TABLES

OF THE

MOTION OF THE MOON

BY

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WITH THE ASSISTANCE OF
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PREFACE

THIS volume of Tables of the Motion of the Moon is the sequel to my theory printed in the *Memoirs of the Royal Astronomical Society* during the years 1901–8. The fundamental constants which have to be determined from observation are based mainly on the Greenwich meridian observations and the papers containing the discussions which lead to the values finally adopted are contained in the *Monthly Notices* of the same Society issued during the years 1913–15.

The first Tables of the Moon, founded on the law of gravitation, were published by Clairaut in 1752. During the succeeding century several volumes of the same nature appeared, but the *Tables de la Lune* of Hansen, bearing the date 1857, were the first which permitted the position of the moon to be computed from theory with an accuracy comparable with that of observation. Their general excellence is sufficiently confirmed by the fact that they have been used for obtaining the ephemeris of the moon up to the present time* in most of the national almanacs and also for almost all researches which demand a knowledge of the moon's place. The only other set of tables which can be compared with them are those founded on Delaunay's theory, appearing in 1911 under the final direction of Radau; these have been used for the ephemeris of the moon in the *Connaissance des Temps* since their publication.

The appearance of Hansen's work constitutes an epoch in the history of astronomical tables. Based on his own theory, which itself had an unusual and complicated form, it includes some three hundred periodic terms and contains devices for tabulation which abbreviate the work of the computer very considerably. The fundamental constants were determined from observation with a high degree of accuracy considering the data which Hansen had at his disposal and there are few constants obtainable from theory whose observed values are used. It is true that there are errors in both the theory and the tables, but these are sufficiently infrequent as to permit of correction. The portions of the theory due to solar action have required but little correction. The least satisfactory part is the set of perturbations produced by planetary action; the terms given are few in number and some of them are quite erroneous. Nevertheless, with one or two corrections supplied by Newcomb, Hansen's Tables have fulfilled the needs of navigation and astronomy for over half a century.

The large number of periodic terms in the expressions for the moon's position in terms of the time practically requires that tables of double-entry be used. In the ordinary form such tables demand a double interpolation and the labour of performing this detracts very greatly from their apparent efficiency. Hansen devised a plan by which the double interpolations with two variable arguments could be avoided or rendered quite simple: in fact, in actual use his double-entry

* The ephemeris computed from the tables in the present volume will be inserted for the first time in the Almanacs for 1923.

tables are but little more troublesome than those of single entry and with some alterations they can be made quite as simple. Like most of the Tables for the motions of the bodies in the solar system they are adapted for the calculation of an ephemeris at equidistant intervals.

The work of forming Tables based on the theory of Delaunay suffered from several difficulties. Although the theory in its extent and form is perhaps the most remarkable of all those which have dealt with the moon's motion and has formed a standard of comparison for all later work, its greatest value does not appear in a reduction to tabular form. It is algebraic throughout and the series representing many of the coefficients converge so slowly that the required degree of numerical accuracy is lacking. In some cases coefficients had to be estimated and in others to be taken bodily from later theories. Moreover the planetary terms had not been computed at Delaunay's death, so that these had to be supplied. The Tables themselves are so formed that the computation of an ephemeris requires nearly the same amount of work as that of as many separate positions. Arguments which do not vary uniformly with the time are used and there are some triple-entry tables.

The calculation and publication of new tables can not be justified unless they shall possess a theoretical and practical accuracy greater than that of those previously in existence. Further, their form and content should be such that the labour of computing from them shall not be excessive. Every effort has therefore been made to satisfy these desiderata. The theory itself has been extended so as to include the effects of every known force which acts on the moon, and such tests as have been made on the accuracy of the work by the author and others have so far given satisfactory results. The formation and calculation of the Tables have been performed under favourable circumstances. We have been able by various devices to include every known sensible term and also many that separately must be classed as insensible in comparison with modern observations, but which in the aggregate will occasionally show themselves. Although nearly 1500 terms are included—nearly five times as many as are contained in Hansen's Tables—the time needed to obtain the annual ephemeris is certainly not greater than, and is probably less than, that which the use of Hansen's Tables demands. Finally, the tests performed after the Tables were in proof give evidence of the very high accuracy of the work of Dr Hedrick and those who have also assisted in the calculations. My own part in the latter has been a minor one in general, but I have differenced all the proofs and tested each table to see that it corresponds to the terms it is supposed to contain. That some errors should have remained up to this stage in dealing with such large numbers of terms, many of which required two or three transformations before calculation was begun, is inevitable. But the fact that in these final searching tests, only three cases of wrong terms inserted were discovered and these so small as to be only worth mentioning as a matter of record, gives reason to hope that the tables are practically free from sensible errors.

The work of planning the Tables was begun in 1908 immediately after the completion of the theory. Arrangements had previously been made by which Yale

University undertook the cost of calculation, printing and publication. The first step required was a transformation of the latitude into a form which would diminish very considerably the number of tables and arguments. In the autumn of 1909 the general plans for the Tables had been outlined and calculation was started by Dr Hedrick who came to reside in New Haven shortly afterwards. Since that time to the summer of the present year the work has proceeded continuously with from one to four computers engaged according to the needs of the work. One portion, the final steps in the calculation of certain of the remainder tables from 1800–1900, is still in Dr Hedrick's hands; all the remainder tables for this period, not being needed for future ephemeris calculations, will be published separately at a later date.

When the Tables were started it was the intention to use the results of Cowell's extensive investigations into the comparison between observation and theory. A careful study of his work, however, showed that changes were needed if the highest degree of accuracy was to be obtained. His papers were completed some years before the new theory was finished and therefore his comparisons were mainly based on Hansen's Tables, with such corrections as were available at the time. Hence a new investigation was started. The differences between Hansen's theory, as used in his Tables, and the new theory were tabulated and applied to Cowell's results. Examination was also made of systematic errors in the observations. On the whole the earlier investigation was found to give values for the constants which differed very little from the corrected values. The final results were summarized in a paper to which reference is made in Chapter I, Section I. This explains how the three sets of constants which are involved in the work arose. The first set was used in reducing the theory to numerical form; the second set, to which the theory was transformed, was used in computing most of the tables; the third set, finally adopted, is that to which the Tables were reduced. The difference between the second and third sets is very small and all the necessary changes could be made through slight changes in the added constants. Hence the Tables, with their precepts, represent the theory with the finally adopted set of constants.

As stated above, the chief effort has been directed towards making the Tables convenient for the computation of the annual ephemeris, rather than for that of a single place. The latter is rarely required now, unless it be at the time of an eclipse or occultation, records of which have come down to us from the past. Hence uniformly changing arguments with values tabulated successively at the intervals chosen for the computation of the ephemeris are used throughout unless some considerable advantage could be gained by a variable argument. The rules and precepts to be followed by the ephemeris computer are all collected in Chapter V of the Introduction so that it is unnecessary for him to refer to any other part of Section I for information. In the following Chapter the few additional precepts necessary for the computation of a single place are given. In finding an ancient position of the moon a much lower degree of accuracy for purposes of comparison with observation can be adopted; this permits of a considerable abbreviation of the work. Precepts for such a case with an example are given in Chapter VI; these also are intended to be complete in themselves in order that reference to Chapter V or to other parts of the Introduction for information may be avoided.

A full account of the methods used in the formation of the Tables is given in Section I so that it is unnecessary to describe them here in any detail. Certain features may, however, call for some notice, more particularly in a comparison with Hansen's Tables which necessarily form a standard. His device for utilizing double-entry tables has been adopted with only minor changes. Hansen printed the values for successive half-days in a line so that the formation of the differences for interpolation would be easy. Here they are printed in column and the differences, or rather the variations per unit change of the argument, are also printed: these changes materially assist in avoiding mistakes. Less space is used for a given division of the argument, since the values for the intervening quarter-days which Hansen prints are omitted here: their sole use was to diminish the maximum factor for the final interpolation from ·5 to ·25, and since second differences are sufficient and must be used in either case, there is little or no advantage in retaining this feature of Hansen's work. The use of the synodic instead of the anomalistic month is rather more efficient in permitting a larger number of terms to be placed in each double-entry table and thus in diminishing the number of such tables.

The method used for the tabulation of the larger terms in single-entry tables is quite different from that adopted by Hansen. He used the anomalistic month as a basis and the arguments have to be calculated for the beginning of each month; the tabulation has to extend over a period equal to the anomalistic month plus the period of the term without any use being made of the resulting subdivision of the argument. He also uses a decimal division of the argument where the interval of twelve hours is too great for convenient interpolation. The single-entry tables as constructed below have really no beginning or end; they are completely re-entrant, so that wherever the start be made, the values for the half-day intervals can be continued indefinitely without recomputation of the argument or change of the interpolating factor. This is achieved by finding a suitable convergent to the ratio of half a day to the period of the term. The numerator of the fraction is the number of divisions of the half-day required for easy interpolation and replaces the decimal division of Hansen. The denominator is the number of values of the term actually tabulated. It is true that since a convergent can not completely represent the actual ratio, there is a gradual deviation of the argument from its true value; nevertheless, the change in all cases is so slow that it is a simple matter to account for it. In the few cases where this change has been sensible in the course of a year, the secular variations of the argument are also sensible and the two have been combined so that there is no additional work for the computer.

Two other new forms of tables are used. One is a table of double entry which requires only the same interpolation as a single-entry table and is also so constructed as to be completely re-entrant. The second is a device by which a number of terms of very short period are summed only at long intervals, the values at half-day intervals being obtained by an auxiliary table which requires no interpolation. These are fully described in Chapter II.

The use of several different forms of tables is objectionable when it is necessary to pass frequently from one form of table to another. The objection disappears when the computer can continuously enter all the tables of one form for a whole year or for a series of years, as is the case here. The time taken in learning how to use the table is soon saved by the rapidity with which the work can be done when it is once started. It is not necessary either that one computer should do the whole of the work. It has been so arranged that the greater part of it is in blocks independent of one another and several of these blocks are separately tested by differences.

In Chapter I of the Introduction, the expressions for the coordinates of the moon in their final numerical form are given with some small corrections and additions which have been required since the theory was published. Every term placed in the Tables is given a reference number and the table in which it occurs is also indicated. In Chapter IV the terms are again listed under the table in which they occur and the reference numbers are also given, so that it is possible to trace any term without difficulty to its final destination, or conversely. Chapters II and III contain the methods of construction of the different kinds of tables and the general plans adopted so that all sensible terms might be included. Chapters V and VI contain the precepts with examples for the computation of the annual ephemeris and of a single place, including the abbreviated form useful for an ancient observation. Chapter VII contains the explanation of a new method for the transformation from longitude and latitude to right ascension and declination; it also includes precepts for the use of those tables in Section VI which have been constructed to simplify this computation. Dr Hedrick's method for interpolation to hours with explanations of the use of the corresponding tables in Section VI is given in Chapter VIII.

One of the most difficult problems has been that of the inclusion of large numbers of small terms which could not be conveniently placed in tables of single or double entry. These, which we have called 'remainder terms', would have required an amount of space in this volume and computation for the ephemeris quite out of proportion to their importance if they had been made part of the general plan. The solution of the problem which is explained in Chapter IX depends mainly on two methods of treatment. The great majority of the terms are of short period, and each of them is expressed in the form $a \cos A + b \sin A$, where A is of short period and is common to a large number of terms, while a, b are of comparatively long period and different for each term. All the terms a, b which are attached in this way to a given argument A are summed at 10-day (in one case 14-day) intervals from the year 1800 to 2050 and the results placed in tables. The sums thus obtained are incorporated in the ephemeris in different ways explained in Chapter V. This, unlike the other tables, is a limited tabulation and will therefore require extension after the year 2050. Lists for this purpose and precepts for using them are given in Chapter IX; these are arranged either for computation during a series of years after 2050 and before 1800, or for finding a single place.

While many efforts have been made in the past to represent the motion of the moon by gravitational theory alone, it is now admitted that this cannot be done completely. When we attempt to represent ancient and modern observations by the same set of constants, it is found that, whatever adjustments be made, there is some disagreement with theory. The same is true of the modern observations. There are oscillating differences which do not correspond to any theoretical gravitational terms, and they are large enough to exclude the possibility of being due to errors either in the theory or in the observations.

The former of these differences is principally concerned with the value which shall be attached to the secular acceleration of the moon's mean motion. While many doubts have been raised as to the trustworthiness of ancient records, the general concensus of opinion leads to a real difference of at least 2″ per century, this being about 30 per cent. of the theoretical value. Some decision was necessary as to which value should be used. For the ephemeris during the next century it is not important since the mean motion—a constant determined by observation—can always be so adjusted as to satisfy the modern data, thus giving the same numerical values for some time to come whatever be the value of the acceleration adopted. Cowell has shown that there is also good evidence for a difference between theory and observation in the secular acceleration of the moon's node or in that of the earth's motion round the sun: it is the difference between these two angles for which a value is furnished by ancient observations. His results have been confirmed by Fotheringham. The cause or causes of these differences, if they have a real existence, are matters of conjecture. My object has been to retain only the results of known forces so far as this was possible and it was therefore decided that the theoretical values of the secular variations should be used, the mean motion being so adjusted as to satisfy modern observations as closely as possible.

To some extent involved in this question are the oscillating differences between theory and observation. Newcomb represented the principal portion of these by a term in the mean longitude with a coefficient of some 12″ and a period of about 270 years. The neglect of this makes so considerable a difference that in spite of its empirical nature, for no explanation of it has yet been accepted, its retention seemed necessary. I have, however, changed its coefficient and period so as to conform with the adopted values of the mean motion and secular acceleration when comparison is made with the observations of the last 150 years. Still more puzzling are certain oscillations with smaller amplitudes and shorter periods. Harmonic analyses of past observations, seemingly successful in representing them by two or three harmonic terms, have failed in prediction in the last few years. Lately the difference from the mean has mounted to about 7″. Since prediction of their future course has now little foundation, they have necessarily been left aside. All that can be done is to make an estimate of their magnitude from the observations of the past few years whenever it is desirable to predict the position of the moon with high accuracy, as in the case of an eclipse of the sun, and alter the values obtained from the Tables accordingly.

The theoretical and observed values of the mean motions of the perigee and node do not quite agree. But here the differences are very close to the limits of accuracy of both theory and observation. Slight changes in certain constants, particularly in those connected with the figures of the earth and moon, will produce complete accordance, and these changes are within the range of doubt concerning the values of those constants. Hence the observed values have been used in the sense that the observational constants involved have received the values which will cause agreement. The number, 1/294·0, thus resulting for the earth's figure, also produces agreement between the theoretical and observed values of the moon's mean distance, and does not interfere with the inequality in latitude produced by the earth's figure. This number is larger than that, 1/298, determined by other methods and is outside the probable error of the latter. In spite of this disagreement and because of the consistency it brings to the portions involved in the moon's motion, it has been adopted.

The last word has not been yet said on the values of these constants and of others in which the differences do not call for special mention here. I have therefore in Chapter X given the data by means of which any probable changes in the adopted constants can be easily made, either in the computation of the ephemeris or in that of a single place. In particular it is hoped that this Chapter may be found useful to those who wish to test various hypotheses in the representation of the moon's place at the time of an ancient eclipse.

It is a pleasant duty to acknowledge the assistance which has been rendered by all those who have been connected with the preparation of the Tables. Much the heaviest part of the arrangement and performance of the calculations has been borne by Dr Henry B. Hedrick, whose services were secured at the outset and who has spent his whole time on the work for nearly nine years. Every part of it has passed through his hands. He has prepared and tested all calculations which were performed by others. Many of the devices which have been employed to simplify the use of the Tables are due to him, and no decisions have been made without frequent discussions in which his suggestions have given valuable aid. His familiarity with known methods of computation and ability to devise new ones have contributed in no small degree to such novel and useful features as the Tables may be found to possess. The method for interpolation to hours, already referred to, is, with the corresponding tables of Section VI, wholly contributed by him.

Mr George F. Murray was for four years engaged on the work of summing the numerous small terms placed in the planetary and 'remainder' tables of Section VI. His accuracy, faithfulness and ability to carry on his work with but little supervision lightened our task very materially. Miss M. Gundersen has from time to time carried out with accuracy and speed large masses of computations. In occasional calculations, particularly in those requiring something more than a knowledge of

routine computation, we have been fortunate in securing the services of Mrs H. F. M. Hedrick.

During his residence in New Haven, Professor K. Hirayama of the Observatory of Tokio volunteered his assistance at a time when serious delays seemed probable owing to pressure of work for which computers were not available. My thanks are due to him for his very substantial contribution towards the formation of the tables of Section II and also for assistance in the computation of an ephemeris.

The reading of the proof has been almost entirely directed to the detection of errors in the manuscript. That this has been possible is due to the remarkable record of the Cambridge University Press which in setting up over five hundred quarto pages of numerical tables has allowed less than a dozen printer's errors to pass its proof-readers and has, in addition, frequently queried our own mistakes. Few sheets have required a second proof and in the actual use of the Tables, as finally printed, for the calculation of the ephemeris for two years, no error of any kind has been detected. It is interesting to notice that although manuscript has been continuously sent across the Atlantic during the war, no part of it has failed to reach the printer and in only one case have returning proofs been lost.

Finally, I wish to express my appreciation of the co-operation of the Corporation and Administrative Officers of Yale University and of their willingness to prevent material difficulties from interfering with the plan to complete the work as thoroughly and rapidly as possible. No financial or other considerations have been allowed to prevent its continuation in the nine years during which it has been in progress.

This volume brings to a close the work started thirty years ago with a study of Hill's papers made at the suggestion of my former teacher and friend, George Darwin. The undertaking of a complete recalculation of the moon's motions and later of tables which should make the theory available for practical and scientific use was no ambitious plan formed at the beginning but grew naturally out of the desire to continue the work as each stage in it was reached. Some part of it has always been in progress and there have been long periods during which it has been my sole occupation outside of the duties connected with an academic position and of the hours given to recreation. The word 'finis' brings with it some feeling of regret. The time spent in actual calculation was often a relief from attempts to solve more difficult problems in other lines. To what extent it has been worth while as a contribution to the subject must be left to the future and to others for judgment. My hope is that it will give some aid in unravelling the tangled skein of problems which our nearest celestial neighbour has never failed to present, and that the satisfaction to myself in seeing the work finally brought to a conclusion will be shared by those who have been interested in watching its progress.

ERNEST W. BROWN.

1918 *November* 29.

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ERRATUM

Correction to Table P 44, Section VI.

Add to the values given in the table the following:

Years	Addition	Years	Addition
1900–1915	+2	1966–1995	−2
1916–1932	+1	1996–2015	−3
1933–1948	0	2016–2045	−2
1949–1965	−1	2046–2050	−1

SECTION I

EXPLANATION OF THE TABLES

CHAPTER I

THE EXPRESSIONS FOR THE POSITION OF THE MOON IN TERMS OF THE TIME

The expressions for the Longitude and Sine Parallax of the Moon referred to the Earth's centre and to the mean ecliptic of the date are taken from the *Memoirs of the Royal Astronomical Society*, the solar parts from vol. LVII, pp. 109–145, and the planetary and other parts from vol. LIX, pp. 94–103. The solar part of the Latitude is taken from the *Monthly Notices of the Royal Astronomical Society*, vol. LXXI, pp. 656–660, this being a transformation from the expression for the latitude given in the memoir first quoted. Before setting down the complete values of the coordinates which are given in Lists 1α—1θ below, a number of changes and additions have been made to the previously published expressions. In particular, certain of the fundamental constants have been altered. Three sets of values of these constants are to be distinguished. The first set is that used in working out the theory in the memoirs quoted above; the second set is that used in Lists 1α—1θ of this chapter and therefore that used in the construction of the tables; the third set is that finally adopted, the changes necessary for the adoption of these final constants being incorporated in the precepts for the use of the tables (Chap. V).

The changes and additions referred to above are the following.

To the solar portions:

A few small terms in longitude depending on the characteristics e^6, e^5e', $e^3e'\gamma^2$ have been added.

Terms in parallax with coefficients less than 0″·0002 have been omitted.

The caption 'Parallax' on p. 142 of vol. LVII, *Mem. R. A. S.*, is changed to 'Sine Parallax' (correction of error).

The lunar eccentricity is changed to correspond to the coefficient 22639″·500 of the principal elliptic term in longitude (see p. 6).

The lunar inclination is changed to correspond to the coefficient 18461″·350 of the principal term in latitude when the latter is expressed as a sum of harmonic terms (see p. 6).

The value 3422″·700 of the constant term in the sine of the moon's equatorial horizontal parallax is retained unchanged in the expression for the sine parallax.

The parameter $\alpha_1 = (E - M)\, a \div (E + M)\, a'$ (*Mem. R. A. S.* vol. LVII, p. 109) is changed from 0·00250532 to 0·00251273 to correspond to the finally adopted values, E/M = 81·5300, the solar parallax = 8″·80549*, and the constant term in the sine of the moon's equatorial horizontal parallax = 3422″·540.

* Intended to be 8″·80600. The tables involving α_1 had been computed before the new values were obtained; the difference is much smaller than the probable error of this constant and therefore the tables were not changed.

The solar eccentricity has been brought up to the epoch 1900.

The portion S of the latitude (*l.c.* p. 660) contains a number of very small terms whose arguments contain $2F$ and it is desired to diminish the errors caused by their omission from the tables as much as possible. A small term $a \sin(2F + \alpha)$ in S, where α is a multiple of l, l', D, gives rise to terms

$$2\gamma a \cos F \sin(2F + \alpha) = \gamma a \sin(F + \alpha) + \gamma a \sin(3F + \alpha)$$

in the latitude. The term $\gamma a \sin(F + \alpha)$ gives rise to terms $\frac{1}{2} a \sin \alpha$ in S and $\frac{1}{2} a \cos \alpha$ in C which may be combined with terms having the same arguments already present in S, C. The term $\gamma a \sin(3F + \alpha)$ is not inserted in the tables. The error in latitude so produced has a maximum value only one-half of that which would have been produced by the neglect of the original term in S. The terms which have been treated in this manner are marked by a star following the table number in List iβ.

To the planetary parts:

The notations L, ϖ, ☊ are respectively substituted for w_1, w_2, $w_3 + 1^\circ\!\!.4 t_c$.

The coefficients of the terms with argument $w_3 + 1^\circ\!\!.4 t_c$, depending on the earth's ellipticity, have been changed to correspond to the value 1/294 for this constant (*l.c.* p. 96).

The sign of the term $+ 0''\!\!.840 \sin(w_3 + 276^\circ\!\!.2)$ in $\delta\varpi$ has been changed (correction of error on *l.c.* p. 96).

The portion '+ the ten periodic terms...' in $\delta\varpi$ has been changed to '− 2·5 times the ten periodic terms...' (correction of error on *l.c.* p. 96) and these terms have been listed as far as they are sensible.

To δ☊ has been added '+ ·75 times the ten periodic terms in δL whose arguments are independent of L, ϖ, ☊' (correction of error on *l.c.* p. 96) and these terms have been listed as far as they are sensible.

A number of planetary terms in parallax are inserted (addition not previously published).

The empirical term $+ 10''\!\!.71 \sin\{140^\circ\!\!.0\,(t_c - 18{\cdot}5) + 170^\circ\!\!.7\}$ is inserted (see *Monthly Notices R. A. S.* vol. LXXV, p. 510).

The arguments of all the planetary terms are given for the epoch at which they were computed, namely, 1850·0.

The notations for the arguments are as follows:

L, ϖ, ☊, the geocentric mean longitudes of the Moon, of its perigee and of its node;

L', ϖ', the geocentric mean longitudes of the Sun and of its perigee;

T, V, J, M, Q, S_n, the heliocentric mean longitudes of the Earth, Venus, Jupiter, Mars, Mercury, Saturn, with the origin at the Sun;

$$D = L - L', \quad l = L - \varpi, \quad l' = L' - \varpi', \quad F = L - \text{☊}, \quad T = L' + 180^\circ.$$

The values of L, ϖ, ☊ are taken from the *Monthly Notices R. A. S.* vol. LXXV, p. 510, and those of the other arguments from the tables for the respective bodies published in the Washington Astronomical Papers for the use of the American Ephemeris. To these values must be added the periodic additions to the elements given in List iη below.

In the lists which follow, the composition of each argument which is not printed fully, is shown by the multiples of the fundamental arguments present in it.

Every term which has been included in the tables receives a reference number in italic type; terms with no reference number are not included.

The table or tables which include each term are exhibited in the final columns.

In the lists of solar terms, the principal characteristic, 'prin. char.,' shows the highest powers of the solar and lunar eccentricities (e', e), of the lunar inclination ($2 \sin^{-1} \gamma$) and, except in the latitude, of the ratio of the parallaxes (α_1) contained in the coefficients when the latter are expressed in a literal form.

LIST iα. *Solar terms in the true longitude.* The table numbers are those of Section III except when prefixed by the letter P which indicates tables in Section VI.

LIST iβ. *Solar terms in the latitude.* The latitude is expressed in the form

$$(1 + C)(\gamma_1 \sin S + \gamma_2 \sin 3S + \gamma_3 \sin 5S + N).$$

The angle S is the sum of F and the periodic terms listed; in F are included the terms additive to $L, -\Omega$ shown in List iη.

The table numbers are those of Sect. IV, except when followed by the number III, when they are those of Sect. III, or prefixed by the letter P, when they are those of Sect. VI. The portions taken over from Sect. III can be seen by reference to Chap. V.

The stars attached to the table numbers of certain terms in S are explained above.

LIST iγ. *Solar terms in sine parallax.* The table numbers refer to the tables of Sect. V.

LIST iδ. *Planetary and other perturbations additive to the true longitude.* The terms are expressed in the respective forms

$$a \sin \{\theta + jT + i(T - V) + \alpha\}, \qquad a \sin \{\theta + jJ + i(J - T) + \alpha\},$$
$$a \sin \{\theta + jM + i(M - T) + \alpha\}, \qquad a \sin \{\theta + jS_n + i(S_n - T) + \alpha\},$$

the multiples of the angles present in any argument being shown under the respective headings; in the last eight terms the angles are independent of the planetary arguments.

In seven cases the number III after the table number indicates tables of Sect. III; otherwise, as shown by the letter P, they belong to Sect. VI.

Terms, or differences between terms in the list and those inserted in the tables, which have coefficients less than 0″.003 are not indicated.

LIST iϵ. *Planetary and other perturbations additive to the latitude.* The notations are the same as in List iδ, the tables of Sect. IV being indicated by the number IV. The terms which have been taken into the latitude through the presence of planetary terms in the portion of S taken from the longitude are denoted by the signification (S) after the table number; to show these clearly it has in some cases been necessary to divide a coefficient into two parts but all differences of this kind less than 0″.003 are not shown.

LIST iζ. *Planetary and other perturbations in sine parallax.* All terms which have reference numbers have been included by taking over from the longitude the sums of certain tables multiplied by suitable constants. As with List iϵ, it was necessary to divide certain coefficients into two parts in order to indicate the portions included in the tables, but differences of this kind and terms with coefficients less than 0".0003 are not indicated.

LIST iη. *Terms additive to the elements.* These are divided into two classes. The first contains the terms of very long period which are tabulated with the secular portions of the arguments in Sect. II; those affected to a sensible degree by these terms and included are shown. The second class contains the remainder of the terms additive to the elements. Those additive to the mean longitude L are also additive to the true longitude and the tables which take account of this direct effect are given in the third column of the list. The last column gives the reference numbers of the periodic terms in the true longitude which are sensibly affected by the additions to the elements and the tables through which these effects are included. The effects on the latitude, produced by carrying over into S certain portions of the longitude and with them some of these planetary terms, are not noted; the tables thus carried over are shown in the scheme of Chap. V. But the terms which are directly additive to S through the presence in its secular part F of the mean longitude L are indicated. Finally the effects in parallax are not noted although included to a higher degree of accuracy than is necessary by the devices explained in Chap. III.

To this list should be added the effects of the secular change of the solar eccentricity. This is accounted for by multiplying all terms containing the multiple i of l' by $\{1 - \cdot 00248\ (t_c - 19)\}^{|i|}$; it is, however, sufficiently accurate to take i equal to unity in all terms whose arguments contain l'. But the presence of e'^2 in the coefficients of the terms in longitude which have the arguments $2D$, $2D - l$, requires the addition to the true longitude of the terms

$$(-2''.2)\ (+\cdot 00496)\ (t_c - 19) \sin 2D + (-1''.6)\ (+\cdot 00496)\ (t_c - 19) \sin (2D - l).$$

These terms are included by certain instructions given in the precepts for the use of the tables (Chap. V).

LIST iθ. *The fundamental arguments and constants.* The arguments are expressed in Julian centuries of 36525 days (t_c), the epoch being 1900·0 except in the last block where the perihelia and nodes of the planets have the values for 1850·0.

The lunar eccentricity corresponds to a coefficient 22639".550 of the principal elliptic term in longitude and is computed by using the purely elliptic expression for the coefficient of that term. The value used in computing the tables corresponds to a coefficient of 22639".500; the method for changing to the final value will be explained in Chap. IV.

The value of γ is the sine of half the lunar inclination when the purely elliptic value is used in the principal latitude term with a coefficient of 18461".400, the latitude being expressed as a sum of harmonic terms. The value used in computing the tables corresponds to a coefficient of 18461″·350; the method for changing to the final value will be explained in Chap. IV.

The mean distance of the moon used in computing the tables of the parallax corresponds to a value 3422″·7000 of the constant term in the sine parallax; the method for changing to the final value 3422″·5400 will be explained in Chap. IV.

For the purpose of carrying the computations to more places of decimals than those given, zeros have been added to the fundamental values of the arguments wherever necessary.

LIST 1*a*. Solar terms in the true longitude.

Prin. Char.	Multiples of l	l'	F	D	Coef. of sin	Ref. No.	Table No.
1	0	0	0	8	+ 0″·001		
				6	+ ·127	1	33
				4	+ 13·902	2	33
				2	+ 2369·902	3	31
e	1	0	0	6	+ ·023	4	16
				4	+ 1·979	5	39
				2	+ 191·953	6	35
				0	+ 22639·500	7	30
				−2	− 4586·426	8	32
				−4	− 38·428	9	37
				−6	− ·393	10	16
				−8	− ·004	11	16
e'	0	1	0	6	− ·004	12	1
				4	− ·289	13	1
				2	− 24·420	14	24
				0	− 668·111	15	47
				−2	− 165·145	16	23
				−4	− 1·877	17	1
				−6	− ·024	18	1
α_1	0	0	0	5	+ ·004	19	33
				3	+ ·403	20	33
				1	− 125·154	21	33
e^2	2	0	0	6	+ ·004	22	16
				4	+ ·213	23	16
				2	+ 14·387	24	38
				0	+ 769·016	25	30
				−2	− 211·656	26	34
				−4	− 30·773	27	36
				−6	− ·570	28	16
				−8	− ·009	29	16
ee'	1	1	0	4	− ·051	30	2
				2	− 2·921	31	2
				0	− 109·667	32	25
				−2	− 205·962	33	27
				−4	− 4·391	34	2
				−6	− ·072	35	2
				−8	− ·001		
	1	−1	0	6	+ ·005	36	3
				4	+ ·283	37	3
				2	+ 14·577	38	28
				0	+ 147·693	39	26
				−2	+ 28·475	40	29
				−4	+ ·636	41	3
				−6	+ ·011	42	3
e'^2	0	2	0	4	− ·003	43	1
				2	− ·189	44	1
				0	− 7·486	45	1
				−2	− 8·096	46	1
				−4	− ·151	47	1
				−6	− ·002	48	1

Prin. Char.	Multiples of l	l'	F	D	Coef. of sin	Ref. No.	Table No.
γ^2	0	0	2	6	− 0″·001		
				4	− ·085	49	17
				2	− 5·741	50	44
				0	− 411·608	51	40
				−2	− 55·173	52	41
				−4	+ ·025	53	17
				−6	+ ·001		
$e\alpha_1$	1	0	0	3	− ·002	54	16
				1	− 8·466	55	16
				−1	+ 18·609	56	16
				−3	+ 3·215	57	16
				−5	+ ·014	58	16
$e'\alpha_1$	0	1	0	5	+ ·002	59	1
				3	+ ·150	60	1
				1	+ 18·023	61	1
				−1	+ ·560	62	1
				−3	− ·066	63	1
				−5	− ·001		
e^3	3	0	0	4	+ ·021	64	16
				2	+ 1·060	65	16
				0	+ 36·124	66	30
				−2	− 13·193	67	16
				−4	− 1·187	68	16
				−6	− ·293	69	32
				−8	− ·009	70	16
e^2e'	2	1	0	4	− ·007	71	4
				2	− ·290	72	4
				0	− 7·649	73	4
				−2	− 8·627	74	4
				−4	− 2·740	75	4
				−6	− ·091	76	4
				−8	− ·003	77	4
	2	−1	0	4	+ ·033	78	5
				2	+ 1·181	79	5
				0	+ 9·703	80	5
				−2	− 2·494	81	5
				−4	+ ·360	82	5
				−6	+ ·014	83	5
ee'^2	1	2	0	2	− ·014	84	6
				0	− 1·167	85	6
				−2	− 7·412	86	6
				−4	− ·311	87	6
				−6	− ·008	88	6
	1	−2	0	4	+ ·024	89	7
				2	+ ·757	90	7
				0	+ 2·580	91	7
				−2	+ 2·533	92	7
				−4	+ ·022	93	7
e'^3	0	3	0	0	− ·103	94	47
				−2	− ·344	95	1
				−4	− ·010	96	1

LIST i*a* (*cont.*).

