22	19 24	19 24	19 25	19 26	19 27	19 29
Sept. 31	20 0	20 4	20 10	20 16	20 19	20 23	20 28	20 34	20 36	20 39	20 42	20 46	20 49
1	20 49	20 57	21 6	21 15	21 21	21 28	21 35	21 44	21 49	21 54	21 58	22 4	22 11
2	21 40	21 51	22 3	22 16	22 24	22 33	22 43	22 56	23 2	23 8	23 16	23 24	23 33
3	22 34	22 48	23 2	23 18	23 27	23 38	23 50	.....	.....	.....	.....	.....	.....
4	23 31	23 46	.....	.....	.....	.....	.....	0 6	0 13	0 21	0 30	0 40	0 52
5	.....	.....	0 1	0 19	0 29	0 41	0 55	1 13	1 21	1 30	1 40	1 52	2 5
6	0 29	0 44	1 0	1 18	1 29	1 41	1 56	2 13	2 22	2 31	2 41	2 53	3 7
7	1 28	1 42	1 57	2 15	2 25	2 36	2 50	3 6	3 14	3 22	3 32	3 43	3 55
8	2 26	2 38	2 52	3 7	3 15	3 26	3 37	3 51	3 58	4 5	4 13	4 22	4 32
9	3 22	3 32	3 43	3 55	4 2	4 9	4 18	4 29	4 34	4 40	4 46	4 52	5 0
10	4 17	4 24	4 31	4 39	4 43	4 48	4 54	5 2	5 5	5 9	5 13	5 17	5 22
11	5 9	5 13	5 16	5 20	5 22	5 25	5 28	5 31	5 32	5 34	5 36	5 38	5 40
12	6 0	6 0	6 0	5 59	5 59	5 59	5 58	5 58	5 58	5 58	5 58	5 57	5 57
13	6 50	6 46	6 42	6 38	6 35	6 32	6 29	6 25	6 23	6 21	6 19	6 16	6 14
14	7 39	7 32	7 25	7 16	7 12	7 6	7 0	6 52	6 49	6 45	6 41	6 36	6 31
15	8 28	8 18	8 8	7 56	7 49	7 41	7 32	7 22	7 16	7 11	7 5	6 58	6 51
16	9 16	9 4	8 51	8 37	8 28	8 19	8 7	7 54	7 48	7 40	7 33	7 24	7 14
17	10 5	9 51	9 36	9 20	9 10	8 59	8 46	8 30	8 23	8 15	8 5	7 55	7 43
18	10 53	10 39	10 23	10 5	9 54	9 42	9 28	9 11	9 3	8 54	8 44	8 32	8 19
19	11 41	11 27	11 11	10 52	10 42	10 30	10 15	9 58	9 49	9 40	9 30	9 18	9 4
20	12 29	12 15	12 0	11 42	11 32	11 20	11 6	10 49	10 41	10 32	10 22	10 11	9 58
21	13 16	13 3	12 49	12 33	12 24	12 13	12 1	11 46	11 38	11 30	11 22	11 11	11 0
22	14 2	13 51	13 40	13 26	13 18	13 9	12 58	12 45	12 39	12 33	12 25	12 17	12 7
23	14 48	14 40	14 30	14 20	14 13	14 6	13 58	13 48	13 43	13 38	13 32	13 26	13 19
24	15 34	15 28	15 22	15 14	15 10	15 5	15 0	14 53	14 50	14 46	14 43	14 39	14 34
25	16 20	16 17	16 14	16 10	16 8	16 6	16 3	16 0	15 58	15 57	15 55	15 53	15 51
26	17 6	17 6	17 7	17 7	17 8	17 8	17 8	17 9	17 9	17 9	17 9	17 9	17 10
27	17 54	17 57	18 1	18 6	18 8	18 11	18 15	18 19	18 21	18 23	18 25	18 28	18 31
28	18 43	18 50	18 58	19 6	19 11	19 17	19 23	19 31	19 35	19 39	19 43	19 48	19 54
29	19 35	19 45	19 56	20 8	20 15	20 23	20 32	20 44	20 49	20 55	21 2	21 9	21 17
30	20 30	20 42	20 55	21 11	21 20	21 30	21 42	21 56	22 3	22 10	22 19	22 28	22 39
Oct. 1	21 26	21 40	21 56	22 13	22 23	22 34	22 48	23 5	23 12	23 21	23 31	23 42	23 55

LOCAL ASTRONOMICAL MEAN TIME OF MOONRISE (MOON'S UPPER LIMB  
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To obtain standard time, see directions on page 712.

For other longitudes and for southern latitudes see page 746.

Date.	Lat.	0°	+10°	+20°	+30°	+35°	+40°	+45°	+50°	+52°	+54°	+56°	+58°	-60°
Oct.	1	8 59	8 46	8 31	8 15	8 6	7 55	7 43	7 28	7 20	7 12	7 4	6 54	6 42
	2	9 58	9 42	9 26	9 8	8 58	8 46	8 32	8 15	8 7	7 59	7 48	7 37	7 24
	3	10 55	10 40	10 24	10 6	9 56	9 43	9 29	9 12	9 4	8 54	8 44	8 32	8 19
	4	11 53	11 39	11 24	11 7	10 57	10 46	10 32	10 16	10 8	10 0	9 50	9 39	9 27
	5	12 50	12 38	12 25	12 10	12 1	11 52	11 40	11 26	11 20	11 13	11 4	10 55	10 45
	6	13 44	13 35	13 25	13 13	13 7	12 59	12 50	12 40	12 35	12 29	12 23	12 16	12 8
	7	14 37	14 30	14 24	14 16	14 12	14 7	14 1	13 54	13 51	13 47	13 43	13 39	13 34
	8	15 28	15 25	15 22	15 18	15 16	15 14	15 11	15 9	15 7	15 5	15 3	15 1	14 58
	9	16 17	16 18	16 18	16 19	16 19	16 20	16 20	16 21	16 21	16 22	16 22	16 22	16 22
	10	17 6	17 10	17 14	17 19	17 22	17 25	17 29	17 33	17 35	17 37	17 40	17 43	17 46
	11	17 54	18 2	18 9	18 18	18 23	18 29	18 35	18 43	18 47	18 51	18 56	19 1	19 7
	12	18 43	18 53	19 3	19 16	19 23	19 31	19 40	19 51	19 57	20 2	20 9	20 16	20 25
	13	19 32	19 44	19 57	20 12	20 21	20 31	20 42	20 56	21 3	21 10	21 19	21 28	21 39
	14	20 21	20 35	20 49	21 6	21 16	21 28	21 41	21 57	22 5	22 13	22 23	22 34	22 46
	15	21 10	21 24	21 40	21 58	22 9	22 21	22 35	22 52	23 0	23 9	23 20	23 32	23 45
	16	21 58	22 13	22 29	22 47	22 57	23 10	23 24	23 41	23 49	23 58	.....	.....	.....
	17	22 46	23 0	23 15	23 32	23 42	23 54	.....	.....	.....	.....	0 9	0 20	0 34
	18	23 33	23 46	23 59	.....	.....	.....	0 7	0 24	0 31	0 39	0 49	1 0	1 13
	19	.....	.....	.....	0 15	0 24	0 34	0 46	1 0	1 7	1 14	1 23	1 32	1 43
	20	0 19	0 30	0 41	0 54	1 2	1 10	1 20	1 32	1 38	1 44	1 51	1 59	2 8
	21	1 4	1 12	1 21	1 31	1 37	1 44	1 52	2 1	2 5	2 10	2 15	2 21	2 27
	22	1 49	1 55	2 1	2 7	2 11	2 16	2 21	2 27	2 30	2 33	2 36	2 40	2 44
	23	2 34	2 37	2 40	2 43	2 45	2 47	2 49	2 52	2 53	2 55	2 56	2 58	3 0
	24	3 21	3 20	3 20	3 19	3 18	3 18	3 18	3 17	3 17	3 16	3 16	3 16	3 16
	25	4 9	4 5	4 1	3 56	3 54	3 51	3 47	3 43	3 41	3 39	3 37	3 34	3 32
	26	4 59	4 52	4 44	4 36	4 31	4 26	4 19	4 12	4 8	4 4	4 0	3 56	3 50
	27	5 52	5 42	5 32	5 19	5 12	5 4	4 55	4 44	4 39	4 33	4 27	4 20	4 12
	28	6 49	6 36	6 23	6 8	5 59	5 49	5 37	5 23	5 16	5 9	5 1	4 52	4 41
	29	7 47	7 33	7 18	7 0	6 50	6 39	6 26	6 9	6 1	5 53	5 43	5 32	5 20
	30	8 47	8 32	8 17	7 58	7 48	7 36	7 22	7 4	6 56	6 47	6 37	6 26	6 12
Nov.	31	9 47	9 33	9 18	9 0	8 50	8 38	8 25	8 8	8 0	7 51	7 41	7 30	7 17
	1	10 45	10 32	10 19	10 4	9 55	9 44	9 32	9 18	9 10	9 3	8 54	8 45	8 34
	2	11 41	11 30	11 20	11 7	11 0	10 52	10 42	10 30	10 25	10 19	10 12	10 5	9 56
	3	12 34	12 26	12 19	12 10	12 5	11 59	11 52	11 44	11 40	11 36	11 32	11 27	11 21
	4	13 24	13 20	13 16	13 11	13 8	13 5	13 2	12 57	12 55	12 53	12 51	12 48	12 45
	5	14 13	14 12	14 12	14 11	14 11	14 10	14 10	14 9	14 9	14 9	14 8	14 8	14 8
	6	15 1	15 4	15 7	15 10	15 12	15 14	15 17	15 20	15 22	15 23	15 25	15 27	15 29
	7	15 49	15 55	16 1	16 8	16 12	16 17	16 23	16 30	16 33	16 36	16 40	16 44	16 49
	8	16 36	16 45	16 55	17 6	17 12	17 19	17 27	17 37	17 42	17 47	17 53	18 0	18 7
	9	17 25	17 36	17 48	18 2	18 10	18 19	18 30	18 43	18 49	18 56	19 4	19 12	19 22
	10	18 13	18 26	18 41	18 57	19 6	19 17	19 30	19 45	19 52	20 1	20 10	20 20	20 32
	11	19 2	19 17	19 32	19 50	20 0	20 12	20 26	20 43	20 51	21 0	21 10	21 22	21 35
	12	19 51	20 6	20 22	20 40	20 51	21 3	21 17	21 34	21 43	21 52	22 2	22 14	22 28
	13	20 39	20 54	21 9	21 27	21 37	21 49	22 3	22 20	22 28	22 36	22 46	22 58	23 11
	14	21 27	21 40	21 54	22 10	22 20	22 31	22 43	22 59	23 6	23 14	23 23	23 33	23 44
15	22 13	22 24	22 37	22 51	22 59	23 8	23 19	23 32	23 38	23 45	23 53	.....	.....	
16	22 58	23 7	23 17	23 28	23 35	23 43	23 51	.....	.....	.....	.....	0 1	0 11	
17	23 42	23 49	23 56	.....	.....	.....	.....	0 2	0 7	0 12	0 18	0 24	0 31	

# TABLE X.

## LOCAL ASTRONOMICAL MEAN TIME OF MOONSET (MOON'S UPPER LIMB), MERIDIAN OF GREENWICH, 1920.

To obtain civil time, write P. M. after the astronomical time if it is less than twelve hours; if greater than twelve hours, subtract twelve hours from it, mark the result A. M., and add one to the day.

To obtain standard time, see directions on page 712.

For other longitudes and for southern latitudes see page 746.

Date.	Lat.	0°	+10°	+20°	+30°	+35°	+40°	+45°	+50°	+52°	+54°	+56°	+58°	+60°	
		h m	h m	h m	h m	h m	h m	h m	h m	h m	h m	h m	h m	h m	
Oct.	1	21 26	21 40	21 56	22 13	22 23	22 34	22 48	23 5	23 12	23 21	23 31	23 42	23 55	
	2	22 24	22 39	22 55	23 13	23 24	23 38	23 50	.....	0 8	0 16	0 25	0 35	0 47	1 1
	3	23 23	23 37	23 53	.....	0 10	0 20	0 32	0 46	1 3	1 10	1 19	1 29	1 40	1 53
	4	.....	.....	.....	0 10	0 20	0 32	0 46	1 3	1 10	1 19	1 29	1 40	1 53	.....
	5	0 20	0 33	0 47	1 3	1 12	1 22	1 35	1 49	1 56	2 4	2 12	2 22	2 33	.....
	6	1 16	1 27	1 38	1 51	1 58	2 7	2 17	2 28	2 34	2 40	2 47	2 54	3 2	.....
	7	2 10	2 18	2 26	2 35	2 41	2 47	2 54	3 2	3 6	3 10	3 15	3 20	3 26	.....
	8	3 1	3 6	3 11	3 16	3 19	3 23	3 27	3 32	3 34	3 36	3 39	3 42	3 45	.....
	9	3 51	3 53	3 54	3 55	3 56	3 57	3 58	3 59	4 0	4 0	4 1	4 1	4 2	.....
	10	4 41	4 38	4 36	4 33	4 32	4 30	4 28	4 26	4 24	4 23	4 22	4 20	4 19	.....
	11	5 29	5 24	5 18	5 11	5 8	5 3	4 58	4 52	4 50	4 46	4 43	4 39	4 35	.....
	12	6 18	6 9	6 0	5 50	5 44	5 38	5 30	5 21	5 16	5 12	5 6	5 0	4 54	.....
	13	7 7	6 56	6 44	6 31	6 23	6 14	6 4	5 52	5 46	5 39	5 32	5 25	5 16	.....
	14	7 56	7 43	7 29	7 13	7 4	6 53	6 41	6 26	6 20	6 12	6 3	5 54	5 42	.....
	15	8 45	8 31	8 16	7 58	7 48	7 36	7 23	7 6	6 58	6 49	6 40	6 28	6 16	.....
	16	9 34	9 19	9 3	8 45	8 34	8 22	8 8	7 50	7 42	7 33	7 23	7 11	6 58	.....
	17	10 22	10 7	9 52	9 34	9 23	9 12	8 57	8 40	8 32	8 23	8 13	8 1	7 48	.....
	18	11 9	10 55	10 41	10 24	10 15	10 4	9 51	9 35	9 27	9 19	9 10	8 59	8 47	.....
	19	11 55	11 43	11 31	11 16	11 8	10 58	10 47	10 33	10 26	10 19	10 11	10 2	9 52	.....
	20	12 41	12 31	12 21	12 9	12 2	11 54	11 45	11 34	11 28	11 22	11 16	11 9	11 1	.....
	21	13 26	13 19	13 11	13 2	12 57	12 51	12 45	12 36	12 33	12 29	12 24	12 19	12 13	.....
	22	14 11	14 7	14 2	13 57	13 54	13 50	13 46	13 42	13 39	13 37	13 34	13 32	13 28	.....
	23	14 56	14 55	14 54	14 53	14 52	14 51	14 50	14 49	14 48	14 48	14 47	14 46	14 45	.....
	24	15 43	15 45	15 48	15 50	15 52	15 54	15 56	15 58	15 59	16 1	16 2	16 3	16 5	.....
	25	16 32	16 38	16 44	16 50	16 54	16 59	17 4	17 10	17 13	17 16	17 20	17 23	17 28	.....
	26	17 24	17 33	17 42	17 53	17 59	18 6	18 14	18 24	18 28	18 33	18 39	18 45	18 52	.....
	27	18 19	18 30	18 43	18 57	19 5	19 14	19 25	19 38	19 44	19 51	19 59	20 8	20 17	.....
	28	19 16	19 30	19 44	20 1	20 11	20 22	20 35	20 51	20 58	21 6	21 16	21 26	21 38	.....
	29	20 16	20 30	20 46	21 4	21 15	21 27	21 41	21 58	22 6	22 15	22 26	22 37	22 51	.....
	30	21 16	21 31	21 46	22 4	22 15	22 26	22 41	22 58	23 6	23 15	23 25	23 36	23 49	.....
Nov.	31	22 15	22 28	22 43	22 59	23 9	23 20	23 32	23 48	23 55	.....	.....	.....	.....	
	1	23 12	23 24	23 38	23 50	23 58	.....	0 7	0 17	0 30	0 36	0 42	0 58	1 7	
	2	.....	.....	.....	.....	.....	.....	0 7	0 17	0 30	0 36	0 42	0 58	1 7	
	3	0 6	0 15	0 24	0 35	0 41	0 48	0 56	1 5	1 9	1 14	1 19	1 25	1 32	
	4	0 58	1 4	1 10	1 16	1 20	1 24	1 29	1 35	1 38	1 41	1 44	1 48	1 52	
	5	1 48	1 50	1 52	1 55	1 57	1 58	2 0	2 3	2 4	2 5	2 6	2 8	2 9	
	6	2 36	2 35	2 34	2 33	2 32	2 31	2 30	2 29	2 28	2 28	2 27	2 26	2 25	
	7	3 24	3 20	3 15	3 10	3 7	3 3	2 59	2 55	2 52	2 50	2 48	2 45	2 41	
	8	4 12	4 4	3 56	3 47	3 42	3 36	3 30	3 22	3 18	3 14	3 10	3 4	2 59	
	9	5 0	4 50	4 39	4 27	4 20	4 12	4 2	3 51	3 46	3 40	3 34	3 27	3 19	
	10	5 48	5 36	5 23	5 8	4 59	4 50	4 38	4 24	4 18	4 10	4 2	3 53	3 43	
	11	6 37	6 23	6 9	5 52	5 42	5 31	5 18	5 2	4 54	4 46	4 36	4 26	4 14	
	12	7 28	7 12	6 56	6 38	6 28	6 16	6 1	5 44	5 36	5 27	5 17	5 5	4 52	
	13	8 15	8 0	7 44	7 26	7 16	7 4	6 50	6 32	6 24	6 15	6 4	5 53	5 39	
14	9 3	8 49	8 34	8 16	8 6	7 55	7 41	7 25	7 17	7 8	6 58	6 48	6 35		
15	9 49	9 37	9 23	9 8	8 59	8 48	8 36	8 22	8 14	8 7	7 58	7 49	7 37		
16	10 35	10 24	10 13	10 0	9 52	9 43	9 33	9 21	9 15	9 9	9 2	8 54	8 44		
17	11 19	11 11	11 2	10 52	10 46	10 39	10 32	10 22	10 18	10 13	10 7	10 2	9 55		