Prin. Char.	Multiples of l	l'	F	D	Coef. of sin	Ref. No.	Table No.
$e\gamma^2$	1	0	2	4	− 0″·018	*97*	18
				2	− ·992	*98*	18
				0	−45·099	*99*	43
				−2	− ·179	*100*	18
				−4	− ·301	*101*	18
	1	0	−2	6	− ·001		
				4	− ·067	*102*	19
				2	− 6·382	*103*	19
				0	+39·532	*104*	42
				−2	+ 9·366	*105*	45
				−4	+ ·202	*106*	19
				−6	+ ·003	*107*	19
$e'\gamma^2$	0	1	2	4	+ ·002	*108*	10
				2	+ ·066	*109*	10
				0	+ ·415	*110*	10
				−2	− 2·152	*111*	10
				−4	− ·007	*112*	10
	0	1	−2	2	− 1·440	*113*	11
				0	+ ·076	*114*	11
				−2	+ ·384	*115*	11
				−4	+ ·011	*116*	11
e^2a_1	2	0	0	3	− ·004	*117*	16
				1	− ·586	*118*	16
				−1	+ 1·750	*119*	16
				−3	+ 1·225	*120*	16
				−5	+ ·059	*121*	16
				−7	+ ·001		
$ee'a_1$	1	1	0	3	+ ·023	*122*	2
				1	+ 1·267	*123*	2
				−1	+ ·137	*124*	2
				−3	+ ·233	*125*	2
				−5	+ ·001		
	1	−1	0	3	+ ·003	*127*	3
				1	− ·122	*128*	3
				−1	− 1·089	*129*	3
				−3	− ·276	*130*	3
				−5	− ·003	*131*	3
e'^2a_1	0	2	0	3	− ·002	*132*	1
				1	− ·039	*133*	1
				−1	− ·042	*134*	1
				−3	− ·006	*135*	1
γ^2a_1	0	0	2	3	+ ·004	*136*	17
				1	+ ·255	*137*	17
				−1	+ ·584	*138*	17
				−3	+ ·254	*139*	17
				−5	+ ·001		

Prin. Char.	Multiples of l	l'	F	D	Coef. of sin	Ref. No.	Table No.
e^4	4	0	0	4	+0″·002	*140*	16
				2	+ ·070	*141*	16
				0	+1·938	*142*	30
				−2	− ·952	*143*	16
				−4	+ ·003	*144*	16
				−6	− ·014	*145*	16
				−8	− ·004	*146*	16
e^3e'	3	1	0	2	− ·025	*147*	8
				6	− ·551	*148*	8
				−2	− ·482	*149*	8
				−4	− ·100	*150*	8
				−6	− ·039	*151*	8
				−8	− ·001		
	3	−1	0	4	+ ·003	*152*	9
				2	+ ·088	*153*	9
				0	+ ·681	*154*	9
				−2	− ·183	*155*	9
				−4	− ·029	*156*	9
				−6	+ ·005	*157*	9
$e^2e'^2$	2	2	0	0	− ·067	*158*	2
				−2	− ·297	*159*	2
				−4	− ·161	*160*	2
				−6	− ·008	*161*	2
	2	−2	0	4	+ ·003	*162*	3
				2	+ ·062	*163*	3
				0	+ ·197	*164*	3
				−2	+ ·254	*165*	3
				−4	+ ·036	*166*	3
				−6	+ ·001		
ee'^3	1	3	0	0	− ·018	*167*	P 4, P 7
				−2	− ·250	*168*	P 16, P 19
				−4	− ·016	*169*	P 46, P 47
	1	−3	0	4	+ ·001		
				2	+ ·032	*170*	P 46, P 47
				0	+ ·051	*171*	P 4, P 7
				−2	+ ·003	*172*	P 16, P 19
e'^4	0	4	0	0	− ·001		
				−2	− ·013	*173*	1
$e^2\gamma^2$	2	0	2	4	− ·003	*174*	20
				2	− ·123	*175*	20
				0	−3·996	*176*	46
				−2	+ ·557	*177*	20
				−4	− ·005	*178*	20
				−6	− ·003	*179*	20
	2	0	−2	4	− ·011	*180*	21
				2	− ·459	*181*	21
				0	−1·298	*182*	21
				−2	+ ·538	*183*	21
				−4	+ ·173	*184*	21
				−6	+ ·005	*185*	21

List 1a (*cont.*).

Prin. Char.	Multiples of l	l'	F	D	Coef. of sin	Ref. No.	Table No.
$ee'\gamma^2$	1	1	2	2	+0″.012	*186*	12
				0	+ ·263	*187*	12
				−2	+ ·059	*188*	12
				−4	− ·024	*189*	12
				−6	− ·001		
	1	1	−2	4	+ ·002	*190*	15
				2	+ ·083	*191*	15
				0	− ·083	*192*	15
				−2	+ ·426	*193*	15
				−4	+ ·019	*194*	15
	1	−1	2	4	− ·002	*195*	14
				2	− ·064	*196*	14
				0	− ·304	*197*	14
				−2	+ ·002	*198*	14
				−4	+ ·018	*199*	14
	1	−1	−2	4	− ·007	*200*	13
				2	− ·372	*201*	13
				0	+ ·083	*202*	13
				−2	− ·065	*203*	13
				−4	− ·002	*204*	13
$e'^2\gamma^2$	0	2	2	0	+ ·004	*205*	P 42, P 43
				−2	− ·066	*206*	P 39
				−4	− ·002		
	0	2	−2	2	− ·025	*207*	P 39
				0	− ·002		
				−2	+ ·016	*208*	P 48, P 49
γ^4	0	0	4	2	+ ·014	*209*	17
				0	+ ·418	*210*	17
				−2	+ ·074	*211*	17
$e^3\alpha_1$	3	0	0	1	− ·042	*212*	16
				−1	+ ·130	*213*	16
				−3	+ ·045	*214*	16
				−5	+ ·016	*215*	16
				−7	+ ·001		
$e^2e'\alpha_1$	2	1	0	3	+ ·003	*216*	4
				1	+ ·092	*217*	4
				−1	+ ·006	*218*	4
				−3	+ ·084	*219*	4
				−5	+ ·006	*220*	4
	2	−1	0	1	− ·014	*221*	5
				−1	− ·352	*222*	5
				−3	+ ·042	*223*	5
				−5	− ·003	*224*	5
$ee'^2\alpha_1$	1	2	0	1	− ·008	*225*	6
				−1	− ·002	*226*	6
				−3	+ ·012	*227*	6
	1	−2	0	−1	+ ·003	*228*	7
				−3	+ ·001		
$e'^3\alpha_1$	0	3	0	1	− ·001		
				−1	− ·002	*229*	1

Prin. Char.	Multiples of l	l'	F	D	Coef. of sin	Ref. No.	Table No.
$e\gamma^2\alpha_1$	1	0	2	1	+0″.045	*230*	18
				−1	+ ·024	*231*	18
				−3	+ ·030	*232*	18
				−5	+ ·002	*233*	18
	1	0	−2	3	− ·010	*234*	19
				1	− ·041	*235*	19
				−1	− ·016	*236*	19
				−3	− ·011	*237*	19
$e'\gamma^2\alpha_1$	0	1	2	3	− ·001		
				1	− ·035	*238*	10
				−1	+ ·013	*239*	10
				−3	+ ·020	*240*	10
	0	1	−2	3	− ·009	*241*	11
					+ ·018	*241a*	*
				1	− ·001		
				−1	− ·002	*242*	11
e^5	5	0	0	2	+ ·005	*243*	16
				0	+ ·113	*244*	30
				−2	− ·069	*245*	16
				−4	+ ·004	*246*	16
e^4e'	4	1	0	2	− ·002		
				0	− ·040	*247*	P 48, P 49
				−2	− ·030	*248*	P 42, P 43
				−6	− ·002		
				−8	− ·001		
	4	−1	0	2	+ ·007		
				0	+ ·048	*249*	P 48, P 49
				−2	− ·019	*250*	P 42, P 43
				−4	− ·001		
$e^3e'^2$	3	2	0	0	− ·003	*251*	P 46, P 47
				−2	− ·016	*252*	P 40, P 41
				−4	− ·006	*253*	P 40, P 41
				−6	− ·003	*254*	P 46, P 47
	3	−2	0	2	+ ·005		
				0	+ ·016	*255*	P 46, P 47
				−2	+ ·011	*256*	P 40, P 41
				−4	+ ·004	*257*	P 40, P 41
				−6	+ ·001		
$e^2e'^3$	2	3	0	0	− ·001		
				−2	− ·010	*258*	P 39
				−4	− ·008	*259*	P 42, P 43
				−6	− ·001		
	2	−3	0	2	+ ·003	*260*	P 48, P 49
				0	+ ·004	*261*	P 42, P 43
				−2	+ ·001		
ee'^4	1	4	0	−2	− ·006	*262*	P 16, P 19
$e^3\gamma^2$	3	0	2	4	− ·003	*263*	22
				2	− ·011	*264*	22
				0	− ·330	*265*	22
				−2	+ ·092	*266*	22

* The erroneous term *241* is corrected by the tabulation of the term *241a* in Chap. V.

List ia (*concl.*).

Prin. Char.	Multiples of l	l'	F	D	Coef. of sin	Ref. No.	Table No.
$e^2\gamma^2$	3	0	−2	4	−0″·001		
				2	− ·033	*267*	P 46, P 47
				0	− ·055	*268*	48
				−2	− ·005	*269*	P 40, P 41
				−4	+ ·009	*270*	P 46, P 47
				−6	+ ·003		
$e^2e'\gamma^2$	2	1	2	2	+ ·002		
				0	+ ·043	*271*	P 48, P 49
				−2	+ ·028	*272*	P 42, P 43
	2	1	−2	2	+ ·009	*273*	P 42, P 43
				0	+ ·026	*274*	P 39
				−2	+ ·022	*275*	P 42, P 43
				−4	+ ·016	*276*	P 48, P 49
				−6	+ ·001		
	2	−1	2	2	− ·009		
				0	− ·053	*277*	P 48, P 49
				−2	+ ·004	*278*	P 42, P 43
	2	−1	−2	4	− ·001		
				2	− ·029	*279*	P 42, P 43
				0	− ·024	*280*	P 39
				−2	·000		
				−4	− ·002		
$ee'^2\gamma^2$	1	2	2	0	+ ·003	*281*	P 46, P 47
				−2	+ ·004	*282*	P 40, P 41
				−4	− ·001		
	1	2	−2	2	− ·002		
				0	·000		
				−2	+ ·015	*283*	P 46, P 47
				−4	+ ·001		
	1	−2	2	2	− ·003		
				0	− ·005	*284*	P 46, P 47
				−2	+ ·007	*285*	P 40, P 41
				−4	− ·001		
	1	−2	−2	4	− ·001		
				2	− ·016	*286*	P 40, P 41
				0	·000		
				−2	− ·005		
$e'^3\gamma^2$	0	3	2	−2	− ·002		
	0	3	−2	−2	+ ·001		
$e\gamma^4$	1	0	4	2	+ ·003		
				0	+ ·090	*287*	48
				−2	+ ·009	*288*	P 46, P 47
	1	0	−4	4	− ·001		
				2	+ ·001		
				0	− ·080	*289*	48
				−2	− ·019		
$e'\gamma^4$	0	1	4	0	− ·001		
				−2	+ ·003	*290*	P 42, P 43
	0	1	−4	2	+ ·002		
				0	·000		
				−2	− ·001		

Prin. Char.	Multiples of l	l'	F	D	Coef. of sin	Ref. No.	Table No.
e^4a_1	4	0	0	1	−0″·003	*291*	16
				−1	+ ·010	*292*	16
				−3	+ ·002	*293*	16
				−5	+ ·001		
$e^3e'a_1$	3	1	0	1	+ ·007	*294*	8
				−1	− ·001		
				−3	+ ·003	*295*	8
				−5	+ ·002	*296*	8
	3	−1	0	1	− ·002	*297*	9
				−1	− ·023	*298*	9
				−3	+ ·007	*299*	9
$e^2\gamma^2a_1$	2	0	2	1	+ ·006	*300*	20
				−1	− ·003	*301*	20
	2	0	−2	3	− ·001		
				1	− ·001		
				−1	+ ·001		
				−3	− ·003	*302*	21
$ee'\gamma^2a_1$	1	1	2	1	− ·006	*303*	P 48, P 49
				−1	+ ·001		
				−3	+ ·002		
	1	1	−2	1	− ·002		
				−1	·000		
				−3	− ·001		
	1	−1	2	−3	− ·001		
	1	−1	−2	3	− ·001		
				1	− ·004	*304*	P 39
				−1	·000		
				−3	+ ·001		
γ^4a_1	0	0	4	1	− ·001		
				−1	− ·001		
e^6	6	0	0	0	+ ·007	*305*	30
				−2	− ·005	*306*	16
$e^4\gamma^2$	4	0	2	2	− ·001		
				0	− ·025	*307*	48
				−2	+ ·010	*308*	P 48, P 49
				−4	− ·001		
	4	0	−2	2	− ·001		
				0	− ·007	*309*	48
				−2	+ ·002		
$e^2\gamma^4$	2	0	4	2	+ ·001		
				0	+ ·011	*310*	48
	2	0	−4	0	+ ·001		
				−2	− ·003	*311*	P 48, P 49
				−4	− ·001		
e^5e'	5	1	0	0	− ·004		
				−2	− ·004	*312*	P 46, P 47
	5	−1	0	0	+ ·004		
$e^3e'\gamma^2$	3	1	2	0	+ ·006		
	3	−1	2	0	− ·006		

LIST iβ. Solar terms in Latitude. Terms in S.

Prin. Char.	Multiples of l	l'	F	D	Coef. of sin	Ref. No.	Table No.
1	0	0	0	1	− 112″.79	*313*	12, 33 III
				2	+ 2373·36	*314*	12, 31 III
				3	− 4·01	*315*	12, 33 III
				4	+ 14·06	*316*	12, 33 III
				5	− ·13	*317*	12
				6	+ ·60	*318*	12, 33 III
				8	+ ·01		
e	1	0	0	6	+ ·25	*320*	12
				5	− ·01		
				4	+ 6·98	*322*	12, 39 III
				3	− ·74	*323*	12
				2	+ 192·72	*324*	12, 35 III
				1	− 13·51	*325*	12
				0	+ 22609·07	*326*	12, 30 III
				−1	+ 3·59	*327*	12
				−2	− 4578·13	*328*	12, 32 III
				−3	+ 5·44	*329*	12
				−4	− 38·64	*330*	12, 37 III
				−5	+ ·25	*331*	12
				−6	− 1·43	*332*	12
				−8	− ·03	*333*	12
e^2	2	0	0	6	+ ·03	*334*	12
				4	+ 1·02	*335*	12
				3	− ·10	*336*	12
				2	+ 14·78	*337*	12, 38 III
				1	− 1·20	*338*	12
				0	+ 767·96	*339*	12, 30 III
				−1	+ 2·01	*340*	12
				−2	− 152·53	*341*	12, 34 III
				−3	+ ·91	*342*	12
				−4	− 34·07	*343*	12, 36 III
				−5	+ ·12	*344*	12
				−6	− 1·40	*345*	12
				−8	− ·07	*346*	12
e^3	3	0	0	4	+ ·16	*347*	12
				2	+ 2·96	*348*	12
				1	− ·09	*349*	12
				0	+ 50·64	*350*	12, 30 III
				−1	+ ·19	*351*	12
				−2	− 16·40	*352*	12
				−3	+ ·05	*353*	12
				−4	− ·74	*354*	12
				−5	+ ·03		
				−6	{ − ·29 { − ·02	*355*	36 III
				−8	− ·01		

Prin. Char.	Multiples of l	l'	F	D	Coef. of sin	Ref. No.	Table No.
e^4	4	0	0	2	+ 0″.30	*356*	12
				0	+ 3·60	*357*	12, 30 III
				−2	− 1·58	*358*	12
				−4	+ ·02		
				−6	− ·03		
e^5	5	0	0	2	+ ·04		
				0	+ ·28	*359*	12, 30 III
				−2	− ·14	*360*	12
				−4	+ ·01		
e'	0	1	0	6	− ·06	*361*	1
				5	+ ·01		
				4	− 1·59	*362*	1
				3	+ ·53	*363*	1
				2	− 25·10	*364*	1, 24 III
				1	+ 17·93	*365*	1
				0	− 126·98	*366*	1
				−1	+ ·32	*367*	1
				−2	− 165·06	*368*	1, 23 III
				−3	+ ·29	*369*	1
				−4	− 6·46	*370*	1
				−6	− ·22	*371*	1
e'^2	0	2	0	4	− ·04	*372*	1
				2	− 1·68	*373*	1
				1	− ·04	*374*	1
				0	− ·66	*375*	1
				−1	− ·04	*376*	1
				−2	− 16·35	*377*	1
				−3	+ ·01		
				−4	− ·65	*378*	1
e'^3	0	3	0	−2	− ·57	*379*	1
				−4	− ·01		
ee'	1	1	0	6	− ·01		
				4	− ·50	*380*	2
				3	+ ·08	*381*	2
				2	− 11·75	*382*	2
				1	+ 1·52	*383*	2
				0	− 115·18	*384*	2, 25 III
				−1	− ·12	*385*	2
				−2	− 182·36	*386*	2, 27 III
				−3	+ ·36	*387*	2
				−4	− 9·66	*388*	2
				−5	+ ·01		
				−6	− ·37	*389*	2
$e^2e'^2$	2	2	0	0	− ·09	*390*	2
				−2	− ·27	*391*	2
				−4	− ·16	*392*	2
				−6	− ·02		

LIST iβ (*cont.*). Terms in S (*cont.*).

Prin. Char.	Multiples of l	l'	F	D	Coef. of sin	Ref. No.	Table No.
ee'	−1	1	0	6	− 0″·09	*393*	3
				5	+ ·01		
				4	− 2·27	*394*	3
				3	+ ·38	*395*	3
				2	− 23·59	*396*	3, 29 III
				1	− ·55	*397*	3
				0	− 138·76	*398*	3, 26 III
				−1	+ ·33	*399*	3
				−2	− 31·70	*400*	3, 28 III
				−3	+ ·04	*401*	3
				−4	− 1·53	*402*	3
				−6	− ·06	*403*	3
$e^2e'^2$	−2	2	0	4	− ·04	*404*	3
				2	− ·21	*405*	3
				0	− ·22	*406*	3
				−2	− ·20	*407*	3
e^2e'	2	1	0	4	− ·07	*408*	4
				2	− 1·45	*409*	4
				1	+ ·14	*410*	4
				0	− 10·56	*411*	4
				−1	+ ·02	*412*	4
				−2	− 7·59	*413*	4
				−3	+ ·07	*414*	4
				−4	− 2·54	*415*	4
				−6	− ·25	*416*	4
	2	−1	0	4	+ ·22	*417*	5
				2	+ 3·32	*418*	5
				1	− ·04	*419*	5
				0	+ 11·67	*420*	5
				−1	− ·37	*421*	5
				−2	− 1·17	*422*	5
				−3	+ ·04	*423*	5
				−4	+ ·20	*424*	5
				−6	+ ·06	*425*	5
e^3e'	3	1	0	2	− ·17	*426*	8
				1	− ·01		
				0	− ·94	*427*	8
				−2	− ·57	*428*	8
				−4	− ·08	*429*	8
				−6	− ·06	*430*	8
	3	−1	0	4	+ ·01		
				2	+ ·36	*431*	9
				0	+ ·96	*432*	9
				−2	− ·23	*433*	9
				−6	+ ·01		

Prin. Char.	Multiples of l	l'	F	D	Coef. of sin	Ref. No.	Table No.
e^4e'	4	1	0	0	− 0″·01		
				−2	{ − ·03	*434*	†
					{ + ·05		
	4	−1	0	2	+ ·02		
				0	− ·02		
				−2	{ − ·02	*435*	†
					{ + ·03		
ee'^2	1	2	0	2	− ·13	*436*	6
				0	− 1·25	*437*	6
				−2	− 6·12	*438*	6
				−4	− ·65	*439*	6
				−6	− ·03		
	−1	2	0	4	− ·07	*440*	7
				2	− 2·40	*441*	7
				0	− 2·32	*442*	7
				−2	− 1·82	*443*	7
				−4	− ·12	*444*	7
ee'^3	1	3	0	0	− ·02	*445*	‡
				−2	{ − ·25	*446*	‡
					{ + ·03		
				−4	− ·02		
	−1	3	0	0	{ − ·05	*447*	‡
					{ + ·01		
				−2	− ·06		
γ^2	0	0	2	4	− ·02		12*
				2	− ·04	*448*	13
				0	− ·20	*449*	13
				−1	+ ·84	*450*	13
				−2	− 52·14	*451*	13
				−3	+ ·25	*452*	13
				−4	− 1·67	*453*	13
				−6	− ·03	*454*	13
$e\gamma^2$	1	0	2	2	− ·02		12*
				0	− ·02		12*
				−1	+ ·07	*455*	14
				−2	− 9·52	*456*	14
				−3	+ ·04	*457*	14
				−4	− ·33	*458*	14
				−5	− ·02		12*
				−6	− ·04	*459*	14

* For explanation of the star, see p. 4.

† Included through the presence of term *3* in S containing terms in Tables P 42, P 43.

‡ Included through the presence of term *7* in S containing terms in Tables P 4, P 7.

List iβ (*cont.*). Terms in S (*cont.*).

Prin. Char.	Multiples of *l*	*l'*	*F*	*D*	Coef. of sin	Ref. No.	Table No.
$e\gamma^2$	−1	0	2	4	− 0″.02		12*
				3	+ ·02		12*
				2	− ·71	*460*	15
				1	+ ·06	*461*	15
				0	−85·13	*462*	15
				−1	+ ·04	*463*	15
				−2	+ 3·37	*464*	15
				−3	− ·01		
				−4	+ ·04	*465*	15
$e^2\gamma^2$	2	0	2	−1	− ·01		
				−2	− ·75	*466*	17
				−4	+ ·02		12*
	−2	0	2	4	− ·02		12*
				2	− 1·14	*467*	16
				0	− ·74	*468*	16
				−2	+ ·38	*469*	16
				−4	+ ·02		12*
$e^3\gamma^2$	3	0	2	2	− ·02		12*
				0	− ·04		12*
				−2	− ·07		12*
	−3	0	2	4	− ·08		12*
				2	+ ·02		12*
				0	− ·11		12*
				−2	+ ·04		12*
$e^4\gamma^2$	4	0	2	0	+ ·02		12*
				−2	+ ·01		
	−4	0	2	0	− ·02		12*
$e'\gamma^2$	0	1	2	2	− ·02		1*
				0	+ ·10	*470*	10
				−2	− 2·26	*471*	10
				−3	+ ·02		1*
				−4	− ·17	*472*	10
	0	−1	2	2	+ ·04	*473*	11
				0	+ ·16	*474*	11
				−1	− ·06	*475*	11
				−2	+ 1·30	*476*	11
				−4	+ ·08	*477*	11

Prin. Char.	Multiples of *l*	*l'*	*F*	*D*	Coef. of sin	Ref. No.	Table No.
$e'^2\gamma^2$	0	2	2	−2	−0″.09		1*
				−4	− ·02		1*
	0	−2	2	2	+ ·02		1*
				−2	+ ·02		1*
$ee'\gamma^2$	1	1	2	0	+ ·02		2*
				−2	− ·35	*478*	18
				−4	− ·03		2*
	−1	−1	2	2	− ·07		2*
				0	{ + ·32	*479*	15
					{ − ·01		
				−2	− ·02		2*
	1	−1	2	2	+ ·02		3*
				0	+ ·03		3*
				−2	+ ·07		3*
				−4	+ ·01		3*
	−1	1	2	0	{ − ·32	*480*	15
					{ − ·01		
				−2	+ ·19		3*
				−4	− ·01		
$e^2e'\gamma^2$	2	1	2	0	− ·02		4*
				−2	{ + ·03	*481*	†
					{ − ·03		4*
	−2	−1	2	2	+ ·02	*482*	†
				0	+ ·02		4*
	2	−1	2	0	+ ·02		5*
				−2	− ·01		
	−2	1	2	0	− ·02		5*
				−2	{ − ·03	*483*	†
					{ + ·04		5*

* For explanation of the star, see p. 4.

† Included through the presence of term *3* in S containing terms in Tables P 42, P 43.

LIST 1β (*cont.*). Terms in $\gamma_1 C$.

Prin. Char.	Multiples of l	l'	F	D	Coef. of cos	Ref. No.	Table No.
1	0	0	0	1	−0″·725	484	43
				2	+ ·601	485	43
				3	+ ·394	486	43
				4	− ·001		
				5	+ ·012	487	43
				6	− ·042	488	43
				8	− ·001		
e	1	0	0	6	− ·018	489	43
				5	+ ·001		
				4	− ·445	490	43
				3	+ ·068	491	43
				2	+ ·029	492	43
				1	+ ·455	493	43
				0	+ ·079	494	43
				−1	− ·094	495	43
				−2	− ·077	496	43
				−3	+ ·192	497	43
				−4	+ ·001		
				−5	+ ·020	498	43
				−6	− ·092	499	43
				−8	− ·003	500	43
e^2	2	0	0	6	− ·003	501	43
				4	− ·074	502	43
				3	+ ·007	503	43
				2	− ·017	504	43
				1	+ ·054	505	43
				0	+ ·107	506	43
				−1	− ·018	507	43
				−2	+5·679	508	43
				−3	− ·030	509	43
				−4	− ·308	510	43
				−5	+ ·007	511	43
				−6	− ·074	512	43
				−8	− ·004	513	43
e^3	3	0	0	4	− ·012	514	43
				2	− ·166	515	43
				1	+ ·006	516	43
				0	−1·300	517	43
				−1	− ·005	518	43
				−2	+ ·258	519	43
				−3	− ·002		
				−4	+ ·042	521	43
				−5	− ·001		
				−6	− ·002		
				−8	− ·001		
e^4	4	0	0	2	−0″·023	522	43
				0	− ·145	523	43
				−2	+ ·052	524	43
				−6	− ·001		
e^5	5	0	0	2	− ·002		
				0	− ·015	525	43
				−2	+ ·005	526	43
				−4	− ·001		
e'	0	1	0	6	+ ·005	527	34
				5	− ·001		
				4	+ ·123	528	34
				3	− ·032	529	34
				2	+ ·040	530	34
				1	+ ·007	531	34
				0	−1·302	532	34
				−1	− ·001		
				−2	+ ·054	533	34
				−3	+ ·031	534	34
				−4	− ·416	535	34
				−6	− ·016	536	34
e'^2	0	2	0	4	+ ·004	537	34
				2	+ ·131	538	34
				0	− ·037	539	34
				−2	− ·740	540	34
				−3	+ ·001		
				−4	− ·044	541	34
e'^3	0	3	0	−2	− ·025	542	34
				−4	− ·001		
ee'	1	1	0	6	+ ·001		
				4	+ ·041	543	35
				3	− ·007	544	35
				2	+ ·787	545	35
				1	− ·022	546	35
				0	+ ·461	547	35
				−1	+ ·005	548	35
				−2	+2·056	549	35
				−3	+ ·012	550	35
				−4	− ·471	551	35
				−5	+ ·001		
				−6	− ·027	552	35
$e^2e'^2$	2	2	0	0	+ ·002		
				−2	+ ·002		
				−4	+ ·002		

List iβ (*cont.*). Terms in γ_1C (*concl.*). Terms in N. Principal terms.

Prin. Char.	Multiples of l	l'	F	D	Coef. of cos	Ref. No.	Table No.
ee'	−1	1	0	6	+0″·006	*553*	36
				5	− ·001		
				4	+ ·146	*554*	36
				3	− ·006	*555*	36
				2	− ·443	*556*	36
				1	+ ·021	*557*	36
				0	+ ·679	*558*	36
				−1	+ ·016	*559*	36
				−2	−1·540	*560*	36
				−3	+ ·004	*561*	36
				−4	− ·111	*562*	36
				−6	− ·005	*563*	36
$e^2e'^2$	−2	2	0	2	− ·003	*564*	36
				−2	− ·010	*565*	36
e^2e'	2	1	0	4	+ ·006	*566*	37
				2	+ ·116	*567*	37
				1	− ·003	*568*	37
				0	+ ·259	*569*	37
				−2	+ ·078	*570*	37
				−3	− ·002		
				−4	+ ·022	*571*	37
				−6	− ·014	*572*	37
	2	−1	0	4	− ·018	*573*	38
				2	− ·212	*574*	38
				0	− ·151	*575*	38
				−1	+ ·001		
				−2	− ·003	*576*	38
				−4	− ·012	*577*	38
				−6	+ ·003	*578*	38
e^3e'	3	1	0	2	+ ·011	*579*	41
				1	− ·001		
				0	+ ·032	*580*	41
				−2	+ ·005	*581*	41
				−4	+ ·003	*582*	41
				−6	− ·001		
	3	−1	0	4	− ·001		
				2	− ·022	*583*	42
				0	− ·026	*584*	42
				−1	+ ·002		
				−2	+ ·003	*585*	42
				−6	− ·001		
e^4e'	4	1	0	0	+0″·007		
				−2	+ ·006		
	4	−1	0	2	− ·002		
				0	− ·008		
				−2	+ ·003		
ee'^2	1	2	0	2	+ ·014	*586*	39
				0	+ ·008	*587*	39
				−2	+ ·117	*588*	39
				−4	− ·032	*589*	39
				−6	− ·001		
	−1	2	0	4	+ ·006	*590*	40
				2	− ·014	*591*	40
				0	+ ·027	*592*	40
				−2	− ·105	*593*	40
				−4	− ·009	*594*	40
ee'^3	1	3	0	−2	+ ·004		
	−1	3	0	−2	− ·003		

Terms in N.

Term	Ref. No.	Table No.
$-526''\!\cdot069 \sin(F-2D)$	*595*	21
$-\ \ 3\cdot352 \sin(F-4D)$	*596*	22
$+\ 44\cdot297 \sin(F+l-2D)$	*597*	25
$-\ \ 6\cdot000 \sin(F+l-4D)$	*598*	23
$+\ 20\cdot599 \sin(F-l)$	*599*	24
$-\ 30\cdot598 \sin(F-l-2D)$	*600*	26
$-\ 24\cdot649 \sin(F-2l)$	*601*	27
$-\ \ 2\cdot000 \sin(F-2l-2D)$	*602*	28
$-\ 22\cdot571 \sin(F+l'-2D)$	*603*	19
$+\ 10\cdot985 \sin(F-l'-2D)$	*604*	20

Principal terms.

Term	Ref. No.	Table No.
{ $+18518''\!\cdot511 \sin S$	*605*	33
{ $+\ \ 1\cdot189 \sin S$	*606*	†
$-\ \ 6\cdot241 \sin 3S$	*607*	33
$+\ \ \cdot004 \sin 5S$	*607a*	33

† Added in with the terms in C by means of the device explained on p. 42.

LIST iγ. Solar terms in sine Parallax.