LOCAL ASTRONOMICAL MEAN TIME OF MOONRISE (MOON'S UPPER LMB, MERIDIAN OF GREENWICH, 1920.

To obtain civil time, write P. M. after the astronomical time if it is less than twelve hours; if greater than twelve hours, subtract twelve hours from it, mark the result A. M., and add one to the day.

To obtain standard time, see directions on page 712.

For other longitudes and for southern latitudes see page 746.

Lat. Date.	0°	+10°	+20°	+30°	+35°	+40°	+45°	+50°	+52°	+54°	+56°	+58°	+60°
Nov. 16	h m 22 58	h m 23 7	h m 23 17	h m 23 28	h m 23 35	h m 23 43	h m 23 51	.....	.....	.....	.....	h m 0 1	h m 0 11
17	23 42	23 49	23 56	.....	0 5	0 9	0 15	0 21	0 28	0 32	0 36	0 40	0 45
18	.....	.....	.....	0 5	0 9	0 15	0 21	0 28	0 32	0 36	0 40	0 45	0 50
19	0 26	0 30	0 34	0 39	0 42	0 45	0 49	0 53	0 55	0 57	1 0	1 3	1 6
20	1 11	1 12	1 13	1 14	1 15	1 16	1 16	1 18	1 18	1 18	1 19	1 20	1 20
21	1 57	1 55	1 52	1 50	1 48	1 46	1 44	1 42	1 41	1 40	1 39	1 37	1 36
22	2 45	2 40	2 34	2 27	2 24	2 19	2 14	2 9	2 6	2 3	2 0	1 55	1 52
23	3 37	3 28	3 19	3 8	3 3	2 56	2 48	2 39	2 35	2 30	2 25	2 19	2 12
24	4 32	4 20	4 8	3 54	3 46	3 37	3 27	3 14	3 8	3 2	2 55	2 47	2 38
25	5 30	5 16	5 2	4 46	4 36	4 25	4 12	3 57	3 50	3 42	3 33	3 23	3 11
26	6 31	6 16	6 1	5 43	5 32	5 20	5 6	4 49	4 41	4 32	4 22	4 10	3 57
27	7 33	7 19	7 3	6 45	6 34	6 22	6 8	5 51	5 43	5 34	5 24	5 12	4 56
28	8 35	8 21	8 7	7 50	7 41	7 30	7 17	7 1	6 54	6 46	6 36	6 26	6 14
29	9 34	9 22	9 10	8 56	8 48	8 39	8 29	8 16	8 10	8 3	7 56	7 47	7 35
30	10 29	10 21	10 12	10 2	9 56	9 49	9 41	9 32	9 27	9 23	9 17	9 11	9 4
Dec. 1	11 22	11 16	11 11	11 5	11 1	10 57	10 53	10 47	10 44	10 42	10 38	10 35	10 31
2	12 11	12 10	12 8	12 6	12 5	12 4	12 2	12 0	11 59	11 58	11 58	11 56	11 55
3	13 0	13 1	13 3	13 5	13 6	13 8	13 9	13 11	13 12	13 13	13 14	13 15	13 17
4	13 47	13 52	13 57	14 3	14 6	14 10	14 15	14 20	14 23	14 26	14 29	14 33	14 36
5	14 34	14 42	14 50	15 0	15 5	15 12	15 19	15 28	15 32	15 37	15 42	15 48	15 54
6	15 21	15 32	15 43	15 55	16 3	16 12	16 22	16 34	16 39	16 46	16 52	17 0	17 9
7	16 9	16 22	16 35	16 50	16 59	17 10	17 22	17 37	17 43	17 51	18 0	18 10	18 21
8	16 57	17 11	17 26	17 44	17 54	18 5	18 19	18 35	18 43	18 52	19 2	19 13	19 25
9	17 46	18 1	18 16	18 35	18 45	18 57	19 12	19 29	19 37	19 46	19 57	20 9	20 22
10	18 34	18 49	19 5	19 23	19 33	19 45	20 0	20 17	20 25	20 34	20 44	20 56	21 9
11	19 22	19 35	19 51	20 8	20 18	20 29	20 42	20 58	21 6	21 14	21 24	21 34	21 46
12	20 9	20 21	20 34	20 49	20 58	21 8	21 20	21 34	21 40	21 48	21 56	22 5	22 15
13	20 54	21 4	21 15	21 28	21 35	21 44	21 53	22 5	22 10	22 16	22 23	22 30	22 36
14	21 38	21 46	21 55	22 4	22 10	22 16	22 23	22 32	22 36	22 41	22 46	22 51	22 57
15	22 22	22 27	22 33	22 39	22 43	22 47	22 53	22 57	23 0	23 3	23 6	23 9	23 13
16	23 5	23 8	23 10	23 13	23 14	23 16	23 18	23 21	23 22	23 23	23 25	23 26	23 28
17	23 49	23 49	23 48	23 47	23 46	23 46	23 45	23 45	23 44	23 44	23 44	23 43	23 43
18	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	23 58
19	0 35	0 31	0 27	0 22	0 20	0 17	0 13	0 9	0 7	0 5	0 3	0 1	.....
20	1 23	1 16	1 9	1 0	0 56	0 50	0 44	0 36	0 33	0 29	0 25	0 20	0 15
21	2 15	2 5	1 54	1 42	1 35	1 28	1 19	1 8	1 3	0 57	0 51	0 44	0 37
22	3 10	2 58	2 44	2 29	2 21	2 11	1 59	1 45	1 39	1 32	1 24	1 15	1 4
23	4 9	3 55	3 40	3 22	3 12	3 1	2 48	2 32	2 24	2 15	2 6	1 55	1 43
24	5 11	4 56	4 41	4 22	4 12	4 0	3 45	3 28	3 20	3 11	3 0	2 49	2 35
25	6 15	6 0	5 45	5 27	5 17	5 5	4 52	4 35	4 27	4 18	4 8	3 57	3 44
26	7 17	7 4	6 51	6 35	6 26	6 16	6 4	5 50	5 43	5 35	5 27	5 17	5 6
27	8 16	8 6	7 56	7 44	7 37	7 29	7 20	7 8	7 3	6 57	6 51	6 44	6 36
28	9 12	9 6	8 59	8 51	8 46	8 41	8 35	8 27	8 24	8 20	8 16	8 12	8 6
29	10 6	10 2	9 59	9 55	9 53	9 51	9 48	9 44	9 43	9 41	9 39	9 37	9 35
30	10 56	10 56	10 57	10 57	10 57	10 58	10 58	10 59	10 59	10 59	11 0	11 0	11 0
31	11 44	11 48	11 52	11 57	11 59	12 2	12 6	12 10	12 12	12 14	12 17	12 19	12 22
32	12 32	12 39	12 46	12 55	12 59	13 5	13 12	13 19	13 23	13 27	13 31	13 36	13 42



FOR NORTHERN STATIONS NOT ON THE MERIDIAN OF GREENWICH, AND FOR SOUTHERN STATIONS.

*For northern stations not on the meridian of Greenwich.*—For longitudes twelve hours or less west from Greenwich obtain the data for the given latitude from Table X for the given date and for the date following; for longitudes twelve hours or less east from Greenwich obtain the data for the given latitude from Table X for the given date and for the date preceding. Subtract the time on the earlier date from the time on the later and multiply the difference by the twenty-fourth part of the longitude in hours and decimals of an hour, positive if west, negative if east. Apply the product as a correction to the time on the given date.

*For southern stations.*—The instant of moonrise or moonset for any station south of the equator is that of moonset or moonrise, respectively, at a place of the same latitude north of the equator whose longitude is twelve hours different from that at the southern station.

If the southern station be twelve hours or less west from Greenwich, and the phenomenon at that station occurs between noon and midnight, the local astronomical day will be the same at the southern and northern stations. If, however, the phenomenon at the southern station occurs between midnight and noon, the local astronomical day at the northern station will be one day later than at the southern.

If the southern station be twelve hours or less east from Greenwich, and the phenomenon at that station occurs between noon and midnight, the local astronomical day at the northern station will be one less than at the southern station. If, however, the phenomenon occurs between midnight and noon, the local astronomical day will be the same at the two stations.

Having thus determined the true astronomical day at the northern station, compute by the rule for northern latitudes. For the desired local time of moonrise at the southern station change the time of moonset at the northern station twelve hours. For the desired local time of moonset at the southern station change the time of moonrise at the northern station twelve hours.

*Example.*—December 20, 1920, civil date, find the time of moonrise and moonset in longitude  $4^{\text{h}} 43^{\text{m}}$  west from Greenwich and in latitude  $33^{\circ} 30'$  south.

The longitude of the northern station is  $7^{\text{h}}.3$  east from Greenwich and its latitude is  $33^{\circ}.5$  N. Upon inspection of Table X it is seen that the astronomical day at the southern station is December 20 for moonrise and December 19 for moonset, the former phenomenon occurring between noon and midnight, the latter between midnight and noon. For the northern station, in accordance with the precepts given above, both phenomena are to be computed for December 20.

At northern station—

	Moonrise. d h m	Moonset. d h m
Table X, Lat. $+33^{\circ}.5$ . . . . .	Dec. 19 0 21	Dec. 19 13 19
Table X, Lat. $+33^{\circ}.5$ . . . . .	20 0 57	20 14 20
Difference . . . . .	36	61
Product of Diff. by $-\frac{7.3}{24}$ . . . . .	-11	-19
Local astronomical mean time . . . . .	0 46	14 1

At southern station—

	Moonset.	Moonrise.
Local astronomical mean time . . . . .	12 46	2 1
Civil time . . . . .	Dec. 20 12 46 A.M.	Dec. 20 2 1 P.M.

## ON THE ARRANGEMENT AND USE OF THE AMERICAN EPHEMERIS AND NAUTICAL ALMANAC.

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There are in general use three different kinds of time, True Solar Time—also called Apparent Solar Time—Mean Solar Time, and Sidereal Time.

*True or Apparent Solar Time* is measured by the diurnal motion of the Sun, the length of the day being the interval between two successive transits of the Sun over the same meridian, and the time of day being the hour-angle of the Sun westward from the meridian. Owing to the obliquity of the ecliptic and to the lack of uniformity of the motion of the Earth in its orbit, the rate of motion of the Sun in hour-angle and the length of the apparent solar day are not constant. Therefore clocks and chronometers can not be regulated to apparent solar time, which may, however, be determined by observations of the Sun when visible.

*Mean Solar Time* is measured by the motion of a fictitious body called the mean Sun, which is supposed to move uniformly in the celestial equator, completing the circuit in one tropical year. Since mean solar time is uniform and regular in its passage, clocks and watches may be regulated to it, and those in ordinary use are usually so regulated.

Mean solar time can not, of course, be determined by direct observation, but may be determined indirectly by correcting observations of the Sun for the equation of time, or by converting to mean time sidereal time determined by observations of fixed stars.

*The Equation of Time* is the difference in hour-angle between the true Sun and the mean Sun. The true Sun is sometimes before and sometimes behind the mean Sun by an amount which varies from zero to about 16 minutes. The equation of time is given for Greenwich mean noon on pages 2-16 and for Washington apparent noon on pages 514-521.

*The Mean Solar Day* is the unit of mean solar time and is equal in length to the mean or average of all the true or apparent solar days of the year. It may be otherwise defined as the interval of time elapsing between two successive transits of the mean Sun across the meridian of any place.

*Sidereal Time* or star time, in general terms, is measured by the diurnal motion of the fixed stars, or, speaking more precisely, by the diurnal motion of that point on the celestial equator called the vernal equinox, from which the right ascensions of the heavenly bodies are measured. Astronomical clocks regulated to sidereal time are called sidereal clocks. Sidereal time may be determined from observations of stars whose right ascensions are known.

*A Sidereal Day* is very nearly the length of time in which the Earth rotates on its axis and is accurately defined as the time interval between two successive transits of the vernal equinox over the same meridian. The sidereal day is shorter than the mean solar day by  $3^m 56^s.555$  sidereal time or  $3^m 55^s.909$  mean solar time, the tropical year of 365.2422 mean solar days containing

366.2422 sidereal days. Sidereal time and the length of the sidereal day are subject to slight irregularities on account of small differences between the positions of the true and mean equinoxes.