Prin. Char.	Multiples of l	l'	F	D	Coef. of cos	Ref. No.	Table No.
1	0	0	0	6	+ 0"·0032	*608*	16
				4	+ ·2607	*609*	16
				2	+ 28·2333	*610*	16
				0	+3422·7000	*611*	24
e	1	0	0	6	+ ·0007	*612*	10
				4	+ ·0433	*613*	10
				2	+ 3·0861	*614*	18
				0	+ 186·5398	*615*	15
				−2	+ 34·3117	*616*	17
				−4	+ ·6008	*617*	22
				−6	+ ·0086	*618*	10
				−8	+ ·0002	*619*	10
e'	0	1	0	4	− ·0053	*620*	1
				2	− ·3000	*621*	1
				0	− ·3997	*622*	1
				−2	+ 1·9178	*623*	19
				−4	+ ·0339	*624*	1
				−6	+ ·0006	*625*	1
a_1	0	0	0	3	+ ·0023	*626*	16
				1	− ·9781	*627*	16
e^2	2	0	0	4	+ ·0054	*628*	18
				2	+ ·2833	*629*	21
				0	+ 10·1657	*630*	15
				−2	− ·3039	*631*	10
				−4	+ ·3722	*632*	17
				−6	+ ·0109	*633*	10
				−8	+ ·0002	*634*	10
ee'	1	1	0	4	− ·0012	*635*	2
				2	− ·0484	*636*	2
				0	− ·9490	*637*	2
				−2	+ 1·4437	*638*	2
				−4	+ ·0673	*639*	2
				−6	+ ·0015	*640*	2
	1	−1	0	4	+ ·0060	*641*	3
				2	+ ·2302	*642*	3
				0	+ 1·1528	*643*	3
				−2	− ·2257	*644*	3
				−4	− ·0102	*645*	3
				−6	− ·0005	*646*	3
e'^2	0	2	0	2	− ·0028	*647*	1
				0	− ·0086	*648*	1
				−2	+ ·0918	*649*	1
				−4	+ ·0028	*650*	19
γ^2	0	0	2	2	− ·0009	*651*	11
				0	− ·0124	*652*	11
				−2	− ·1052	*653*	11
				−4	+ ·0031	*654*	11

Prin. Char.	Multiples of l	l'	F	D	Coef. of cos	Ref. No.	Table No.
ea_1	1	0	0	3	−0"·0003	*655*	10
				1	− ·1093	*656*	10
				−1	+ ·0118	*657*	10
				−3	− ·0386	*658*	10
				−5	− ·0003	*659*	10
$e'a_1$	0	1	0	3	+ ·0027	*660*	1
				1	+ ·1494	*661*	1
				−1	− ·0037	*662*	1
				−3	+ ·0007	*663*	1
e^3	3	0	0	4	+ ·0007	*664*	10
				2	+ ·0243	*665*	10
				0	+ ·6215	*666*	15
				−2	− ·1187	*667*	10
				−4	+ ·0074	*668*	10
				−6	+ ·0046	*669*	17
				−8	+ ·0002	*670*	10
e^2e'	2	1	0	2	− ·0051	*671*	4
				0	− ·1038	*672*	4
				−2	− ·0192	*673*	4
				−4	+ ·0324	*674*	4
				−6	+ ·0017	*675*	4
	2	−1	0	4	+ ·0007	*676*	5
				2	+ ·0213	*677*	5
				0	+ ·1268	*678*	5
				−2	− ·0017	*679*	5
				−4	− ·0043	*680*	5
				−6	− ·0002	*681*	5
ee'^2	1	2	0	0	− ·0106	*682*	6
				−2	+ ·0484	*683*	6
				−4	+ ·0044	*684*	6
				−6	+ ·0002	*685*	6
	1	−2	0	4	+ ·0005	*686*	7
				2	+ ·0112	*687*	7
				0	+ ·0196	*688*	7
				−2	− ·0212	*689*	7
				−4	− ·0003	*690*	7
e'^3	0	3	0	0	− ·0002	*691*	1
				−2	+ ·0036	*692*	1
				−4	+ ·0002	*693*	1
$e\gamma^2$	1	0	2	0	− ·0010	*694*	12
				−2	− ·0833	*695*	12
				−4	+ ·0014	*696*	12
				−6	+ ·0002	*697*	12
	1	0	−2	4	− ·0005	*698*	13
				2	− ·0481	*699*	13
				0	− ·7136	*700*	13
				−2	− ·0112	*701*	13

LIST iγ (*concl.*).

Prin. Char.	Multiples of l	l'	F	D	Coef. of cos	Ref. No.	Table No.
$e'\gamma^2$	0	1	2	0	+0″.0013		
				−2	− ·0066	702	23
				−4	+ ·0005		
	0	1	−2	2	+ ·0014		
				0	+ ·0017		
$e^2\alpha_1$	2	0	0	1	− ·0100	703	10
				−1	+ ·0155	704	10
				−3	− ·0088	705	10
				−5	− ·0008	706	10
$ee'\alpha_1$	1	1	0	3	+ ·0003	707	2
				1	+ ·0164	708	2
				−3	− ·0025	709	2
	1	−1	0	1	− ·0014	710	3
				−3	+ ·0036	711	3
$e'^2\alpha_1$	0	2	0	1	− ·0003	712	1
				−1	+ ·0003	713	1
$\gamma^2\alpha_1$	0	0	2	−1	+ ·0071	714	11
				−3	− ·0017	715	11
e^4	4	0	0	2	+ ·0018	716	10
				0	+ ·0401	717	15
				−2	− ·0130	718	10
				−6	+ ·0002	719	10
e^3e'	3	1	0	2	− ·0006	720	8
				0	− ·0097	721	8
				−2	− ·0045	722	8
				−4	+ ·0006	723	8
				−6	+ ·0005	724	8
	3	−1	0	2	+ ·0017	725	9
				0	+ ·0115	726	9
				−2	− ·0017	727	9
				−4	+ ·0002	728	9
$e^2e'^2$	2	2	0	0	− ·0009	729	2
				−2	− ·0009	730	2
				−4	+ ·0020	731	2
	2	−2	0	2	+ ·0013	732	3
				0	+ ·0024	733	3
				−4	− ·0005	734	3
ee'^3	1	3	0	0	− ·0002		
				−2	+ ·0014		
				−4	+ ·0002		
	1	−3	0	2	+ ·0004		
				0	+ ·0004		
				−2	+ ·0002		

Prin. Char.	Multiples of l	l'	F	D	Coef. of cos	Ref. No.	Table No.
$e^2\gamma^2$	2	0	2	0	+0″.0004		
				−2	− ·0090	735	20
				−4	+ ·0002		
	2	0	−2	2	− ·0053	736	14
				0	+ ·0004	737	14
				−2	− ·0141	738	14
				−4	− ·0004	739	14
$ee'\gamma^2$	1	1	2	−2	{ − ·0030	740	P 38
					{ − ·0002		
	1	1	−2	2	+ ·0006		
				0	{ + ·0026	741	13
					{ − ·0002		
				−2	− ·0006		
	1	−1	2	0	+ ·0003		
				−2	+ ·0004		
	1	−1	−2	2	{ − ·0030	742	P 38
					{ + ·0003		
				0	{ − ·0026	743	13
					{ − ·0003		
$e'^2\gamma^2$	0	2	2	−2	− ·0004		
$e^3\alpha_1$	3	0	0	1	− ·0009	744	10
				−1	+ ·0017	745	10
				−5	− ·0002	746	10
$e^2e'\alpha_1$	2	1	0	3	+ ·0002	747	4
				1	+ ·0015	748	4
				−1	− ·0002	749	4
				−3	− ·0005	750	4
				−5	− ·0002	751	4
	2	−1	0	1	− ·0005	752	5
				−1	− ·0028	753	5
				−3	− ·0005	754	5
				−5	+ ·0002	755	5
$e\gamma^2\alpha_1$	1	0	2	1	+ ·0002	756	12
				−1	+ ·0010	757	12
				−3	+ ·0002	758	12
				−5	− ·0002	759	12
	1	0	−2	3	− ·0002	760	13
				−1	+ ·0006	761	13
				−3	+ ·0004	762	13
$e'\gamma^2\alpha_1$	0	1	−2	1	− ·0003		
e^5	5	0	0	2	+ ·0002	763	10
				0	+ ·0026	764	15
				−2	− ·0012	765	10
$e^3\gamma^2$	3	0	2	−2	− ·0009		
	3	0	−2	2	− ·0005		
				0	− ·0003		
				−4	− ·0008		
$e\gamma^4$	1	0	−4	2	+ ·0002		

LIST 18. Planetary terms in the true longitude.

Multiples of *T*	*T* − *V*	*a*	Coef. of sin	Ref. No.	Table No.
		θ = 0			
0	1	0·0	0″·822	*766*	P 1
	2	179·8	·307	*767*	,,
	3	359·3	·042	*768*	,,
	4	0	·046	*769*	,,
	5	0	·033	*770*	,,
	6	0	·024	*771*	,,
	7	0	·017	*772*	,,
	8	0	·012	*773*	,,
	9	0	·008	*774*	,,
	10	0	·006	*775*	,,
	11	0	·004	*776*	,,
	21	0	·003	*777*	P 40, P 41
1	− 2	254	·010	*778*	P 1
	− 1	84	·016	*779*	,,
	1	82	·042	*780*	,,
	2	272·9	·348	*781*	,,
	3	271·7	·176	*782*	,,
	5	271	·004	*783*	,,
	6	272	·006	*784*	,,
	7	272	·004	*785*	,,
2	− 18	209	·050	*786*	P 40, P 41
	− 1	27	·003	*787*	P 1
	1	25	·005	*788*	,,
	2	33	·003	*789*	,,
	3	199·0	·092	*790*	,,
	4	204	·026	*791*	,,
	5	17	·009	*792*	,,
	6	207	·004	*793*	,,
3	5	114	·026	*794*	,,
		θ = *l*			
0	− 7	180	0″·004	*795*	P 4, P 7
	− 6	180	·005	*796*	,,
	− 5	180	·006	*797*	,,
	− 4	180	·006	*798*	,,
	− 3	180	·008	*799*	,,
	− 2	0·0	·061	*800*	,,
	− 1	180·0	·129	*801*	,,
	1	0·0	·152	*802*	,,
	2	180·0	·048	*803*	,,
	3	180·0	·127	*804*	,,
	4	180	·011	*805*	,,

Multiples of *T*	*T* − *V*	*a*	Coef. of sin	Ref. No.	Table No.
		θ = *l* (*cont.*)			
1	− 2	258	0″·004	*806*	P 4, P 7
	1	75	·008	*807*	,,
	2	271	·046	*808*	,,
	3	272	·040	*809*	,,
	4	272	·005	*810*	,,
	5	92	·004	*811*	,,
	23	272	·006	*812*	P 39
− 1	− 3	268	·032	*813*	P 4, P 7
	− 2	264	·046	*814*	,,
	− 1	104	·009	*815*	,,
	1	102	·003	*816*	,,
	2	282	·007	*817*	,,
	3	280	·007	*818*	,,
2	− 18	209	·003	*819*	P 42, P 43
	3	210	·014	*820*	P 4, P 7
	4	205	·004	*821*	,,
	5	19	·003	*822*	,,
	6	198	·016	*823*	,,
− 2	− 5	161	·003	*824*	,,
	− 4	336	·004	*825*	,,
	− 3	331	·015	*826*	,,
3	5	115	·004	*827*	,,
− 3	− 5	65	·004	*828*	,,
		θ = 2*D*			
0	− 11	0	0″·003	*829*	P 10, P 13
	− 10	0	·005	*830*	,,
	− 9	0	·006	*831*	,,
	− 8	0	·008	*832*	,,
	− 7	0	·008	*833*	,,
	− 6	0	·011	*834*	,,
	− 5	0	·011	*835*	,,
	− 4	0	·008	*836*	,,
	− 3	180	·034	*837*	,,
	− 2	0	·036	*838*	,,
	− 1	180	·023	*839*	,,
	1	0·0	·099	*840*	,,
	2	179·5	·136	*841*	,,
	3	178	·013	*842*	,,
	4	180	·004	*843*	,,
	18	0	·003	*844*	P 40, P 41

List iδ (*cont.*).

Multiples of *T*	*T* − *V*	*a*	Coef. of sin	Ref. No.	Table No.
		$\theta = 2D$ (*cont.*)			
1	1	232	0″·003	*845*	P 10, P 13
	2	271·0	·040	*846*	,,
	3	271·5	·037	*847*	,,
	4	89	·005	*848*	,,
	20	273	·003	*849*	P 40, P 41
−1	−11	78	·003	*850*	P 10, P 13
	−10	78	·004	*851*	,,
	− 9	78	·004	*852*	,,
	− 8	78	·004	*853*	,,
	− 7	78	·005	*854*	,,
	− 6	78	·005	*855*	,,
	− 5	84	·007	*856*	,,
	− 4	78	·007	*857*	,,
	− 2	271	·019	*858*	,,
	1	98	·009	*859*	,,
	2	281	·013	*860*	,,
	3	281	·003	*861*	,,
2	3	199	·011	*862*	,,
	4	202	·003	*863*	,,
	5	20	·004	*864*	,,
−2	− 6	162	·006	*865*	,,
	− 3	342	·015	*866*	,,
	− 2	7	·003	*867*	,,
	15	151	·004	*868*	P 40, P 41
	18	151	·010	*869*	,,
		$\theta = 2D - l$			
0	−10	180	0″·003	*870*	P 16, P 19
	− 9	180	·006	*871*	,,
	− 8	180	·008	*872*	,,
	− 7	180	·013	*873*	,,
	− 6	180	·022	*874*	,,
	− 5	180	·038	*875*	,,
	− 4	180·0	·083	*876*	,,
	− 3	{180·0	·662	*877*	,,
		{ 0·0	·004	*877a*	P 40
	− 2	0·0	·137	*878*	P 16, P 19
	− 1	180	·013	*879*	,,
	1	0·0	·133	*880*	,,
	2	179·6	·157	*881*	,,
	3	178	·014	*882*	,,
	4	180	·003	*883*	,,
	18	0	·011	*884*	P 39
1	− 2	259	·003	*885*	P 16, P 19
	− 1	270	·003	*886*	,,
	2	271·4	·065	*887*	,,
	3	271·9	·049	*888*	,,
	4	90	·005	*889*	,,

Multiples of *T*	*T* − *V*	*a*	Coef. of sin	Ref. No.	Table No.
		$\theta = 2D - l$ (*cont.*)			
−1	− 8	269	0″·003	*890*	P 16, P 19
	− 7	269	·005	*891*	,,
	− 6	269	·008	*892*	,,
	− 5	269	·024	*893*	,,
	− 4	89	·030	*894*	,,
	− 2	268	·038	*895*	,,
	1	101	·009	*896*	,,
	2	281	·013	*897*	,,
	17	253	·003	*898*	P 39
2	3	200	·019	*899*	P 16, P 19
	4	202	·004	*900*	,,
	5	19	·004	*901*	,,
−2	− 7	340	·003	*902*	,,
	− 6	162·6	·079	*903*	,,
	− 5	165	·004	*904*	,,
	− 3	340	·024	*905*	,,
	− 2	6	·003	*906*	,,
	15	151	·025	*907*	P 39
3	5	114	·004	*908*	P 16, P 19
		$\theta = 2D + l$			
0	− 5	0	0″·003	*909*	P 46, P 47
	− 3	0	·004	*910*	,,
	− 2	0	·004	*911*	,,
	1	0	·011	*912*	,,
	2	180	·015	*913*	,,
	3	180	·003	*914*	,,
1	2	271	·005	*915*	,,
	3	271	·004	*916*	,,
−1	− 2	269	·003	*917*	,,
		$\theta = 4D - l$			
0	1	180	0″·006	*918*	P 46, P 47
	2	0	·007	*919*	,,
		$\theta = 2l$			
0	− 2	0	0″·005	*920*	P 4, P 7
	− 1	180	·010	*921*	,,
	1	0	·010	*922*	,,
	2	180	·006	*923*	,,
	3	{180	·006	*924*	,,
		{180	·003	*925*	P 42, P 43
1	2	273	·003	*926*	P 4, P 7
−1	− 2	267	·003	*927*	,,

List 18 (*cont.*).

Multiples of T	$T-V$	a	Coef. of sin	Ref. No.	Table No.
			$\theta = 2l - 2D$		
0	−2	0	0″·007	928	P 39
	−1	180	·005	929	,,
	2	180	·003	930	,,
	3	180·0	·073	931	,,
	4	0	·003	932	,,
1	4	92	·004	933	,,
−1	−3	268	·003	934	,,
	−2	268	·003	935	,,
2	6	17·4	·062	936	,,
			$\theta = 2l - 4D$		
0	3	0	0″·008	937	P 42, P 43
			$\theta = 3l - 2D$		
0	3	180	0″·003	938	P 40
			$\theta = -4D$		
0	3	0	0″·007	939	P 48, P 49
			$\theta = -D$		
1	3	273	0″·005	940	P 40, P 41
			$\theta = l - D$		
1	3	273	0″·011	941	P 39
			$\theta = ☊$		
2	3	216	0″·019	942	P 39
−2	−5	255	·003	943	,,
	−4	255	·009	944	,,
	−3	75	·016	945	,,
	−2	75	·005	946	,,
			$\theta = ☊ + 2F$		
2	3	216	0″·004	947	P 42, P 43
−2	−3	40	·004	948	,,
			$\theta = ☊ \pm l$		
2	3	216	0″·003	949	P 40

Multiples of J	$J-T$	a	Coef. of sin	Ref. No.	Table No.
			$\theta = 0$		
0	1	178·8	0″·643	950	P 2
	2	359·6	·187	951	,,
	3	7	·010	952	,,
1	−3	257	·006	953	,,
	−2	274	·018	954	,,
	0	289·9	·087	955	,,
	1	241·5	·165	956	,,
	2	352·0	·052	957	,,
	3	355	·004	958	,,
2	−1	250	0·010	959	,,
	0	324	·005	960	,,
	1	238	·025	961	,,
	2	344	·006	962	,,
3	1	230	·003	963	,,
			$\theta = l$		
0	−2	180	0″·036	964	P 5, P 8
	−1	1·0	·144	965	,,
	1	179·0	·158	966	,,
	2	180·0	·190	967	,,
	3	21	·005	968	,,
1	−2	274	·006	969	,,
	0	282·3	·062	970	,,
	1	242	·039	971	,,
	2	352·5	·096	972	,,
−1	−2	188	·007	973	,,
	−1	298	·035	974	,,
	0	257·2	·063	975	,,
	2	273	·006	976	,,
	3	286	·008	977	,,
2	0	326	·007	978	,,
	1	238	·005	979	,,
	2	343	·004	980	,,
−2	−1	302	·005	981	,,
	0	214	·007	982	,,
			$\theta = 2D$		
0	−3	0	0″·004	983	P 11, P 14
	−2	180·0	·070	984	,,
	−1	1	·033	985	,,
	1	178·5	·167	986	,,
	2	359·2	·085	987	,,
	3	13	·007	988	,,
1	0	349	·027	989	,,
	1	237	·035	990	,,
	2	352	·015	991	,,
−1	−2	8	·030	992	,,
	−1	303	·006	993	,,
	0	184	·033	994	,,
	2	273	·009	995	,,
	3	102	·006	996	,,
2	1	236	·005	997	,,
	2	345	·003	998	,,
−2	0	200	·003	999	,,
	1	110	·006	1000	,,

List 1δ (*cont.*).

Multiples of *J*	*J* − *T*	α	Coef. of sin	Ref. No.	Table No.
			$\theta = 2D - l$		
0	−4	180	0″.004	1001	P 17, P 20
	−3	182	·022	1002	,,
	−2	180·3	1·137	1003	,,
	−1	1	·051	1004	,,
	1	178·4	·211	1005	,,
	2	359·2	·089	1006	,,
	3	14	·006	1007	,,
1	−3	261	·005	1008	,,
	−2	310	·013	1009	,,
	0	5·5	·056	1010	,,
	1	237·0	·046	1011	,,
	2	352	·020	1012	,,
−1	−3	187	·006	1013	,,
	−2	7·5	·436	1014	,,
−1	−1	296	·018	1015	,,
	0	174·2	·060	1016	,,
	2	273	·016	1017	,,
	3	102	·007	1018	,,
2	1	237	·006	1019	,,
	2	344	·003	1020	,,
−2	−2	19	·005	1021	,,
	−1	291	·003	1022	,,
			$\theta = 2D + l$		
0	−2	180	0″.003	1023	P 46, P 47
	−1	1	·005	1024	,,
	1	178	·021	1025	,,
	2	359	·007	1026	,,
1	0	353	·004	1027	,,
	1	237	·005	1028	,,
	2	352	·003	1029	,,
−1	0	182	·004	1030	,,
	2	273	·003	1031	,,
			$\theta = 4D - l$		
0	−2	180	0″.007	1032	P 46, P 47
	1	358	·009	1033	,,
	2	179	·005	1034	,,
−1	−2	7	·003	1035	,,
			$\theta = 2l$		
0	−2	180	0″.003	1036	P 5, P 8
	−1	2	·011	1037	,,
	1	178	·012	1038	,,
	2	180	·010	1039	,,
1	0	293	·005	1040	,,
	1	239	·003	1041	,,
−1	−1	301	·003	1042	,,
	0	247	·005	1043	,,

Multiples of *J*	*J* − *T*	α	Coef. of sin	Ref. No.	Table No.
			$\theta = 2l - 2D$		
0	−2	180	0″.005	1044	P 39
	−1	2	·011	1045	,,
	1	0	·003	1046	,,
	2	179·9	·240	1047	,,
1	2	172·5	·284	1048	,,
2	2	163	·003	1049	,,
			$\theta = 2l - 4D$		
0	2	0	0″.009	1050	P 42, P 43
1	2	173	·007	1051	,,
			$\theta = 3l - 2D$		
0	2	180	0″.007	1052	P 40, P 41
1	2	172	·005	1053	,,
			$\theta = ☊$		
1	0	45	0″.005	1054	P 39
2	0	168	·006	1055	,,

Multiples of *M*	*M* − *T*	α	Coef. of sin	Ref. No.	Table No.
			$\theta = 0$		
0	1	180	0″.011	1056	P 3
	2	180·2	·195	1057	,,
	3	357	·014	1058	,,
	4	349	·005	1059	,,
1	−3	260	·006	1060	,,
	1	224·4	·327	1061	,,
	2	212·4	·038	1062	,,
	3	212·5	·048	1063	,,
	4	331	·010	1064	,,
2	2	244·8	·093	1065	,,
	3	245	·020	1066	,,
	4	244	·014	1067	,,
	5	62	·006	1068	,,
3	3	277	·016	1069	,,
	4	276	·013	1070	,,
	5	275	·006	1071	,,
	6	94	·003	1072	,,
			$\theta = l$		
0	−3	180	0″.003	1073	P 6, P 9
	−2	0	·038	1074	,,
	−1	0	·004	1075	,,
	1	180	·005	1076	,,
	2	180	·043	1077	,,
	3	0	·003	1078	,,
	4	180	·003	1079	,,
1	1	223·3	·073	1080	,,
	2	212	·010	1081	,,
	3	213	·013	1082	,,
	5	210	·009	1083	,,

LIST 18 (*cont.*).

Multiples of M	$M-T$	a	Coef. of sin	Ref. No.	Table No.
			$\theta = l$ (*cont.*)		
−1	−3	330	0″·009	*1084*	P 6, P 9
	−2	327	·008	*1085*	,,
	−1	306·3	·074	*1086*	,,
2	2	245	·017	*1087*	,,
	3	245	·005	*1088*	,,
	4	244	·003	*1089*	,,
	6	63	·006	*1090*	,,
−2	−4	296	·003	*1091*	,,
	−3	295	·005	*1092*	,,
	−2	295	·018	*1093*	,,
3	3	277	·003	*1094*	,,
	4	276	·003	*1095*	,,
−3	−4	264	·003	*1096*	,,
			$\theta = 2D$		
0	−2	0	0″·005	*1097*	P 12, P 15
	1	180	·004	*1098*	,,
	2	181	·044	*1099*	,,
	3	0	·005	*1100*	,,
1	1	224	·023	*1101*	,,
	2	212	·006	*1102*	,,
	3	214	·008	*1103*	,,
	4	37	·003	*1104*	,,
−1	−5	149	·003	*1105*	,,
	−2	328	·003	*1106*	,,
	−1	317	·023	*1107*	,,
	3	280	·003	*1108*	,,
2	2	244	·005	*1109*	,,
	3	244	·004	*1110*	,,
	4	246	·004	*1111*	,,
−2	−2	297	·008	*1112*	,,
			$\theta = 2D - l$		
0	−5	180	0″·003	*1113*	P 18, P 21
	−4	182	·020	*1114*	,,
	−3	0	·005	*1115*	,,
	−2	0	·013	*1116*	,,
	−1	0	·003	*1117*	,,
	1	180	·008	*1118*	,,
	2	181·0	·061	*1119*	,,
	3	353	·005	*1120*	,,
1	1	220	·031	*1121*	,,
	2	212	·011	*1122*	,,
	3	214	·014	*1123*	,,
	4	27	·003	*1124*	,,
−1	−6	149	·003	*1125*	,,
	−5	151	·043	*1126*	,,
	−4	329	·003	*1127*	,,
	−3	327	·003	*1128*	,,
	−2	328	·006	*1129*	,,
	−1	320	·035	*1130*	,,
	3	280	·004	*1131*	,,
2	2	244	0·011	*1132*	,,
	3	244	·006	*1133*	,,
	4	245	·005	*1134*	,,
−2	−6	298	·033	*1135*	,,
	−3	296	·003	*1136*	,,
	−2	297	·014	*1137*	,,

Multiples of M	$M-T$	a	Coef. of sin	Ref. No.	Table No.
			$\theta = 2D + l$		
0	2	180	0″·006	*1138*	P 46, P 47
1	1	82	·003	*1139*	,,
−1	−1	93	·003	*1140*	,,
			$\theta = 2l$		
0	−2	0	0″·003	*1141*	P 6, P 9
	2	180	·003	*1142*	,,
1	1	232	·003	*1143*	,,
−1	−1	308	·003	*1144*	,,
			$\theta = 2l - 2D$		
0	−2	0	0″·004	*1145*	P 39
1	5	209	·017	*1146*	,,
2	6	244	·018	*1147*	,,

Multiples of S_n	S_n-T	a	Coef. of sin	Ref. No.	Table No.
			$\theta = 0$		
0	1	179·6	0″·042	*1148*	P 39
	2	0	·008	*1149*	,,
1	0	273	·021	*1150*	,,
	1	257	·013	*1151*	,,
2	0	297	·003	*1152*	,,
			$\theta = l$		
0	−1	0	0″·006	*1153*	P 40, P 41
	1	180	·010	*1154*	,,
	2	180	·003	*1155*	,,
1	0	263	·012	*1156*	P 40
	1	257	·003	*1157*	,,
−1	−1	283	·003	*1158*	,,
	0	277	·012	*1159*	,,
			$\theta = 2D$		
0	1	180	0″·010	*1160*	P 42, P 43
	2	0	·005	*1161*	,,
1	0	270	·004	*1162*	P 42
	1	257	·003	*1163*	P 42, P 43
−1	0	255	·004	*1164*	P 42
			$\theta = 2D - l$		
0	−2	180	0″·019	*1165*	P 40, P 41
	1	180	·014	*1166*	,,
	2	0	·004	*1167*	,,
1	0	271	·006	*1168*	,,
	1	257	·003	*1169*	,,
−1	−2	271	·005	*1170*	,,
	0	267	·006	*1171*	,,

List iδ (*concl.*).

Term	Ref. No.	Table No.
$+0''.010 \sin 2D$	*1172*	31 III
$+ .039 \sin (2D - l)$	*1173*	32 III
$+ .004 \sin (2F - l)$	*1174*	42 III
$- .035 \sin l'$	*1175*	47 III
$+0''.004 \sin (2l' + 228°)$	*1176*	1 III
$- .006 \sin (l + l')$	*1177*	25 III
$- .006 \sin (l - l')$	*1178*	26 III
$- .038 \sin 2☊$	*1179*	P 39

List iε. Planetary terms in the latitude.

Multiples of T	T − V	α	Coef. of sin	Ref. No.	Table No.
		$\theta = \pm F$			
0	1	0	0″.009	*1180*	P 44
	2	180	·004	*1181*	,,
1	2	273	·006	*1182*	,,
		$\theta = \pm F + l$			
0	−2	0	0″.003	*1183*	P 4, P 7 (S)
	−1	180	·004	*1184*	,,
	1	{ 0	·007	*1185*	,,
		{ 180	·003		
	2	180	·003	*1186*	,,
	3	180	·006	*1187*	,,
		$\theta = F + 2D$			
0	−2	0	0″.003	*1188*	P 10, P 13 (S)
	1	0	·005	*1189*	,,
	2	{ 180	·006	*1190*	,,
		{ 180	·003		
		$\theta = -F + 2D$			
0	−7	180	0″.003	*1191*	32 IV
	−6	180	·005	*1192*	,,
	−5	180	·009	*1193*	,,
	−4	180	·023	*1194*	,,
	−3	0	·045	*1195*	,,
	−2	0	·021	*1196*	,,
	−1	180	·005	*1197*	,,
	1	{ 0	·012	*1198*	,,
		{ 0	·004	*1199*	P 10, P 13 (S)
	2	{ 180	·017	*1200*	32 IV
		{ 180	·006	*1201*	P 10, P 13 (S)
1	2	271	·009	*1202*	P 44, P 45
	3	272	·006	*1203*	P 44
−1	−5	270·0	·068	*1204*	P 44, P 45
	−2	269	·006	*1205*	,,
2	3	199	·003	*1206*	P 44
−2	−3	341	·005	*1207*	,,
		$F + 2D - l$			
0	−4	180	0″.004	*1208*	P 16, P 19 (S)
	−3	180	·029	*1209*	,,
	−2	0	·006	*1210*	,,
	−1	0	·005		
	1	0	·006	*1211*	,,
	2	180	·008	*1212*	,,
1	2	271	·003	*1213*	,,
−2	−6	162	·004	*1214*	,,

Multiples of T	T − V	α	Coef. of sin	Ref. No.	Table No.
		$\theta = -F + 2D - l$			
0	−4	180	0″.004	*1215*	P 16, P 19 (S)
	−3	180	·031	*1216*	,,
	−2	0	·006	*1217*	,,
	−1	0	·005		
	1	0	·006	*1218*	,,
	2	180	·008	*1219*	,,
1	2	271	·003	*1220*	,,
−2	−6	162	·004	*1221*	,,
		$\theta = F - 2D + l$			
1	5	90	0″.004	*1222*	P 16, P 19 (S)
		$\theta = F - 2D - l$			
1	5	270	0″.004	*1223*	P 16, P 19 (S)
		$\theta = \pm F + 2l - 2D$			
0	3	180	0″.003	*1224*	P 16, P 19 (S)
2	6	18	·003		
		$\theta = L$			
0	−6	285	0″.003	*1226*	30 IV
	−5	285	·005	*1227*	,,
	−4	285	·006	*1228*	,,
	−3	285	·009	*1229*	,,
	−2	285	·014	*1230*	,,
	−1	285	·027	*1231*	,,
	1	105	·015	*1232*	,,
	2	105	·006	*1233*	,,
	3	105	·003	*1234*	,,
2	3	215·6	·077	*1235*	P 44, P 45
−2	−7	255	·003	*1236*	31 IV
	−6	255	·005	*1237*	,,
	−5	255	·009	*1238*	,,
	−4	255	·025	*1239*	,,
	−3	51·6	·074	*1240*	,,
	−2	75	·018	*1241*	,,
	−1	75	·010	*1242*	,,
	1	75	·006	*1243*	,,
	2	75	·004	*1244*	,,
	3	75	·003	*1245*	,,
3	5	125	·030	*1246*	P 44, P 45
−3	−5	67	·007	*1247*	,,

List i*e* (*concl.*).

Multiples of *T*	*T* − *V*	*a*	Coef. of sin	Ref. No.	Table No.
			$\theta = L + l$		
2	3	216	0″.004	*1247a*	P 44, P 45
−2	−3	75	·004		
			$\theta = L - l$		
2	3	36	0″.003	*1247c*	P 44, P 45
−2	−3	255	·004		
			$\theta = L - 2D$		
2	3	36	0″.004		

Multiples of *M*	*M* − *T*	*a*	Coef. of sin	Ref. No.	Table No.
			$\theta = \pm F$		
0	2	180	0″.003	*1248*	P 44
			$\theta = F - 2D$		
0	−2	0	0″.008	*1249*	P 44, P 45
	2	180	·003	*1250*	P 12, P 15 (S)
1	1	223	·005	*1251*	P 44
−1	−1	316	·005	*1252*	P 44
			$\theta = \pm F + l - 2D$		
0	−2	0	0″.003	*1252a*	P 18, P 21 (S)
			$\theta = L$		
1	1	345	0″.010	*1252b*	P 44, P 45

Multiples of *J*	*J* − *T*	*a*	Coef. of sin	Ref. No.	Table No.
			$\theta = \pm F$		
0	1	180	0″.009	*1253*	P 44
1	0	37	·009	*1254*	"
			$\theta = \pm F + l$		
0	−1	0	0″.006	*1255*	P 6, P 9 (S)
	1	180	·008	*1256*	"
	2	180	·008	*1257*	"
1	0	301	·004	*1258*	"
	2	353	·004	*1259*	"
−1	0	240	·004	*1260*	"

Multiples of *J*	*J* − *T*	*a*	Coef. of sin	Ref. No.	Table No.
			$\theta = -F + 2D$		
0	−3	180	0″.005	*1261*	P 44, P 45
	−2	0	·020	*1262*	"
		0	·006	*1263*	P 11, P 14 (S)
	−1	0	·006	*1264*	P 44, P 45
	1	180	·021	*1265*	"
		180	·008	*1266*	P 11, P 14 (S)
	2	0	·008	*1267*	P 44, P 45
		0	·004	*1268*	P 11, P 14 (S)
1	0	350	·007	*1269*	P 44, P 45
	1	237	·006	*1270*	P 44
−1	0	181	·004	*1271*	"
	2	273	·003	*1272*	"
			$\theta = F + 2D$		
0	−1	180	0″.003		
	1	180	·008	*1273*	P 11, P 14 (S)
	2	0	·003	*1274*	"
			$\theta = \pm F + l - 2D$		
0	−2	180	0″.004	*1275*	P 17, P 20 (S)
	−1	0	·011	*1276*	"
	2	0	·051	*1277*	"
1	2	172	·020	*1278*	"
			$\theta = F + 2l - 2D$		
0	2	180	0″.006	*1279*	P 17, P 20 (S)
1	2	172	·013	*1280*	"
		352	·008	*1281*	P 44
			$\theta = -F + 2l - 2D$		
0	2	180	0″.014	*1282*	P 17, P 20 (S)
		0	·008	*1283*	P 44, P 45
1	2	172	·013	*1284*	P 17, P 20 (S)
		352	·008	*1285*	P 44
			$\theta = L$		
1	0	34	0″.007	*1286*	P 44, P 45
2	0	168	·035	*1287*	"
−2	0	24	·018	*1288*	"

Term	Ref. No.	Table No.
$+0''.005 \sin (2D - F)$	*1289*	12 IV, 43 IV
$- \cdot 017 \sin L$	*1290*	30 IV
$+ \cdot 008 \sin (L - 2T + 75^\circ)$	*1291*	31 IV
$- \cdot 007 \sin (L - 2D)$	*1292*	"
$+ \cdot 083 \sin (F + 2\Omega)$	*1293*	P 44, P 45
$+ \cdot 003 \sin (F - 2T)$	*1294*	P 44
$+ \cdot 005 \sin (F + 2\Omega + l)$	*1295*	P 44, P 45
$- \cdot 005 \sin (F + 2\Omega - l)$	*1296*	"

List iζ Planetary terms in sine Parallax.

Term	Ref. No.	Table No.
$+0''.0003 \cos(2T-2V)$		
$+\ \cdot 0005 \cos(l-2T+2V)$	1298	P 4, P 7
$+\ \cdot 0012 \cos(l-T+V+180°)$	1299	,,
$+\ \cdot 0012 \cos(l+T-V)$	1300	,,
$+\ \cdot 0003 \cos(l+2T-2V+180°)$	1301	,,
$+\ \cdot 0011 \cos(l+3T-3V+180°)$	1302	,,
$+\ \cdot 0003 \cos(l+3T-2V+271°)$	1303	,,
$+\ \cdot 0003 \cos(l+4T-3V+272°)$	1304	,,
$+\ \cdot 0003 \cos(l-4T+3V+268°)$	1305	,,
$+\ \cdot 0003 \cos(l-3T+2V+264°)$	1306	,,
$+\ \cdot 0003 \cos(2D-7T+7V)$	1307	P 10, P 13
$+\ \cdot 0003 \cos(2D-6T+6V)$	1308	,,
$+\ \cdot 0004 \cos(2D-3T+3V+180°)$	1309	,,
{ $+\ \cdot 0003 \cos(2D-T+V+180°)$	1310	,,
{ $+\ \cdot 0008 \cos(2D-T+V+180°)$		
$+\ \cdot 0010 \cos(2D+T-V)$	1311	,,
$+\ \cdot 0017 \cos(2D+2T-2V+180°)$	1312	,,
$+\ \cdot 0003 \cos(2D+3T-2V+271°)$	1313	,,
$+\ \cdot 0004 \cos(2D+4T-3V+271°)$	1314	,,
$+\ \cdot 0008 \cos(2D-3T+2V+271°)$	1315	,,
$+\ \cdot 0003 \cos(2D+T-2V+281°)$	1316	,,
$+\ \cdot 0003 \cos(2D-5T+3V+342°)$	1317	,,
$+\ \cdot 0004 \cos(2D-l-5T+5V+180°)$	1318	P 16, P 19
$+\ \cdot 0008 \cos(2D-l-4T+4V+180°)$	1319	,,
{ $+\ \cdot 0049 \cos(2D-l-3T+3V+180°)$	1320	,,
{ $+\ \cdot 0006 \cos(2D-l-3T+3V+180°)$		
$+\ \cdot 0012 \cos(2D-l-2T+2V)$	1321	,,
$+\ \cdot 0005 \cos(2D-l+T-V)$	1322	,,
$+\ \cdot 0006 \cos(2D-l+2T-2V+180°)$	1323	,,
$+\ \cdot 0003 \cos(2D-l+3T-2V+271°)$	1324	,,
$+\ \cdot 0003 \cos(2D-l-6T+5V+269°)$	1325	,,
$+\ \cdot 0003 \cos(2D-l-5T+4V+89°)$	1326	,,
$+\ \cdot 0003 \cos(2D-l-3T+2V+268°)$	1327	,,
$+\ \cdot 0007 \cos(2D-l-8T+6V+163°)$	1328	,,
$+\ \cdot 0003 \cos(2D+l+2T-2V+180°)$		
$+0''.0004 \cos(l-2J+2T+180°)$	1329	P 5, P 8
$+\ \cdot 0011 \cos(l-J+T+1°)$	1330	,,
$+\ \cdot 0013 \cos(l+J-T+179°)$	1331	,,
$+\ \cdot 0014 \cos(l+2J-2T+180°)$	1332	,,
$+\ \cdot 0005 \cos(l+J+337°)$	1333	,,
$+\ \cdot 0003 \cos(l+2J-T+242°)$	1334	,,
$+\ \cdot 0007 \cos(l+3J-2T+353°)$	1335	,,
$+\ \cdot 0003 \cos(l-2J+T+298°)$	1336	,,
$+\ \cdot 0005 \cos(l-J+204°)$	1337	,,
$+\ \cdot 0009 \cos(2D-2J+2T+180°.0)$	1338	P 11, P 14
{ $+\ \cdot 0004 \cos(2D-J+T+1°)$	1344	,,
{ $+\ \cdot 0004 \cos(2D-J+T+1°)$		
$+\ \cdot 0018 \cos(2D+J-T+178°)$	1345	,,
$+\ \cdot 0009 \cos(2D+2J-2T+359°)$	1346	,,
$+\ \cdot 0003 \cos(2D+2J-T+237°)$	1347	,,
$+\ \cdot 0003 \cos(2D-3J+2T+8°)$	1348	,,
{ $+\ \cdot 0004 \cos(2D-J+184°)$	1349	,,
{ $+\ \cdot 0007 \cos(2D-J+184°)$		
$+\ \cdot 0003 \cos(2D+J-2T+273°)$	1350	P 17, P 20
{ $+\ \cdot 0086 \cos(2D-l-2J+2T+180°.3)$	1351	,,
{ $+\ \cdot 0009 \cos(2D-l-2J+2T+180°.3)$		
{ $+\ \cdot 0016 \cos(2D-l+J-T+178°)$	1352	,,
{ $-\ \cdot 0010 \cos(2D-l+J-T+178°)$		
$+\ \cdot 0004 \cos(2D-l+J-7°)$	1353	,,
$+\ \cdot 0003 \cos(2D-l+2J-T+237°)$	1354	,,
$+\ \cdot 0036 \cos(2D-l-3J+2T+7°.5)$	1355	,,
$+\ \cdot 0004 \cos(2D-l-J+183°)$	1356	,,
$+\ \cdot 0004 \cos(2D+l+J-T+178°)$		
$+\ \cdot 0003 \cos(l-2M+2T)$	1357	P 6, P 9
$+\ \cdot 0003 \cos(l+2M-2T+180°)$	1358	,,
$+\ \cdot 0006 \cos(l+2M-T+223°)$	1359	,,
$+\ \cdot 0006 \cos(l-2M+T+306°)$	1360	,,
$+\ \cdot 0004 \cos(2D+2M-2T+181°)$	1361	,,
$+\ \cdot 0008 \cos(2D-2M+T+317°)$		
$+\ \cdot 0003 \cos(2D-l+2M-2T+181°)$	1362	P 18, P 21
$+\ \cdot 0003 \cos(2D-l-6M+5T+151°)$	1363	,,
$+\ \cdot 0003 \cos(2D-l-2M+T+320°)$	1364	,,

List iη. Periodic terms additive to the elements.

Terms included in the Tables of Sect. II.

Element	Terms	Ref. No.	Args. of Sect. II in which the terms are included
L	$+0''.84 \sin\{20°.2\,(t_c-18\cdot 5)+41°.1\}$	1365	23, 26, 27, 30, 31, 32, 33, 35, 55, 71, 72, 73, L.
	$+\ \cdot 31 \sin\{l+3T-10V-2°.6\,(t_c-18\cdot 5)+33°\}$	1366	30, 31, 32, 33, 71, 72, L.
	$+\ \cdot 04 \sin(4D-3l+25M-23T+67°)$	1367	30, 31, 32, 33, L.
ϖ	$-2\cdot 10 \sin\{20°.2\,(t_c-18\cdot 5)+41°.1\}$	1368	26, 27, 30, 32, 34, 35, 71, 72, 73, ϖ.
☊	$+\ \cdot 63$,, ,,	1369	55, ☊.
T, l'	$-6\cdot 40$,, ,,	1370	23, 26, 27, 31, 32, 33, 34, 35, 47, 55, 72, 73.
J	$+0°.33 \sin\{38°.5\,(t_c-18\cdot 5)+115°\}$	1371	80.
S_n	$-0°.83$,, ,,	1372	In Arg. S_n.

List iη (*cont.*).

Terms included in the Tables of Sects. III—VI.

Terms additive to L	Ref. No.	Table No.	Periodic terms affected and tables in which effects are included
$+14''.27 \sin\{l+16T-18V-1^\circ.0\,(t_e-18.5)+151^\circ.1\}$	*1373*	P 23	*7, 25* in P 26; *3* in P 29; *8* in P 32; *21, 32, 39, 33* in P 40, P 41; *16, 51* in P 42, P 43; *6, 9, 99* in P 46, P 47; *595* through Arg. 55.
$+10''.71 \sin\{140^\circ.0\,(t_e-18.5)+170^\circ.7\}$	*1374*	P 24	*7, 25* in P 27; *3* in P 30; *8* in P 33.
$+\ 7''.261 \sin \text{☊}$	*1375*	P 22	*7, 25* in P 25; *3* in P 28; *8* in P 31; *39* in P 40, P 41; *16* in P 42, P 43; *52* in P 39; *6* in P 46, P 47; *51, 99, 104, 176* in 49 III; *595* in 29 IV; in S through P 34.
$+\ \cdot 282 \sin\{\text{☊}-2^\circ.3\,(t_e-18.5)+276^\circ.2\}$	*1376*	P 39	*7, 8* in P 40, P 41; *3* in P 42; in S through P 34, P 35.
$+\ \cdot 04\ \sin\{119^\circ.0\,(t_e-18.5)+152^\circ\}$	*1377*	,,	*7* in P 40.
$+\ \cdot 003 \sin(Q-4T+239^\circ)$	*1378*	,,	
$+\ \cdot 075 \sin(2D-l+T-3Q+105^\circ)$	*1379*	,,	*7* in P 40.
$+\ \cdot 003 \sin(2F-l+3T-4Q+67^\circ)$	*1380*	,,	
$+\ \cdot 003 \sin(2D-l+5T-4Q+113^\circ)$	*1381*	,,	
$+\ \cdot 237 \sin(13T-8V+313^\circ.9)$	*1382*	,,	*7* in P 40; *8* in P 40, P 41; *3* in P 42.
$+\ \cdot 108 \sin(l+29T-26V+112^\circ.0)$	*1383*	,,	*7* in P 40.
$+\ \cdot 030 \sin(l+21T-21V)$	*1384*	,,	
$+\ \cdot 126 \sin(2D-l+21T-20V+273^\circ.0)$	*1385*	,,	*7* in P 40.
$+\ \cdot 033 \sin(2D-l+8T-12V+303^\circ)$	*1386*	,,	
$+\ \cdot 054 \sin(2F-2D+6T-5V+270^\circ)$	*1387*	,,	
$+\ \cdot 010 \sin(3l-2D+24T-24V)$	*1388*	,,	
$+\ \cdot 013 \sin(D+12T-15V+262^\circ)$	*1389*	,,	
$+\ \cdot 013 \sin(D+25T-23V+190^\circ)$	*1390*	,,	
$+\ \cdot 003 \sin(F+24T-23V+285^\circ)$	*1391*	,,	
$+\ \cdot 008 \sin(D+l-F+17T-18V+75^\circ)$	*1392*	,,	
$+\ \cdot 003 \sin(8M-4T+310^\circ)$	*1393*	P 3	
$+\ \cdot 008 \sin(9M-5T+305^\circ)$	*1394*	,,	
$+\ \cdot 006 \sin(11M-6T+335^\circ)$	*1395*	P 39	
$+\ \cdot 006 \sin(13M-7T+19^\circ)$	*1396*	,,	
$+\ \cdot 026 \sin(15M-8T+43^\circ)$	*1397*	,,	*7* in P 40; *8* in P 40, P 41.
$+\ \cdot 004 \sin(17M-9T+63^\circ)$	*1398*	,,	
$+\ \cdot 017 \sin(D-F+2M+165^\circ)$	*1399*	,,	
Terms additive to ϖ			
$-\ 0''.118 \sin\{l+16T-18V-1^\circ.0\,(t_e-18.5)+151^\circ.1\}$	*1400*		*7* in P 26; *8* in P 32.
$-\ 2''.076 \sin \text{☊}$	*1401*		*7* in P 25; *8* in P 31; *39* in P 40, P 41; *6* in P 46, P 47; *99, 104, 107* in 49 III; *595, 597, 600* in 29 IV.
$-\ \cdot 840 \sin\{\text{☊}-2^\circ.3\,(t_e-18.5)+276^\circ.2\}$	*1402*		*7, 8* in P 40, P 41; *595* in 29 IV.
$-\ \cdot 10\ \sin\{119^\circ.0\,(t_e-18.5)+152^\circ\}$	*1403*		*7* in P 40.
$-\ \cdot 593 \sin(13T-8V+313^\circ.9)$	*1404*		*7* in P 40; *8* in P 40, P 41.
$-\ \cdot 065 \sin(15M-8T+43^\circ)$	*1405*		*7* in P 40; *8* in P 40, P 41.
Terms additive to ☊			
$+\ 0''.17\ \sin\{l+16T-18V-1^\circ.0\,(t_e-18.5)+151^\circ.1\}$	*1406*		in S through P 44.
$+95''.96\ \sin \text{☊}$	*1407*		*50* in P 48, P 49; *51* in 49 III, P 42, P 43; *99, 104, 176* in 49 III; *52* in P 39; *103* in P 40, P 41; *105* in P 46, P 47; *595* in 29 IV, P 44, P 45; *597, 600* in 29 IV; *601, 603, 604* in P 44, P 45; in S through P 34.
$+15''.58\ \sin\{\text{☊}-2^\circ.3\,(t_e-18.5)+276^\circ.2\}$	*1408*		*50* in P 48, P 49; *51, 99, 104* in 49 III; *52* in P 39; *105* in P 46, P 47; *595, 597, 600* in 29 IV; *601, 603, 604* in P 44, P 45; in S through P 34, P 35.
$+\ 1''.86\ \sin\{\text{☊}-0^\circ.9\,(t_e-18.5)+290^\circ.1\}$	*1409*		*51* in 49 III; *595* in 29 IV; in S through P 34, P 35.

LIST iη (*concl.*).

Terms additive to T and l'	Ref. No.	Periodic terms affected and tables in which effects are included
$-0''.27 \sin\{119^\circ.0\,(t_c-18{\cdot}5)+152^\circ\}$	*1410*	*3* in P 42; *8* in P 40, P 41.
$-1{\cdot}89 \sin(13T-8V+313^\circ.9)$	*1411*	*3* in P 42; *8* in P 40, P 41; *595* in P 44, P 45.
$+\ {\cdot}20 \sin(15M-8T+216^\circ)$	*1412*	*8* in P 40, P 41.
Terms additive to γ		
$-4''.318 \cos \Omega$	*1413*	*3* in P 43; *8* in P 40, P 41; *50* in P 48, P 49; *51* in 49 III, P 42, P 43; *52* in P 39; *103* in P 40, P 41; *105* in P 46, P 47; *595* in 29 IV, P 44, P 45; *597*, *600* in 29 IV; *601*, *603*, *604* in P 44, P 45; in C through P 36; *99*, *104*, *176* in 49 III.
$-\ {\cdot}698 \cos\{\Omega-2^\circ.3\,(t_c-18{\cdot}5)+276^\circ.2\}$	*1414*	*50* in P 48, P 49; *51*, *99*, *104* in 49 III; *52* in P 39; *105* in P 46, P 47; *595*, *597*, *600* in 29 IV; *601*, *603*, *604* in P 44, P 45; in C through P 36, P 37.
$-\ {\cdot}083 \cos\{\Omega-0^\circ.9\,(t_c-18{\cdot}5)+290^\circ.1\}$	*1415*	*51* in 49 III; *595* in 29 IV; in C through P 36, P 37.

LIST iθ. *The fundamental arguments and constants.*

Epoch 1900·0.

$$L=270^\circ\,26'\,11''.71+1336^r\,307^\circ\,53'\,26''.06t_c+\ 7''.14t_c^2+0''.0068t_c^3.$$
$$\varpi=334^\circ\,19'\,46''.40+\ \ 11^r\,109^\circ\,02'\,02''.52t_c-37''.17t_c^2-0''.045t_c^3.$$
$$\Omega=259^\circ\,10'\,59''.79-\ \ 5^r\,134^\circ\,08'\,31''.23t_c+\ 7''.48t_c^2+0''.008t_c^3.$$
$$L'=279^\circ\,41'\,48''.04+\ 100^r\ \ 0^\circ\,46'\ \ 8''.13t_c+\ 1''.090t_c^2.$$
$$\varpi'=281^\circ\,13'\,15''.04+\ \ 1^\circ\,43'\ \ 9''.03t_c+\ 1''.630t_c^2.$$
$$V=342^\circ\,46'\ \ 1''.39+\ 162^r\,199^\circ\,12'\,42''.88t_c.$$
$$J=238^\circ\ \ 3'\ \ 0''.88+\ \ 8^r\,156^\circ\,18'\,11''.52t_c.$$
$$M=293^\circ\,44'\,51''.36+\ \ 53^r\ \ 61^\circ\,41'\,57''.62t_c.$$
$$S_n=266^\circ\,34'\ \ 2''.76+\ \ 3^r\,143^\circ\,30'\,47''.33t_c.$$
$$Q=178^\circ\,10'\,44''.68+\ 415^r\ \ 74^\circ\ \ 4'\,14''.80t_c.$$
$$T=L'+180^\circ.$$

Whence

$$D=350^\circ\,44'\,23''.67+1236^r\,307^\circ\,07'\,17''.93t_c+\ 6''.05t_c^2+0''.0068t_c^3.$$
$$l=296^\circ\,06'\,25''.31+1325^r\,198^\circ\,51'\,23''.54t_c+44''.31t_c^2+0''.0518t_c^3.$$
$$l'=358^\circ\,28'\,33''.00+\ \ 99^r\,359^\circ\ \ 2'\,59''.10t_c-\ 0''.54t_c^2-0''.0120t_c^3.$$
$$F=\ 11^\circ\,15'\,11''.92+1342^r\ \ 82^\circ\ \ 1'\,57''.29t_c-\ 0''.34t_c^2-0''.0012t_c^3.$$

$e={\cdot}054900489$; $\gamma={\cdot}044886967$; const. term in sine parallax $=3422''.5400$; $E\div M=81{\cdot}53$;

$e'={\cdot}01675104-{\cdot}0000418\,0t_c$; solar parallax $=8''.80549$; $\alpha_1=\dfrac{\text{solar parallax}}{\text{lunar parallax}}\cdot\dfrac{E-M}{E+M}={\cdot}002512\,87$; $\epsilon=\dfrac{1}{294}$.

Elements of the planets, epoch 1850·0.

	Perihelion	Node	Eccentricity	Inclination	Log. mean dist., ⊕ = 1	Inverse of mass, ⊙ = 1
Venus	129° 27′ 34″	75° 19′ 47″ − 1786″t_c*	·0068446	3° 23′ 35″.3	$\bar{1}$·8593374	408000
Jupiter	11 54 27	98 55 58	·048254	1 18 42	·7162374	1047·35
Mars	333 17 55	48 24 1	·093261	1 51 2	·1828960	3093500
Saturn	90 6 40	112 20 51	·056061	2 29 39	·9794957	3501·6
Mercury	75 7 19	46 33 12	·205604	7 0 7	$\bar{1}$·5878216	6000000

* Freed from precession.

CHAPTER II

METHODS OF TABULATION AND FORMS OF TABLES

The tabulation of harmonic functions of the time.

The value of a periodic term at any date is obtained by finding the value of its angle or argument on that date and then referring to the table in which the values of the term for different values of the argument are given. Any units may be used to express the argument provided they are the same in both cases. Since the main object of this work is to obtain the ephemeris of the moon at intervals half a day apart, the most convenient unit is, in general, the day.

A term having an argument which is a simple linear function of the time has a period which is measured by the constant number of days after the lapse of which all values of the term are repeated; this number is inversely proportional to the coefficient of the time in the argument. The expression of an argument in days consists in giving the number of days since the argument was zero. This form of expression can be transferred to degree measure by dividing by the period and multiplying by 360; the term can thus be tabulated by means of ordinary sine-tables according to the values of the argument expressed in days. Whenever the number of days in the argument exceeds the period, the latter is to be subtracted. The principal reason for extensive tabulation of the arguments is to avoid the subtraction of many periods when the required dates are distant from the epoch.

When the argument is not a linear function of the time but contains t^2, t^3, the period is not constant. If the function has been tabulated for a certain constant period, the divisions will cease to correspond to half-days but will correspond to intervals of time which vary with the date. Fortunately the additional terms in the adopted arguments of the lunar theory are always small and by adding to the argument the fraction of the day which corresponds to the advance (or retardation) of the argument which these terms cause, we can always find from the table giving the term, the correct value of the latter corresponding to the argument at the given date. This additional portion of the argument is called the 'secular variation.'

It was assumed above that the period chosen for the tabulation of the term was that found by using the coefficient of t in the argument at some epoch—usually that from which all the angles are reckoned. But it is obvious that we can transfer the argument to any other epoch and use the new coefficient of t for the determination of the period. The same result can be obtained by using any period whatever and adding to the secular variation a term (with the proper coefficient) proportional to the time. This latter point of view is more convenient and will be adopted. The period chosen will be taken sufficiently near the period at the adopted epoch so that the additional term in the secular variation proportional to t shall have a very small coefficient. The choice will be made in such a way as to simplify the use of the tables.

This plan is used for all tables containing a single argument. For those containing two arguments, it is necessarily modified, as will be seen below, but its essential features are retained.

Tables of single entry.

A single entry table is one which gives at suitable intervals the values of the Fourier series

$$a_0 + a_1 \cos A + a_2 \cos 2A + \ldots + b_1 \sin A + b_2 \sin 2A + \ldots,$$

the coefficients being constants and the argument A being approximately of the form $\alpha_0 + \alpha_1 t$. It is desired to tabulate this function in such a manner that the values for consecutive half-days shall follow one another and that the argument A shall not exceed 360°. The coefficients are in many cases so large and the period so short that interpolation between successive half-days would demand much labour. A further division of the argument is necessary. Usually this division is made by giving the values of the function for intermediate decimal fractions of a day. The plan adopted here has the same character but replaces the decimal fractions of a day by other divisions which can assist in simplifying the work for the ephemeris computer.

The number of parts into which the half-day is divided for the purpose of easy interpolation is so chosen that the adopted period of the argument contains an integral number of these same parts. (The method of finding this number of parts will be explained below.) Thus the 360° which includes the required range of values of any argument is divided into an integral number of parts and another integral number of the same parts is equivalent to that portion of the argument which is described in half a day. The rest is a matter of arrangement. Suppose, as in Arg. 40, that there are 311 parts in the half-day and 8463 parts in the period; the latter is equivalent to $13^d.5$ + 66 parts. Suppose also that the function has been tabulated for every one of the 8463 parts. Beginning with the value for $0^d.0$ we choose the values for 0, 311, 622, ..., 8397 parts and place them in column opposite the arguments $0^d.0$, $0^d.5$, ..., $13^d.5$, with the number 0 at the head. The argument for the next half-day is 8708 – 8463 = 245 and for the succeeding half-days 556, 867, ... These are placed in column opposite the arguments $0^d.0$, $0^d.5$, ..., $13^d.0$ with the number 245 at the head. The process is continued until 311 columns are formed when all the values have been placed. Columns which have at their head a number greater than 66 will end with $13^d.0$ since $13^d.5$ + parts greater than 66 would exceed the period.

For interpolation, we obviously use columns with consecutive numbers at the head, for their values on the same line in consecutive columns differ only by one part. In order to facilitate interpolation, columns with consecutive part-numbers should follow one another in the table; this also has the advantage of permitting the differences to be economically printed, for one column of differences will serve for several columns of the function. In order to avoid the computation of the new argument every time the end of the period is reached an extra line is added showing the number of the next column to be followed when the end of one column is reached; the word 'succession' (succ.) is used to denote this. Thus at the foot of column 0 in Table 40, Sect. III, the succession number 245 is found; at the end of column 245, the number 490 − 311 = 179; at the end of column 179 the number 179 + 245 − 311 = 113; and so on. We finally get to the column 311 which is equivalent to column 0 when the whole process can be repeated.

Hence for a table arranged in this manner the argument is most conveniently given in two parts, one an integral number of half-days and the other a number of parts which will be always less than the number of parts in a half-day. The argument for the beginning of any year will therefore consist of an integral number of half-days, an integral number of parts and a fraction of a part. Since the period and the half-day contain integral numbers of parts it is evident that the fraction, i.e. the interpolating factor, will remain constant as long as the secular variation from the beginning of the year is insensible. In general, the number of parts has been so chosen that there is no sensible error in maintaining the same fraction for a run of a year. The cases of exception are considered below.

In a few cases no division of the half-day is given. A near integral multiple of the number of half-days in the period is then chosen as the period and interpolation is carried out between successive half-days with a decimal division of the day.

In the great majority of the tables only one or two places of decimals are necessary in the interpolating factors, and in no table more than three places. For the last, certain variable parts are added to the factors before interpolation and the latter is done as a step separate from the extraction of the function from the table.

In the majority of cases, the Fourier series for any table is confined to terms which can be expressed in the form

$$a_0 + a_1 \cos A + a_2 \cos 2A + \ldots.$$

The property $\cos i\,(360^\circ - A) = \cos iA$ then enables us to give two arguments to each value of the function. The second set of arguments will be found at the right and foot of the table and the values for successive half-days are then read up instead of down; the succession number in these cases appears at the top. This is the case with the argument 245 in the example just given. The columns of differences have signs for reading up opposite to those printed.

In the case of Table 30, Sect. III, the function is

$$a_1 \sin A + a_2 \sin 2A + \ldots,$$

and the property $\sin iA = -\sin i\,(360^\circ - A)$ permits a similar abbreviation, the sign of the function being changed for the lower and right-hand arguments.

In the case of Table 33, Sect. IV, the function is

$$a_1 \sin A + a_3 \sin 3A + a_5 \sin 5A,$$

and the two properties, $\sin i\,(360 - A) = -\sin iA$, $\sin i\,(180 - A) = \sin iA$ for i odd, permit of four arguments for each value, with a change of sign.

A certain number of the tables in Sect. VI have their values tabulated for specific dates. Tables P 23, P 26, P 29, P 32 have the argument of the Great Venus term, the period of which is 270·95 years, while tables P 24, P 27, P 30, P 33 have that of the empirical term, the period of which is 257·14 years. In each case the tabulation is made annually through the period of the argument for a run of years which includes the epoch date 1900·0. For other years it is a simple matter to subtract the necessary multiples of the period so that the given date shall correspond to one of those for which the function is tabulated.

The tables P 39—P 45 give the values of the sums of a number of periodic terms at intervals of 10 days for each year from 1900 to 2050. For convenience in use, each 'year' begins at the time when l' is zero near the beginning of that year. These values are entered (with values from other similar tables) opposite the half-days of the year nearest to the dates when $l' = 0^d$, 10^d, ..., and then interpolations to twentieths give the values for the intervening half-days.

Tables of double entry.

A double-entry table is one designed for the tabulation of an expression of the form $\Sigma_{i,j}\, a_{i,j} \cos(iA + jB + \alpha)$, where $i, j = 0, \pm 1, \pm 2, \ldots$. In general such tables demand two interpolations, one for each argument. The labour of performing such double interpolations is avoided in the plan used by Hansen in his *Tables de la Lune*. The values from a number of such tables are to be added together; all of them have the common argument A but B differs in each case. The plan consists in extracting from the tables with a tabular value of A, interpolation being made for B alone. After the sums have been obtained, interpolation for A is made on the sums only. Since it is intended to extract values at intervals of $0^d\!.5$ only, this plan demands that the variations of the sums during $0^d\!.5$ shall not be so great that the latter interpolation is difficult. Hence the terms in such tables, if of short period, must have small coefficients. The advantage consists in the large number of terms which may be included in one such table as compared with the number in a single-entry table.

Four kinds of double-entry tables are used here. In the first of them the common argument is D, whose period is the synodic month; in these the values are tabulated at intervals of half a day. In the second, the common argument is l', the solar mean anomaly, and these are tabulated at intervals of ten days. In the third, the second argument is so far divided that no interpolation for it is necessary; interpolation for the first argument, when necessary, is made within its common interval of division, namely $0^d\!.5$. In the fourth class, the values are extracted without interpolation at intervals of ten days or fourteen days, the values for the intermediate times being obtained by simple rules and by auxiliary tables which demand no interpolation.

Double-entry tables of the first form with D *as the common argument.*

The function is tabulated for the values $-15^d\!.5$, $-15^d\!.0$, ..., $+15^d\!.0$, $+15^d\!.5$ of D, the series of values going somewhat over the period $29^d\!.53$ of D in order to furnish the second differences needed in the interpolation for this argument. The

360° through which the second argument may run is divided into an integral number of parts sufficient to permit of easy interpolation. The function would naturally be tabulated for each of these values of the second argument with each value of D, but as it is desired to avoid changing the second argument every half-day (since it also progresses while D is changing) a different plan is adopted. Starting with any one of the given values of the second argument, the function is tabulated at intervals of half a day from $D = 0$ forward to $D = 15^{d}.5$ and backward to $D = -15^{d}.5$, thus giving a range of values of the function for 63 consecutive half-days. This computation is made for each value of the second argument. The latter is thus defined by its value at the time when $D = 0$. If we needed its value at any other time (which we do not), it would be necessary to add its change during that time to its value when $D = 0$. If the values of the function corresponding to successive starting values of the second argument be placed in succeeding columns, interpolation for that argument must be made between successive numbers in the same line; the interpolating factor will be the same as at the time when $D = 0$, since the change in the second argument from the time when $D = 0$ is independent of its starting value. Hence, when we know the value of the second argument at the time when $D = 0$ and the number of days from this time, the value of the function can be easily found.

As numerous negative arguments are troublesome, the plan is slightly modified by adding 15^{d} to D so that the argument actually used is not D but $\mathrm{D} = D + 15^{d}.0$; these 15^{d} must of course be also added in the tabulation of the argument itself in Sect. II. The only difference is that the tabular value of the second argument corresponds to the value $15^{d}.0$ of D and that it is used for the fifteen and a half days preceding and following the value $\mathrm{D} = 15^{d}.0$, i.e., from $\mathrm{D} = -0^{d}.5$ to $\mathrm{D} = 30^{d}.5$. When D progresses beyond the latter value its period must be subtracted and then the tabular value of the second argument changes *per saltum*, the change being the amount of its motion during a period of D. The tables of the function are accordingly arranged so that a single column gives its values from $\mathrm{D} = -0^{d}.5$ to $\mathrm{D} = 30^{d}.5$ for each tabular value of the second argument.

When all the values from the group of tables have been added, the sums are for times when D has the values mentioned. These sums are then interpolated so as to furnish the values of the functions on the required dates when D is not, in general, an integral multiple of a half-day. The interpolating factor remains constant through one period of D. If Bessel's formula be used, third differences are never necessary in carrying out this interpolation. There are, in general, one or two overlapping values as we go from one period of D to the next and the comparison of these constitutes a useful test of the work.

To assist those familiar with Hansen's tables, some differences of arrangement may be noted. Hansen uses the mean anomaly of the moon as the common argument instead of the synodic month; the new tables therefore contain four half-days in each 'month' more than Hansen's, but on the average about one less 'month' in a year. The values for the intermediate quarter-days given by Hansen are omitted here; their sole use is to diminish the maximum interpolating factor for the common argument from 0·50 to 0·25, and as second differences have to be used in any case, no sufficient advantage is gained by the resultant doubling of the space to be occupied by these tables. The space thus saved has been utilized in order to render the computer's work easier by printing the differences or, more exactly, the variations per unit change of the second argument, in all cases. Finally the consecutive half-daily values are printed in column instead of in line, so that the 'vertical argument' of these tables corresponds to the 'horizontal argument' of Hansen's and *vice versâ*: it is less difficult to avoid the error of accidentally moving to an adjoining column than of moving to an adjoining line and the printing of the variations does away with the necessity for Hansen's arrangement in which the differences have to be found.

In the majority of the tables the change $30^d - D$ for D and $180° - B$ for B leaves the function unaltered so that they may be diminished to half the extent they would otherwise have by printing a double set of arguments. Further, by changing the signs throughout when necessary, one column of variations will serve for two columns of the function.

The number of parts into which the second argument is to be divided has been taken large enough in each case to render interpolation easy, the exact number being so chosen that the addition to it in changing from one 'month' to the next need not be taken to more places, for the sake of avoiding accumulated error during a year, than the number adopted in the tabulated value; this result was obtained by choosing the proper convergent of the ratio of the period of D to that of the second argument. There is an exception to this in the case of Argument I, but here the small difference in the last unit between the values in successive years can easily be distributed through the year by inspection. In other cases where such a difference is noticeable the error in the function may be neglected, but the difference in the argument can always be distributed in the same manner, if the computer prefers to do it.

Double-entry tables of the second form with l' as the common argument.