The mean solar and sidereal days are each divided into 24 hours. About March 23 (civil date) of each year, about two days after the vernal equinox, there is an instant when the face of a sidereal clock shows the same time as a mean time clock, and the former gains on the latter  $3^m 56^s.555$  sidereal time per mean solar day, so that at the end of a year it will have gained one sidereal day and will again agree with the mean time clock.

*The Civil Day* begins at midnight and comprises 24 hours, the hours being counted from 0 to 12 in two series; the first marked A. M., running from midnight to noon, and the second, marked P. M., running from noon to midnight.

*The Astronomical Day* begins at noon on the civil day of the same date, the 24 hours being counted from 0 to 24, running from noon of one day to noon of the next following day. Astronomical time as well as civil time may be either apparent or mean. Astronomical time only is used throughout this volume.

The civil day begins twelve hours before the astronomical day; therefore the first half of the civil day coincides with the last half of the preceding astronomical day, and the last half of the civil day coincides with the first half of the astronomical day of the same date. Hence we have the following rules:

*To convert Civil Time into Astronomical Time.*—If the civil time is marked A. M., take one from the day and add twelve to the hours; if the civil time is marked P. M., take away the designation P. M. Thus, January 9, 2 o'clock, A. M., civil time, is January 8, 14<sup>h</sup>, astronomical time; and January 9, 2 o'clock, P. M., civil time, is January 9, 2<sup>h</sup>, astronomical time.

*To convert Astronomical Time into Civil Time.*—If the astronomical time is less than twelve hours, write P. M. after it; if greater than twelve hours, subtract twelve hours from it, mark the result A. M., and add one to the day.

*To convert Solar or Sidereal Time of any meridian B to that of another meridian A,* add the difference of longitude expressed in time when A is east of B, and subtract the difference of longitude when A is west of B.

Greenwich mean time, which at any fixed observatory is obtained by applying the longitude to the local mean time, on board ship is usually taken from the mean time chronometer set to Greenwich time.

Greenwich mean noon of any date means the noon at the beginning of the astronomical day.

## PART I.—THE EPHEMERIS FOR THE MERIDIAN OF GREENWICH.

Pages 2-17 contain for Greenwich mean noon of each day the *Sun's Apparent Right Ascension, Apparent Declination, Semidiameter, Horizontal Parallax, True Longitude, and Latitude.* They also contain the *Logarithm of the Radius Vector of the Earth, the Precession in Longitude, the Nutation in Longitude, the Aberration, the True Obliquity, the Equation of Time, the Sidereal Time or Right Ascension of Mean Sun, and the Mean Time of Sidereal Noon.* Adjoining columns contain, for each Greenwich mean noon, the *Variation per*



*Hour* for those of the quantities for which it seemed advisable to give a rate of motion. By multiplying any one of those variations by the hours and parts of an hour from Greenwich mean noon and adding the product algebraically to the corresponding quantity at noon, we obtain an approximate value of the quantity in question for any given Greenwich mean time. If great exactness is desired, the value of the hourly variation is found for the time halfway between Greenwich mean noon and the given Greenwich mean time before multiplying by the hours and parts of an hour from Greenwich mean noon.

It is to be noted that here, as elsewhere throughout the volume, the positive sign used with declinations or latitudes indicates north and the negative sign south.

The Sun's *Apparent Right Ascension* and *Declination* are affected both by aberration and by nutation, and therefore denote the *apparent* position of the *true* Sun. The Sun's *True Longitude* is the true geometric longitude not corrected for aberration; it is referred to the true equinox.

The Sun's *Latitude* is referred to the ecliptic of the date.

The Sun's *Declination* is required whenever that body is observed for the purpose of finding latitude, local time, or azimuth.

The Sun's *Semidiameter* is used in reducing the altitude of the upper or lower limb of the Sun to the altitude of the center; and in reducing the angular distance between the limb of the Sun and any other object to the distance from the center of the Sun.

The *Horizontal Parallax* is the angle subtended by the equatorial radius of the Earth, as seen from the center of the Sun.

The *Precession in Longitude* is the quantity to be applied to the longitude of the Sun referred to the mean equinox of the beginning of the Besselian fictitious year, i. e., the instant when the Sun's mean longitude is  $280^\circ$ , in order to refer it to the mean equinox of date.

The *Nutation in Longitude* is the quantity to be applied to the longitude of a body referred to the mean equinox of date in order to refer it to the true equinox, short-period terms being neglected.

The *Aberration* is the quantity to be subtracted from the true longitude of the Sun in order to obtain its apparent longitude.

The *True Obliquity* is the inclination of the Earth's equator to the ecliptic, short-period terms being neglected.

The corrections to the values of the nutation and the obliquity here given, to take account of the short-period terms, may be found on pages 215-216.

The *Equation of Time* is the apparent time of Greenwich mean noon, or the hour angle of the true Sun at that instant. When interpolated to any given Greenwich mean time, it is the correction to be applied to mean time in order to obtain apparent time.

The *Sidereal Time of Mean Noon* is the right ascension of the mean Sun at Greenwich mean noon. It may be reduced for the longitude or to any Greenwich mean time by using the hourly variation,  $+9^s.8565$ ; or by Table III, page 695 of this volume, for reducing intervals of mean time to sidereal time. It is useful in converting mean time to sidereal time. We first find the Greenwich mean time, then the right ascension of the mean Sun for that time,

and this being added to the local astronomical mean time, i. e., the hour angle of the mean Sun, will give the hour angle of the vernal equinox, or the sidereal time required.

The sidereal time of mean noon, reduced for the longitude of the place, is also used in converting sidereal time to mean time. Subtracting the reduced value from the given sidereal time gives the interval of sidereal time past noon, and that is converted into the required mean time by subtracting from it the corresponding reduction of a sidereal interval to a mean-time interval, taken from Table II, page 692 of this volume. If the sidereal interval is less than  $3^{\text{h}} 56^{\text{m}}.555$ , there are two mean times corresponding to the given sidereal time, one a few minutes after the preceding noon, and the other a few minutes before the following noon, the mean-time interval between these two mean times being  $23^{\text{h}} 56^{\text{m}} 4^{\text{s}}.09$ . The mean time, approximately known, will always show which one is to be taken. Instead of using Table II the reduction of a sidereal to a mean-time interval may be found by multiplying  $-9^{\text{s}}.8296$  by the hours and parts of an hour of the sidereal interval.

The *Mean Time of Sidereal Noon* is the number of hours, minutes, and seconds after Greenwich mean noon when the vernal equinox passes the meridian of Greenwich; it may be reduced to any other meridian by using the hourly variation,  $-9^{\text{s}}.8296$ , to effect the necessary interpolation, or the reduction may be taken directly from Table II. In the same way the reduction may be made to any Greenwich sidereal time, and the result will then represent  $24^{\text{h}} -$  Right Ascension of the Mean Sun. This column may be conveniently used for converting sidereal to mean time, or—which is the same problem—for finding the time of meridian passage of a star whose right ascension is known, by adding to the mean time of the *preceding* local sidereal noon, the mean time equivalent of the given sidereal time.

As examples of the use of pages 2-17:

1. Let the Sun's declination be required for April 14, 1920,  $2^{\text{h}} 5^{\text{m}} 20^{\text{s}}$ , P. M., at a place whose longitude is  $58^{\circ} 20'$ , or  $3^{\text{h}} 53^{\text{m}} 20^{\text{s}}$  west from Greenwich:

Local mean time . . . . .	April 14,	$\begin{matrix} \text{h} & \text{m} & \text{s} \\ 2 & 5 & 20 \end{matrix}$
Longitude from Greenwich (additive) . . . . .		$\begin{matrix} 3 & 53 & 20 \\ \hline \end{matrix}$
Greenwich mean time . . . . .	April 14,	$\begin{matrix} 5 & 58 & 40 \end{matrix}$

Reducing the minutes and seconds to decimals of an hour, we find that this moment is  $5^{\text{h}}.978$  after Greenwich mean noon on April 14, or  $18^{\text{h}}.022$  before Greenwich mean noon on April 15.

On page 6 of the Ephemeris we find that the variation of declination per hour is:

At Greenwich mean noon, April 14 . . . . .	$+54.01$
At Greenwich mean noon, April 15 . . . . .	$+53.61$
Difference for one day . . . . .	$- 0.40$

If great exactness is desired, we find the amount of this hourly variation for the time halfway between Greenwich noon and the time of observation; that is, for 3 hours after Greenwich noon of the 14th, this being half of 6 hours. Three hours is 0.125 of a day; so the calculation is as follows:

Variation at Greenwich mean noon, April 14 . . . . .	+54.01
Change in 0.125 of a day . . . . .	-0'' .40×0.125
	+53.96
Variation at 3 hours after noon . . . . .	+53.96
Declination at Greenwich noon, April 14 . . . . .	+9 23 56.5
Change in 5.978 hours . . . . .	+53'' .96×5.978
	+ 5 22.6
Sun's declination at time of observation . . . . .	+9 29 19.1

With equal facility the computation might have been made backward from the succeeding noon. Thus in the example just given the time is 18<sup>h</sup>.022 before Greenwich noon of April 15; half this interval is about 0.375 of a day, and the hourly motion for the middle of the interval is +53'' .76. Then we find:

Declination at Greenwich noon, April 15 . . . . .	+9 45 28.1
Change in -18.022 hours . . . . .	+53'' .76×-18.022
	- 16 8.9
Sun's declination at time of observation . . . . .	+9 29 19.2

● It will always be well to make the calculation in both ways, as a check; but if the results differ slightly the one derived from the nearest noon should be regarded as the more accurate.

2. Let the Sun's right ascension and the equation of time be required for July 13, 1920, 10<sup>h</sup> 3<sup>m</sup> 30<sup>s</sup>, A. M., mean time, at a place whose longitude is 85° 15', or 5<sup>h</sup> 41<sup>m</sup> west from Greenwich.

Local astronomical mean time . . . . .	July 12,	22 3 30
Longitude from Greenwich (additive) . . . . .		5 41 0
Greenwich mean time . . . . .	July 13,	3 44 30-3.7417

	<i>Sun's Right Ascension.</i>	<i>Equation of Time.</i>
Greenwich noon, July 13 . . . . .	7 29 45.14	-5 29.89
Change in 3.7417 hours . . . . .	10°.158×3.7417	+38.01 -0°.301×3.7417
	7 30 23.15	- 5 31.02

In this case the hourly variations interpolated to half the interval, or 1<sup>h</sup>.87 after noon, have been used.

3. If the sidereal time is required for the same time and place, we have:

Sidereal time at Greenwich mean noon, July 13 . . . . .	7 24 15.26
Reduction for 3 <sup>h</sup> 44 <sup>m</sup> 30 <sup>s</sup> from Table III, or 9°.8565×3.7417 . . . . .	+36.88
Add the local astronomical mean time . . . . .	22 3 30.00
The required sidereal time (rejecting 24 <sup>h</sup> ) . . . . .	5 28 22.14

4. On July 13, 1920, A. M., at a place whose longitude is 85° 15' W., suppose the sidereal time to be 5<sup>h</sup> 28<sup>m</sup> 22<sup>s</sup>.14 and that the corresponding mean time is required.

The astronomical day is July 12; the longitude in time,  $+5^h 41^m 0^s$ , or  $+5^h.6833$ .

*First solution.*

Sidereal time at Greenwich mean noon . . . . . July 12,	h m s	7 20 18.70
Reduction for $5^h 41^m 0^s$ from Table III, or $9^s.8565 \times 5.6833$ . . . . .		+56.02
<hr/>		
The sidereal time at local mean noon, July 12 . . . . .		7 21 14.72
The given sidereal time ( $+24^h$ , if necessary for the following subtraction) . . . . .		29 28 22.14
<hr/>		
Subtracting the first from the second gives the sidereal interval from noon . . . . .		22 7 7.42 = $22^h.1187$
Reduction for $22^h 7^m 7^s.42$ from Table II, or $-9^s.8296 \times 22.1187$ . . . . .		-3 37.42
<hr/>		
The required astronomical mean time . . . . . July 12,		22 3 30.00

*Second solution.*

Mean time at Greenwich sidereal noon . . . . . July 12,	h m s	16 36 57.52
Reduction for longitude from Table II, or $-9^s.8296 \times 5.6833$ . . . . .		-55.86
<hr/>		
Mean time of <i>preceding</i> local sidereal noon . . . . . July 12,		16 36 1.66
Add the given sidereal time . . . . .		5 28 22.14
Reduction for $5^h 28^m 22^s.14$ from Table II, or $-9^s.8296 \times 5.4728$ . . . . .		-53.80
<hr/>		
The required astronomical mean time . . . . . July 12,		22 3 30.00

If there is any doubt about the mean time of the *preceding* local sidereal noon, the first solution is to be preferred.

Pages 18-25 contain the rectangular coordinates of the Sun, referred to the center of the Earth as the origin, and to the true equator and equinox as the plane and point of reference. Each coordinate is given for every Greenwich mean noon and midnight. The columns *Reduc. to Mean Eq'x of 1920.0* give the corrections to be applied to the coordinates for noon in order to obtain the corresponding coordinates referred to the mean equator and equinox of the beginning of the Besselian fictitious year.

Pages 26-117 contain *The Moon's Right Ascension and Declination* for each day and hour of Greenwich mean time, referred to the true equator and equinox. They are accompanied by columns of *Variations per Minute*, by means of which interpolation may be conveniently made to any moment of Greenwich mean time. The right ascension or declination is taken out for the given day and hour of Greenwich mean time; the *Var. per Min.* is multiplied by the minutes and parts of a minute of the Greenwich time, and the product is added numerically in case of the right ascension and algebraically in case of the declination.

Thus, suppose the Moon's right ascension and declination are required for January 25, 1920,  $10^h 10^m 30^s$ , astronomical mean time at Greenwich:

	<i>Right Ascension.</i>	<i>Declination.</i>
	h m s	' "
January 25, $10^h$ . . . . .	23 54 39.05	+3 43 1.2
Change in 10.5 minutes . . . . . $2^s.0841 \times 10.5$	21.88	+11.568 $\times 10.5$ +2 1.5
<hr/>		
January 25, $10^h 10^m 30^s$ . . . . .	23 55 0.93	+3 45 2.7

For the sake of precision the differences here employed have been interpolated for  $5^m.2 = 0^h.09$ .

Page 117 contains also the *Phases of the Moon* and the dates of the *Moon's Apogee* and *Perigee*, or greatest and least distances from the Earth.

Pages 118–133 contain for every Greenwich mean noon and midnight the *Moon's Longitude* and *Latitude* referred to the true equinox and the ecliptic, its *Semidiameter*, and its *Equatorial Horizontal Parallax*. The column adjoining that of the horizontal parallax gives the variation of that quantity per hour, by means of which it can be reduced to any other Greenwich mean time in the manner shown in the preceding examples. When allowing for change in the variation itself, note must be taken of the fact that the tabular interval is here 12 hours instead of 24. The quantity thus obtained is the equatorial horizontal parallax; to obtain the horizontal parallax at any given place, the correction for the latitude of the place must be applied. The reduction of the Moon's semidiameter may be readily found by multiplying the reduction of the horizontal parallax by 0.2725 (see page xi), or by simply computing the proportional part.