The tables at ten-day intervals, P 1—P 21, Sect. VI, with l' as the common argument, are constructed on the same plan. Two slight differences are to be noted. No addition is made to l' similar to the 15^d added to D, the tabulated values of the second argument corresponding to $l' = 0$ and being taken from $l' = 0^d$ to $l' = 370^d$*. For epochs near the twentieth century l' is zero very near the beginning of each year, and to avoid changing the second argument during the year we define it by its value not at the time when l' was *last* zero but by its value when l' is zero *near the beginning of the year considered*. This is indicated in Table 3, Sect. II, where a negative value of l' obviously denotes that l' is zero after the beginning of the year and that the second argument corresponds to this particular year. The differences in the ten-day tables are not printed and they have to be formed between two consecutive numbers on the same line, but only 38 values

* The year was actually divided into 36·5 parts, the small difference of a quarter of a day being insensible when applied to these tables.

have to be extracted from each table for a year's ephemeris and few values extend beyond three digits. Each of the three second arguments 79, 80, 81 is divided into 73 parts, a number which considerably simplified the work of tabulation.

In other respects the procedure is the same as with the tables of the first form. It is, however, unnecessary to interpolate for the common argument in the previous manner. The half-days of the year nearest to the tabulated values of l' are chosen and, as stated above, the interpolations are to twentieths to obtain the values for consecutive half-days.

Double-entry tables of the third form, requiring interpolation for one argument only.

The Tables 48, 49 of Sect. III and 29, 30, 31, 32 of Sect. IV are in reality double-entry tables used on a single-entry plan. In fact, in the actual use made of them, the two arguments nearly correspond to the two parts of the arguments of the single-entry tables. There is no interpolation for the second argument and only a simple one, performed when the values are extracted, for the first argument.

A cycle is chosen which, as nearly as necessary, contains integral multiples of the periods of both arguments; it is chosen large enough for interpolation of the values for the second argument to be unnecessary. The cycle is also to contain an integral number of half-days. The first condition is obtained by finding a suitable convergent to the ratio of the period of the first argument to that of the second; and the second condition by taking the nearest integral number of half-days in the cycle. The values of the function are then tabulated for every half-day through the latter period.

It remains to so arrange the values that no tabular argument shall exceed its period. In the convergent obtained, the numerator is the number of parts into which the second argument is divided and the denominator is the addition to the second argument whenever we proceed to the following period of the first argument. If the first argument contained an integral number of half-days, the tables would be arranged like the tables with common argument D; the difference being that on reaching the foot of any column a succession number could be given showing the next column to be followed, since the second argument and its addition are always integral; in this respect it is like the single-entry tables. But since the first argument is not an integral number of half-days in any of the tables, some modification of the plan is necessary. The manner of arrangement is best illustrated by an example. In Table 48, Sect. III, the second argument is divided into 159 parts and its 'addition' for a period of the first argument is 4 parts. The period of the first argument is $27^{d}.555$. Suppose we start with Arg. 30 = 0 and Arg. 48 = 0. On reaching the foot of column 0 after running from the start for $27^{d}.5$, the next value required is that for $28^{d}.0$ which gives a value $0^{d}.445$ ($0^{d}.45$) for Arg. 30 and a value 4 for Arg. 48. These are found at the top of col. 4 where the first (vertical) argument has the value $0^{d}.45$ instead of the value $0^{d}.0$ and the succeeding values progress by $0^{d}.5$ from this value. At the foot of the column 4, Arg. 30 has the value 27·445; the succeeding value is 27·945 − 27·555 = ·39 and the column number is $4 + 4 = 8$. We can thus proceed through the whole table. In starting with any other values, say Arg. $30 = 12^d.61$, Arg. $48 = 12$, we note that in column 12 the nearest tabular argument to that given for Arg. 30 is $12^d.84$, hence we must interpolate for this argument with the factor $2\,(12{\cdot}61 - 12{\cdot}84) = -{\cdot}46$, which gives the value 23 to the function. It will be noticed that we get the value 24 if we use Arg. $48 = 13$ with the factor $2\,(12{\cdot}61 - 12{\cdot}70) = -{\cdot}18$: a unit change in the second argument does not change the function as much as a unit in most cases. Since the values for successive half-days follow one another throughout the table, the interpolating factor remains constant as long as we follow the succession numbers in regular order, and no new argument need be computed except for testing purposes. The errors caused by using the integral instead of the exact periods are not sensible through a run of a year.

In other respects these tables are similar to those of the first form. The tabular second argument corresponds to a definite value of the first argument and it remains constant through a given column in the same manner.

Double-entry tables of the fourth form requiring auxiliary tables only.

The Tables P 46, P 47, P 48, P 49, Sect. VI, are designed to include a large number of small terms of approximately 10, 10, 7, 7 day periods respectively. It was desired to tabulate these for 250 years. If the necessary interval of $0^d.5$ had been adopted, the space required would have been out of all proportion to the importance of the terms. The following scheme was devised and adopted.

Consider a term $a \sin B'$ where B' has a period of approximately ten days and express it in the form

$$a \sin B \cos A + a \cos B \sin A, \quad B' = B + A,$$

where A is an argument having a period of exactly ten days, and consequently B is of long period. Tabulate $a \sin B$ at intervals of ten days, so choosing the constant part of A that A is zero at the beginning of each interval. Consider any two consecutive values of $a \sin B$ and denote them by f_1, f_2. If second differences in the series of values of $a \sin B$ can be neglected, the intermediate values of $a \sin B \cos A$ are given by the formula

$$\{f_1 + \tfrac{1}{20} i\,(f_2 - f_1)\} \cos i\,.\,18^\circ, \qquad i = 1, 2, \ldots, 19.$$

For $i = 10$ this becomes $-\tfrac{1}{2}(f_1 + f_2)$ which can therefore be obtained immediately from the ten-day values.

Consider next the values given by $i = 1, 2, 3, 4, 5$. Suppose that, in forming these it is possible to neglect the portions containing the factor $f_2 - f_1$. The errors caused by this neglect are found to be

$$(f_2 - f_1)\,({\cdot}048,\ {\cdot}081,\ {\cdot}088,\ {\cdot}062,\ {\cdot}000)$$

respectively, or a maximum error of $\tfrac{1}{11}(f_2 - f_1)$. If such an error may be neglected, the five values are given by the expression $f_1 \cos i\,.\,18^\circ$ where $i = 1, 2, 3, 4, 5$.

For $i = 6, 7, \ldots, 15$, we may write the formula

$$-\{\tfrac{1}{2}(f_2+f_1) - \tfrac{1}{20}(10-i)(f_2-f_1)\}\cos(180^\circ - i\,.\,18^\circ)\},$$

and we see that the same maximum error will be caused by the neglect of $f_2 - f_1$. The formula is then $-\tfrac{1}{2}(f_2+f_1)\cos(10-i)\,18^\circ$.

For $i = 16, 17, 18, 19$ we get in the same manner $f_2 \cos(20-i)\,18^\circ$, with the same maximum error.

If then we tabulate $a \sin B$ at intervals of ten days and supply an additional table giving the values of $f\cos 18^\circ$, $f\cos 36^\circ$, $f\cos 54^\circ$, $f\cos 72^\circ$, for all needed values of f, the four half-day values on either side of any ten-day or intermediate five-day value can be immediately read off. A glance at the Table P 46 shows that the neglected fraction of the difference will never produce an error of more than a unit in the last place given.

In order to avoid negative quantities, a constant C has been added to each tabular value. The intermediate five-day values are therefore given by

$$C - \tfrac{1}{2}(f_2+f_1) = 2C - \tfrac{1}{2}(C+f_2) - \tfrac{1}{2}(C+f_1),$$

that is, by twice the constant of the table less the mean of the two values.

The auxiliary Table P 46*a* gives the values of

$$C - C\cos i\,.\,18^\circ + (f+C)\cos i\,.\,18^\circ$$

for $i = -4, -3, -2, -1, 0$ (Arg.), $1, 2, 3, 4$.

For economy of arrangement, the date is given in two parts. The argument A is zero at 1900·0 and is therefore zero at $1901 + 5^d$, and so on depending on the number of days in the year.

The tabulation of $a\cos B \sin A = a\cos B\cos(A - 90^\circ)$ is made in the same manner, but $A - 90^\circ$ is zero $2^d\!.5$ after the argument A; the same Table P 46*a* can be used for the intermediate half-day values when the ten-day values have been found from Table P 47.

In Tables P 48, P 49, the period of A is 7 days. The intermediate $3^d\!.5$-values are again $-\tfrac{1}{2}(f_2+f_1)$ and the errors caused in the half-day values by the neglect of $f_2 - f_1$ are $(f_2 - f_1)$ (·064, ·089, ·047), giving again a maximum error of $\tfrac{1}{11}(f_2-f_1)$ which can be neglected. The auxiliary Table P 48*a* gives the values of

$$C - C\cos\tfrac{1}{14}i\,.\,360^\circ + (f+C)\cos\tfrac{1}{14}i\,.\,360^\circ,$$

for $i = -3, -2, -1, 0$ (Arg.), $1, 2, 3$.

For Table P 49, the epoch of $A - 90^\circ$ is $1^d\!.75$ later than that of A. This is printed 2^d with sufficient accuracy. But we must form Table P 49*a* from the formula last given with $i = -2{\cdot}5, -1{\cdot}5, -0{\cdot}5, +0{\cdot}5, +1{\cdot}5, +2{\cdot}5$, using the values for $\pm 0{\cdot}5$ as the argument without sensible error.

It was found sufficient to tabulate the values in Tables P 48, P 49 at intervals of 14 days; the intermediate 7-day values are obviously obtained by interpolation to halves, when the procedure outlined above can be applied.

Continuation of the Tables P 39—P 49.

These have been computed for the years 1900 to 2050*. For their continuation before 1800 or after 2050, the necessary materials and the methods by which the computations can be carried out, whether the object be to find them for a series of years or for a single place, are given in Chap. IX. The problem is simply that of the summation of a number of harmonic terms of different periods. Hence the necessary data are the periods and epoch values of the arguments and the coefficients. But these are supplemented by tabulation of each term and by certain other devices for the simplification of the work.

* The greater part of the computations for the years 1800 to 1900 has been completed and will be published separately.

CHAPTER III

ON THE MANNER OF TABULATION OF THE EXPRESSIONS IN CHAPTER I

Tabulation of the True Longitude.

The terms with large coefficients or terms with moderately large coefficients but of very short period are placed in single-entry tables. The great majority of the solar terms in longitude, latitude and parallax are placed in double-entry tables of the first form with D as the common argument. The planetary terms in longitude which depend on T and on one of the three arguments V, J, M only, are placed in double-entry tables (P 1, P 2, P 3, Sect. VI) of the second form with common argument l'. But there is still a large number of terms, chiefly in the planetary parts of the true longitude, which it is desirable to include. The great majority of them depend on T, on one of the three arguments V, J, M, and also on one of the three arguments l, $2D$, $2D - l$. In order to reduce the large number of double-entry tables which would have been required for these the following plan was adopted.

Consider a term $a \sin (l + A)$ in longitude. Here a is a small coefficient (except in one case, less than 1″) and A is an argument composed of l', one of the three arguments V, J, M, and a constant. This term may be written in the form

$$a \sin A \,.\, \cos l + a \cos A \,.\, \sin l.$$

Now we have a single-entry table in longitude containing the term $22639''\!\cdot5 \sin l$. The above term may therefore be included if we multiply the tabular value in this table by $1 + a \cos A \div 22639\cdot5$ and add to the argument $a \sin A \div 22639\cdot5$, expressed in the proper units, since $\delta \,.\, \sin l = \delta l \,.\, \cos l$.

All terms of the form $a \sin A$ may be combined in double-entry tables with l' as common argument and one of the three, V, J, M as second argument. The terms of the form $a \cos A$ may be similarly treated.

In the same manner, terms of the form $a \sin (2D + A)$ may be attached to Table 31, III, containing the term $2369''\!\cdot9 \sin 2D$, and those of the form $a \sin (2D - l + A)$ to the Table 32, III, containing the term $4586''\!\cdot4 \sin (2D - l)$.

The coefficients a are given in seconds of arc. To find the same coefficients for addition to the arguments, divide by the coefficients of the terms with arguments l, $2D$, $2D - l$, respectively, multiply by the number of parts into which the respective arguments are divided, and divide by 2π. The six factors are as follows:

Arg.	Coef.	No. of parts	Factor of a for factor part	Factor of a for arg. addition
l (arg. 30)	$22639''\!\cdot5$	18186	$441\cdot7 \times 10^{-7}$	·1278
$2D$ (arg. 31)	$2369''\!\cdot9$	8682	$422\cdot0 \times 10^{-6}$	·5830
$2D - l$ (arg. 32)	$4586''\!\cdot4$	21314	$218\cdot0 \times 10^{-6}$	·7397

The tables for the factor parts are expressed in units of 10^{-7}, 10^{-6}, 10^{-6}, respectively, and the tables for the additions to the arguments are expressed in units of $0^c.001$, $0^c.01$, $0^c.01$, where the letter c denotes a part or column number of the respective Arguments 30, 31, 32. These 18 tables are numbered P 4—P 21, Sect. VI.

Table 30, III, also contains the term $769''.0 \sin 2l$ and it is found that the planetary terms with argument $2l + A$ are included through the inclusion of those with arguments $l + A$. This is a natural consequence of the theory.

There are several solar terms in longitude depending on the arguments l, $2F$ which have been placed in a double-entry table of the third form. (Table 48, Sect. III.)

The terms additive to the elements (List $i\eta$, Chap. I) have to be considered.

Three of them with periods of many hundred years are directly added to the arguments and to L, $-\Omega$, ϖ in the tabulation of these quantities in Sect. II whenever they could produce sensible changes in the coordinates; they are thus completely accounted for.

In general, the terms additive to the mean longitude are also additive to the true longitude and therefore fall in with the plans for this coordinate. These terms additive to the arguments l, $2D$, $2D - l$ are left in that form so that after tabulation they may be added to the values from the double-entry tables for additions to Args. 30, 31, 32 just considered; their coefficients, being given in seconds of arc, must be multiplied by the respective factors 18186, 8682, 21314 and divided by 1296000.

The effects of the presence of the Great Venus term, the empirical term and the terms with arguments depending solely on Ω, in these three arguments are placed in single-entry tables in Sect. VI.

All the terms, not so far included in tables, which arise from additions to the elements are expressed as additions to the true longitude. If $b \sin B$ be such a term present in the argument of an elliptic or solar term $a \sin A$ in longitude, where a, b are expressed in seconds of arc, the resulting addition to the true longitude (since a is always small) is

$$\tfrac{1}{2}ab\,\{\sin (A + B) - \sin (A - B)\} \div 206265.$$

If $b \cos B$ be an addition to γ in the coefficient of the term $a \sin A$ in longitude, where a contains the factor γ^2, the addition to the true longitude is

$$ab\,\{\sin (A + B) + \sin (A - B)\} \div (206265\gamma), \qquad \gamma = \cdot 04488.$$

Certain of the terms so arising have been placed in the double-entry Table 49, Sect. III, of the third form.

After all the larger terms (those over about $0''.4$, in general) have been included in these various tables, along with such smaller terms as could be included without altering the forms of the tables, there still remained a very considerable number of minute terms which it seemed desirable not to neglect but which would have required many tables. The plan adopted was their summation in blocks for a period of years sufficient to satisfy the needs of the ephemeris up to the year 2050.

These 'remainder' terms were first classified according to their periods—long, and approximately one month, a half, a third, ..., of a month.

The sums of the terms of long period were formed by a method explained in Chap. IX at 10-day intervals from the time when $l' = 0$ near the beginning of every year from 1800 to 2050. The results from 1900 to 2050 are contained in the Table P 39.

A term $a \sin A$ with a period of about one month was expressed in the form $a \sin (A - l) \cos l + a \cos (A - l) \sin l$. The coefficients of $\sin l$, $\cos l$ were then expressed as a factor of Table 30, III, and an addition to the argument of that table, respectively, in the manner explained above for the planetary terms containing the argument l. The argument $A - l$ has a long period. All the terms in each of the two portions were then summed at 10-day intervals and the results are given in Tables P 41, P 40.

A term $a \sin A$ with a period of approximately half a month was expressed in the form $a \sin (A - 2D) \cos 2D + a \cos (A - 2D) \sin 2D$ and treated similarly with respect to Table 31, III; the results are given in Tables P 43, P 42.

The terms with periods approximating to a third and a quarter of a month were placed in double-entry tables of the fourth form. The two portions arising from the terms with periods of nearly ten days were summed at 10-day intervals from the epoch 1900·0 and the results placed in Tables P 46, P 47, Sect. VI. Those arising from the terms with periods of nearly seven days were summed at 14-day intervals from 1900·0 and the results placed in Tables P 48, P 49. It is to be noticed that Tables P 46—P 49 run continuously at the given intervals from 1900·0 and not from the time when $l' = 0$ in each year as with Tables P 39—P 45.

A few small terms with shorter periods were neglected. These can be found by noting the terms in the lists of Chap. I which have no reference numbers attached.

The tabulation of the mean longitude together with the three terms of very long period is explained below in the portion dealing with the arguments.

Tabulation of the Latitude.

The Latitude has three portions respectively denoted by S, N, and C; to be summed with N are the 'principal' terms having the arguments S, 3S, 5S.

The division of the terms in latitude into these three parts was so made that all the large solar terms in S have coefficients which are nearly the same as those of a number of terms with the same arguments in longitude. The latter are contained in the single-entry Tables 23—39, Sect. III. The sums of the values from these tables are kept separate in the computation of the longitude so that they may be taken *en bloc* directly into S. After these large terms have been taken out of S, the remaining solar terms are placed in double-entry tables of the first form with D as the common argument, with the exception of two small terms which are placed in single-entry tables and two other terms which are expressed as an addition, depending on the day of the year, to the argument of Table 15, IV. With the tables from the longitude is also included the mean longitude. There are still to be added to S the value of $-\Omega$, which is found amongst the tables of arguments, and certain terms arising from planetary and other sources (see below).

A single-entry table gives the values of the principal terms depending on the argument S. The solar terms contained in N are placed in single-entry tables of the same form as the single-entry tables in longitude. Also included in N are four double-entry tables of the third form containing certain terms arising from planetary and other sources (see below).

The sums of these are to be multiplied by $1 + C$. The solar terms in C are all small and are placed in double-entry tables of the first form with D as the common argument. Further terms in C are dealt with below.

The methods of dealing with the terms due to planetary and other non-solar actions require some more detailed explanation.

In the first place a number of planetary terms in longitude have been included in the latitude through the additions to the arguments and coefficients of Tables 30, 31, 32, III, taken over from the longitude into S. If a small term $b \sin B$ has been added to the argument of the solar term in longitude, $a \sin A$ (where a, b are expressed in seconds of arc), it produces a term $(ab \div 206265) \sin B \cos A$ in the true longitude. Now the principal term in latitude is approximately 18519″ sin (F + portion from the true longitude). The small addition to the true longitude therefore causes an addition to the latitude of

$$\frac{ab}{206265} \cdot \frac{18519}{206265} \sin B \cos A \cos (F + \text{portion from the true longitude}).$$

We may, with sufficient accuracy, here confine the portion from the true longitude to the terms $a_1 \sin l + a_2 \sin 2D + a_3 \sin (2D - l)$, and $\cos (F +$ these terms) is, also with sufficient accuracy,

$$\cos F - \sin F \, [a_1 \sin l + a_2 \sin 2D + a_3 \sin (2D - l)].$$

Here $a_1 = 22640''$, $a_2 = 2370''$, $a_3 = 4586''$, and each must be divided by 206265. The products of sines and cosines are to be expressed as sums of sines and we then obtain the terms in latitude which have been included through the portion taken into S from the longitude. The presence of a term $b \cos B$ in the coefficient a is similarly treated; the corresponding terms in latitude will be obtained by replacing $\sin B \cos A$ in the above formula by $\cos B \sin A$. When both sets of terms thus found are subtracted from List iϵ, which gives the planetary terms in latitude, it is found that a large number of these terms have been accounted for.

From this new list three groups were extracted, placed in double-entry tables of the third form (Tables 30, 31, 32, Sect. IV) and included with the tables constituting N.

Of the terms added to the elements which have not been taken over from the longitude, the principal are the Great Venus, the empirical, and the terms depending on the argument Ω, in so far as these are additive to $F = L - \Omega$. For the first of these there is a small portion in $-\Omega$ which is placed in Table P 44, Sect. VI; apart from this portion the Great Venus and the empirical terms are additive to F in the same way as to L and therefore the Tables P 23, P 24, used in the longitude, are also available here. But all the terms in $L, - \Omega$ which depend on the argument Ω and are thus additive to F or S have been combined in Tables P 34, P 35 and in Arg. 83. The similar terms additive to γ and therefore to C have been combined in Tables P 36, P 37 and in Arg. 84; these have required the factor $2\gamma/18519$ in preparation for addition to C. The manner of formation of these tables containing the terms with argument $- \Omega$ is explained at the end of Chap. IV.

These same terms, present in the elements $L, - \Omega, \gamma$, also sensibly affect certain of the terms in N. The largest of them have been placed in the double-entry Table 29, Sect. IV, of the third form which is included with the tables constituting N.

Finally, from all sources, a number of very small terms still remain; these have been dealt with in a manner similar to that adopted for the remainder terms in longitude. They were first expressed as additions to the latitude when not so given, and separated into classes according to their periods. It was then seen that the great majority of them had periods of approximately a month, and that those of other periods could be neglected with very small resulting errors. The magnitude of the maximum error caused in the latitude by the neglect of any term in S or C can be found as follows: divide coefficients of terms in S by 11 and multiply those in C by 18000; the resulting coefficients are those of terms in the latitude expressed in seconds of arc. These remainder terms of monthly period are expressed in the form $a \sin A = a \sin (A - F) \cos F + a \cos (A - F) \sin F$, where a is given in seconds of arc. Then $a \sin (A - F)$ after division by $2\gamma = \cdot 0898$ is an addition to S, while $a \cos (A - F)$ after division by 18519 is an addition to C. The argument $A - F$ is of long period and the two groups of such terms were summed at 10-day intervals from the time when $l' = 0$ in each year from 1800 to 2050; the results from 1900 to 2050 have been placed in Tables P 44, P 45, Sect. VI.

Tabulation of the Parallax.

The terms in sine parallax are those tabulated. All the solar terms not neglected, with four exceptions, are placed in single-entry tables and in double-entry tables of the first form with D as the common argument. Two of these exceptions are accounted for by an addition depending on the day of the year to the argument of Table 13, V, and the other two by an addition to the factor of Table 15, V.

The planetary and other terms due to non-solar action are practically all accounted for in the following way. A term $b \cos B$ of period approximately a month can be expressed in the form $b \cos (B - l) \cos l - b \sin (B - l) \sin l$. The single-entry Table 15, V, contains the term $186'' \cos l$. Hence $b \cos (B - l) \cos l$ can be treated as a factor, $b \cos (B - l) \div 186$, of this table and $- b \sin (B - l) \sin l$ as an addition, $b \sin (B - l) \div 186$, expressed in the proper units, to its argument. It is found then that if we take the portions which form additions to the factor and argument of Table 30, III, and apply them to Table 15, V, in the parallax, all the outstanding monthly terms from all sources are sufficiently accounted for.

The same is true of the terms containing the lunar arguments $2D$, $2D - l$. The modifications for actual application are as follows. Arg. 30 of Table 30, III, and Arg. 70 of Table 15, V, are the same within the limits of error, but the former argument is divided into half as many more parts as the latter. Hence the addition to Arg. 30 must be multiplied by 2/3 before application to Arg. 70. In the same way the periods of Args. 32 (Table 32, III) and 71 (Table 17, V) are the same, but the ratio of their division into parts is 335 : 109, so that the corresponding factor is 109/335 or 1/3 with sufficient accuracy. Finally, Arg. 31 (Table 31, III) has half the period of Arg. 33 (Table 16, V), but an addition to D is an addition of twice the amount to 2D, so that these changes cancel one another. However, the division of the arguments is in the ratio 3 : 1 so that the factor to be applied is 1/3.

The Empirical Term.

Mention must be made of a special treatment of the empirical term. It is applied directly to the mean longitude and to the arguments l, $2D$, $2D - l$ of Tables 30, 31, 32, III, and to $F = L - ☊$ so far as this is additive to S. It is not applied directly to other terms in the coordinates although it affects them to a small amount, in fact, to nearly the same extent as the Great Venus term, which has been included to the degree of accuracy adopted throughout. Indirectly, it is carried into S with the tables from the longitude and into the parallax through the presence in Args. 70, 33, 71 of the additions to Args. 30, 31, 32. The omissions in any case are all of short period and no omitted coefficient is so large as 0."03 in longitude or latitude, and is insensible in the parallax to the adopted degree of accuracy.

The reason for these omissions, in comparison with many other smaller terms which have been included, arises from the facility with which any change shown to be desirable in this term may be made. Under the present plan, it is only necessary to change Table P 24 and then to compute again Tables P 27, P 30, P 33 which are deduced from P 24 by constant factors, independent of the term, after the constants which are added to render those tables positive have been subtracted. (See Chap. X.)

Degrees of accuracy.

In the lists of Chap. I the coefficients in longitude are given to 0."001 and this degree of accuracy was adopted in computing the tables. In general, coefficients less than 0."003 were neglected. In printing, the last place has been cut off so that the unit for computation is 0."01. These standards have been in general adopted for the arguments and for other portions which were not directly additive, that is, the number of places was such that the error should be less than 0."005 in any table for finding the true longitude. Some concessions were made in a few cases, but nowhere does the error exceed 0."02.

The same degree of accuracy was adopted for the latitude. This demands that the terms in S be computed to 0."01 and printed in units of 0."1; that the terms in C be given in units of 10^{-6} having been computed one place further; and that the terms in N be computed to 0."001 and printed in units of 0."01. The chief concession consists in the fact that C is multiplied by the factor 18519 and that therefore the initial error of any one number is raised from 0".005 to 0".01.

In the parallax, the computations were made in units of 0".0001 and printed in units of 0".001.

In order to utilize arguments which are common to two or more tables and at the same time to avoid unnecessary tabulation, in certain of the tables the values are given for every second and in others for every fourth value of the argument. In all cases, however, the variations printed are those for unit change of the argument, and these variations are given in the same units and to the same degree of accuracy as the function itself; since every terminal figure is liable to an error of half a unit, the maximum error in any interpolated value is a unit and a half in the last place for those tables in which the values are tabulated for every fourth value of the argument.

A slight loss of accuracy is also caused in some of the tables where one column of variations serves for several columns of the function. All these errors are unsystematic and can be treated as accidental. They fall in with the general scheme for such errors and are accounted for in a general manner in Chap. V which gives the probability of error for any single place computed from these tables, due to accumulations caused by the arithmetical operations. It is supposed that, in accordance with the usual practice, the last place in each coordinate will be cut off before publication in the Almanacs, so that the final longitude, latitude and parallax are printed to 0".1, 0".1, 0".01, respectively.

Tabulation of the arguments of the single-entry tables.

Let any argument be expressed in the form

$$a_0 + a_1 d + a_2 d^2 + a_3 d^3 - 1296000''\, i,$$

where a_0, a_1, a_2, a_3 are given in seconds of arc, d is the number of days elapsed since the epoch 1900·0 and i is an integer so chosen that the argument is less than 360°. Divide by a certain number b, nearly equal to a_1 and expressed in seconds of arc, and put

$$A = \frac{a_0}{b} + d + \frac{a_1 - b}{b} d + \frac{a_2}{b} d^2 + \frac{a_3}{b} d^3 - \frac{1296000}{b} i.$$

The coefficient of i is the period expressed in days and we have seen above that it is to be so chosen that the ratio of this period to half a day is that of two integers and that $(a_1 - b)/b$ shall be small. To find this ratio convert $1296000/\frac{1}{2}a_1$ into a continued fraction; this is the ratio of the period at epoch to 0ᵈ.5. Amongst the convergents choose that one which gives the necessary division of the half-day as explained above. The numerator of the convergent is then the number of divisions of the argument for which the function is tabulated while the denominator is the number of parts into which the half-day is divided; half the ratio is the adopted period expressed in days. On division of 1296000 by this period we obtain the divisor b.

An argument A expressed in this form can therefore always be obtained by adding to the value at epoch, expressed in days, the number of days since the epoch, the secular variation which consists of the three small terms having as coefficients $(a_1 - b)/b$, a_2/b, a_3/b, and by subtracting a sufficient number of multiples of the adopted period to render A positive and less than this period.

For the sake of brevity of notation put

$$A = a_0 + d + a_1 d + a_2 d^2 + a_3 d^3 - pi$$

so that p is the adopted period expressed in days. Divide d into three parts such that

$$d = d_1 + d_2 + d_3.$$

Here d_1 will denote the number of days contained in the maximum integral number of centuries present in d; d_2 the number of days present in the maximum integral number of years present in $d - d_1$; and d_3 is the remainder. If d be negative, d_1 is to be so chosen that d_2, d_3 are positive.

Substitute this expression for d in A and divide A into three parts such that

$$A = A_1 + A_2 + A_3,$$

where

$$A_1 = d_1 + a_1 d_1 + a_2 d_1^2 + a_3 d_1^3 + (2a_2 d_1 + 3a_3 d_1^2)(d_2 + d_3) + 3a_3 d_1 (d_2 + d_3)^2 - i_1 p,$$
$$A_2 = d_2 + a_0 + a_1 d_2 + a_2 d_2^2 + a_3 d_2^3 + (a_1 + 2a_2 d_2 + 3a_3 d_2^2) d_3 + (a_2 + 3a_3 d_2) d_3^2 - i_2 p,$$
$$A_3 = d_3 + a_3 d_3^3 - i_3 p,$$

i_1, i_2, i_3 being integers so chosen that A_1, A_2, A_3 are each positive and less than p.

The tabulation of A_1 is made by giving for the beginning of each century the portion of A_1 independent of $d_2 + d_3$ and giving separately the coefficients of $(d_2 + d_3)$ and of $(d_2 + d_3)^2$. The portion of A_2 independent of d_3 and the coefficients of d_3, d_3^2 are given for the beginning of every year of the century 1900—2000. And the values of A_3 are given for the days from the beginning of any year. This is possible because d_1 is zero during the twentieth century, while d_3 is zero at the beginning of any year.

It is evident that, in finding the argument at any date, the first part of A_1 will be constant during any given century while the second and third parts must be multiplied by the number of days and by the square of this number, respectively, elapsed since the beginning of the century. Similarly, the first part of A_2 is constant during any year while the second and third parts are to be multiplied by the number of days and by the square of this number elapsed since the beginning of the year. The term $a_3 d_3^3$ in A_3 can always be neglected. In the tabulation it is convenient to express $d_2 + d_3$ in A_1 as a fractional part of a century: its coefficient must therefore be multiplied by 36525 and that of $(d_2 + d_3)^2$ by 36525^2. Similarly d_3 in A_2 is expressed as a fractional part of a year so that its coefficient must be multiplied by 365·25 and that of d_3^2 by $(365{\cdot}25)^2$.

Some terms of very long period are added to certain of the arguments, these terms being such that tabulation at century intervals is sufficient. Their coefficients, being given in seconds of arc, must be divided by b before addition to the argument A. Suppose these terms have been so tabulated and the first and second differences formed. Then the three parts additive to A_1 are the coefficients of n^0, n^1, n^2 in Bessel's formula of interpolation less the corresponding coefficients for the twentieth century, and the part additive to A_2 is the latter portion which has been subtracted from that additive to A; here n is the fraction of the century denoted above by $(d_2 + d_3) \div 36525$. By this device we succeed in keeping the values and rates of change for the twentieth century wholly in A_2, and those for other centuries in A_1, but additive to A_2.

Tabulation of the arguments of the double-entry tables.

The tabulation of the arguments of the double-entry tables is made on the same plan as that of the single-entry. Let A be the first or vertical argument of such a table. Then A is expressed in days as before. There is, however, no advantage in any special period for the vertical argument of double-entry tables of the first three kinds; we therefore use the period at epoch and tabulate the argument by centuries, years of the twentieth century and days as before. Let

$$A = \alpha_0 + d + \alpha_2 d^2 + \alpha_3 d^3 - pi.$$

The second argument B is conveniently expressed in parts of the circumference through division by 1296000. Thus

$$B = \beta_0 + \beta_1 d + \beta_2 d^2 + \beta_3 d^3 - i',$$

where i' is the number required to make B less than unity.

We desire the value of B when $A = 0$. The latter equation leads to

$$d = \alpha_0' + \alpha_1' i + \alpha_2' i^2 + \alpha_3' i^3.$$

Substituting in the expression for B we find

$$B = \beta_0' + \beta_1' i + \beta_2' i^2 + \beta_3' i^3 - i',$$

where, in each case, we can stop at the third power of i.

The values of B are to be tabulated for integral values of i. This is done by centuries, years and days in exactly the same manner as the single-entry arguments. We put $i = i_1 + i_2 + i_3$ where i_1 is the number of times A has passed through zero in an integral number of centuries from the epoch, i_2 the number of times it has passed through zero in an integral number of years after 1900·0 and i_3 the remainder; i' is always so chosen that B is positive and less than unity. The formulae are the same as those for the single entry tables if we replace d by i.