If, for example, the semidiameter of the Moon is to be taken out for March 10, 1920, 7<sup>h</sup>, P. M., Greenwich mean time, we see that the difference of the semidiameters at noon and midnight of March 10 is 2".2; then,

$$12^h : 7^h - 2''.2 : 1''.3$$

which is the correction to be subtracted from the semidiameter at noon, because the semidiameter is decreasing. The Moon's semidiameter for March 10, 7<sup>h</sup>, is therefore 14' 52".0.

The Moon's semidiameter and horizontal parallax are required for all observations of the Moon.

Pages 118–133 contain also: The *Moon's Age*, or the time elapsed since the preceding new Moon, given to tenths of a day; the mean time of the *Moon's Transit, Upper and Lower*, at Greenwich, given to tenths of a minute; and the *Variation per Hour* of the latter quantity, that is, the variation for one hour of longitude, by means of which the local time of an upper or lower transit of the Moon may be computed for any place whose longitude is known.

Pages 134–198 contain for each of the seven major planets the geocentric ephemeris followed immediately by the heliocentric ephemeris.

The geocentric ephemeris gives the planet's *Apparent Right Ascension* and *Apparent Declination* with the respective *Variations per Hour* or *per Day*. The positions thus given are referred to the true equator and equinox, and are corrected for aberration. The geocentric ephemeris gives also the *Logarithm of Distance from Earth* with the *Variation per Hour* or *per Day*, the planet's *Semidiameter* and *Horizontal Parallax*, and, to tenths of a minute, the time of *Transit Meridian of Greenwich*. All the data, except the last named, are given for Greenwich mean noon.

The right ascension and declination of a planet are required whenever it is observed for time, latitude, or azimuth. The mode of reducing the ephemeris positions of planets to other instants of Greenwich mean time is the same as that already given for the Sun. The local mean time of meridian transit of any planet at any place can be found by dividing the proper daily difference of the ephemeris times by 24, multiplying the quotient by the longitude of the place expressed in hours and fractions, and applying the product with its proper sign to the time of Greenwich transit.

The heliocentric ephemeris gives the *Heliocentric Longitude*, *Mean Equinox of Date*; the *Heliocentric Latitude*; and the *Logarithm of Radius Vector*; with

their respective *Variations per Day*. The heliocentric longitude may be referred to the true equinox by applying nutation. The variations are given for the instant of Greenwich mean noon. The column *Reduction to Orbit* contains the correction to be applied to the heliocentric longitude in order to obtain the longitude measured along the orbit of the planet. This orbit longitude is equal to the distance from the mean equinox to the node, plus the distance from the node to the planet. The heliocentric latitude is referred to the ecliptic of the date. The *Logarithm of Radius Vector* is the logarithm of the distance of the center of the planet from that of the Sun.

## PART II.—THE EPHEMERIS FOR THE MERIDIAN OF WASHINGTON.

Pages 200–201 contain formulæ for reducing mean positions of stars to apparent positions, including expressions for the Besselian star-numbers and star-constants, and for the independent star-numbers; the whole based upon the constants of the Paris Conference of May, 1896, and expressed in the notation of BESSEL.

Pages 202–205 contain the logarithms of the *Besselian Star-Numbers*,  $A$ ,  $B$ ,  $C$ ,  $D$ , for each Washington mean midnight, with the values of  $E$  appended at the bottoms of the pages. The terms of short period have been included. These numbers serve to reduce the mean place of a star at the beginning of the Besselian fictitious year to its apparent place at any of the dates for which the numbers are given, and in ordinary cases four-figure logarithms suffice; but where extreme accuracy is desired the logarithms of  $A$ ,  $C$ , and  $D$  are sometimes needed to five places of decimals. Along with the solar day, the first column contains the sidereal hour of Washington mean midnight for certain dates, and by interpolation among them it is easy to find the sidereal time for which any set of quantities is given.

The following is an example of the reduction of a star to apparent place by the Besselian star-numbers:

*Computation of the apparent place of  $\alpha$  Aquila, May 26, 1920, for the upper transit at Washington.*

log $a$	0.5165	log $b$	7.2464 $n$	log $c$	8.0459	log $d$	8.8235 $n$
log $A$	9.7985	log $B$	0.8351	log $C$	0.8881 $n$	log $D$	1.2708 $n$
log $a'$	0.5184	log $b'$	9.9940	log $c'$	9.4342	log $d'$	8.4169 $n$
log $Aa$	0.3150	log $Bb$	8.0815 $n$	log $Cc$	8.9940 $n$	log $Dd$	0.0943
log $Aa'$	0.3169	log $Bb'$	0.8291	log $Cc'$	0.3223 $n$	log $Dd'$	9.6877
Mean Place, 1920.0		$\alpha_0$	<sup>h</sup> 18 <sup>m</sup> 37 <sup>s</sup> 53.677	$\delta_0$	-9 7 48.80		
		$Aa$	+2.065	$Aa'$	+2.07		
		$Bb$	-0.012	$Bb'$	+6.75		
		$Cc$	-0.086	$Cc'$	-2.10		
		$Dd$	+1.243	$Dd'$	+0.49		
		$E$	+0.002	$r\mu'$	0.00		
		$r\mu$	+0.001				
Apparent Place, May 26,		$\alpha$	18 37 56.890	$\delta$	-9 7 41.59		

Pages 206–213 contain the *Independent Star-Numbers*, which can frequently be advantageously used instead of the *Besselian Star-Numbers*. The terms of short period have been included. These quantities are connected with those of Bessel by the relations given on page 200, which also contains the formulæ

and precepts for the application of both systems of numbers. In order to use the Besselian numbers, it is necessary to have the values of the star-constants,  $a, b, c, d, a', b', c', d'$ , while the independent star-numbers render it possible to determine the apparent place of a star without computing these star-constants. Four-figure logarithms usually suffice, but where extreme accuracy is desired the logarithms of  $g$  and  $h$  are needed to five places of decimals, and  $G$  and  $H$  are needed to one-tenth of a minute of arc. The column  $\tau$  gives the fraction of a year, counted from the beginning of the Besselian fictitious year to each date.

The following is an example of the reduction of a star to apparent place by the independent star-numbers:

*Computation of the apparent place of  $\alpha$  Aquilæ, May 26, 1920, for the upper transit at Washington.*

$G =$	h m		
	1 53.9		$\delta_0 =$ - 9 7.8
$\alpha_0 =$	18 37.9		$G + \alpha_0 =$ 20 <sup>h</sup> 31 <sup>m</sup> .8
$H =$	13 30.0		$H + \alpha_0 =$ 8 7.9

$\log \frac{1}{r}$	8.8239	$\log \frac{1}{r}$	8.8239		$\alpha_0$	h m s	
$\log g$	1.1566	$\log h$	1.3052		$f + f'$		+1.994
$\log \sin (G + \alpha_0)$	9.8968 n	$\log \sin (H + \alpha_0)$	9.9285		(g)		+0.121
$\log \tan \delta_0$	9.2060 n	$\log \sec \delta_0$	0.0055		(h)		+1.156
$\log (g)$	9.0833	$\log (h)$	0.0631		$\tau \mu$		+0.001
$\log g$	1.1566	$\log h$	1.3052		$\alpha$	18 37 53.877	
$\log \cos (G + \alpha_0)$	9.7869	$\log \cos (H + \alpha_0)$	9.7239 n		$\delta_0$	- 9 7 48.80	
$\log (g')$	0.9455	$\log \sin \delta_0$	9.2005 n		(g')	+8.82	
		$\log (h')$	0.2296		(h')	+1.70	
$\log i$	0.5254 n				(i)	-3.31	
$\log \cos \delta_0$	9.9945				$\tau \mu'$	0.00	
$\log (i)$	0.5199 n				$\delta$	- 9 7 41.59	

Page 214 contains for every tenth sidereal day the *Besselian* and *Independent Star-Numbers*, exclusive of all short-period terms. They are useful in computing ephemerides of stars, similar to those on pages 316–513, for which data containing short-period terms should not be employed.

Pages 215–216 contain for Washington mean midnight of each day the short-period terms of the nutation in longitude and obliquity, for use in connection with the formulæ on page 201, and the coefficients mentioned later, which are given for each star on pages 316–513.

Pages 217–230 contain the *Mean Places of Ten-day Stars* for the beginning of the Besselian fictitious year. These pages give also the magnitude, spectral type, annual variations, and proper motions for each star. The annual variations are to be considered as the differential coefficients of each coordinate with respect to the time at the beginning of the year.

Page 231 contains, for the *Circumpolar Stars*, the same data as the immediately preceding pages do for the ten-day stars.

Pages 232–315 contain for every upper transit at Washington the apparent positions of seventeen northern and eighteen southern circumpolar stars arranged in the order of their right ascensions. The mean solar time of transit is given in the column *Washington Mean Time*, in order that each transit above

and below the pole may be readily identified. Suppose, for example, that the transit of Polaris below the pole on January 26 is to be found, and we wish to know whether it precedes or follows the upper transit of the same date. On page 232 we find that the upper transit occurs January 26.2; the lower transit, therefore, occurs January 26.7. But the lower transit of July 1 precedes the upper one, which occurs July 1.8. A transit occurring very nearly at noon may also be identified without a computation to ascertain the actual mean date, by simply noting the tenth of a day in the column *Washington Mean Time*.

The secant and tangent of the apparent declination for the 15th of each month and the mean place in right ascension and declination for the beginning of the year are given for each star at the foot of the page.

Pages 316-513 contain, for every tenth upper transit at Washington, the apparent places of 790 stars, being all those given in the list of mean places of ten-day stars. The *Washington Mean Time* in the left-hand column of each page gives the day and tenth of the transit, so that intermediate transits may be readily identified; and to facilitate interpolation, the differences of each coordinate are given for every ten days.

In connection with the ephemeris of each ten-day star there are given at the foot of the page (1) the seconds of the mean place in both right ascension and declination for the beginning of the year, (2) the secant and the tangent of the mean of the star's greatest and least apparent declinations during the year, and (3) the coefficients of the short-period terms of the nutation, the use of which is explained on page 201.

Pages 514-521 contain, for Washington apparent noon, the *Apparent Right Ascension and Declination* of the Sun, the *Equation of Time*, and the *Variation per Hour* of these quantities; the *Semidiameter* of the Sun, and the *Sidereal Time of Semidiameter Passing Meridian*. The last column on each page contains the *Sidereal Time of Mean Noon*.

The *Equation of Time, Mean-App.* is the correction to be applied to apparent time in order to obtain mean time. Each number as given is the mean time of transit of the Sun's center over the meridian of Washington counted from the nearest noon.

Pages 522-537 contain the *Right Ascension of Center*, the *Geocentric Declination of Center*, the *Sidereal Time of Semidiameter Passing Meridian*, the *Geocentric Semidiameter*, and the *Equatorial Horizontal Parallax* of the Moon, and the *Washington Mean Time* at the moment of each upper and lower transit over the meridian of Washington.

The *Variation per Hour of Longitude* is the correction to be applied in each case to the quantity in the preceding column to obtain its value for the time of transit over the meridian one hour west of Washington, supposing the rate of change to be uniform and equal to what it is at the instant of transit over the meridian of Washington. The quantities in the third column, when corrected for another longitude by the hourly variations, give the local mean time of transit for that longitude. By means of the variations per hour of longitude any one of the quantities under consideration can be computed with great exactness for the moment of transit over any meridian not more than one hour



distant from Washington. To obtain the same accuracy for more distant meridians, we may proceed as follows: Let  $F$  represent either the *Washington Mean Time*, the *Right Ascension of Center*, or the *Geocentric Declination of Center*, and let  $V$  represent the corresponding *Variation per Hour of Longitude*. Write down three successive values of  $F$ , together with the corresponding values of  $V$ , and difference the latter as in the following scheme, where the middle values,  $F_0$  and  $V_0$ , belong to the culmination from which is to be derived the value of  $F$  for the culmination on the meridian whose longitude is  $\lambda$ :—

Function.	Var. per Hour of Longitude.	$\Delta'$	$\Delta''$
$F_{-1}$	$V_{-1}$	$a'$	
$F_0$	$V_0$	$a''$	$b$
$F_{+1}$	$V_{+1}$		

Then, for the culmination at the meridian  $\lambda$

$$F_\lambda = F_0 + \lambda V_0 + \frac{\lambda^2}{48}(a' + a'') + \frac{\lambda^3 b}{864}$$

where  $\lambda$  must be expressed in hours and decimals of an hour, and reckoned from Washington or from  $180^\circ$  from Washington according as the upper or lower culmination is used for the middle value ( $F_0$ ). Adding twelve hours to the Washington time of lower transit at Washington gives the local time of upper transit at places whose longitude is  $180^\circ$  from Washington.

The column *Bright Limbs* is given to indicate to the observer which limbs are illuminated. When one limb is full and the terminator is within  $1''$  of the opposite limb, both can be well observed, and in such cases both are indicated, the defective limb being indicated by an italic letter or numeral, and the correction for defective illumination (as seen from Washington) being given in a footnote.

Pages 538–555 contain for each of the seven major planets, the geocentric *Apparent Right Ascension* and *Declination*, the *Horizontal Parallax*, *Semidiameter*, *Sidereal Time of Semidiameter Passing Meridian*, and the *Washington Mean Time*, for the moments of all transits which it is usually desirable to observe over the meridian of Washington. The stellar magnitude at opposition for Jupiter, Saturn, Uranus, and Neptune, respectively, is given at the bottom of the page containing the ephemeris of the planet.

### PART III.—PHENOMENA.

This part gives the dates of the principal astronomical phenomena of the year, expressed in Greenwich mean time, except in the case of the occultations visible at Washington, where Washington time is used.

Pages 558–563 contain all necessary data respecting the solar and lunar eclipses which occur during the year.

The eclipse elements are given for the moment of conjunction of the Sun and Moon in right ascension, but the subsequent tables and results are computed from the exact positions of these bodies at the several instants referred to. The times and angles designated as the circumstances of a lunar eclipse

remain the same throughout all parts of the Earth, and require no explanation beyond a mere statement of the fact that in computing them the geometrical diameter of the Earth's shadow has been augmented in the proportion of 51:50. The principal circumstances of each total and annular eclipse of the Sun are stated in five lines, as follows:—

The line entitled "Eclipse begins" gives the Greenwich mean time at which the Moon's penumbra first touches the Earth, together with the latitude and longitude of the point of contact.

The line entitled "Central eclipse begins" gives the time when the axis of the Moon's shadow first touches the Earth, together with the latitude and longitude of the point of contact.

The line entitled "Central eclipse at local apparent noon" gives the time when the axes of the Earth and of the shadow cone lie in the same plane, together with the latitude and longitude of the point where the axis of the shadow cone then cuts the Earth's surface.

The lines entitled "Central eclipse ends" and "Eclipse ends" give, respectively, the times when and the localities where these events occur, the phenomena being the converse of those denoted by the similar phrases for the beginning.

In the case of partial solar eclipses the axis of the Moon's shadow does not come into contact with the Earth, and the three lines entitled, respectively, "Central eclipse begins," "Central eclipse at local apparent noon," and "Central eclipse ends," are replaced by a single line entitled "Greatest eclipse," whereon are given the time when and the latitude and longitude where the eclipse attains its greatest magnitude. The latter phenomenon necessarily occurs with the Sun in the horizon.

*Maps of the Eclipses.*—The regions in which each eclipse is visible are shown upon the map relating to it, from which may be taken approximately, for any place, both the times of the beginning and ending of the eclipse and its magnitude. The dotted curves show the outline of the shadow for each hour of Greenwich mean time, and therefore pass through all places where the eclipse begins or ends at the hour indicated. To find the instant of beginning at any place, we determine by inspection between what pair of these curved lines the place is situated. The eclipse will then begin between the corresponding hours of Greenwich mean time; and the fraction of the hour may be determined by dividing the hour in the same proportion as the space representing it on the map is divided by the place in question. This division may be made a little more exact by allowing for changes in the spaces as indicated by their varying width. The Greenwich mean time thus found must be reduced to local mean time by applying the longitude.

As an example, suppose we wish to find the times at which the eclipse of November 10, 1920, begins and ends at Richmond, Va., whose latitude is  $+37^{\circ} 22'$  and whose longitude is  $+77^{\circ} 26'$ .

For the beginning we compare the distance of the place from the curves of 2<sup>h</sup> and 3<sup>h</sup> and find it to correspond to about 4 minutes from the former, thus giving for the approximate time of beginning 2<sup>h</sup> 4<sup>m</sup>; for the end we compare the distance of the place from the curves of 4<sup>h</sup> and 5<sup>h</sup> and find it to

correspond to about 6 minutes from the former, thus giving for the approximate time of ending, 4<sup>h</sup> 6<sup>m</sup>; and both of these results are probably correct to within 3 or 4 minutes.

Changing to local mean time, we shall have—

		Beginning.			Ending.		
		d	h	m	d	h	m
Greenwich mean time . . . . .	November	10	2	4	10	4	6
Longitude west . . . . .			5	10		5	10
Local Mean Time . . . . .	November	9	20	54	9	22	56

In the case of total and annular eclipses, a fair estimate of the magnitude of the eclipse at any place may be obtained from the position thereof relative to the central line and to the limit. On the central line the eclipse is annular or total, while between the central line and the limit the maximum magnitude of the eclipse is given by the quotient of the distance of the place from the limit divided by the distance of the central line from the limit, the measurements being made upon a line drawn through the place perpendicularly to the central line.

*More Accurate Computations.*—A more accurate determination of the phases, as visible at any point of the Earth's surface, may be obtained from the Besselian elements which are given for every 10 minutes of Greenwich mean time. Their geometric signification is as follows:—

Let us imagine a plane passing through the center of the Earth, perpendicular to the right line joining the centers of the Sun and Moon. This latter line is the axis of the Moon's shadow, and the plane is called the *fundamental plane* or plane of *xy*. We take the intersection of this plane with that of the Earth's equator as the axis of *x*, and the center of the Earth as the origin of coordinates. The axis of *y* is perpendicular to that of *x*, and directed toward the north; *x* and *y* are then the coordinates of the point in which the axis of the shadow intersects the fundamental plane, and they are here expressed in terms of the Earth's equatorial radius as unity. The angle *d*, of which the sine and cosine are both given, is the declination of that point of the celestial sphere toward which the axis of the shadow is directed; or, in other words, it is the declination of the center of the Sun as seen from the center of the Moon. The angle *μ* is the Greenwich hour-angle of this same point of the celestial sphere.

The quantities *l*<sub>1</sub> and *l*<sub>2</sub> are the radii of the shadow cones upon the fundamental plane, *l*<sub>1</sub> corresponding to the penumbra, and *l*<sub>2</sub> to the umbra. The notation is that of CHAUVENET'S *Spherical and Practical Astronomy*, in which *l*<sub>2</sub> is regarded as positive for an annular and negative for a total eclipse.

The angles *f*<sub>1</sub> and *f*<sub>2</sub>, the tangents of which are given, are the angles which the elements of the respective shadow cones make with the axis of the shadow; or, they are the semiangles of the two cones.

In order to facilitate interpolation to any required moment, the logarithms of *x*', *y*', and *μ*', which are the changes of *x*, *y*, and *μ*, in one minute of time, are given at the bottom of the table.

The method of computing an eclipse from its Besselian elements is based on the fact that the distance of the observer from the axis of the shadow cones is equal to the radius of the penumbra at the point of observation for the beginning and ending of the eclipse, and is equal to the radius of the umbra at the

point of observation for the beginning and ending of totality or of the annular phase. To find this distance and radius in each case we proceed as follows:

(1) The coordinates of the observer,  $\xi$ ,  $\eta$ , and  $\zeta$ , together with their variations in one minute, are computed for some assumed moment of Greenwich mean time, as near as practicable to the true time of the required phase.

(2) The coordinates  $x$  and  $y$  of the axis of the shadow, together with their variations in one minute, are taken for the same moment from the tables of elements.

(3) From (1) and (2) the position and motion of the observer relative to the axis of the shadow are found.

(4) The radius of the penumbra or umbra at a distance from the fundamental plane equal to that of the observer is also computed.

(5) Then, assuming the motions to be uniform, we determine the time required for the observer to be brought to a distance from the axis of the shadow equal to this radius.

The formulæ and directions for the several steps in the computation are as follows:—

(1) Find  $\rho \cos \varphi'$  and  $\rho \sin \varphi'$ , which are the geocentric coordinates of the station referred to the Earth's equator,  $\rho$  being the distance from the center of the Earth and  $\varphi'$  the geocentric latitude. These coordinates may be computed from the following table based on the compression of the Earth adopted at the Paris Conference of 1911,  $1/297$ , by the formulæ—

$$\rho \cos \varphi' = F \cos \varphi$$

$$\rho \sin \varphi' = \frac{\sin \varphi}{G}$$

$\varphi$  being, as usual, the geographic latitude.

Table for Computing the Geocentric Coordinates of a Place.

$\varphi$	Log F.	Log G.
0°	0.00000	0.00293
5	0.00001 1	0.00292 1
10	0.00004 3	0.00289 3
15	0.00010 6	0.00283 6
20	0.00017 7	0.00276 7
25	0.00026 9	0.00267 9
30	0.00037 11	0.00256 11
35	0.00048 11	0.00245 11
40	0.00060 12	0.00232 13
45	0.00073 13	0.00220 12
50	0.00086 13	0.00207 13
55	0.00098 12	0.00195 12
60	0.00110 12	0.00183 12
65	0.00120 10	0.00173 10
70	0.00129 9	0.00164 9
75	0.00137 8	0.00156 8
80	0.00142 5	0.00151 5
85	0.00145 3	0.00148 3
90	0.00146 1	0.00146 2

For the assumed Greenwich mean time of computation, take from the table of elements the values of  $\sin d$ ,  $\cos d$ , and  $\mu$ . Then, with  $\lambda$  for the longitude west from Greenwich, the coordinates of the observer will be—

$$\begin{aligned} \xi &= \rho \cos \varphi' \sin (\mu - \lambda) \\ \eta &= \rho \sin \varphi' \cos d - \rho \cos \varphi' \sin d \cos (\mu - \lambda) = \eta_1 - \eta_2 \\ \zeta &= \rho \sin \varphi' \sin d + \rho \cos \varphi' \cos d \cos (\mu - \lambda) = \zeta_1 + \zeta_2 \end{aligned}$$

and their variations in one minute of mean time will be—

$$\begin{aligned} \xi' &= [7.63992] \rho \cos \varphi' \cos (\mu - \lambda) \\ \eta' &= [7.63992] \rho \cos \varphi' \sin d \sin (\mu - \lambda) - [7.63992] \xi \sin d \\ \zeta' &\text{ is not needed.} \end{aligned}$$

(2) For the same assumed moment of Greenwich mean time, take from the tables of elements the coordinates  $x$  and  $y$  of the axis of the shadow, together with their variations for one minute, which are equal to one-tenth of the differences of two consecutive numbers. These variations are represented by  $x'$  and  $y'$ , and their logarithms are given beneath the tables of  $x$  and  $y$ .

(3) The distance  $m$  and position-angle  $M$  of the axis of the shadow relative to the observer, and the relative motions,  $n$  and  $N$ , are computed by the formulæ—

$$\begin{aligned} m \sin M &= x - \xi \\ m \cos M &= y - \eta \\ n \sin N &= x' - \xi' \\ n \cos N &= y' - \eta' \end{aligned}$$

(4) Both for the umbra and for the penumbra, the radius  $L$  at the distance  $\zeta$  from the fundamental plane is computed by the formulæ—

$$L = l - \zeta \tan f$$

$l$  and  $f$  being taken from the table of elements, and  $\zeta$  computed in (1).

(5) If the time chosen for computation is exactly that of the beginning or ending of the eclipse, we shall have—

$$m = L$$

But, as this condition will rarely be fulfilled on a first trial, a correction  $\tau$  to the assumed time is computed thus: Find the angle  $\psi$  from the equation—

$$\sin \psi = \frac{m \sin (M - N)}{L}$$

There will be two values for this angle; the one for which  $\cos \psi$  is negative must be taken for the beginning of the eclipse, for the beginning of the annular phase, or for the ending of the total phase, but the one for which  $\cos \psi$  is positive must be taken for the ending of the eclipse, for the ending of the annular phase, or for the beginning of the total phase. The correction  $\tau$  to the assumed time will then be found, in minutes, from—

$$\tau = \frac{m \cos (M - N)}{n} + \frac{L \cos \psi}{n}$$

However, only in case the value of  $\tau$  does not exceed a few minutes can the time thus corrected be considered even fairly accurate. Therefore it is best to commence the computation by assuming times near the phenomena wanted. The times for the beginning and the ending of an eclipse may be

derived from the chart with sufficient exactness as previously explained; the time for the total or for the annular phase may then be assumed as midway between the times assumed for the beginning and the ending of the eclipse; or, in case of a partial eclipse, this time midway may be assumed as that of the maximum eclipse.

The more accurate times resulting from the computation as outlined above and as illustrated in the example below may now be taken in place of those originally assumed, and the whole computation may be repeated, thus leading to a value of  $\tau$  in each case, which should be very small, and which should give a very accurate time of the phenomenon. Such a repetition of the computation will be advisable, moreover, for the reason that it will enable one to locate and eliminate any accidental numerical errors that may have occurred in the first computation.

As a result of this last approximation the computed times of contact will be theoretically exact within less than a second, but the uncertainties of the solar and lunar tables are such that an unavoidable error of several seconds may exist in the prediction.

*Position-angle of Point of Contact.*—The position-angle  $P$ , of the point of contact, reckoned from the north point of the Sun's limb toward the east, is found by the formula—

$$P = N + \psi$$

where the results of the last approximation are used.

The position-angle  $V$ , of the point of contact, reckoned from the vertex of the Sun's limb toward the east, is found by the formula—

$$V = P - C$$

where  $C$  is obtained from

$$\tan C = \frac{\xi}{\eta}$$

$\sin C$  having the same algebraic sign as  $\xi$ , and the results of the last approximation again being used.

*Time of Maximum Eclipse.*—For a partial eclipse, or for a central eclipse at a point at which the eclipse is only partial indicated by  $\sin \psi$  greater than unity for the umbra, the correction to the assumed time to obtain the time of maximum eclipse is given by the formula—

$$\tau = -\frac{m \cos (M - N)}{n}$$

*Magnitude of the Maximum Eclipse.*—This is given by the formula—

$$D^* = \frac{L - \Delta}{2L - 0.5446}$$

where  $\Delta = \pm m \sin (M - N)$ , always taken positive, and  $L$  is the radius of the penumbra.  $D$  is, in all cases, the ratio to the Sun's diameter of the straight line passing through the centers of the two disks and having for its extremities the Sun's limb that is nearest to the Moon's center and the Moon's limb that is nearest to the Sun's center. In a partial eclipse  $D$  is the fraction of the Sun's diameter covered by the Moon.

\*Since, in obtaining this formula, the angles of the two shadow cones are considered the same, the value obtained therefrom should be increased by  $\frac{1}{11}$ th of itself.

Computation of the Solar Eclipse of November 10, 1920, for Allegheny, Pa.

The position of Allegheny is—

Latitude,  $\varphi = + 40 \ 28 \ 58$   
 Longitude,  $\lambda = + 80 \ 1 \ 21$

and its geocentric coordinates are—

$\rho \sin \varphi' = -9.81009$   
 $\rho \cos \varphi' = -9.88176$

From the eclipse chart we find the approximate times of the phases to be—

Beginning Nov.  $\begin{matrix} d & h & m \\ 10 & 2 & 0 \end{matrix}$  } Greenwich Mean Time.  
 Middle  $\begin{matrix} 10 & 3 & 0 \end{matrix}$  }  
 Ending  $\begin{matrix} 10 & 4 & 0 \end{matrix}$  }