Each argument, however, is here expressed as a decimal fraction of four right angles. It is convenient to divide this circumference into an integral number of parts and to express B in the same way we must multiply it before tabulation by this number. The latter has been so chosen that the last tabulated unit of the coefficient of i shall differ from the true value by as small a quantity as possible. This number is found by converting β_1', or $10\beta_1'$, or $10^2\beta_1'$, ..., into a continued fraction. The denominator is then the 'period' of B expressed in parts, while the numerator is approximately the addition to be made to B whenever A passes through zero; the changes produced by the third and fourth terms of B are always insensible during a single period.

The special features of the arguments of the first three different kinds of double-entry tables will be found in Chap. IV where the values of the argument are obtained.

The Calendar.

The arguments must be related to calendar dates, the centuries and years of which do not progress with a uniform number of days, since common years contain 365 days while leap years contain 366 days.

Following the usual practice, the day 0·0 of common years will be taken to be Greenwich noon of January 0 (i.e. the noon preceding January 1) while day 0·0 of leap years will be Greenwich noon of January 1. There are therefore 366 days in the years next preceding leap years and 365 days in other years. The numbering of the days in both kinds of years agrees in the months after February.

In the twentieth century, every fourth year from 1903 to 1999 inclusive will contain 366 days, the remaining years having only 365 days; there are therefore 36525 days in this century and the same is true concerning the centuries commencing with the years 1500, 2300, 2700 in the Gregorian Calendar. All other centuries in this calendar will contain 36524 days. Since the extra day in the centuries containing 36525 days is always added at the end of the century we can still use the values for the twentieth century as additional to the values for all centuries.

In the Julian Calendar all the years divisible by 4 are leap years and every century contains 36525 days. The date 1900 in the Gregorian Calendar is the same as the date $1900{\cdot}0 + 13^d$ in the Julian Calendar.

If p be the (integral) number of centuries from 1900 and d_1 the number of days in the p centuries, the values of d_1 may be symbolically expressed as follows:

Julian Calendar, $d_1 = 36525p + 13,$

Gregorian Calendar, $d_1 = 36524p +$ integral part of $\frac{1}{4}(p + 3)$ or of $\frac{1}{4}p,$

according as p is positive or negative.

If p' be the number of years from the beginning of any century, the value of d_2 is given by

$$d_2 = 365p' + \text{integral part of } \tfrac{1}{4}p', \qquad p' = 0, 1, \ldots 99.$$

The tabulation of the arguments for 366 days will serve for both kinds of years, the values for the last two half-days being used only in the years preceding leap years.

CHAPTER IV

DESCRIPTION OF QUANTITIES CONTAINED IN THE TABLES

The Tables of Sect. II.

Table 1 is for the conversion of calendar days into days of the year and decimal fractions of the year and for the conversion of hours, minutes and seconds to decimal parts of a day; the latter part of the table is not needed for the ephemeris.

Table 2 contains the portions to be added to the values of the arguments and of L, $-\Omega$, ϖ, given in Table 3, for centuries other than the twentieth.

Table 3 contains the values of the arguments and of L, $-\Omega$, ϖ for the beginnings of the years of the twentieth century. The periods and number of parts in $0^{d}.5$ of the single-entry arguments are shown, as well as the periods and 'additions' for the double-entry arguments.

Table 4 contains the portions to be added to the values of the arguments and of L, $-\Omega$, ϖ, given in Table 3, for the days from the beginning of any year.

Table 5 is for the conversion of seconds of arc into degrees, minutes and seconds.

The general method by which the arguments and L, $-\Omega$, ϖ are expressed in terms of the time has been explained in Chap. II. The numerical values of the quantities which have been used in the construction of Tables 2, 3, 4 will now be given.

Arguments D, 1–22.

Arg. D. From List iθ, Chap. I,

$$D = 350^{\circ}\ 44'\ 23''.67 + 1602961637''.93t_c + 6''.05t_c^2 + 0''.0068t_c^3 - 1296000''i,$$

where t_c is the number of centuries of 36525 mean solar days from 1900·0 and i is an integer so chosen as to render D positive and less than 360°.

The adopted motion of D in a mean solar day is the coefficient of t_c divided by 36525 or 43886''.6978215*. The expression of D in days is obtained by dividing the above value of D by this motion. We find

$$D = 28^{d}.7709883 + d + 0^{d}.000137855t_c^2 + 0^{d}.000000154493t_c^3 - 29^{d}.53058818123i,$$

where d is the number of days from 1900·0. The coefficient of i is the period.

The argument of the tables is D $= D + 15^{d}$. The value of D is tabulated in days and decimal parts of a day.

In order to obtain the arguments 1–22 it is necessary to find the dates on which D $= 15^{d}$ or $D = 0^{d}$. For this it is convenient to use $t = 100t_c$ so that t represents the number of years of 365·25 days from 1900·0, and to express the

* Zeros are added to the initial values expressed in seconds of arc and centuries in order to carry the computations to the required number of significant figures.

coefficients as decimal fractions of the circumference or four right angles. From the equation $D = 0$ we find, by continued approximation or otherwise,

$$t = -0{\cdot}07877\,067 + 0{\cdot}08085\,03440\,97i - 2{\cdot}4672 \times 10^{-13}\,i^2 - 2{\cdot}242 \times 10^{-19}\,i^3.$$

Args. 1–22. These are combinations of the arguments $l - D$, l', $2F - 2D$. From the values in Chap. I, we find, expressed in terms of t and parts of the circumference,

$$l - D = 0{\cdot}84824\,2006 + 0{\cdot}88699\,26358\,8t + 2{\cdot}952160 \times 10^{-9}\,t^2 + 3{\cdot}4722 \times 10^{-14}\,t^3,$$

$$l' = 0{\cdot}99576\,6204 + 0{\cdot}99997\,36041\,7t - 4{\cdot}16667 \times 10^{-11}\,t^2 - 0{\cdot}9259 \times 10^{-14}\,t^3,$$

$$2F - 2D = 0{\cdot}11396\,3349 + 2{\cdot}10749\,50518\,5t - 9{\cdot}86111 \times 10^{-10}\,t^2 - 1{\cdot}2346 \times 10^{-14}\,t^3.$$

Substituting the value of t in terms of i previously found we obtain the following values of these arguments when $D = 0$:

$$l - D = 0{\cdot}77837\,300 + 0{\cdot}07171\,36597\,85i + 1{\cdot}9079 \times 10^{-11}\,i^2 + 1{\cdot}815 \times 10^{-17}\,i^3,$$

$$l' = 0{\cdot}91699\,761 + 0{\cdot}08084\,82099\,85i - 0{\cdot}05191 \times 10^{-11}\,i^2 - 0{\cdot}512 \times 10^{-17}\,i^3,$$

$$2F - 2D = 0{\cdot}94795\,455 + 0{\cdot}17039\,17001\,37i - 0{\cdot}69659 \times 10^{-11}\,i^2 - 0{\cdot}700 \times 10^{-17}\,i^3.$$

The circumference of each argument is divided into a given number of parts. Hence after it has been formed from the above expressions according to the description given in col. 2 of List iiα below, it must be multiplied by the number shown in col. 3. The results are given in the succeeding columns.

LIST iiα. Arguments 1–22 expressed in terms of multiples of the period of D.

No.	Description	Per.	Const. Term	Coef. of i	Coef. of $10^{-9}\,i^2$	Coef. of $10^{-15}\,i^3$
		c	c	c	c	c
1	l'	141	129·29666	11·39959 7608	−0·0732	−0·722
2	$l'+l-D$	156	108·47782	23·79965 1684	+2·8954	+2·033
3	$l'-l+D$	116	16·08046	1·05960 7823	−2·2734	−2·699
4	$2l+l'-2D$	124	58·74421	27·81016 5665	+4·6672	+3·866
5	$2l-l'-2D$	128	81·88779	8·01012 6027	+4·9507	+5·302
6	$2l'+l-D$	132	80·83261	30·81013 0528	+2·3814	+1·044
7	$2l'-l+D$	100	5·56222	8·99827 6019	−2·0117	−2·839
8	$3l+l'-3D$	50	12·60583	14·79945 9467	+2·8360	+2·465
9	$3l-l'-3D$	42	17·56110	5·64029 6314	+2·4259	+2·503
10	$2F+l'-2D$	80	69·19617	20·09919 2810	− ·5988	− ·970
11	$2F-l'-2D$	44	1·36211	3·93991 3567	− ·2837	− ·083
12	$2F+l+l'-3D$	24	15·43980	7·75088 5678	+ ·2783	+ ·145
13	$2F-l+l'-D$	44	3·80948	7·89915 5015	−1·1688	−1·332
14	$2F+l-l'-3D$	32	25·89856	5·16022 8798	+ ·4042	+ ·521
15	$2F-l-l'-D$	28	7·07235	0·49923 5250	− ·7147	− ·561
16	$l-D$	251	195·37163	18·00012 8606	+4·7888	+4·606
17	$2F-2D$	51	48·34568	8·68997 6707	− ·3553	− ·357
18	$2F+l-3D$	38	27·60045	9·20000 3677	+ ·4603	+ ·424
19	$2F-l-D$	76	12·88820	7·49953 1067	−1·9794	−1·911
20	$2F+2l-4D$	94	47·44185	29·49898 7852	+2·9320	+2·754
21	$2F-2l$	56	21·90768	1·51000 5312	−2·5829	−2·425
22	$2F+3l-5D$	36	10·19065	13·87917 6462	+1·8098	+1·708

To find the values of i for tabulation in Sect. II, we observe that they are those for which $D = 0^d$ or D = $15^d{\cdot}0$, and that the double-entry tables depending on this common argument have been tabulated from $D = -15^d{\cdot}5$ to $D = +15^d{\cdot}5$, that is, from D = $-0^d{\cdot}5$ to D = $+30^d{\cdot}5$. Hence when D exceeds its period, we subtract the latter and add unity to i. Since D is $43^d + \dots$ at 1900·0, the value of i at this epoch is unity.

To find the values for the beginnings of other centuries we note that either 1236 or 1237 zero values of D are passed over in each century according to its value at the beginning. The choice is obtained from the value of D in Table 2: when D increases from one century to the succeeding century the number is 1236, when it decreases the number is 1237.

Similarly for the years of the twentieth century. Turn to the value of D in Table 3: when D increases from one year to the next the number is 12, when it decreases the number is 13.

In Table 4, where the interval is 30^d, every period of D is shown with the resulting additions to the arguments 1–22.

Arguments 23–47, 51–62, 71–78, 82–84.

These are the single-entry arguments. To a number of them have been added certain terms of very long period shown in List iη, Chap. I.

In List iiβ are given the full descriptions of these arguments, together with the values used in the tabulation, expressed in parts of the circumference (indicated by the letter '*r*') and in Julian centuries of 36525 days. The notation used for the periodic terms is, at epoch 1850,

$$s_1 = \sin(20^\circ\!.2t_c + 41^\circ\!.1),$$

$$s_2 = \sin(l + 3T - 10V - 2^\circ\!.6t_c + 33^\circ) = \sin(76^\circ\!.0 + 16^\circ\!.23t_c + 0^\circ\!.012t_c^2),$$

$$s_3 = \sin(4D - 3l + 25M - 23T + 67^\circ) = \sin(233^\circ\!.9 - 6^\circ\!.07t_c - 0^\circ\!.03t_c^2).$$

The method for finding the period to be adopted is described in Chap. III. List iiγ gives the number of parts into which the half-day for each argument is divided, the adopted period expressed in days and parts and also in parts alone, and the addition to the adopted period necessary to find the period at the epoch 1900·0. In the cases of Args. 58, 78, 82, 83, 84 no division of the half-day was necessary, and the period is expressed in days only.

In order to obtain the arguments in forms ready for tabulation it is necessary to express them in days and parts of a day. The coefficients of t_c^0 in List iiδ are the epoch values. The terms given involving t_c^1, t_c^2, t_c^3 and constituting the secular variations, are expressed in parts per century; the periodic additions are also shown. To get the values on any day we must further add the number of days since the epoch and subtract the necessary multiples of the adopted periods shown in List iiγ. This process was carried through with the arguments expressed wholly in terms of the parts of each, the final step being the conversion to integral multiples of a half-day and the remaining parts. But since Args. 58, 78, 82, 83, 84 require no division of the half-day, the process was carried through in days and decimal fractions of a day.

Arguments 83, 84 contain functions of the time denoted by ϕ, ψ, respectively. An investigation at the end of this chapter shows how these are obtained.

LIST ii β. Single-entry Arguments in terms of t_c and parts of the circumference.

No.	Description	Value. Coefficients of						
		t_c^0	t_c^1	$10^{-6}\,t_c^2$	$10^{-8}\,t_c^3$	$10^{-6}\,s_1$	$10^{-6}\,s_2$	$10^{-6}\,s_3$
		r	r	r	r	r		
23	$2D - l' + 270° + 20''.88 s_1$	+0·70278 884	+2373·70887 0957	+ 9·75309	+1·9753	+16·11	—	—
24	$2D + l' + 90°$	+ ·19432 125	+2573·70359 1791	+ 8·91975	+0·1235	—	—	—
25	$l + l' + 90°$	+ ·06828 573	+1425·54973 9692	+33·77314	+3·0710	—	—	—
26	$l - l' + 270° - \overset{c}{0.5} + 9''.34 s_1$	+ ·57669 425	+1225·55501 8858	+34·60648	+4·9228	+ 7·21	—	—
27	$2D - l - l' + 270° + 17''.94 s_1$	+ ·88026 931	+1048·15649 1682	−24·43672	−2·0216	+13·84	—	—
28	$2D + l - l' + 270°$	+ ·52530 837	+3699·26125 0232	+43·94290	+5·9722	—	—	—
29	$2D - l + l' + 90°$	+ ·37180 172	+1248·15121 2516	−25·27006	−3·8734	—	—	—
30	$l - \overset{c}{0.7797} + 2''.94 s_1 + 0''.31 s_2 + 0''.04 s_3$	+ ·82247 666	+1325·55237 92747	+34·18981	+3·9969	+2·27	r +0·24	r +0·03
31	$2D + 270° - \overset{c}{0.5} - \overset{c}{1.3} + 14''.48 s_1 + 0''.62 s_2 + 0''.08 s_3$	+ ·69834 772	+2473·70623 13735	+ 9·33642	+1·0494	+11·17	+0·48	+0·06
32	$2D - l + 270° - \overset{c}{3.407} + 11''.54 s_1 + 0''.31 s_2 + 0''.04 s_3$	+ ·87587 567	+1148·15385 20988	−24·85339	−2·9475	+ 8·90	+0·24	+0·03
33	$D - \overset{c}{0.5} + 7''.24 s_1 + 0''.31 s_2 + 0''.04 s_3$	+ ·97419 114	+1236·85311 5687	+ 4·66821	+0·5247	+ 5·59	+0·24	+0·03
34	$2l - 2D + 90° - 8''.60 s_1$	+ ·19648 401	+ 177·39852 7176	+59·04320	+6·9444	− 6·64	—	—
35	$2D + l + 270° + 17''.42 s_1$	+ ·52107458	+3799·25861 0648	+43·52623	+5·0643	+13·44	—	—
36	$4D - 2l + 270°$	+ ·00207 103	+3296·30770 4198	−49·70678	−5·8950	—	—	—
37	$4D - l + 270°$	+ ·82459 056	+3621·86008 3473	−15·51697	−1·8981	—	—	—
38	$2D + 2l + 270°$	+ ·34359 411	+5124·81098 9924	+77·71604	+9·0432	—	—	—
39	$4D + l + 270°$	+ ·46962 962	+6272·96484 2023	+52·86265	+6·0957	—	—	—
40	$2F + 90°$	+ ·31251 840	+2684·45573 6559	− 0·52469	−0·1852	—	—	—
41	$2F - 2D + 90°$	+ ·36396 335	+ 210·74950 5185	− 9·86111	−1·2346	—	—	—
42	$2F - l + 90°$	+ ·48999 887	+1358·90335 7284	−34·71450	−4·1821	—	—	—
43	$2F + l + 90°$	+ ·13503 792	+4010·00811 5834	+33·66512	+3·8117	—	—	—
44	$2F + 2D + 90°$	+ ·26107 344	+5158·16196 7933	+ 8·81173	+0·8642	—	—	—
45	$2F + 2D - l + 90°$	+ ·43855 391	+3832·60958 8658	−25·37808	−3·1327	—	—	—
46	$2F + 2l + 90°$	+ ·95755 745	+5335·56049 5109	+67·85493	+7·8086	—	—	—
47	$l' + 90° - 6''.40 s_1$	+ ·24576 620	+ 99·99736 04167	− 0·41667	−0·9259	− 4·94	—	—
51	$2F + 2l - 2D + 90°$	+ ·00900 241	+2861·85426 3735	+58·51851	+6·7592	—	—	—
52	$2F + l + l' - 2D + 90°$	+ ·18224 908	+1636·29924 4877	+23·91203	+1·8364	—	—	—
53	$2D - l' - F + 270°$	+ ·67152 964	+1031·48100 2678	+10·01544	+2·0679	—	—	—
54	$2D + l' - F + 90°$	+ ·16306 205	+1231·47572 3512	+ 9·18210	+0·2161	—	—	—
55	$2D - F + 270° + 14''.27 s_1$	+ ·66729 585	+1131·47836 30941	+ 9·59877	+1·1420	+11·01	—	—
56	$4D - F + 270°$	+ ·61585 089	+3605·18459 4469	+18·93519	+2·1914	—	—	—
57	$4D - F - l + 270°$	+ ·79333 137	+2279·63221 5194	−15·25462	−1·8055	—	—	—
58	$F - l + 270°$	+ ·95873 967	+ 16·67548 9004	−34·45216	−4·0895	—	—	—
59	$F + l - 2D + 270°$	+ ·65522 368	+ 194·07401 6180	+24·59104	+2·8549	—	—	—
60	$2D + l - F + 270°$	+ ·48981 538	+2457·03074 2370	+43·78858	+5·1389	—	—	—
61	$2l - F + 270°$	+ ·36377 986	+1308·87689 0271	+68·64197	+8·0864	—	—	—
62	$2l + 2D - F + 270°$	+ ·31233 491	+3782·58312 1645	+77·97839	+9·1358	—	—	—
71	$l - \overset{c}{0.5} - \overset{c}{0.5198} + 2''.94 s_1 + 0''.31 s_2 + 0''.04 s_3$	+ ·82243 542	+1325·55237 92747	+34·18981	+3·9969	+ 2·27	+0·24	+0·03
72	$2D - l - \overset{c}{1.1085} + 11''.54 s_1 + 0''.31 s_2 + 0''.04 s_3$	+ ·12587 568	+1148·15385 20988	−24·85339	−2·9475	+ 8·90	+0·24	+0·03
73	$2D + l + 17''.42 s_1$	+ ·77107 458	+3799·25861 0648	+43·52623	+5·0643	+13·44	—	—
74	$2D - l'$	+ ·95278 884	+2373·70887 0957	+ 9·75309	+1·9753	—	—	—
75	$2l + 2F - 2D + 180°$	+ ·25900 241	+2861·85426 3735	+58·51851	+6·7592	—	—	—
76	$2l + 2D$	+ ·59359 411	+5124·81098 9924	+77·71604	+9·0432	—	—	—
77	$4D - l$	+ ·07459 056	+3621·86008 3473	−15·51697	−1·8981	—	—	—
78	$l' + 2F - 2D + 180°$	+ ·60972 955	+ 310·74686 5602	−10·27778	−2·1605	—	—	—
82	$-\Omega + 90°$	+ ·53004 646	+ 5·37261 6690	− 5·77160	−0·6173	—	—	—
83	$-\Omega + 280°.78 + \phi$	+ ·05999 090	,,	,,	,,	$(+\phi)$	—	—
84	$-\Omega + 189°.95 + \psi$	+ ·80768 535	,,	,,	,,	$(+\psi)$	—	—

List iiγ. Divisions and periods of the single-entry Arguments.

No.	Parts in $0^d{\cdot}5$	Adopted Period in		Per. at epoch less adopted period	No.	Parts in $0^d.5$	Adopted Period in		Per. at epoch less adopted period
		Parts	Days and parts				Parts	Days and parts	
	c	c	d c	c		c	c	d c	c
23	599	18434	15·0 + 464	+0·00028 342	47	25	18263	365·0 + 13	−0·01793 337
24	167	4740	14·0 + 64	− ·00195 247	51	19	485	12·5 + 10	− ·01723 29
25	189	9685	25·5 + 46	+ ·00054 090	52	3	134	22·0 + 2	− ·06972 979
26	142	8464	29·5 + 86	+ ·00189 333	53	39	2762	35·0 + 32	− ·00051 324
27	258	17981	34·5 + 179	− ·00179 071	54	47	2788	29·5 + 15	− ·00350 567
28	178	3515	9·5 + 133	− ·00089 060	55	130	8393	32·0 + 73	+ ·00185 470
29	207	12115	29·5 + 109	− ·00155 400	56	80	1621	10·0 + 21	− ·00117 266
30	330	18186	27·5 + 36	+ ·00334 2388	57	112	3589	16·0 + 5	− ·00000 892
31	294	8682	14·5 + 156	− ·00707 4722	58	—	—	2190·5	$-0^d{\cdot}15945$
32	335	21314	31·5 + 209	− ·00104 8320	59	5	1882	188·0 + 2	$+0^c{\cdot}01392\ 020$
33	98	5788	29·5 + 6	− ·00471 648	60	171	5084	14·5 + 125	+ ·00232 223
34	14	5765	205·5 + 11	− ·01414 43	61	53	2958	27·5 + 43	− ·00599 096
35	277	5326	9·5 + 63	− ·00035 805	62	205	3959	9·5 + 64	+ ·00090 45
36	117	3722	15·5 + 95	− ·00316 813	71	220	12124	27·5 + 24	+ ·00222 8259
37	396	7987	10·0 + 67	+ ·00097 003	72	109	6935	31·5 + 68	+ ·00264 398
38	299	4262	7·0 + 76	+ ·00108 510	73	277	5326	9·5 + 63	− ·00035 805
39	31	361	5·5 + 20	+ ·00154 505	74	71	2185	15·0 + 55	− ·00163 586
40	311	8463	13·5 + 66	+ ·00041 033	75	15	383	12·5 + 8	− ·11886 81
41	21	7279	173·0 + 13	+ ·02064 89	76	59	841	7·0 + 15	− ·00313 036
42	152	8171	26·5 + 115	+ ·00049 130	77	65	1311	10·0 + 11	− ·00236 603
43	189	3443	9·0 + 41	− ·00198 075	78	—	—	117·5	$+0^d{\cdot}03940$
44	179	2535	7·0 + 29	+ ·00182 454	82	—	—	6800·0	−1·63672
45	133	2535	9·5 + 8	− ·00399 395	83	—	—	..	..
46	68	931	6·5 + 47	− ·00127 840	84	—	—	..	..

The remaining double-entry arguments.

The arguments not included in the lists are those of the double-entry tables which do not have D as one of their arguments.

Arg. 48 is the value of $2F - 2l$ when $l = 0$. It is sufficiently accurate to take Arg. 30 for l since the small constant and periodic terms which have been added to Arg. 30 exert no sensible effect. We can also omit the term depending on t_c^3 in Arg. 48. Taking the value of Arg. 30 given in List iiβ, putting it equal to i and solving for $t = 100t_c$, we find

$$t = -0{\cdot}062051 + 0{\cdot}07544\,02478\,27i - 1{\cdot}47 \times 10^{-12}\,i^2.$$

Whence, from the values of F, l given above,

$$\begin{aligned} \text{Arg. } 48 &= 0^r{\cdot}417479 + 0^r{\cdot}33350\,97800\,9t - 6^r{\cdot}890 \times 10^{-9}\,t^2 \\ &= 0^r{\cdot}396784 + 0^r{\cdot}02516\,00604\,0i - 39^r{\cdot}8 \times 10^{-12}\,i^2 \\ &= 63^c{\cdot}0887 + 4^c{\cdot}00044\,9604i - 6^c{\cdot}28 \times 10^{-9}\,i^2, \end{aligned}$$

the circumference being divided into 159 parts. The 'addition' to Arg. 48 whenever Arg. 30 passes through zero is 4^c with sufficient approximation during a run of a year, and this addition is adopted in Table 48, Sect. III.

The period of Arg. 30 is $27^d{\cdot}55455$ and 159 of these make $4381^d{\cdot}17$. The half-day of Table 48, III, is slightly increased so as to make this period appear to be $4381^d{\cdot}00$; the accumulated error in a run of a year is less than $0^d{\cdot}02$ and this produces no sensible change in the function.

LIST ii δ. Expressions for the single-entry arguments in parts of a half-day and centuries. The number of days from the Epoch 1900·0 is to be added to each argument.

No.	Values of the coefficients of						
	t_c^0	t_c^1	t_c^2	t_c^3	s_1	s_2	s_3
	c	c	c	c	c		
23	12955·209	− 0·67276	+0·17978 89	+0·00036 413	+0·2970	—	—
24	921·083	+ 5·02508	+ ·04227 96	+ ·00000 585	—	—	—
25	661·347	− 0·77108	+ ·32709 28	+ ·00029 743	—	—	—
26	4881·1400	− 2·32038 6	+ ·29290 93	+ ·00041 667	+ ·0610	—	—
27	15828·123	+ 1·87694	− ·43939 66	− ·00036 350	+ ·2489	—	—
28	1846·458	+ 3·29456	+ ·15445 93	+ ·00020 992	—	—	—
29	4504·377	+ 1·93963	− ·30614 66	− ·00046 926	—	c —	c —
30	14957·56045	− 4·43051 1	+ ·62177 599	+ ·00072 6876	+ ·0413	+0·0044	+0·0005
31	6063·05491	+ 17·50078 3	+ ·08105 874	+ ·00009 1109	+ ·0970	+ ·0041	+ ·0005
32	18668·41401	+ 1·20363 3	− ·52972 513	− ·00062 8230	+ ·1898	+ ·0051	+ ·0006
33	5638·6183	+ 5·83360	+ ·02701 96	+ ·00003 037	+ ·0324	+ ·0014	+ ·0002
34	5456·4803	+ 2·50919	+ ·34038 32	+ ·00040 034	− ·0383	—	—
35	2775·2432	+ 1·36031	+ ·23182 07	+ ·00026 877	+ ·0716	—	—
36	7·708	+ 7·27501	− ·18500 85	− ·00021 941	—	—	—
37	6586·005	− 3·51328	− ·12393 41	− ·00015 160	—	—	—
38	1464·398	− 5·56098	+ ·33122 57	+ ·00038 542	—	—	—
39	169·536	− 9·69207	+ ·01908 35	+ ·00002 201	—	—	—
40	2644·8432	− 1·10150	− ·00444 05	− ·00001 567	—	—	—
41	2709·290	− 4·35175	− ·07177 92	− ·00008 987	—	—	—
42	4003·781	− 0·66763	− ·28365 22	− ·00034 172	—	—	—
43	464·935	+ 7·94283	+ ·11590 89	+ ·00013 124	—	—	—
44	661·822	− 9·41127	+ ·02233 78	+ ·00002 191	—	—	—
45	1111·734	+ 15·30727	− ·06433 33	− ·00007 941	—	—	—
46	891·486	+ 6·82097	+ ·06317 29	+ ·00007 270	—	—	—
47	4488·4283	+ 1·79328 8	− ·00760 964	− ·00016 9097	− ·0902	—	—
51	4·37	+ 49·3180	+ ·02838 0	+ ·00003 28	—	—	—
52	24·42	+114·2102	+ ·00320 3	+ ·00000 25	—	—	—
53	1854·765	+ 0·52940	+ ·02766 26	+ ·00005 712	—	—	—
54	454·617	+ 4·31715	+ ·02559 97	+ ·00000 602	—	—	—
55	5600·6140	− 2·09855 2	+ ·08056 250	+ ·00009 5848	+ ·0924	—	—
56	998·295	+ 4·22765	+ ·03069 39	+ ·00003 552	—	—	—
57	2847·266	+ 0·02034	− ·05474 88	− ·00006 480	—	—	—
58	$2100^{d}11$	+ $2^{d}66$	$-0^{d}07546$ 3	$-0^{d}00008$ 96	—	—	—
59	$1233^{c}1316$	− $2^{c}70155$	$+0^{c}04628$ 07	$+0^{c}00005$ 373	—	—	—
60	2490·222	− 5·70579	+ ·22262 12	+ ·00026 126	—	—	—
61	1076·061	+ 7·84144	+ ·20304 25	+ ·00023 920	—	—	—
62	1236·53	− 3·4213	+ ·30871 6	+ ·00036 17	—	—	—
71	9971·2070	− 2·95367 4	+ ·41451 733	+ ·00048 4584	+ ·0275	+ ·0029	+ ·0003
72	872·9478	− 3·03569 5	− ·17235 833	− ·00020 4409	+ ·0630	+ ·0017	+ ·0002
73	4106·743	+ 1·36031	+ ·23182 07	+ ·00026 877	+ ·0716	—	—
74	2081·843	+ 3·88306	+ ·02131 05	+ ·00004 316	—	—	—
75	99·20	+340·1832	+ ·02240 5	+ ·00002 59	—	—	—
76	499·213	+ 16·04252	+ ·06535 89	+ ·00007 605	—	—	—
77	97·788	+ 8·56943	− ·02034 27	− ·00002 488	—	—	—
78	$71^{d}64$	− $12^{d}2439$	$-0^{d}00120$ 8	$-0^{d}00000$ 259	—	—	—
82	3604·32	+ 8·79347	− ·03923 8	− ·00004 197	—	—	—
83	408·00	,,	,,	,,	$(+\phi)$	—	—
84	5492·23	,,	,,	,,	$(+\psi)$	—	—

The argument is tabulated with reference to Arg. 30 in the same manner as Args. 1–22 with reference to D, the value of i at epoch being 0.

Args. 49, 50. By definition, and by the values in Chap. I,

$$\begin{aligned}\text{Arg. } 49 &= 2F + \Omega - 0^{\circ}.11t_e - 10^{\circ}.3 + 7^{d}.0 \\ &= 97700\,4'' + 347\,20913''.27t + 0''.00068t^2 - 12\,96000''\,i + 7^{d}.0 \\ &= 0^{r}.75386 + 26^{r}.79082\,814t + 6^{r}.05 \times 10^{-10}\,t^2 - i + 7^{d}.0 \\ &= 10^{d}.2776 + 7^{d}.0 + d + 7^{d}.2 \times 10^{-5}\,t_e^2 - 13^{d}.63339\,715i,\end{aligned}$$

the argument being expressed in days by the methods previously used and the coefficient of t being used to find the period. The argument is tabulated from this expression in the same manner as D.

Arg. 50 is the value of l when Arg. 49 $= 7^{d}.0$. From the third of the above expressions for Arg. 49, we find

$$t = -\,0.02813\,9 + 0.03732\,62071\,1i - 2.73 \times 10^{-14}\,i^2,$$

and thence from the given value of l,

$$\begin{aligned}\text{Arg. } 50 &= 0^{r}.82252 + 13^{r}.25552\,37928t + 3^{r}.42 \times 10^{-9}\,t^2 \\ &= 0^{r}.44952 + 0^{r}.49477\,84264i + 4^{r}.42 \times 10^{-12}\,i^2 \\ &= 45^{c}.402 + 49^{c}.97262\,107i + 4^{c}.46 \times 10^{-10}\,i^2,\end{aligned}$$

the circumference being divided into 101 parts. The addition to Arg. 50 whenever Arg. 49 passes through zero is $50^{c}.00$ with sufficient accuracy during a run of a year, and this addition is adopted in Table 49, III.

The period of Arg. 49 is $13^{d}.6334$ and 101 of these make $1376^{d}.97$. The half-day of Table 49, III, is slightly diminished so as to make this period $1377^{d}.00$ with an insensible error in a run of a year.

Arg. 50 is tabulated in the same manner as Arg. 48, the value at epoch being obtained with $i = 1$.

Args. 63, 64. By definition and by the values in Chap. I,

$$\begin{aligned}\text{Arg. } 63 &= 2D - F - \Omega + 0^{\circ}.1t_e + 9^{\circ}.7 + 16^{d}.0 \\ &= 2\,90675''.63 + 147\,33592''.2980t + 0''.00049\,6t^2 - 12\,96000''\,i + 16^{d}.0 \\ &= 0^{r}.22428\,7 + 11^{r}.36851\,25757t + 3^{r}.82 \times 10^{-10}\,t^2 - i + 16^{d}.0 \\ &= 7^{d}.2059 + 16^{d}.0 + d + 1^{d}.23 \times 10^{-8}\,t^2 - 32^{d}.12821\,3569i,\end{aligned}$$

which is tabulated like D.

Arg. 64 is the value of l when Arg. 63 $= 16^{d}.0$. Proceeding, as before, with Arg. 63 we find

$$t = -\,0.01972\,88 + 0.08796\,22548i - 2.61 \times 10^{-13}\,i^2.$$

Whence, with the value of l previously given, and since we can always subtract any multiple of the circumference,

$$\begin{aligned}\text{Arg. } 64 &= 0^{r}.56100\,4 + 0^{r}.16598\,57613i + 2^{r}.19 \times 10^{-11}\,i^2 \\ &= 19^{c}.6351 + 5^{c}.80950\,165i + 7^{c}.67 \times 10^{-10}\,i^2,\end{aligned}$$

the circumference being divided into 35 parts. The addition to Arg. 64 when Arg. 63 passes through zero is $6^{c}.0$ with sufficient accuracy during a run of a year, this being adopted in Table 29, IV.