T	Nov. 10	Beginning. 2 <sup>h</sup> 0 <sup>m</sup>	Middle. 3 <sup>h</sup> 0 <sup>m</sup>	Ending. 4 <sup>h</sup> 0 <sup>m</sup>		Beginning.	Middle.	Ending.
					$\log m \sin M$	9.29994 <sup>n</sup>	9.19263	9.68521
					$\log \sin$ or $\cos M$	9.96953	9.96661	9.94365
$\mu$	33 59 54	48 59 54	63 59 54		$\log m \cos M$	9.71094	9.58230	9.42105
$\lambda$	80 1 21	80 1 21	80 1 21		$\log \tan M$	9.58900 <sup>n</sup>	9.61033	0.26416
$\mu - \lambda$	-46 1 27	-31 1 27	-16 1 27		$\log n \sin N$	7.79281	7.75328	7.72591
$\log \rho \cos \varphi'$	9.88176	9.88176	9.88176		$\log \sin$ or $\cos N$	9.97223	9.97230	9.97514
$\log \sin (\mu - \lambda)$	9.85711 <sup>n</sup>	9.71214 <sup>n</sup>	9.44098 <sup>n</sup>		$\log n \cos N$	7.36021 <sup>n</sup>	7.32015 <sup>n</sup>	7.26788 <sup>n</sup>
$\log \xi$	9.73887 <sup>n</sup>	9.59390 <sup>n</sup>	9.32274 <sup>n</sup>		$\log \tan N$	0.43260 <sup>n</sup>	0.43813 <sup>n</sup>	0.45803 <sup>n</sup>
$\log \cos d$	9.98020	9.98017	9.98014		$M$	338 47 11	22 10 48	61 26 26
$\log \rho \sin \varphi'$	9.81009	9.81009	9.81009		$N$	110 16 12	110 14 51	109 12 15
$\log \sin d$	9.47016 <sup>n</sup>	9.47044 <sup>n</sup>	9.47072 <sup>n</sup>		$M - N$	228 30 59	271 55 57	312 14 11
$\log \eta_1$	9.79029	9.79026	9.79023		$\log m$	9.74141	9.61569	9.74156
$\log \zeta_1$	9.28025 <sup>n</sup>	9.28053 <sup>n</sup>	9.28081 <sup>n</sup>		$\log n$	7.82058	7.78098	7.75077
$\log \sin d$	9.47016 <sup>n</sup>	9.47044 <sup>n</sup>	9.47072 <sup>n</sup>		$\log \zeta$	9.49780		9.70624
$\log \rho \cos \varphi'$	9.88176	9.88176	9.88176		$\log \tan f$	7.67432		7.67433
$\log \cos (\mu - \lambda)$	9.84158	9.93295	9.98279		$\log \zeta \tan f$	7.17212		7.38057
$\log \cos d$	9.98020	9.98017	9.98014		$l$	+0.56496		+0.56520
$\log \eta_2$	9.19350 <sup>n</sup>	9.28515 <sup>n</sup>	9.33527 <sup>n</sup>		$\zeta \tan f$	+0.00149		+0.00240
$\log \zeta_2$	9.70354	9.79488	9.84469		$L$	+0.56347		+0.56280
$\eta_1$	+0.61700	+0.61696	+0.61692		$\log m$	9.74141	9.61569	9.74156
$-\eta_2$	+0.15614	+0.19282	+0.21640		$\log \sin (M - N)$	9.87457 <sup>n</sup>	9.99975 <sup>n</sup>	9.86945 <sup>n</sup>
$\zeta_1$	-0.19066	-0.19078	-0.19090		$\text{colog } L$	0.24913		0.24965
$\zeta_2$	+0.50529	+0.62356	+0.69934		$\log \sin \psi$	9.86511 <sup>n</sup>		9.86066 <sup>n</sup>
$\zeta$	+0.31463	+0.43278	+0.50844		$\psi$	227 8 22		313 29 10
$\log \rho \cos \varphi'$	9.88176	9.88176	9.88176		$\log m/n$	1.92083	1.83471	1.90079
$\log \cos (\mu - \lambda)$	9.84158	9.93295	9.98279		$\log \cos (M - N)$	9.82112 <sup>n</sup>	8.52791	9.82750
$\log \text{const.}$	7.63992	7.63992	7.63992		$\log (1)$	1.74195 <sup>n</sup>	0.36262	1.81829
$\log \xi$	9.73887 <sup>n</sup>	9.59390 <sup>n</sup>	9.32274 <sup>n</sup>		$\log L$	9.75087		9.75035
$\log \sin d$	9.47016 <sup>n</sup>	9.47044 <sup>n</sup>	9.47072 <sup>n</sup>		$\log \cos \psi$	9.83265 <sup>n</sup>		9.83770
$\log \xi'$	7.36326	7.45463	7.50447		$\text{colog } n$	2.17942		2.24923
$\log \eta'$	6.84895	6.70426	6.43338		$\log (2)$	1.76294 <sup>n</sup>		1.83728
$x$	-0.74761	-0.23673	+0.27416		-(1)	+55.201	-2.305	-65.810
$\xi$	-0.54811	-0.39255	-0.21025		+(2)	-57.935		+68.751
$x - \xi$	-0.19950	+0.15582	+0.48441		$\tau$	<sup>m</sup> -2.734	<sup>m</sup> -2.305	<sup>m</sup> +2.941
$y$	+1.28711	+1.19199	+1.09698		$T$	<sup>d h m</sup> 10 2 0	<sup>d h m</sup> 10 3 0	<sup>d h m</sup> 10 4 0
$\eta$	+0.77314	+0.80978	+0.83332		$T + \tau$	<sup>d h m</sup> 10 1 57.266	<sup>d h m</sup> 10 2 57.695	<sup>d h m</sup> 10 4 2.941
$y - \eta$	+0.51397	+0.38221	+0.26366					
$x'$	+0.008514	+0.008515	+0.008515					
$\xi'$	+0.002308	+0.002849	+0.003195					
$x' - \xi'$	+0.006206	+0.005666	+0.005320					
$y'$	-0.001586	-0.001584	-0.001582					
$\eta'$	+0.000706	+0.000506	+0.000271					
$y' - \eta'$	-0.002292	-0.002090	-0.001853					

Taking the three times just found, we make a new computation in each case. The times resulting from the new computation are—

	November	Greenwich Mean Time.			Local Mean Time.		
		d	h	m s	d	h	m s
Beginning of the eclipse	.	10	1	57 16.3	9	20	37 10.9
Middle of the eclipse	.	.	.	2 57 44.1	21	37	38.7
Ending of the eclipse	.	.	.	4 2 56.6	22	42	51.2

The values from the last approximation of the quantities needed in computing the position angles, and the computation of these position angles, are—

	First Contact.	Last Contact.
$\log \xi$	9.74381 $n$	9.90285 $n$
$\log \eta$	9.88716	9.92122
$\log \tan C$	9.85665 $n$	9.38163 $n$
$N$	110.26	109.12
$\psi$	227.15	313.57
$P$	337.41	62.69
$C$	324.29	346.46
$V$	13.1	76.2

The quantities needed in computing the magnitude of the greatest eclipse, and the computation of that magnitude, are—

$T$	2 <sup>h</sup> 58 <sup>m</sup>	$l$	+0.5651	$L-\Delta$	+0.1506
$\log \zeta$	9.6325	$\zeta \tan f$	+0.0020	$2L-0.5446$	+0.5816
$\log \tan f$	7.6743	$L$	+0.5631	$D$	0.259
$\log \zeta \tan f$	7.3068	$\Delta$	+0.4125	$1/400 D$	0.001
				Magnitude	0.26

Pages 564–567 contain the adopted mean places and annual proper motions of such stars, as bright as magnitude 6.5, as will be occulted during the year by the Moon.

Pages 568–605 contain the elements for the prediction of the times of occultations of stars and planets by the Moon during the current year. The system of coordinates employed is similar to that already described for eclipses, the fundamental plane passing through the center of the Earth, and being taken perpendicular to the line joining the star and the center of the Moon, but the cone circumscribing the Moon and star is regarded as a cylinder which intercepts the fundamental plane in a circle having the same linear diameter as the Moon.

In the columns referring to the star, those headed *Red'ns from 1920.0* give the quantities necessary to reduce the mean place of the star at the beginning of 1920 to its apparent place at the time of occultation. These reductions are sufficiently accurate to be definitive.

Under the general head, *At Conjunction in R. A.*, are five columns giving certain quantities for the moment of geocentric conjunction of the Moon and star in right ascension, as follows:

The *Greenwich Mean Time* is the moment,  $T$ , at which the two bodies are in geocentric conjunction in right ascension. At that moment the coordinate  $x$  of the axis of the cylinder on the fundamental plane has the value zero.



The column *Hour Angle, H*, gives the common geocentric hour-angle of the Moon and star at the same moment, expressed in sidereal time and counted from the meridian of Greenwich—positive toward the west and negative toward the east. Column *Y* gives the coordinate *y* of the axis of the cylinder upon the fundamental plane at the same moment. Columns *x'* and *y'* give the variations of *x* and *y* in one hour of mean time. The linear unit in these columns is the Earth's equatorial radius. The limiting parallels, north and south, show the extreme limits of latitude within which the occultation will be visible.

By the aid of these elements, the time of immersion and emersion of a star relative to the limb of the Moon may be computed for any part of the Earth by a method nearly the same as that already explained for computing eclipses, but somewhat more simple.

*Prediction of Occultations for a given Place.*—When it is desired to predict the circumstances of one or more occultations at any place, the first step will be to select them from the general list given in the Ephemeris. The conditions of visibility are:—

1. The limiting parallels in the last columns must include the latitude of the place.
2. The quantity  $H - \lambda$ , taken without regard to sign, must be less than the semidiurnal arc of the star by at least one hour. On very rare occasions an emersion might be seen in the east, or an immersion in the west, when this difference is a few minutes less than an hour.
3. The Sun must not be much more than an hour above the horizon at the local mean time  $T - \lambda$ , unless the star is bright enough to be seen in the daytime.

When many occultations are to be selected, the most convenient course will be to write the value of  $-\lambda$  on the bottom of a slip of paper, and in passing through the list of occultations to pause over each one for which condition (1) is fulfilled, and examine by means of the slip whether conditions (2) and (3) are also fulfilled. If either fails, the computer passes on. Sometimes it will be difficult to determine whether  $H - \lambda$  or  $T - \lambda$  falls within the limits; and in such cases the computer may mark the occultation for trial and leave the decision for the subsequent operations. The whole list can be gone over in less than a day, and it will probably be found that about one-tenth of the occultations are marked for trial.

The next step will be to compute the local times of immersion and emersion from the elements, and to that end let—

- T*—the instant of geocentric conjunction of Moon and star in right ascension, expressed in Greenwich mean time;  
*H*—the Greenwich west hour-angle of the two bodies at that moment;  
 $\lambda$ —the longitude west of Greenwich;  
 $h_0 = H - \lambda$ —the local hour-angle of the star at the instant *T*;  
 $\delta$ —the star's declination.

The procedure for each occultation will then be as follows:—

- (1) The geocentric coordinates of the place,  $\rho \sin \varphi'$  and  $\rho \cos \varphi'$ , are to be computed by the formulæ and table given in connection with eclipses on page 760.

The next step will be to find the approximate instant of apparent conjunction of the Moon and star as seen from the place, and that may be deduced from the time of geocentric conjunction by the application of an approximate correction taken from DOWNES'S table, printed in the volumes of the American Ephemeris for 1882 to 1899. This correction must be reckoned in mean solar hours, and will be designated by the symbol  $t$ . It will have the same sign as  $h_0$ .

When DOWNES'S table is not available, the correction may be computed from the formulæ—

$$\begin{aligned}\xi_0 &= \rho \cos \varphi' \sin h_0 \\ \xi' &= [9.4192] \rho \cos \varphi' \cos \frac{4}{3} h_0 \\ t &= \frac{\xi_0}{\xi' - \xi}\end{aligned}$$

By applying  $t$  to the Greenwich mean time of geocentric conjunction, as given with the elements, we shall have the Greenwich mean time of local conjunction within a few minutes.

(2) Compute for the instant  $T+t$  the following quantities, in which  $t_0$  is the sidereal equivalent of the mean time interval  $t$ :

$$\begin{aligned}\xi &= \rho \cos \varphi' \sin (h_0 + t_0) \\ \eta &= \rho \sin \varphi' \cos \delta - \rho \cos \varphi' \sin \delta \cos (h_0 + t_0) = \eta_1 - \eta_2 \\ \xi' &= [9.4192] \rho \cos \varphi' \cos (h_0 + t_0) \\ \eta' &= [9.4192] \rho \cos \varphi' \sin \delta \sin (h_0 + t_0) - [9.4192] \xi \sin \delta \\ x &= x't \\ y &= Y + y't\end{aligned}$$

Compute also  $m$ ,  $M$ ,  $n$ ,  $N$ , and  $\psi$  from the equations—

$$\begin{aligned}m \sin M &= x - \xi \\ m \cos M &= y - \eta \\ n \sin N &= x' - \xi' \\ n \cos N &= y' - \eta' \\ \sin \psi &= [0.5646] m \sin (M - N)\end{aligned}$$

$\psi$  being taken between the limits  $\pm 90^\circ$ . Finally compute,

$$\begin{aligned}\tau &= -\frac{[1.7782]m}{n} \cos (M - N) \mp \frac{[1.2135]}{n} \cos \psi \\ \delta\tau &= \frac{[6.7591]\tau^2}{n \cos \psi} [\eta_2 \cos (N \mp \psi) - \xi \sin (N \mp \psi)]\end{aligned}$$

where the double signs are to be taken negative for an immersion and positive for an emersion. Both  $\tau$  and  $\delta\tau$  thus have two values, which are expressed in minutes of time, and in order to distinguish them let those pertaining to immersion be designated, respectively,  $\tau'$  and  $\delta\tau'$ , while those pertaining to emersion are designated  $\tau''$  and  $\delta\tau''$ . We then have for the Greenwich mean times of the phases,

$$\begin{aligned}\text{Instant of immersion} &= T + t + \tau' + \delta\tau' \\ \text{Instant of emersion} &= T + t + \tau'' + \delta\tau''\end{aligned}$$

These expressions are practically exact, as the corrections  $\delta\tau$  seldom amount to so much as 1.5 minutes, and whenever an inaccuracy of that magnitude is permissible they may be omitted. As a check upon the results it will be advisable to compute  $\xi$ ,  $\eta$ ,  $x$ , and  $y$  for the times of immersion and emersion finally obtained. If these times are correct, the quantities in question will fulfill the condition,

$$\sqrt{(x - \xi)^2 + (y - \eta)^2} = 0.2725$$

If  $\log m \sin (M - N) > 9.4354$ ,  $\sin \psi$  will be numerically greater than unity, and no occultation is to be expected at the given place; but a very brief one may occur if the excess of the computed distance over the Moon's semi-diameter happens to be within the errors of the ephemerides of the Moon and star.

The position-angle of the line from the Moon's center to the star, at the time of contact, is reckoned from the north point toward the east, and designated by the symbol  $P$ . It is computed from the formulæ—

$$\begin{aligned} & P - N - \psi + \delta P && \text{for immersion,} \\ \text{or} & P - N + \psi + \delta P \pm 180^\circ && \text{for emersion,} \end{aligned}$$

where the angles  $N - \psi$  and  $N + \psi$  are taken directly from the computation of  $\delta\tau$ , and  $\delta P$  is found in degrees of arc from the expression,

$$\delta P = \mp \frac{[7.3088]r^2}{\cos \psi} [\eta_2 \sin N + \xi \cos N]$$

In the latter formula the double sign is to be taken negative for an immersion and positive for an emersion.

The angle from the vertex,  $V$ , is also reckoned in the direction from the north toward the east, and is found from the formula

$$V = P - C$$

where  $C$  is computed from the expression,

$$\tan C = \frac{\xi + [8.2218]r\xi' - [4.9810]r^2\xi}{\eta + [8.2218]r\eta' + [4.9810]r^2\eta_2}$$

$C$  being taken less or greater than  $180^\circ$ , according as the numerator is positive or negative.

The value of  $r$  employed in the latter formula must be so taken as to correspond with the phase for which  $C$  is required.

In the volumes of the American Ephemeris for the years 1882 to 1901 instructions are given for constructing three special tables which greatly diminish the labor of computing occultations, but as these tables should contain from 4700 to 6300 quantities, and as they would apply only to the place for which they were computed, it will rarely be worth while to undertake the labor of forming them. Those who desire further information on the subject may consult any one of the volumes in question.

As an example of an isolated occultation, we will compute that of  $\beta$  Scorpii on June 27, 1920, for Berkeley, Cal., whose position is—

$$\begin{aligned} \varphi &= +37^\circ 52' 24'' \\ \lambda &= + 8^h 9^m 3^s \end{aligned}$$

and whose geocentric coordinates are—

$$\begin{aligned} \rho \sin \varphi &= -9.7857 \\ \rho \cos \varphi &= -9.8978 \end{aligned}$$

From the elements on page 586 we have,

$$\begin{aligned} T &= \begin{matrix} h & m \\ 17 & 15.9 \end{matrix} \\ H &= + 7 39.1 \end{aligned}$$

and

$$h_0 = H - \lambda = - 0 29.9$$

From the formulæ on page 766, we find the correction,  $t$ , to the Greenwich mean time of geocentric conjunction,  $T$ , to be about  $-0^h 18^m.1$ ; therefore the Greenwich mean time of apparent conjunction is—

$T+t$ —June 27, 16<sup>h</sup> 57<sup>m</sup>.8

$\beta$ Scorpii.	Apparent Declination.	G. M. T. of $\zeta$	Hour Angle.	$Y$	$x'$	$y'$
	-19 35.3	June 27 17 15.9	h m +7 39.1	+0.5840	0.5453	-0.0623

$h_0$	h m -0 29.9	$y't$	+0.0188	log $m$	9.3645
$t_0$	-0 18.1	$Y'$	+0.5840	log $n$	9.5451
$h_0+t_0$	-0 48.0	$x$	-0.1644	log const.	0.5646
log ( $\rho \cos \varphi'$ )	9.8978	$\xi$	-0.1643	log $m$	9.3645
log sin ( $h_0+t_0$ )	9.3179 $n$	$x-\xi$	-0.0001	log sin ( $M-N$ )	9.9894
log $\xi$	9.2157 $n$	$y$	+0.6028	log sin $\psi$	9.9185
log ( $\rho \sin \varphi'$ )	9.7857	$\eta$	+0.8343	$\psi$	+55° 59'
log cos $\delta$	9.9741	$y-\eta$	-0.2315	log const.	1.7782
log $\eta_1$	9.7598	$x'$	+0.5453	log $m/n$	9.8194
log ( $\rho \cos \varphi'$ )	9.8978	$\xi'$	+0.2090	log cos ( $M-N$ )	9.3399
log sin $\delta$	9.5254 $n$	$x'-\xi'$	+0.3423	log (1)	0.9375
log cos ( $h_0+t_0$ )	9.9904	$y'$	-0.0623	log const.	1.2135
log $\eta_2$	9.4136 $n$	$\eta'$	+0.0145	colog $n$	0.4549
$\eta_1$	+0.5751	$y'-\eta'$	-0.0768	log cos $\psi$	9.7477
$-\eta_2$	+0.2592	log $m \sin M$	6.0000 $n$	log (2)	1.4161
log ( $\rho \cos \varphi'$ )	9.8978	log cos $M$	0.0000 $n$	-(1)	- 8.66
log cos ( $h_0+t_0$ )	9.9904	log $m \cos M$	9.3645 $n$	$\mp(2)$	$\mp 26.07$
log const.	9.4192	log tan $M$	6.6355	$\tau$ for immersion	-34.73
log $\xi$	9.2157 $n$	log $n \sin N$	9.5344	$\nu$ for emersion	+17.41
log sin $\delta$	9.5254 $n$	log sin $N$	9.9893		
log $\xi'$	9.3074	log $n \cos N$	8.854 $n$		
log $\eta'$	8.1603	log tan $N$	0.6490 $n$		
log $x'$	9.7366	$M$	180 1		
log $t$	9.4794 $n$	$N$	102 39		
log $y'$	8.7945 $n$	$M-N$	77 22		
log $x$	9.2160 $n$				
log $y't$	8.2739				

The computation of  $\delta\tau$  for the two contacts is as follows:

$N\mp\psi$	Immerſion. 46° 40'	Emerſion. 158° 38'	log [(1)-(2)]	8.7657 $n$	9.4789
log cos ( $N\mp\psi$ )	9.8365	9.9691 $n$	log const.	6.7591	6.7591
log $\eta_2$	9.4136 $n$	9.4136 $n$	log $\tau^2$	3.0814	2.4814
log (1)	9.2501 $n$	9.3827	colog ( $n \cos \psi$ )	0.7072	0.7072
log sin ( $N\mp\psi$ )	9.8618	9.5615	log $\delta\tau$	9.3134 $n$	9.4266
log $\xi$	9.2157 $n$	9.2157 $n$	$T+t$	d h m June 27 16 57.8	h m 16 57.8
log (2)	9.0775 $n$	8.7772 $n$	$\tau$	-34.73	+17.41
(1)	-0.1778	+0.2413	$\delta\tau$	- 0.21	+ 0.27
(2)	-0.1195	-0.0599	Greenwich M. T.,	June 27 16 22.9	17 15.5
(1)-(2)	-0.0583	+0.3012	$\lambda$	+ 8 9.0	+8 9.0
			Berkeley M. T.,	June 27 8 13.9	9 6.5

To find  $\delta P$  and  $P$ :

$\log \eta_2$	9.4136 <i>n</i>	$\log \xi$	9.2157 <i>n</i>	(3)	-0.2528
$\log \sin N$	9.9893	$\log \cos N$	9.3403 <i>n</i>	(4)	+0.0360
$\log (3)$	9.4029 <i>n</i>	$\log (4)$	8.5560	(3)+(4)	-0.2168
	Immersion.	Emersion.		Immersion.	Emersion.
$\log [(3)+(4)]$	9.3361 <i>n</i>	9.3361 <i>n</i>	$\delta P$	+ 0.9	- 0.2
$\log \text{const.}$	7.8038 <i>n</i>	7.3038	$N$	102.8	102.6
$\log \tau^2$	3.0614	2.4814	$\mp \psi$	-56.0	+56.0
$\text{colog } \cos \psi$	0.2523	0.2523	const.	0.0	180.0
$\log \delta P$	9.9736	9.3736 <i>n</i>	$P$	47.5	338.4

Pages 606-607 contain in detail all the data necessary for observing every occultation of the general list which is visible at Washington during the current year.

Page 608 contains the *Ephemeris for Physical Observations of the Sun*.

Page 609 contains certain elements referring to the Moon, its equator, and its orbit.

$i$ —the inclination of the Moon's mean equator to the Earth's true equator.

$\Delta$ —the distance on the Moon's mean equator from its ascending node on the Earth's true equator to its ascending node on the ecliptic of date.

$\Omega'$ —the distance along the Earth's true equator from the true equinox to the ascending node of the Moon's mean equator.

$\Gamma'$ —the longitude of the perigee of the Moon's orbit, referred to the mean equinox of date.

$\Omega$ —the longitude of the ascending node of the Moon's orbit on the ecliptic, referred to the mean equinox of date.

$C$ —the Moon's mean longitude, referred to the mean equinox of date.

Pages 610-617 contain the *Ephemeris for Physical Observations of the Moon*. The selenographic longitudes are measured in the plane of the Moon's equator, the axis of reference being the radius of the Moon which passes through the mean center of the visible disk positive toward the west—i. e., toward Mare Crisium—and the latitudes are measured from the Moon's equator, positive toward the north—i. e., in the hemisphere containing Mare Serenitatis.

The optical and physical librations in longitude and latitude have been computed with elements and formulæ given on page xi, and their sums are given in the second and third columns, respectively, the physical libration being given separately in the fourth and fifth columns. The Sun's selenographic colongitude ( $90^\circ$ —longitude) and latitude and the position-angle of the Moon's axis,  $C$ , in the sixth, seventh, and eighth columns, respectively, have all been corrected for the effect of physical libration.

When the libration in longitude is positive, the mean center of the disk is displaced toward the east—that is, the region thus exposed to view is on the west limb—and when the libration in latitude is positive the mean center of the disk is displaced toward the south—that is, the region thus exposed to view is on the north limb.

The altitude of the Sun,  $A$ , at any given time above the horizon of any point on the Moon whose selenographic longitude and latitude,  $\lambda$  and  $\beta$ , are known, may be computed from the following formula, the Sun's selenographic longitude and latitude being denoted by  $l_\odot$  and  $b_\odot$ , respectively:

$$\sin A = \sin b_\odot \sin \beta + \cos b_\odot \cos \beta \cos (l_\odot - \lambda)$$

Pages 618–619 contain the data with reference to the illuminated disks of Mercury and Venus. The angle  $\theta$  is the angle which the arc of the great circle from the planet to the Sun makes with the arc from the planet toward the west, measured in the direction west, north, east, south. It is measured from  $0^\circ$  to  $360^\circ$ . We may also regard  $\theta$  as expressing the angle which the line of cusps makes with the meridian, the positive direction of the meridian being toward the north, and the positive direction of the line of cusps that in which a person following this line would have the illuminated portion of the disk on his right.

Pages 620–625 contain the *Ephemeris for Physical Observations of Mars*. The quantities here given have been corrected for aberration, so that in using them they should be interpolated to the actual time of observation.

$P$ —the position-angle of the axis of rotation measured eastward from the north point of the disk.

$A\oplus$ ,  $A\odot$ —the planetocentric right ascensions of the Earth and Sun, respectively, measured in the plane of the planet's equator from its vernal equinox.

$D\oplus$ ,  $D\odot$ —the planetocentric declinations of the Earth and Sun, respectively, referred to the planet's equator.

$\odot \text{ } \delta$ —the planetocentric longitude of the Sun measured in the plane of the planet's orbit from its vernal equinox.

$k$ —the ratio of the area of the illuminated portion of the apparent disk to the area of the entire apparent disk regarded as circular.

$i$ —the angle between the Sun and the Earth as seen from the planet.

$g$ —the angular value of the greatest defect of illumination as seen from the Earth.

$Q$ —the position-angle of the radius of the disk which passes through the point of greatest defect of illumination—that is, of the radius perpendicular to the line joining the cusps. It is measured eastward from the north point of the disk.

The column headed *Central Meridian* contains the longitude of the meridian which bisects the disk, measured from the adopted zero meridian.

The columns headed *Mean Time of Transit of Zero Meridian* contain the Greenwich Mean Time of every transit of the zero meridian across the actual center of the disk.

Pages 626–627 contain, for the *Satellites of Mars*, the diagram of their orbits, the times of their elongations, and tables for predicting their position angles and distances from the center of the planet.

Pages 628–631 contain the *Ephemeris for Physical Observations of Jupiter*.

The columns headed *Central Meridian* contain the longitudes of the meridian which bisects the disk, measured from the adopted zero meridian of System I and System II, respectively.

The column headed *Correction for Phase* contains the corrections to be applied to the longitudes of the central meridian to obtain the longitudes of the meridian bisecting the illuminated disk.

The column headed *Transit of Zero Meridian* contains the Greenwich Mean Time of every fifth transit of the zero meridian across the center of the illuminated disk.

The quantities in the remaining columns on pages 628–631 are the same as those defined under the *Ephemeris for Physical Observations of Mars*.

Pages 632–657 contain, concerning the *Satellites of Jupiter*, the times of conjunction of Satellites I–IV, the times of elongation of Satellite V, the

differences in right ascension and declination between Jupiter and Satellites VI and VII, and the phenomena of the Satellites I-IV together with their configurations.

Page 658 contains the *Magnitude of Saturn* and the *Elements of the Rings*.

$a$ ,  $b$ —the major axis and minor axis, respectively, of the outer ellipse of the outer ring.

$P$ —the position-angle of the northern semi-minor axis of the rings, measured from the north, positive toward the east.

$B$ —the Saturnicentric latitude of the Earth referred to the plane of the rings, positive toward the north.

$U+180^\circ$ —the Saturnicentric longitude of the Earth measured in the plane of the rings from their ascending node on the Earth's equator.

$\omega$ —the distance in the plane of the rings from their ascending node on the Earth's equator to their ascending node on the ecliptic.

$B'$ —the Saturnicentric latitude of the Sun referred to the plane of the rings, positive toward the north.

$U'+180^\circ$ —the Saturnicentric longitude of the Sun measured in the plane of the rings from their ascending node on the ecliptic.

Pages 659-667 contain, concerning the *Satellites of Saturn*, the diagram of the orbits of the seven inner satellites, the times of elongation for the first eight satellites, the differences in right ascension and declination between Saturn and Phœbe, the ninth satellite, and tables for predicting the position-angles and distances from the center of the planet of the first eight satellites.

Page 668 contains the diagram of the orbits of the satellites of Uranus, together with the times of their elongations.

Pages 669-670 contain tables for predicting the position-angles and distances from the center of the planet of the satellites of Uranus and Neptune.

Page 671 contains the diagram of the orbit of the satellite of Neptune, together with the times of its elongations.

Pages 672-673 contain the *Phenomena*, or the configurations of the Sun, Moon, and planets, expressed in the symbols of page xviii. The predicted times of the conjunctions, quadratures, and oppositions of the planets with respect to the Sun are, respectively, the instants when the longitude of each planet differs from that of the Sun by  $0^\circ$ ,  $\pm 90^\circ$ , or  $180^\circ$ . For the conjunction of the planets with the Moon and with each other, the predicted times are the instants when the two bodies have the same right ascension. In the case of conjunction the degrees and minutes to the right indicate the difference of declination. Thus,  $\delta \text{ } \text{C} \dots \text{ } \delta - 4^\circ 22'$  would be read "Conjunction of Mars with the Moon, Mars,  $4^\circ 22'$  to the South."

These pages contain also the beginning of the seasons; the perihelia and aphelia of the planets, including the Earth; the passage of the planets through the nodes of their orbits upon the ecliptic; and the date of lunar and solar eclipses, with their aspect as seen from Washington.

Pages 674-685 contain the *Positions of Observatories*, together with a list of the authorities from which the positions are obtained. The tabular arrangement is self-explanatory.

Page 686 contains two examples in the computation of lunar distances, which are inserted because lunar distance tables are no longer published.

Pages 687-746 contain a series of tables numbered from I to X.

Table I—For *Finding the Latitude by an Observed Altitude of Polaris.*

Table II—For converting *Sidereal into Mean Solar Time.*

Table III—For converting *Mean Solar into Sidereal Time.*

Table IV—For finding the *Azimuth of Polaris at All Hour Angles.*

Table V—For finding the *Azimuth of Polaris at Elongation.*

Table VI—For *Finding the Times of Upper and Lower Culmination of Polaris.*

Table VII—For finding the *Apparent Place, Time of Upper Culmination, and Time Interval between Upper Culmination and Elongation, of Polaris.*

Table VIII—For finding the time of *Sunrise and Sunset* at any place between the equator and  $60^{\circ}$  north latitude.