The period of Arg. 63 is $32^d.1282$ and 35 of these make $1124^d.49$. The half-day in the table is slightly diminished to make this $1124^d.50$ with an insensible error in a run of a year.

The value at epoch is obtained with $i = 0$, and the argument is tabulated like other horizontal arguments.

Args. 65, 66. By definition and by the values in Chap. I,

$$\text{Arg. } 65 = L + V - T = 550113'' + 181\,36257''.7588t - 12\,96000''\, i$$
$$= 0^r.42447\,0 + 13^r.99402\,6049t - i$$
$$= 11^d.0788 + d - 26^d.10042\,3047i,$$

which is tabulated like D.

Arg. 66 is the value of $V - T$ when Arg. 65 = 0. Proceeding, as before, with Arg. 65 we find

$$t = -\,0\cdot03033\,2 + 0\cdot07145\,90637\,85i.$$

Hence

$$\text{Arg. } 66 = 0^r.67519\,6 + 0^r.62551\,23052t = 0^r.656222 + 0^r.04469\,85237\,3i$$
$$= 29^c.5300 + 2^c.01143\,3568i,$$

the circumference being divided into 45 parts. The addition to Arg. 66 when Arg. 65 passes through zero is $2^c.0$ with sufficient accuracy during a run of a year, this being adopted in Table 30, IV.

The period of Arg. 65 is $26^d.1004$ and 45 of these make $1174^d.52$. The half-day of the table is slightly increased in order to make this $1174^d.50$ with an insensible error in a run of a year.

The value at epoch is obtained with $i = 0$ and the argument is tabulated like other horizontal arguments.

Args. 67, 68. By definition and by the values in Chap. I,

$$\text{Arg. } 67 = L + 3V - 5T = 291428'' + 171\,65630''.7898t - 12\,96000''\, i$$
$$= 0\cdot22486\,7 + 13^r.24508\,549t - i = 6^d.2010 + d - 27^d.57626\,59582i,$$

which is tabulated like D.

Arg. 68 is the value of $V - T$ when Arg. 67 = 0. Proceeding with Arg. 67, as previously with Arg. 65, we find

$$t = -\,0\cdot01697\,74 + 0\cdot07549\,97014\,6i.$$

Hence, with the value for $V - T$ given above,

$$\text{Arg. } 68 = 0^r.66457\,6 + 0^r.04722\,59923i = 27^c.912 + 1^c.98349\,168i,$$

there being 42 parts in the circumference. The addition to Arg. 68 when Arg. 67 passes through zero is $2^c.0$ with sufficient accuracy in a run of a year, this value being adopted in Table 31, IV.

The period of Arg. 67 is $27^d.5763$ and 42 of these make $1158^d.20$. The half-day of the table is slightly increased so as to make this $1158^d.00$, the error being insensible in a run of a year.

The value at epoch is obtained with $i = 0$ and the argument is tabulated like other horizontal arguments.

Args. 69, 70. By definition and by the values in Chap. I,

$$\text{Arg. } 69 = 2D - F + 3V - 3T = 122\,1975'' + 170\,95951''.4282t - 129\,6000''i$$
$$= 0^{r}.94288\,2 + 13^{r}.19132\,0546t - i = 26^{d}.1071 + d - 27^{d}.68866\,07915i,$$

which is tabulated like D.

Arg. 70 is the value of $V - T$ when Arg. 69 = 0. Proceeding as before, with Arg. 69, we find

$$t = -0{\cdot}071477\,46 + 0{\cdot}07580\,74217\,4i.$$

Hence with the value for $V - T$ given above

$$\text{Arg. } 70 = 0^{r}.63048\,6 + 0^{r}.04741\,84751\,2i = 26^{c}.4804 + 1^{c}.99157\,5955i,$$

there being 42 parts in the circumference. The addition to Arg. 70 when Arg. 69 passes through zero is $2^{c}.0$ with sufficient accuracy in a run of a year, this being adopted in Table 32, IV.

The period of Arg. 69 is $27^{d}.6887$ and 42 of these make $1162^{d}.93$. The half-day of the table is slightly decreased in order to make this $1163^{d}.00$, the error being insensible in a run of a year.

The value at epoch is obtained with $i = 0$ and the argument is tabulated like other horizontal arguments.

Args. l', 79, 80, 81. From Chap. I, in decimal parts of the circumference and in days,

$$l' = -0^{r}.00423\,38 + (1^{r} - 0^{r}.00002\,6396)\,t - i = -1^{d}.546 + d - 365^{d}.25964\,11i.$$

Args. 79, 80, 81 are given their values at the times when $l' = 0$ nearest to the beginning of the year. Within the range of dates for which the arguments are tabulated, these times are obtained by giving to i values equal to the integral number of years from 1900·0 and l' is tabulated with this in view. When $l' = 0$ we have

$$t = 0{\cdot}00423\,39 + 1{\cdot}00002\,63965\,3i.$$

The three arguments have their circumferences each divided into 73 parts, and to J is added the periodic term shown in Chap. I. From the values in that chapter we have

$$\text{Arg. } 79 = V - T = 0^{r}.67519\,55 + 0^{r}.62551\,23052t = 0^{r}.67784\,4 + 0^{r}.62552\,88166i$$
$$= 49^{c}.4826 + 45^{c}.66360\,361i,$$
$$\text{Arg. } 80 = T - J - 0^{\circ}.33 \sin (38^{\circ}.3t_{e} + 134^{\circ})$$
$$= 0^{r}.61568\,45 + 0^{r}.91567\,96035t + 0^{r}.00092 \sin (38^{\circ}.3t_{e} + 314^{\circ})$$
$$= 0^{r}.61956\,1 + 0^{r}.91570\,37742i + 0^{r}.00092 \sin (38^{\circ}.3t_{e} + 314^{\circ})$$
$$= 45^{c}.2280 + 66^{c}.84637\,5521i + 0^{c}.067 \sin (38^{\circ}.3t_{e} + 314^{\circ}),$$
$$\text{Arg. } 81 = T - M = 0^{r}.46096\,97 + 0^{r}.46830\,74885t = 0^{r}.46295\,3 + 0^{r}.46831\,98502i$$
$$= 33^{c}.7955 + 34^{c}.18734\,906i.$$

These are tabulated with $i = 0, 1, \ldots 99$ for the years of the twentieth century and with i in multiples of 100 and without the constant term, for the centuries. For the periodic term in Arg. 80 it is sufficient to take the value for the middle of any century. Hence for the twentieth century we use the value 333° of its argument and for other centuries the value $0^\circ\!.067\,\{\sin(38^\circ\!.3t_c + 333^\circ) - \sin 333^\circ\}$. These arguments need no change during a run of a year.

The Mean Longitudes L, $-\Omega$, ϖ.

The Mean Longitude, L. To the adopted value of the mean longitude given in Chap. I must be added the three terms of very long period, namely,

$$+0''\!.840s_1 + 0''\!.310s_2 + 0''\!.040s_3,$$

where s_1, s_2, s_3 have the significations given in the description of List iiβ above. These terms were tabulated by centuries and the first and second differences computed in the manner explained in Chap. III. The values of the terms at the beginning of the century, and the portions to be multiplied by the fraction of the century and by the square of this fraction are, for the twentieth century, $+0''\!.931$, $+0''\!.198$, $-0''\!.056$. After the tabulation by centuries of the three terms, these quantities must be subtracted from the century values and from the parts multiplied by the fraction of the century and by the square of this fraction, since the value for a year in any century other than the twentieth is obtained by adding the value for that century in Table 2 to the value for the corresponding year of the twentieth century, and since in Table 2, all values for 1900 are to be zero.

It is also necessary to subtract the sum of the constants which have been added to the tables of Sect. III. This sum is

$$39814''\!.369 + 1488''\!.80\,(-0{\cdot}00248\,0000t_c) = 39814''\!.369 - 3''\!.69222\,4t_c.$$

Hence, for the purposes of tabulation in Table 2,

$$\begin{aligned} L = &+ 17325\,64409''\!.752224t_c + 7''\!.1400t_c^2 + 0''\!.00680t_c^3 \\ &+ 0''\!.840s_1 + 0''\!.310s_2 + 0''\!.040s_3 - 0''\!.931 - 0''\!.198n + 0''\!.056n^2, \end{aligned}$$

where n is the fraction of any century; and for tabulation in Table 3,

$$L = 9\,33758''\!.272 + 17325\,64409''\!.950t_c + 7''\!.084t_c^2 + 0''\!.0068t_c^3.$$

For tabulation in Table 4, the second term of the latter expression is alone used.

The node, Ω. The node is only needed with the negative sign and therefore $-\Omega$ is tabulated. The treatment is precisely the same as that of L but one less place of decimals is required. There is only one long period term, namely $-0''\!.63s_1$ and the three portions of this for the twentieth century are $-0''\!.49$, $-0''\!.14$, $+0''\!.03$. The sum of the constants to be subtracted from $-\Omega$ is

$$-562''\!.39 - 425''\!.80\,(-0{\cdot}00248\,000t_c) = -562''\!.39 + 1''\!.05598t_c.$$

Hence, for the purposes of tabulation in Table 2,

$$-\Omega = 69\,62910''\!.17402t_c - 7''\!.480t_c^2 - 0''\!.0080t_c^3 - 0''\!.63s_1 + 0''\!.49 + 0''\!.14n - 0''\!.03n^2;$$

and for tabulation in Table 3,

$$-\Omega = 3\,63502''\!.11 + 69\,62910''\!.03t_c - 7''\!.45t_c^2 - 0''\!.008t_c^3.$$

For tabulation in Table 4, the second term of the last expression is alone used.

The perigee, ϖ. The longitude of perigee is not needed in finding the place of the moon by these tables; but it is given in many almanacs and has therefore been tabulated here. The only addition made to it is the term of very long period, $-2''.10s_1$; the three portions of this for the twentieth century are $-1''.64$, $-0''.47$, $+0''.11$.

Hence, for Table 2,

$$\varpi = 146\,48522''.52t_c - 37''.17t_c^2 - 0''.045t_c^3 - 2''.10s_1 + 1''.64 + 0''.47n - 0''.11n^2,$$

and for Table 3,

$$\varpi = 12\,03584''.76 + 146\,48522''.05t_c - 37''.06t_c^2 - 0''.045t_c^3.$$

The second term of this last expression is alone used in Table 4. The values are given to the nearest second.

The terms contained in the Tables of Sections III–VI.

Lists iii–vi which follow show the terms which have been included in the tables of the succeeding sections. The notations for the arguments of the terms are the same as those of Lists iα–iη. The reference numbers also correspond to those in the lists referred to so that the method of disposal of all terms can be found from either set. The constant which has been added to nearly all the tables so that the values may be always positive is shown. The arguments of terms which contain numerical angles are reckoned from the epoch for which they were computed, namely 1850·0, except those in P 22–P 38 where the epoch is 1900·0.

In List iii, the coefficients are given in seconds of arc. In the tables of Sect. III the unit is $0''.01$, the computations having been taken one place further. Certain terms in List iη are to be added to the arguments and coefficients of certain terms in List iα; these produce the four terms shown in List iii under Table 49*; the epoch of the arguments of these four terms is 1850.

In List iv, the coefficients of the terms in S, N are given in seconds of arc to one place further than in the tables, the latter being expressed in units of $0''.1$ and $0''.01$, respectively. The coefficients of the terms in C and the tables included in C are expressed in units of 10^{-6}, the extra place to which the terms are carried in the list being indicated by the figure following the decimal point. Table 29† of the list is like Table 49 in List iii.

In List v, the coefficients are given in seconds of arc, the unit of the tables of Sect. V being $0''.001$.

In List vi, the coefficients of the terms in Tables P 1, P 2, P 3 are given in seconds of arc, the tables being expressed in units of $0''.01$. The coefficients of the terms in Tables P 4, P 5, P 6, and the tables themselves are given in units of $0^{s}.001$ of Arg. 30. Similarly terms in P 7, P 8, P 9 and the tables are given in units of 10^{-7} of the values in Table 30, Sect. III; terms in P 10, P 11, P 12 and

* For centuries very distant from the twentieth, each value f in this table requires the addition of $-(f-50)\times 0{\cdot}0065t_c$, where t_c is the number of centuries from 1900·0.

† For centuries very distant from the twentieth, each value f in this table requires the addition of $-(f-30)\times 0{\cdot}0062t_c$, where t_c is the number of centuries from 1900·0.

the tables in units of $0^c.01$ of Arg. 31; terms in P 13, P 14, P 15 and the tables in units of 10^{-6} of the values in Table 31, Sect. III; terms in P 16, P 17, P 18 and the tables in units of $0^c.01$ of Arg. 32; terms in P 19, P 20, P 21 and the tables in units of 10^{-6} of the values in Table 32, Sect. III.

The units of the coefficients of terms in Tables P 22 to P 33 are shown, the superscript letter '*c*' denoting, as usual, a division of the corresponding argument. Tables P 22–P 24 are in units of $0''.01$; Tables P 25–P 27 in units of $0^c.001$ of Arg. 30; Tables P 28–P 30 in units of $0^c.01$ of Arg. 31; and Tables P 31–P 33 in units of $0^c.01$ of Arg. 32.

The method of formation of Tables P 34, P 35, P 36, P 37 and Args. 83, 84 requires special explanation. The Arg. *F*, the non-periodic part of S, contains the following terms added to the elements in $F = \mathrm{L} - \Omega$ (List iη):

$$+ 7''.26 \sin \Omega - 95''.96 \sin \Omega - 15''.58 \sin (\Omega - 2^\circ.3 t_c + 276^\circ.2)$$
$$- 1''.86 \sin (\Omega - 0^\circ.9 t_c + 290^\circ.1),$$

where the epoch is 1850·0. These were expressed in the form $a \sin \Omega + b \cos \Omega$, where a, b vary slowly with the time and were tabulated by centuries. The final form of expression for tabulation was

$$92''.31 (1 + \phi') \cos (- \Omega + 280^\circ\, 47' + \phi) + 100''.0,$$

in which ϕ, ϕ' vary slowly with the time and were tabulated by centuries, the constants being so taken that $\phi = \phi' = 0$ at 1900·0. The values of ϕ' are contained in Table P 35; the term $92''.31 \cos$ (Arg. 83) + 100″ being placed in Table P 34, the approximate period $6800^d.00$ being used.

The angle is tabulated like those of the single-entry tables and is added to the values in Table 2, Sect. II. The adopted period is the same as that of Arg. 82 $= - \Omega + 90^\circ$ and we have to add to the tabulated values of Arg. 82, $190^\circ 47' + \phi$, or in days, since ϕ was supposed to be expressed in degrees, this quantity multiplied by 6800/360. Hence Arg. 83 $= - \Omega + 280^\circ\, 47' + \phi =$ Arg. 82 $+ 3602^d.8 + \phi^d$.

The period to be added or subtracted is the same as that of Arg. 82, namely, $6798^d.36$.

The principal characteristic of sin S is γ and the constant part of its coefficient is 18520″ which is approximately 2γ. Amongst the terms added to the elements are the following, additive to γ (List iη):

$$- 4''.318 \cos \Omega - 0''.698 \cos (\Omega - 2^\circ.3 t_c + 276^\circ.2) - 0''.083 \cos (\Omega - 0^\circ.9 t_c + 290^\circ.1).$$

These are treated like the corresponding terms in S and are finally expressed in the form

$$4''.474 (1 + \psi') \cos (- \Omega + 189^\circ\, 57' + \psi),$$

in which ψ, ψ' vary slowly with the time and are tabulated by centuries, the constants being so taken that $\psi = \psi' = 0$ at 1900·0. The values of ψ' are given in Table P 37.

The term is placed in C and therefore requires the factor $2 \times 10^{-6}/18520$. Table P 36 contains the term 483·1 cos (Arg. 84), expressed in units of 10^{-6}, the approximate period $6800^d\!.0$ being used. The angle is tabulated like Arg. 83 and we find in the same way,

$$\text{Arg. } 84 = -\,\Omega + 189^\circ\,57' + \psi = \text{Arg. } 82 + 1887^d\!.4 + \psi^d.$$

The period to be added or subtracted is the same as that of Arg. 82, namely $6798^d\!.36$.

These are the only terms in which it is necessary to take account of the portions $-\,2^\circ\!.3t_e$, $-\,0^\circ\!.9t_e$ in the arguments. Where these terms enter elsewhere these portions have been put equal to zero at 1900·0. See, however, the footnotes on p. 59 of this chapter.

Table P 34 is given in units of $0''\!.1$ and the factor Table P 35 in units of the values in P 34. The terms in P 36 and the table itself are given in units of 10^{-6}, the factor Table P 37 being given in units of the values in P 36. The term in Table P 38 and the table itself are given in units of 10^{-4} of the values in Table 15, Sect. V.

In these last two groups of tables and in the tables P 39–P 49, terms which arise from substitution of terms added to the elements from List iη in the arguments and coefficients of other terms are shown in the same manner as those in Table 49, Sect. III.

The terms constituting Tables P 39–P 45 and the tables themselves are expressed in the same manner and the same units as those of Tables P 1, P 4, P 7, P 10, P 13, P 16, P 19, respectively. Tables P 46–P 49*a* are all expressed in units of $0''\!.01$. The terms in Tables P 46, P 47 are tabulated at intervals of 10 days, the manner of obtaining the values for the intervening half-days by means of Table P 46*a* = P 47*a* being explained in Chap. II and again in Chap. V. The terms in Tables P 48, P 49 are tabulated at intervals of 14 days, the values for the intervening half-days being obtained by means of Tables P 48*a*, P 49*a* as explained in the same chapters. The days in the argument of Table 49 are properly 1·75, 15·75, ...; these are printed and used as 2, 16, ..., with sufficient accuracy. Besides the reference number showing the origin of each term in the Tables P 39–P 49 a signification letter (Sg.) is attached. The letters were used in the computation of the tables and are necessary when the extensions of the tables after 2050 or before 1800, according to the methods explained in Chap. XI, are to be made.

The Tables T 50, T 51, T 52, for the transformation to right ascension and declination, are explained in Chap. VIII and Tables U 53–U 58, for interpolation to hours, are explained in Chap. IX.

List iii. Terms included in the Tables of Sect. III.

Table 1. Args. D, 1.

Ref. No.	Term
12	− 0″·004 sin $(l'+6D)$
59	+ ·002 sin $(l'+5D)$
13	− ·289 sin $(l'+4D)$
60	+ ·150 sin $(l'+3D)$
61	+18·023 sin $(l'+D)$
62	+ ·560 sin $(l'-D)$
63	− ·066 sin $(l'-3D)$
17	− 1·877 sin $(l'-4D)$
18	− ·024 sin $(l'-6D)$
43	− ·003 sin $(2l'+4D)$
132	− ·002 sin $(2l'+3D)$
44	− ·189 sin $(2l'+2D)$
133	− ·039 sin $(2l'+D)$
45	− 7·486 sin $2l'$
1176	+ ·004 sin $(2l'+228°)$
134	− ·042 sin $(2l'-D)$
46	− 8·096 sin $(2l'-2D)$
135	− ·006 sin $(2l'-3D)$
47	− ·151 sin $(2l'-4D)$
48	− ·002 sin $(2l'-6D)$
229	− ·002 sin $(3l'-D)$
95	− ·344 sin $(3l'-2D)$
96	− ·010 sin $(3l'-4D)$
173	− ·013 sin $(4l'-2D)$
	+40·000

Table 2. Args. D, 2.

Ref. No.	Term
30	− ·051 sin $(l'+l+4D)$
122	+ ·023 sin $(l'+l+3D)$
31	− 2·921 sin $(l'+l+2D)$
123	+ 1·267 sin $(l'+l+D)$
124	+ ·137 sin $(l'+l-D)$
125	+ ·233 sin $(l'+l-3D)$
34	− 4·391 sin $(l'+l-4D)$
35	− ·072 sin $(l'+l-6D)$
158	− ·067 sin $(2l'+2l)$
159	− ·297 sin $(2l'+2l-2D)$
160	− ·161 sin $(2l'+2l-4D)$
161	− ·008 sin $(2l'+2l-6D)$
	+10·000

Table 3. Args. D, 3.

Ref. No.	Term
42	− ·011 sin $(l'-l+6D)$
131	+ ·003 sin $(l'-l+5D)$
41	− ·636 sin $(l'-l+4D)$
130	+ ·276 sin $(l'-l+3D)$
129	+ 1·089 sin $(l'-l+D)$
128	+ ·122 sin $(l'-l-D)$
127	− ·003 sin $(l'-l-3D)$
37	− ·283 sin $(l'-l-4D)$
36	− ·005 sin $(l'-l-6D)$
166	− ·036 sin $(2l'-2l+4D)$
165	− ·254 sin $(2l'-2l+2D)$
164	− ·197 sin $(2l'-2l)$
163	− ·062 sin $(2l'-2l-2D)$
162	− ·003 sin $(2l'-2l-4D)$
	+ 2·700

Table 4. Args. D, 4.

Ref. No.	Term
71	− 0″·007 sin $(2l+l'+4D)$
216	+ ·003 sin $(2l+l'+3D)$
72	− ·290 sin $(2l+l'+2D)$
217	+ ·092 sin $(2l+l'+D)$
73	− 7·649 sin $(2l+l')$
218	+ ·006 sin $(2l+l'-D)$
74	− 8·627 sin $(2l+l'-2D)$
219	+ ·084 sin $(2l+l'-3D)$
75	− 2·740 sin $(2l+l'-4D)$
220	+ ·006 sin $(2l+l'-5D)$
76	− ·091 sin $(2l+l'-6D)$
77	− ·003 sin $(2l+l'-8D)$
	+20·000

Table 5. Args. D, 5.

Ref. No.	Term
78	+ ·033 sin $(2l-l'+4D)$
79	+ 1·181 sin $(2l-l'+2D)$
221	− ·014 sin $(2l-l'+D)$
80	+ 9·703 sin $(2l-l')$
222	− ·352 sin $(2l-l'-D)$
81	− 2·494 sin $(2l-l'-2D)$
223	+ ·042 sin $(2l-l'-3D)$
82	+ ·360 sin $(2l-l'-4D)$
224	− ·003 sin $(2l-l'-5D)$
83	+ ·014 sin $(2l-l'-6D)$
	+12·000

Table 6. Args. D, 6.

Ref. No.	Term
84	− ·014 sin $(2l'+l+2D)$
225	− ·008 sin $(2l'+l+D)$
85	− 1·167 sin $(2l'+l)$
226	− ·002 sin $(2l'+l-D)$
86	− 7·412 sin $(2l'+l-2D)$
227	+ ·012 sin $(2l'+l-3D)$
87	− ·311 sin $(2l'+l-4D)$
88	− ·008 sin $(2l'+l-6D)$
	+10·000

Table 7. Args. D, 7.

Ref. No.	Term
93	− ·022 sin $(2l'-l+4D)$
92	− 2·533 sin $(2l'-l+2D)$
228	− ·003 sin $(2l'-l+D)$
91	− 2·580 sin $(2l'-l)$
90	− ·757 sin $(2l'-l-2D)$
89	− ·024 sin $(2l'-l-4D)$
	+ 6·000

Table 8. Args. D, 8.

Ref. No.	Term
147	− ·025 sin $(3l+l'+2D)$
294	+ ·007 sin $(3l+l'+D)$
148	− ·551 sin $(3l+l')$
149	− ·482 sin $(3l+l'-2D)$
295	+ ·003 sin $(3l+l'-3D)$
150	− ·100 sin $(3l+l'-4D)$
296	+ ·002 sin $(3l+l'-5D)$
151	− ·039 sin $(3l+l'-6D)$
	+ 1·300

List iii (*cont.*).

Table 9. Args. D, 9.

Ref. No.	Term
152	$+0''\!\cdot\!003 \sin(3l - l' + 4D)$
153	$+ \cdot 088 \sin(3l - l' + 2D)$
297	$- \cdot 002 \sin(3l - l' + D)$
154	$+ \cdot 681 \sin(3l - l')$
298	$- \cdot 023 \sin(3l - l' - D)$
155	$- \cdot 183 \sin(3l - l' - 2D)$
299	$+ \cdot 007 \sin(3l - l' - 3D)$
156	$- \cdot 029 \sin(3l - l' - 4D)$
157	$+ \cdot 005 \sin(3l - l' - 6D)$
	$+ \cdot 800$

Table 10. Args. D, 10.

Ref. No.	Term
108	$+ \cdot 002 \sin(2F + l' + 4D)$
109	$+ \cdot 066 \sin(2F + l' + 2D)$
238	$- \cdot 035 \sin(2F + l' + D)$
110	$+ \cdot 415 \sin(2F + l')$
239	$+ \cdot 013 \sin(2F + l' - D)$
111	$-2\cdot 152 \sin(2F + l' - 2D)$
240	$+ \cdot 020 \sin(2F + l' - 3D)$
112	$- \cdot 007 \sin(2F + l' - 4D)$
	$+3\cdot 000$

Table 11. Args. D, 11.

Ref. No.	Term
116	$- \cdot 011 \sin(2F - l' + 4D)$
115	$- \cdot 384 \sin(2F - l' + 2D)$
242	$+ \cdot 002 \sin(2F - l' + D)$
114	$- \cdot 076 \sin(2F - l')$
113	$+1\cdot 440 \sin(2F - l' - 2D)$
241	$+ \cdot 009 \sin(2F - l' - 3D)$
	$+2\cdot 000$

Table 12. Args. D, 12.

Ref. No.	Term
186	$+ \cdot 012 \sin(2F + l' + l + 2D)$
187	$+ \cdot 263 \sin(2F + l' + l)$
188	$+ \cdot 059 \sin(2F + l' + l - 2D)$
189	$- \cdot 024 \sin(2F + l' + l - 4D)$
	$+ \cdot 400$

Table 13. Args. D, 13.

Ref. No.	Term
204	$+ \cdot 002 \sin(2F + l' - l + 4D)$
203	$+ \cdot 065 \sin(2F + l' - l + 2D)$
202	$- \cdot 083 \sin(2F + l' - l)$
201	$+ \cdot 372 \sin(2F + l' - l - 2D)$
200	$+ \cdot 007 \sin(2F + l' - l - 4D)$
	$+ \cdot 600$

Table 14. Args. D, 14.

Ref. No.	Term
195	$- \cdot 002 \sin(2F + l - l' + 4D)$
196	$- \cdot 064 \sin(2F + l - l' + 2D)$
197	$- \cdot 304 \sin(2F + l - l')$
198	$+ \cdot 002 \sin(2F + l - l' - 2D)$
199	$+ \cdot 018 \sin(2F + l - l' - 4D)$
	$+ \cdot 400$

Table 15. Args. D, 15.

Ref. No.	Term
194	$- \cdot 019 \sin(2F - l - l' + 4D)$
193	$- \cdot 426 \sin(2F - l - l' + 2D)$
192	$+ \cdot 083 \sin(2F - l - l')$
191	$- \cdot 083 \sin(2F - l - l' - 2D)$
190	$- \cdot 002 \sin(2F - l - l' - 4D)$
	$+ \cdot 600$

Table 16. Args. D, 16.

Ref. No.	Term
4	$+0''\!\cdot\!023 \sin(l + 6D)$
54	$- \cdot 002 \sin(l + 3D)$
55	$- 8\cdot 466 \sin(l + D)$
56	$+18\cdot 609 \sin(l - D)$
57	$+ 3\cdot 215 \sin(l - 3D)$
58	$+ \cdot 014 \sin(l - 5D)$
10	$- \cdot 393 \sin(l - 6D)$
11	$- \cdot 004 \sin(l - 8D)$
22	$+ \cdot 004 \sin(2l + 6D)$
23	$+ \cdot 213 \sin(2l + 4D)$
117	$- \cdot 004 \sin(2l + 3D)$
118	$- \cdot 586 \sin(2l + D)$
119	$+ 1\cdot 750 \sin(2l - D)$
120	$+ 1\cdot 225 \sin(2l - 3D)$
121	$+ \cdot 059 \sin(2l - 5D)$
28	$- \cdot 570 \sin(2l - 6D)$
29	$- \cdot 009 \sin(2l - 8D)$
64	$+ \cdot 021 \sin(3l + 4D)$
65	$+ 1\cdot 060 \sin(3l + 2D)$
212	$- \cdot 042 \sin(3l + D)$
213	$+ \cdot 130 \sin(3l - D)$
67	$-13\cdot 193 \sin(3l - 2D)$
214	$+ \cdot 045 \sin(3l - 3D)$
68	$- 1\cdot 187 \sin(3l - 4D)$
215	$+ \cdot 016 \sin(3l - 5D)$
70	$- \cdot 009 \sin(3l - 8D)$
140	$+ \cdot 002 \sin(4l + 4D)$
141	$+ \cdot 070 \sin(4l + 2D)$
291	$- \cdot 003 \sin(4l + D)$
292	$+ \cdot 010 \sin(4l - D)$
143	$- \cdot 952 \sin(4l - 2D)$
293	$+ \cdot 002 \sin(4l - 3D)$
144	$+ \cdot 003 \sin(4l - 4D)$
145	$- \cdot 014 \sin(4l - 6D)$
146	$- \cdot 004 \sin(4l - 8D)$
243	$+ \cdot 005 \sin(5l + 2D)$
245	$- \cdot 069 \sin(5l - 2D)$
246	$+ \cdot 004 \sin(5l - 4D)$
306	$- \cdot 005 \sin(6l - 2D)$
	$+50\cdot 000$

Table 17. Args. D, 17.

Ref. No.	Term
49	$- \cdot 085 \sin(2F + 4D)$
136	$+ \cdot 004 \sin(2F + 3D)$
137	$+ \cdot 255 \sin(2F + D)$
138	$+ \cdot 584 \sin(2F - D)$
139	$+ \cdot 254 \sin(2F - 3D)$
53	$+ \cdot 025 \sin(2F - 4D)$
209	$+ \cdot 014 \sin(4F + 2D)$
210	$+ \cdot 418 \sin 4F$
211	$+ \cdot 074 \sin(4F - 2D)$
	$+ 1\cdot 500$

LIST iii (*cont.*).

TABLE 18. Args. D, 18.

Ref. No.	Term
97	$- 0''.018 \sin (2F+l+4D)$
98	$- \cdot 992 \sin (2F+l+2D)$
230	$+ \cdot 045 \sin (2F+l+D)$
231	$+ \cdot 024 \sin (2F+l-D)$
100	$- \cdot 179 \sin (2F+l-2D)$
232	$+ \cdot 030 \sin (2F+l-3D)$
101	$- \cdot 301 \sin (2F+l-4D)$
233	$+ \cdot 002 \sin (2F+l-5D)$
	$+ 1 \cdot 600$

TABLE 19. Args. D, 19.

Ref. No.	Term
107	$- \cdot 003 \sin (2F-l+6D)$
106	$- \cdot 202 \sin (2F-l+4D)$
237	$+ \cdot 011 \sin (2F-l+3D)$
236	$+ \cdot 016 \sin (2F-l+D)$
235	$+ \cdot 041 \sin (2F-l-D)$
103	$+ 6 \cdot 382 \sin (2F-l-2D)$
234	$+ \cdot 010 \sin (2F-l-3D)$
102	$+ \cdot 067 \sin (2F-l-4D)$
	$+ 7 \cdot 000$

TABLE 20. Args. D, 20.

Ref. No.	Term
174	$- \cdot 003 \sin (2F+2l+4D)$
175	$- \cdot 123 \sin (2F+2l+2D)$
300	$+ \cdot 006 \sin (2F+2l+D)$
301	$- \cdot 003 \sin (2F+2l-D)$
177	$+ \cdot 557 \sin (2F+2l-2D)$
178	$- \cdot 005 \sin (2F+2l-4D)$
179	$- \cdot 003 \sin (2F+2l-6D)$
	$+ 1 \cdot 000$

TABLE 21. Args. D, 21.

Ref. No.	Term
185	$- \cdot 005 \sin (2F-2l+6D)$
184	$- \cdot 173 \sin (2F-2l+4D)$
302	$+ \cdot 003 \sin (2F-2l+3D)$
183	$- \cdot 538 \sin (2F-2l+2D)$
182	$+ 1 \cdot 298 \sin (2F-2l)$
181	$+ \cdot 459 \sin (2F-2l-2D)$
180	$+ \cdot 011 \sin (2F-2l-4D)$
	$+ 2 \cdot 000$

TABLE 22. Args. D, 22.

Ref. No.	Term
263	$- \cdot 003 \sin (2F+3l+4D)$
264	$- \cdot 011 \sin (2F+3l+2D)$
265	$- \cdot 330 \sin (2F+3l)$
266	$+ \cdot 092 \sin (2F+3l-2D)$
	$+ \cdot 500$

TABLE 23. Arg. 23.

Ref. No.	Term
16	$+ 165 \cdot 145 \cos (2D-l'+270^\circ)$
	$+ 170 \cdot 000$

TABLE 24. Arg. 24.