Table IX—*Sunrise and Sunset for Southern Latitudes.*

Table X—For finding the time of *Moonrise and Moonset.*



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<b>Andromedæ.</b>		<b>Aquarii.</b>		<b>Argus.</b>		<b>Boötis.</b>		<b>Can. Maj.</b>		<b>Cassiop.</b>		<b>Ceti.</b>	
$\alpha$	316	$b^1$	507	$\psi$	395	$f$	429	$\xi^2$	372	36 H.	336	$\theta$	326
$\beta$	324	$c^2$	504			11	426	$\sigma^2$	376	38	327	$\iota$	317
$\gamma$	332	$d^1$	510	<b>Arietis.</b>		33	431			40	327	$\mu$	338
$\delta$	320							<b>Can. Min.</b>		50	332	$\nu$	336
$\epsilon$	320	<b>Aquilæ.</b>		$\alpha$	332	<b>Bradley.</b>		$\alpha$	381	55	333	$\xi^1$	333
$\zeta$	321	$\alpha$	476	$\beta$	331			$\beta$	380			$\xi^2$	336
$\eta$	509	$\beta$	477	$\delta$	343	1147	385			<b>Centauri.</b>		$\circ$	335
$\kappa$	510	$\gamma$	475	$\epsilon$	340	1672	235					$\pi$	338
$\lambda$	509	$\delta$	472	$\zeta$	344	2777	437	<b>Can. Ven.</b>		$\alpha^2$	431	$\sigma$	336
$\mu$	323	$\epsilon$	469	$\nu$	337			$\alpha$	420	$\beta$	426	$\tau$	329
$\nu$	503	$\zeta$	469	$\sigma$	339	<b>Camelop.</b>		2	415	$\gamma$	418	$\upsilon$	331
$\omega$	319	$\eta$	476	$\tau$	344	$\beta$	358	8	416	$\delta$	413	2	513
$\pi$	317	$\theta$	478	41	339	4	356	17 H.	423	$\epsilon$	424	12	319
$\upsilon$	327	$\kappa$	474	<b>Aurigæ.</b>		9	357	20	421	$\zeta$	425	13	319
$\psi$	511	$\lambda$	470	$\alpha$	361	17	362			$\eta$	431	20	322
22	317	$\mu$	473	$\beta$	367	43	374	<b>Capricorni.</b>		$\theta$	427	67	334
		$\tau$	478	$\delta$	367	2 H.	346	$\alpha^2$	479	$\iota$	422		
<b>Antliæ.</b>		$\delta$	472	$\epsilon$	358	5 H.	348	$\beta$	479	$\lambda$	410		
$\alpha$	401	$\omega$	472	$\epsilon$	358	9 H.	349	$\gamma$	492	$\pi$	409	<b>Chamæleon.</b>	
$\theta$	396	1	465	$\zeta$	358	19 H.	360	$\delta$	492	$\nu$	419	$\beta$	415
$\iota$	405	2	466	$\eta$	359	22 H.	369	$\zeta$	490			$\delta^2$	404
		6	467	$\theta$	368	25 H.	233	$\theta$	486	<b>Cephei.</b>		$\zeta$	234
<b>Apodis.</b>				$\iota$	357	30 H.	234	$\iota$	489	$\alpha$	489	$\theta$	367
$\alpha$	432	<b>Aræ.</b>		$\lambda$	361	32 H.	235	$\mu$	493	$\beta$	491	$\pi$	411
$\gamma$	447	$\alpha$	455	$\mu$	360			$\pi$	480	$\gamma$	510		
$\delta^1$	444	$\beta$	454	$\nu$	366	<b>Cancri.</b>		$\rho$	480	$\zeta$	496	<b>Cæli.</b>	
$\theta$	425	$\delta$	455	$\circ$	365	$\alpha$	381	$\upsilon$	482	$\eta$	484	$\alpha$	355
59 G.	236	$\epsilon^1$	451	$\chi$	363	$\beta$	386	$\psi$	483	$\theta$	481		
		$\theta$	461	$\psi^1$	370	$\gamma$	389			$\iota$	502	<b>Columbæ.</b>	
				$\psi^2$	374	$\delta$	389	<b>Carinæ.</b>		$\kappa$	479	$\alpha$	365
<b>Aquarii.</b>		<b>Argus.</b>		51	372	$\zeta$	385	$\mu^1$	391	$\circ$	506	$\alpha$	361
$\alpha$	494	$\alpha$	371	63	377	$\eta$	388			$\pi$	504	$\circ$	361
$\beta$	491	$\beta$	393			$\delta$	389	<b>Cassiop.</b>		11	492		
$\gamma$	497	$\gamma$	385	<b>Boötis.</b>		$\zeta$	388			20	495	<b>Comæ.</b>	
$\delta$	502	$\delta$	390	$\alpha$	428	$\eta$	389	$\alpha$	320	24	496	20	416
$\epsilon$	484	$\epsilon$	386	$\beta$	435	$\iota$	392	$\beta$	316	39 H.	238	24	417
$\eta$	499	$\eta$	403	$\gamma$	430	$\kappa$	390	$\gamma$	323	41 H.	511	31	419
$\theta$	497	$\theta$	403	$\delta$	437	$\sigma^2$	390	$\delta$	326	43 H.	232	43	421
$\iota$	495	$\iota$	393	$\epsilon$	432	$\omega$	383	$\epsilon$	330	47 H.	341		
$\lambda$	502	$\lambda$	392	$\eta$	425	$\alpha^1$	386	$\epsilon$	330	48 H.	343		
$\mu$	485	$\mu$	404	$\theta$	429	83	393	$\zeta$	319	51 H.	233	<b>Cor. Austr.</b>	
$\nu$	487	$\nu$	373	$\lambda$	428	<b>Can. Maj.</b>		$\eta$	322	226 B.	490	$\alpha$	470
$\xi$	491	$\xi$	382	$\mu$	487	$\alpha$	374	$\iota$	335				
$\pi$	496	$\pi$	378	$\nu^1$	439	$\beta$	370	$\mu$	324	<b>Ceti.</b>			
$\sigma$	496	$\rho$	384			$\gamma$	377	$\circ$	321	$\alpha$	341	<b>Cor. Bor.</b>	
$\tau$	501	$\sigma$	380	$\sigma$	431	$\delta$	377	$\rho$	512	$\beta$	321	$\alpha$	439
$\upsilon$	499	$\tau$	375	$\tau$	424	$\epsilon$	376	$\omega$	328	$\gamma$	338	$\beta$	438
$\phi$	505	$\upsilon$	396	$\psi$	435	$\zeta$	369	4	507	$\delta$	337	$\epsilon$	443
$\psi$	505	$\phi$	398	$c$	435	$\eta$	379	5 H <sup>1</sup> .	505	$\zeta$	330	$\zeta$	440
$\omega^2$	510	$\chi$	383	$d$	427	$\theta$	376	21	321	$\eta$	324	$\sigma$	445

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$\delta$ 416		$\tau^2$ 340	1586 397	38 G. 344	$\eta$ 398	$\zeta$ 436
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	$\alpha$ 427	$\tau^5$ 347	1830 412	<b>Hydræ.</b>	$\iota$ 409	<b>Lyncis.</b>
<b>Crateris.</b>	$\beta$ 456	$\tau^6$ 348	2001 423	$\alpha$ 394	$\mu$ 397	
$\alpha$ 406	$\gamma$ 460	$\nu^5$ 353	2164 433	$\gamma$ 422	$\xi$ 395	2 369
$\beta$ 407	$\delta$ 471	$\varphi$ 334	2283 236	$\delta$ 388	$\omicron$ 396	8 371
$\delta$ 408	$\epsilon$ 476	$\epsilon$ 345	2320 444	$\epsilon$ 390	$\pi$ 398	15 375
$\zeta$ 411	$\zeta$ 453	$g$ 348	2377 450	$\zeta$ 390	$\rho$ 402	24 381
	$\eta$ 447	12 343	2533 463	$\theta$ 392	$\sigma$ 409	26 383
<b>Crucis.</b>	$\theta$ 443	53 355	3241 481	$\lambda$ 399	$\tau$ 409	27 384
	$\iota$ 438	<b>Fornacis.</b>	4163 512	$\mu$ 401	$\upsilon$ 410	31 386
$\alpha^1$ 415	$\kappa$ 417			$\nu$ 404	$\chi$ 407	40 398
$\beta$ 419	$\lambda$ 410	<b>Gruis.</b>		$\xi$ 410	$d$ 406	
$\gamma$ 416	$\xi$ 459	$\beta$ 339	$\alpha$ 495	$\pi$ 426	$l$ 404	<b>Lyræ.</b>
$\delta$ 414	$\omicron$ 468	$\kappa$ 335	$\beta$ 500	$\sigma$ 388	$p^4$ 407	$\alpha$ 466
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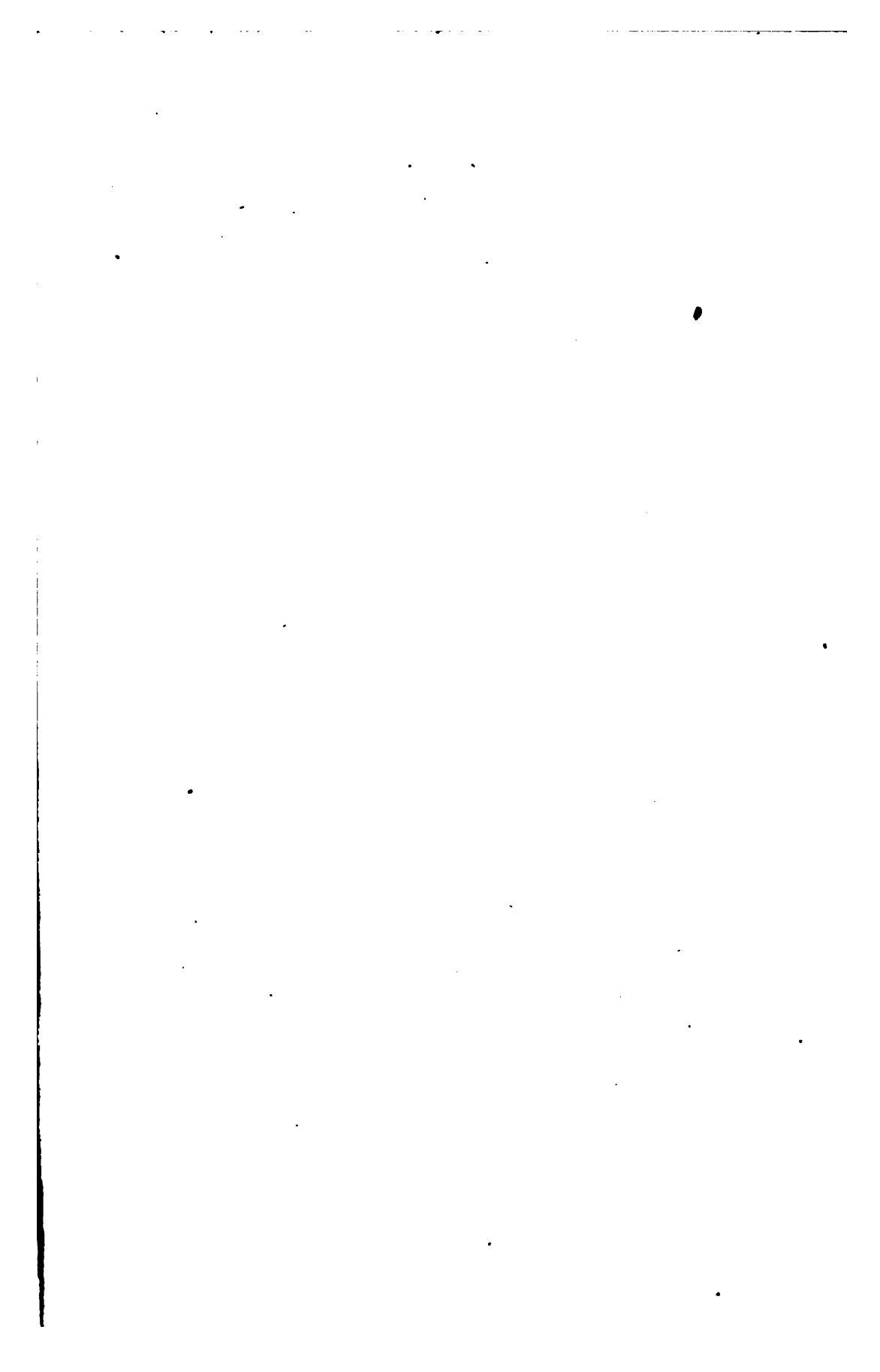
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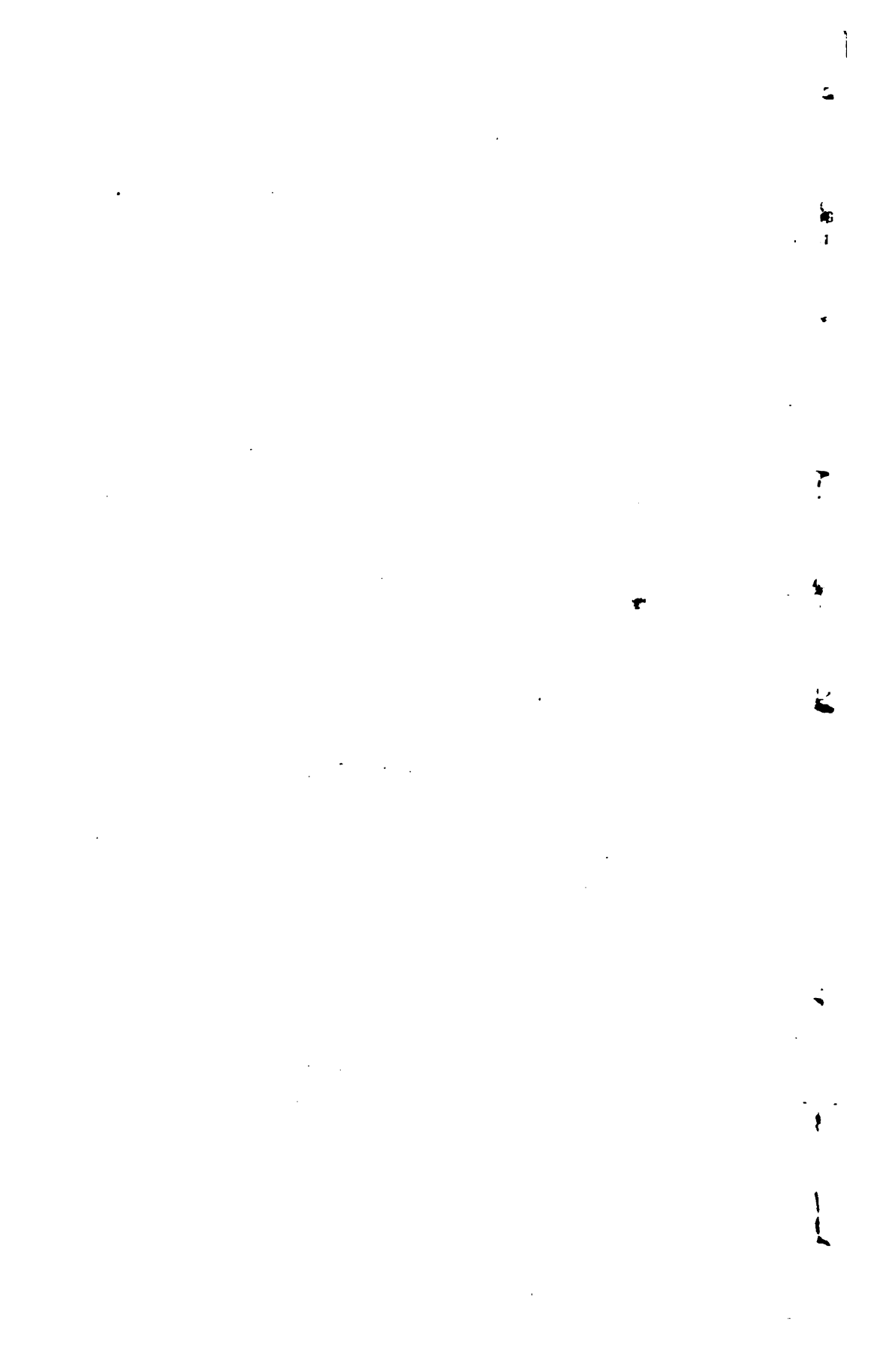
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