Ref. No.	Term
14	$+ 24 \cdot 420 \cos (2D+l'+90^\circ)$
	$+ 25 \cdot 000$

TABLE 25. Arg. 25.

Ref. No.	Term
32	$+ 109 \cdot 667 \cos (l+l'+90^\circ)$
1177	$+ \cdot 006 \cos (l+l'+90^\circ)$
	$+ 110 \cdot 000$

TABLE 26. Arg. 26.

Ref. No.	Term
39	$+ 147 \cdot 693 \cos (l-l'+270^\circ)$
1178	$- \cdot 006 \cos (l-l'+270^\circ)$
	$+ 150 \cdot 000$

TABLE 27. Arg. 27.

Ref. No.	Term
33	$+ 205 \cdot 962 \cos (2D-l-l'+270^\circ)$
	$+ 209 \cdot 000$

TABLE 28. Arg. 28.

Ref. No.	Term
38	$+ 14''.577 \cos (2D+l-l'+270^\circ)$
	$+ 15 \cdot 000$

TABLE 29. Arg. 29.

Ref. No.	Term
40	$+ 28 \cdot 475 \cos (2D+l'-l+90^\circ)$
	$+ 30 \cdot 000$

TABLE 30. Arg. 30.

Ref. No.	Term
7	$+ 22639 \cdot 500 \sin l$
25	$+ 769 \cdot 016 \sin 2l$
66	$+ 36 \cdot 124 \sin 3l$
142	$+ 1 \cdot 938 \sin 4l$
244	$+ \cdot 113 \sin 5l$
305	$+ \cdot 007 \sin 6l$

TABLE 31. Arg. 31.

Ref. No.	Term
3	$+ 2369 \cdot 902 \cos (2D+270^\circ)$
1172	$+ \cdot 010 \cos (2D+270^\circ)$
	$+ 2400 \cdot 000$

TABLE 32. Arg. 32.

Ref. No.	Term
8	$+ 4586 \cdot 426 \cos (2D-l+270^\circ)$
1173	$+ \cdot 039 \cos (2D-l+270^\circ)$
69	$- \cdot 293 \cos 3 (2D-l+270^\circ)$
	$+ 4600 \cdot 000$

TABLE 33. Arg. 33.

Ref. No.	Term
21	$- 125 \cdot 154 \sin D$
20	$+ \cdot 403 \sin 3D$
2	$+ 13 \cdot 902 \sin 4D$
19	$+ \cdot 004 \sin 5D$
1	$+ \cdot 127 \sin 6D$
	$+ 135 \cdot 000$

TABLE 34. Arg. 34.

Ref. No.	Term
26	$+ 211 \cdot 656 \cos (2l-2D+90^\circ)$
	$+ 220 \cdot 000$

TABLE 35. Arg. 35.

Ref. No.	Term
6	$+ 191 \cdot 953 \cos (2D+l+270^\circ)$
	$+ 200 \cdot 000$

TABLE 36. Arg. 36.

Ref. No.	Term
27	$+ 30 \cdot 773 \cos (4D-2l+270^\circ)$
	$+ 31 \cdot 000$

TABLE 37. Arg. 37.

Ref. No.	Term
9	$+ 38 \cdot 428 \cos (4D-l+270^\circ)$
	$+ 40 \cdot 000$

TABLE 38. Arg. 38.

Ref. No.	Term
24	$+ 14 \cdot 387 \cos (2D+2l+270^\circ)$
	$+ 15 \cdot 000$

TABLE 39. Arg. 39.

Ref. No.	Term
5	$+ 1 \cdot 979 \cos (4D+l+270^\circ)$
	$+ 2 \cdot 000$

TABLE 40. Arg. 40.

Ref. No.	Term
51	$+ 411 \cdot 608 \cos (2F+90^\circ)$
	$+ 415 \cdot 000$

TABLE 41. Arg. 41.

Ref. No.	Term
52	$+ 55 \cdot 173 \cos (2F-2D+90^\circ)$
	$+ 56 \cdot 000$

TABLE 42. Arg. 42.

Ref. No.	Term
104	$+ 39 \cdot 532 \cos (2F-l+90^\circ)$
1174	$- \cdot 004 \cos (2F-l+90^\circ)$
	$+ 40 \cdot 000$

List iii (*concl.*).

Table 43. Arg. 43.

Ref. No.	Term
99	+ 45°·099 cos (2F + l + 90°)
	+ 46·000

Table 44. Arg. 44.

Ref. No.	Term
50	+ 5·741 cos (2F + 2D + 90°)
	+ 6·000

Table 45. Arg. 45.

Ref. No.	Term
105	+ 9·366 cos (2F + 2D − l + 90°)
	+ 10·000

Table 46. Arg. 46.

Ref. No.	Term
176	+ 3·996 cos (2F + 2l + 90°)
	+ 4·000

Table 47. Arg. 47.

Ref. No.	Term
15	+ 668·111 cos (l′ + 90°)
1175	+ ·035 cos (l′ + 90°)
94	− ·103 cos 3 (l′ + 90°)
	+ 670·000

Table 48. Args. 30, 48.

Ref. No.	Term
268	+ 0°·055 sin (2F − 3l)
307	− ·025 sin (2F + 4l)
309	+ ·007 sin (2F − 4l)
287	+ ·090 sin (4F + l)
289	+ ·080 sin (4F − l)
310	+ ·011 sin (4F + 2l)
	+ ·268

Table 49. Args. 49, 50.

1375, 1401, 1402, 1407, 1408, 1409, 1413, 1414, 1415 in

Ref. No.	Term
51	+ ·383 sin (2F + ☊ − 0°·11t_e − 10°·3)
99	+ ·041 sin (2F + ☊ − 0°·11t_e − 10°·3 + l)
104	+ ·037 sin (2F + ☊ − 0°·11t_e − 10°·3 − l)
176	+ ·003 sin (2F + ☊ − 0°·11t_e − 10°·3 + 2l)
	+ ·500

List iv. Terms included in the tables of Sect. IV.

Tables of terms in S.

Table 1. Args. D, 1.

Ref. No.	Term
361	− 0°·06 sin (l′ + 6D)
362	− 1·59 sin (l′ + 4D)
363	+ ·53 sin (l′ + 3D)
364	− ·68 sin (l′ + 2D)
365	+ 17·93 sin (l′ + D)
366	− 126·98 sin l′
367	+ ·32 sin (l′ − D)
368	+ ·09 sin (l′ − 2D)
369	+ ·29 sin (l′ − 3D)
370	− 6·46 sin (l′ − 4D)
371	− ·22 sin (l′ − 6D)
372	− ·04 sin (2l′ + 4D)
373	− 1·69 sin (2l′ + 2D)
374	− ·04 sin (2l′ + D)
375	− ·66 sin 2l′
376	− ·04 sin (2l′ − D)
377	− 16·40 sin (2l′ − 2D)
378	− ·66 sin (2l′ − 4D)
379	− ·57 sin (3l′ − 2D)
	+ 200·00

Table 2. Args. D, 2.

Ref. No.	Term
380	− ·50 sin (l′ + l + 4D)
381	+ ·08 sin (l′ + l + 3D)
382	− 11·74 sin (l′ + l + 2D)
383	+ 1·52 sin (l′ + l + D)
384	− 5·52 sin (l′ + l)
385	− ·12 sin (l′ + l − D)
386	+ 23·63 sin (l′ + l − 2D)
387	+ ·36 sin (l′ + l − 3D)
388	− 9·68 sin (l′ + l − 4D)
389	− ·37 sin (l′ + l − 6D)
390	− ·09 sin (2l′ + 2l)
391	− ·27 sin (2l′ + 2l − 2D)
392	− ·16 sin (2l′ + 2l − 4D)
	+ 50·00

Tables of terms in S (*cont.*).

Table 3. Args D, 3.

Ref. No.	Term
393	− 0°·09 sin (l′ − l + 6D)
394	− 2·27 sin (l′ − l + 4D)
395	+ ·38 sin (l′ − l + 3D)
396	+ 4·90 sin (l′ − l + 2D)
397	− ·55 sin (l′ − l + D)
398	+ 8·94 sin (l′ − l)
399	+ ·33 sin (l′ − l − D)
400	− 17·14 sin (l′ − l − 2D)
401	+ ·04 sin (l′ − l − 3D)
402	− 1·53 sin (l′ − l − 4D)
403	− ·06 sin (l′ − l − 6D)
404	− ·04 sin (2l′ − 2l + 4D)
405	− ·21 sin (2l′ − 2l + 2D)
406	− ·22 sin (2l′ − 2l)
407	− ·20 sin (2l′ − 2l − 2D)
	+ 30·00

Table 4. Args. D, 4.

Ref. No.	Term
408	− ·07 sin (2l + l′ + 4D)
409	− 1·45 sin (2l + l′ + 2D)
410	+ ·14 sin (2l + l′ + D)
411	− 10·58 sin (2l + l′)
412	+ ·02 sin (2l + l′ − D)
413	− 7·63 sin (2l + l′ − 2D)
414	+ ·07 sin (2l + l′ − 3D)
415	− 2·54 sin (2l + l′ − 4D)
416	− ·25 sin (2l + l′ − 6D)
	+ 25·00

List iv (*cont.*).

Tables of terms in S (*cont.*).

Table 5. Args. D, 5.

Ref. No.	Term
417	$+\ 0''.22 \sin(2l-l'+4D)$
418	$+\ 3{\cdot}33 \sin(2l-l'+2D)$
419	$-\ {\cdot}04 \sin(2l-l'+D)$
420	$+11{\cdot}69 \sin(2l-l')$
421	$-\ {\cdot}37 \sin(2l-l-D)$
422	$-\ 1{\cdot}17 \sin(2l-l'-2D)$
423	$+\ {\cdot}04 \sin(2l-l'-3D)$
424	$+\ {\cdot}20 \sin(2l-l'-4D)$
425	$+\ {\cdot}06 \sin(2l-l'-6D)$
	$+20{\cdot}00$

Table 6. Args. D, 6.

Ref. No.	Term
436	$-\ {\cdot}13 \sin(2l'+l+2D)$
437	$-\ 1{\cdot}25 \sin(2l'+l)$
438	$-\ 6{\cdot}12 \sin(2l'+l-2D)$
439	$-\ {\cdot}65 \sin(2l'+l-4D)$
	$+10{\cdot}00$

Table 7. Args. D, 7.

Ref. No.	Term
440	$-\ {\cdot}07 \sin(2l'-l+4D)$
441	$-\ 2{\cdot}40 \sin(2l'-l+2D)$
442	$-\ 2{\cdot}32 \sin(2l'-l)$
443	$-\ 1{\cdot}82 \sin(2l'-l-2D)$
444	$-\ {\cdot}12 \sin(2l'-l-4D)$
	$+10{\cdot}00$

Table 8. Args. D, 8.

Ref. No.	Term
426	$-\ {\cdot}17 \sin(3l+l'+2D)$
427	$-\ {\cdot}94 \sin(3l+l')$
428	$-\ {\cdot}57 \sin(3l+l'-2D)$
429	$-\ {\cdot}08 \sin(3l+l'-4D)$
430	$-\ {\cdot}06 \sin(3l+l'-6D)$
	$+\ 2{\cdot}00$

Table 9. Args. D, 9.

Ref. No.	Term
431	$+\ {\cdot}36 \sin(3l-l'+2D)$
432	$+\ {\cdot}96 \sin(3l-l')$
433	$-\ {\cdot}23 \sin(3l-l'-2D)$
	$+\ 2{\cdot}00$

Table 10. Args. D, 10.

Ref. No.	Term
470	$+\ {\cdot}10 \sin(2F+l')$
471	$-\ 2{\cdot}26 \sin(2F+l'-2D)$
472	$-\ {\cdot}17 \sin(2F+l'-4D)$
	$+\ 3{\cdot}00$

Table 11. Args. D, 11.

Ref. No.	Term
473	$+\ {\cdot}04 \sin(2F-l'+2D)$
474	$+\ {\cdot}16 \sin(2F-l')$
475	$-\ {\cdot}06 \sin(2F-l'-D)$
476	$+\ 1{\cdot}30 \sin(2F-l'-2D)$
477	$+\ {\cdot}08 \sin(2F-l'-4D)$
	$+\ 2{\cdot}00$

Table 12. Args. D, 16.

Ref. No.	Term
313	$+12{\cdot}35 \sin D$
314	$+\ 3{\cdot}46 \sin 2D$
1289	$+\ {\cdot}05 \sin 2D$
315	$-\ 4{\cdot}41 \sin 3D$
316	$+\ {\cdot}13 \sin 4D$
317	$-\ {\cdot}13 \sin 5D$

Tables of terms in S (*cont.*).

Table 12 (*cont.*).

Ref. No.	Term
318	$+\ 0''.47 \sin 6D$
320	$+\ {\cdot}25 \sin(l+6D)$
322	$+\ 5{\cdot}00 \sin(l+4D)$
323	$-\ {\cdot}74 \sin(l+3D)$
324	$+\ {\cdot}76 \sin(l+2D)$
325	$-\ 13{\cdot}51 \sin(l+D)$
326	$-\ 30{\cdot}44 \sin l$
327	$+\ 3{\cdot}59 \sin(l-D)$
328	$+\ 8{\cdot}30 \sin(l-2D)$
329	$+\ 5{\cdot}43 \sin(l-3D)$
330	$-\ {\cdot}20 \sin(l-4D)$
331	$+\ {\cdot}24 \sin(l-5D)$
332	$-\ 1{\cdot}43 \sin(l-6D)$
333	$-\ {\cdot}03 \sin(l-8D)$
334	$+\ {\cdot}03 \sin(2l+6D)$
335	$+\ 1{\cdot}01 \sin(2l+4D)$
336	$-\ {\cdot}10 \sin(2l+3D)$
337	$+\ {\cdot}39 \sin(2l+2D)$
338	$-\ 1{\cdot}20 \sin(2l+D)$
339	$-\ 1{\cdot}06 \sin 2l$
340	$+\ 2{\cdot}01 \sin(2l-D)$
341	$+\ 59{\cdot}13 \sin(2l-2D)$
342	$+\ {\cdot}91 \sin(2l-3D)$
343	$-\ 3{\cdot}28 \sin(2l-4D)$
344	$+\ {\cdot}12 \sin(2l-5D)$
345	$-\ 1{\cdot}40 \sin(2l-6D)$
346	$-\ {\cdot}07 \sin(2l-8D)$
347	$+\ {\cdot}16 \sin(3l+4D)$
348	$+\ 2{\cdot}93 \sin(3l+2D)$
349	$-\ {\cdot}09 \sin(3l+D)$
350	$+\ 14{\cdot}56 \sin 3l$
351	$+\ {\cdot}19 \sin(3l-D)$
352	$-\ 16{\cdot}44 \sin(3l-2D)$
353	$+\ {\cdot}05 \sin(3l-3D)$
354	$-\ {\cdot}70 \sin(3l-4D)$
356	$+\ {\cdot}30 \sin(4l+2D)$
357	$+\ 1{\cdot}68 \sin 4l$
358	$-\ 1{\cdot}58 \sin(4l-2D)$
359	$+\ {\cdot}17 \sin 5l$
360	$-\ {\cdot}14 \sin(5l-2D)$
	$+200{\cdot}00$

Table 13. Args. D, 17.

Ref. No.	Term
448	$-\ {\cdot}04 \sin(2F+2D)$
449	$-\ {\cdot}20 \sin 2F$
450	$+\ {\cdot}84 \sin(2F-D)$
451	$-\ 52{\cdot}14 \sin(2F-2D)$
452	$+\ {\cdot}25 \sin(2F-3D)$
453	$-\ 1{\cdot}67 \sin(2F-4D)$
454	$-\ {\cdot}03 \sin(2F-6D)$
	$+100{\cdot}00$

Table 14. Args. D, 18.

Ref. No.	Term
455	$+\ {\cdot}07 \sin(2F+l-D)$
456	$-\ 9{\cdot}52 \sin(2F+l-2D)$
457	$+\ {\cdot}04 \sin(2F+l-3D)$
458	$-\ {\cdot}33 \sin(2F+l-4D)$
459	$-\ {\cdot}04 \sin(2F+l-6D)$
	$+\ 10{\cdot}00$

LIST iv (*cont.*).

Tables of terms in S (*concl.*).

TABLE 15. Args. D, 19.

Ref. No.	Term
460	$- 0''.71 \sin (2F - l + 2D)$
461	$+ .06 \sin (2F - l + D)$
462	$- 85.13 \sin (2F - l)$
463	$+ .04 \sin (2F - l - D)$
464	$+ 3.37 \sin (2F - l - 2D)$
465	$+ .04 \sin (2F - l - 4D)$
	$+ 100.00$

Additions to Arg. 19.

Ref. No.	Term
479, 480	$+ 0''.091 \sin l'$

TABLE 16. Args. D, 21.

Ref. No.	Term
467	$- 1''.14 \sin (2F - 2l + 2D)$
468	$- .74 \sin (2F - 2l)$
469	$+ .38 \sin (2F - 2l - 2D)$
	$+ 2.00$

TABLE 17. Arg. 51.

Ref. No.	Term
466	$+ .75 \cos (2F + 2l - 2D + 90°)$
	$+ .75$

TABLE 18. Arg. 52.

Ref. No.	Term
478	$+ .35 \cos (2F + l + l' - 2D + 90°)$
	$+ .35$

Tables of terms in N.

TABLE 19. Arg. 53.

Ref. No.	Term
603	$+ 22''.571 \cos (2D - F - l' + 270°)$
	$+ 23.000$

TABLE 20. Arg. 54.

Ref. No.	Term
604	$+ 10.985 \cos (2D + l' - F + 90°)$
	$+ 11.000$

TABLE 21. Arg. 55.

Ref. No.	Term
595	$+ 526.069 \cos (2D - F + 270°)$
	$+ 530.000$

TABLE 22. Arg. 56.

Ref. No.	Term
596	$+ 3.352 \cos (4D - F + 270°)$
	$+ 4.000$

TABLE 23. Arg. 57.

Ref. No.	Term
598	$+ 6.000 \cos (4D - F - l + 270°)$
	$+ 6.000$

TABLE 24. Arg. 58.

Ref. No.	Term
599	$+ 20.599 \cos (F - l + 270°)$
	$+ 21.000$

TABLE 25. Arg. 59.

Ref. No.	Term
597	$+ 44.297 \cos (F + l - 2D + 270°)$
	$+ 45.000$

TABLE 26. Arg. 60.

Ref. No.	Term
600	$+ 30.598 \cos (2D - F + l + 270°)$
	$+ 31.000$

TABLE 27. Arg. 61.

Ref. No.	Term
601	$+ 24.649 \cos (2l - F + 270°)$
	$+ 25.000$

Tables of terms in N (*concl.*).

TABLE 28. Arg. 62.

Ref. No.	Term
602	$+ 2''.000 \cos (2l + 2D - F + 270°)$
	$+ 2.000$

TABLE 29. Args. 63, 64.

Ref. No.	Term
1375, 1401, 1402, 1407, 1408, 1409, 1413, 1414, 1415 in 595	$+ .263 \sin (F - 2D + \Omega - 0°.10t_e - 9°.7)$
597	$- .021 \sin (F - 2D + \Omega - 0.10t_e - 9.7 + l)$
600	$+ .017 \sin (F - 2D + \Omega - 0.10t_e - 9.7 - l)$
	$+ .301$

TABLE 30. Args. 65, 66.

Ref. No.	Term
1226	$+ .003 \sin (L + 6V - 6T + 285°)$
1227	$+ .005 \sin (L + 5V - 5T + 285°)$
1228	$+ .006 \sin (L + 4V - 4T + 285°)$
1229	$+ .009 \sin (L + 3V - 3T + 285°)$
1230	$+ .014 \sin (L + 2V - 2T + 285°)$
1231	$+ .027 \sin (L + V - T + 285°)$
1290	$- .017 \sin L$
1232	$+ .015 \sin (L - V + T + 105°)$
1233	$+ .006 \sin (L - 2V + 2T + 105°)$
1234	$+ .003 \sin (L - 3V + 3T + 105°)$
	$+ .105$

TABLE 31. Args. 67, 68.

Ref. No.	Term
1236	$+ .003 \sin (L + 7V - 9T + 255°)$
1237	$+ .005 \sin (L + 6V - 8T + 255°)$
1238	$+ .009 \sin (L + 5V - 7T + 255°)$
1239	$+ .025 \sin (L + 4V - 6T + 255°)$
1240	$+ .074 \sin (L + 3V - 5T + 51°.6)$
1241	$+ .018 \sin (L + 2V - 4T + 75°)$
1242	$+ .010 \sin (L + V - 3T + 75°)$
1291	$+ .008 \sin (L - 2T + 75°)$
1292	$+ .007 \sin (L - 2T)$
1243	$+ .006 \sin (L - V - T + 75°)$
1244	$+ .004 \sin (L - 2V + 75°)$
1245	$+ .003 \sin (L - 3V + T + 75°)$
	$+ .169$

TABLE 32. Args. 69, 70.

Ref. No.	Term
1191	$- .003 \sin (2D - F + 7V - 7T)$
1192	$- .005 \sin (2D - F + 6V - 6T)$
1193	$- .009 \sin (2D - F + 5V - 5T)$
1194	$- .023 \sin (2D - F + 4V - 4T)$
1195	$+ .046 \sin (2D - F + 3V - 3T)$
1196	$+ .019 \sin (2D - F + 2V - 2T)$
1197	$- .004 \sin (2D - F + V - T)$
1198	$+ .012 \sin (2D - F - V + T)$
1200	$- .017 \sin (2D - F - 2V + 2T)$
	$+ .138$

Principal terms.

TABLE 33. Arg. S.

Ref. No.	Term
605	$+ 18518''.511 \sin S$
607	$- 6.241 \sin 3S$
607a	$+ .004 \sin 5S$

List iv (*cont.*).

Tables of terms in C.

Table 34. Args. D, 1.

Ref. No.	Term
527	+ 0·3 cos $(l'+6D)$
528	+ 6·6 cos $(l'+4D)$
529	− 1·7 cos $(l'+3D)$
530	+ 2·1 cos $(l'+2D)$
531	+ ·4 cos $(l'+D)$
532	− 70·3 cos l'
533	+ 2·9 cos $(l'-2D)$
534	+ 1·7 cos $(l'-3D)$
535	− 22·5 cos $(l'-4D)$
536	− ·9 cos $(l'-6D)$
537	+ ·2 cos $(2l'+4D)$
538	+ 7·1 cos $(2l'+2D)$
539	− 2·0 cos $2l'$
540	− 40·1 cos $(2l'-2D)$
541	− 2·4 cos $(2l'-4D)$
542	− 1·4 cos $(3l'-2D)$
	+200·0

Table 35. Args. D, 2.

Ref. No.	Term
543	+ 2·2 cos $(l'+l+4D)$
544	− ·4 cos $(l'+l+3D)$
545	+ 42·4 cos $(l'+l+2D)$
546	− 1·2 cos $(l'+l+D)$
547	+ 24·9 cos $(l'+l)$
548	+ ·3 cos $(l'+l-D)$
549	+110·9 cos $(l'+l-2D)$
550	+ ·6 cos $(l'+l-3D)$
551	− 25·5 cos $(l'+l-4D)$
552	− 1·5 cos $(l'+l-6D)$
	+200·0

Table 36. Args. D, 3.

Ref. No.	Term
553	+ ·3 cos $(l'-l+6D)$
554	+ 7·9 cos $(l'-l+4D)$
555	− ·3 cos $(l'-l+3D)$
556	− 23·8 cos $(l'-l+2D)$
557	+ 1·1 cos $(l'-l+D)$
558	+ 36·7 cos $(l'-l)$
559	+ ·9 cos $(l'-l-D)$
560	− 82·6 cos $(l'-l-2D)$
561	+ ·2 cos $(l'-l-3D)$
562	− 6·0 cos $(l'-l-4D)$
563	− ·3 cos $(l'-l-6D)$
564	− ·2 cos $(2l'-2l+2D)$
565	− ·5 cos $(2l'-2l-2D)$
	+200·0

Table 37. Args. D, 4.

Ref. No.	Term
566	+ ·3 cos $(2l+l'+4D)$
567	+ 6·3 cos $(2l+l'+2D)$
568	− ·2 cos $(2l+l'+D)$
569	+ 14·0 cos $(2l+l')$
570	+ 4·3 cos $(2l+l'-2D)$
571	+ 1·2 cos $(2l+l'-4D)$
572	− ·8 cos $(2l+l'-6D)$
	+ 30·0

Tables of terms in C (*cont.*).

Table 38. Args. D, 5.

Ref. No.	Term
573	− 1·0 cos $(2l-l'+4D)$
574	−11·5 cos $(2l-l'+2D)$
575	− 8·2 cos $(2l-l')$
576	− ·2 cos $(2l-l'-2D)$
577	− ·6 cos $(2l-l'-4D)$
578	+ ·2 cos $(2l-l'-6D)$
	+30·0

Table 39. Args. D, 6.

Ref. No.	Term
586	+ ·8 cos $(2l'+l+2D)$
587	+ ·4 cos $(2l'+l)$
588	+ 6·3 cos $(2l'+l-2D)$
589	− 1·7 cos $(2l'+l-4D)$
	+10·0

Table 40. Args. D, 7.

Ref. No.	Term
590	+ ·3 cos $(2l'-l+4D)$
591	− ·8 cos $(2l'-l+2D)$
592	+ 1·5 cos $(2l'-l)$
593	− 5·7 cos $(2l'-l-2D)$
594	− ·5 cos $(2l'-l-4D)$
	+10·0

Table 41. Args. D, 8.

Ref. No.	Term
579	+ ·6 cos $(3l+l'+2D)$
580	+ 1·7 cos $(3l+l')$
581	+ ·3 cos $(3l+l'-2D)$
582	+ ·2 cos $(3l+l'-4D)$
	+10·0

Table 42. Args. D, 9.

Ref. No.	Term
583	− 1·2 cos $(3l-l'+2D)$
584	− 1·4 cos $(3l-l')$
585	+ ·2 cos $(3l-l'-2D)$
	+10·0

Table 43. Args. D, 16.

Ref. No.	Term
484	−39·2 cos D
485	+32·5 cos $2D$
1289	− ·3 cos $2D$
486	+21·3 cos $3D$
487	+ ·6 cos $5D$
488	− 2·3 cos $6D$
489	− 1·0 cos $(l+6D)$
490	−24·0 cos $(l+4D)$
491	+ 3·7 cos $(l+3D)$
492	+ 1·5 cos $(l+2D)$
493	+24·6 cos $(l+D)$
494	+ 4·2 cos l
495	− 5·1 cos $(l-D)$
496	− 4·2 cos $(l-2D)$
497	+10·4 cos $(l-3D)$
498	+ 1·0 cos $(l-5D)$
499	− 5·0 cos $(l-6D)$
500	− ·2 cos $(l-8D)$

LIST iv (*concl.*).

Tables of terms in C (*cont.*).

TABLE 43 (*cont.*).

Ref. No.	Term
501	− 0·2 cos (2*l* + 6*D*)
502	− 3·9 cos (2*l* + 4*D*)
503	+ ·4 cos (2*l* + 3*D*)
504	− ·9 cos (2*l* + 2*D*)
505	+ 2·9 cos (2*l* + *D*)
506	+ 5·8 cos 2*l*
507	− 1·0 cos (2*l* − *D*)
508	+ 306·7 cos (2*l* − 2*D*)
509	− 1·6 cos (2*l* − 3*D*)
510	− 16·6 cos (2*l* − 4*D*)
511	+ ·4 cos (2*l* − 5*D*)
512	− 4·0 cos (2*l* − 6*D*)
513	− ·2 cos (2*l* − 8*D*)

Tables of terms in C (*concl.*).

TABLE 43 (*concl.*).

Ref. No.	Term
514	− 0·6 cos (3*l* + 4*D*)
515	− 8·9 cos (3*l* + 2*D*)
516	+ ·3 cos (3*l* + *D*)
517	− 70·6 cos 3*l*
518	− ·3 cos (3*l* − *D*)
519	+ 13·8 cos (3*l* − 2*D*)
521	+ 2·1 cos (3*l* − 4*D*)
522	− 1·2 cos (4*l* + 2*D*)
523	− 7·8 cos 4*l*
524	+ 2·8 cos (4*l* − 2*D*)
525	− ·8 cos 5*l*
526	+ ·3 cos (5*l* − 2*D*)
	+ 700·0

LIST v. Terms included in the tables of Sect. V.

TABLE 1. Args. D, 1.

620	− 0″·0053 cos (*l′* + 4*D*)
660	+ ·0027 cos (*l′* + 3*D*)
621	− ·3000 cos (*l′* + 2*D*)
661	+ ·1494 cos (*l′* + *D*)
622	− ·3997 cos *l′*
662	− ·0037 cos (*l′* − *D*)
663	+ ·0007 cos (*l′* − 3*D*)
624	+ ·0339 cos (*l′* − 4*D*)
625	+ ·0006 cos (*l′* − 6*D*)
647	− ·0028 cos (2*l′* + 2*D*)
712	− ·0003 cos (2*l′* + *D*)
648	− ·0086 cos 2*l′*
713	+ ·0003 cos (2*l′* − *D*)
649	+ ·0918 cos (2*l′* − 2*D*)
691	− ·0002 cos 3*l′*
692	+ ·0036 cos (3*l′* − 2*D*)
693	+ ·0002 cos (3*l′* − 4*D*)
	+ 1·0000

TABLE 2. Args. D, 2.

635	− ·0012 cos (*l′* + *l* + 4*D*)
707	+ ·0003 cos (*l′* + *l* + 3*D*)
636	− ·0484 cos (*l′* + *l* + 2*D*)
708	+ ·0164 cos (*l′* + *l* + *D*)
637	− ·9490 cos (*l′* + *l*)
638	+ 1·4437 cos (*l′* + *l* − 2*D*)
709	− ·0025 cos (*l′* + *l* − 3*D*)
639	+ ·0673 cos (*l′* + *l* − 4*D*)
640	+ ·0015 cos (*l′* + *l* − 6*D*)
729	− ·0009 cos (2*l′* + 2*l*)
730	− ·0009 cos (2*l′* + 2*l* − 2*D*)
731	+ ·0020 cos (2*l′* + 2*l* − 4*D*)
	+ 2·5000

TABLE 3. Args. D, 3.

646	− 0″·0005 cos (*l′* − *l* + 6*D*)
645	− ·0102 cos (*l′* − *l* + 4*D*)
711	+ ·0036 cos (*l′* − *l* + 3*D*)
644	− ·2257 cos (*l′* − *l* + 2*D*)
643	+ 1·1528 cos (*l′* − *l*)
710	− ·0014 cos (*l′* − *l* − *D*)
642	+ ·2302 cos (*l′* − *l* − 2*D*)
641	+ ·0060 cos (*l′* − *l* − 4*D*)
734	− ·0005 cos (2*l′* − 2*l* + 4*D*)
733	+ ·0024 cos (2*l′* − 2*l*)
732	+ ·0013 cos (2*l′* − 2*l* − 2*D*)
	+ 1·5000

TABLE 4. Args. D, 4.

747	+ ·0002 cos (2*l* + *l′* + 3*D*)
671	− ·0051 cos (2*l* + *l′* + 2*D*)
748	+ ·0015 cos (2*l* + *l′* + *D*)
672	− ·1038 cos (2*l* + *l′*)
749	− ·0002 cos (2*l* + *l′* − *D*)
673	− ·0192 cos (2*l* + *l′* − 2*D*)
750	− ·0005 cos (2*l* + *l′* − 3*D*)
674	+ ·0324 cos (2*l* + *l′* − 4*D*)
751	− ·0002 cos (2*l* + *l′* − 5*D*)
675	+ ·0017 cos (2*l* + *l′* − 6*D*)
	+ ·6000

TABLE 5. Args. D, 5.

676	+ ·0007 cos (2*l* − *l′* + 4*D*)
677	+ ·0213 cos (2*l* − *l′* + 2*D*)
752	− ·0005 cos (2*l* − *l′* + *D*)
678	+ ·1268 cos (2*l* − *l′*)
753	− ·0028 cos (2*l* − *l′* − *D*)
679	− ·0017 cos (2*l* − *l′* − 2*D*)
754	− ·0005 cos (2*l* − *l′* − 3*D*)
680	− ·0043 cos (2*l* − *l′* − 4*D*)
755	+ ·0002 cos (2*l* − *l′* − 5*D*)
681	− ·0002 cos (2*l* − *l′* − 6*D*)
	+ ·2000

LIST V (*cont.*).

TABLE 6. Args. D, 6.

Ref. No.	Term
682	$-0''.0106 \cos(2l'+l)$
683	$+\cdot 0484 \cos(2l'+l-2D)$
684	$+\cdot 0044 \cos(2l'+l-4D)$
685	$+\cdot 0002 \cos(2l'+l-6D)$
	$+\cdot 1000$

TABLE 7. Args. D, 7.

Ref. No.	Term
690	$-\cdot 0003 \cos(2l'-l+4D)$
689	$-\cdot 0212 \cos(2l'-l+2D)$
688	$+\cdot 0196 \cos(2l'-l)$
687	$+\cdot 0112 \cos(2l'-l-2D)$
686	$+\cdot 0005 \cos(2l'-l-4D)$
	$+\cdot 0500$

TABLE 8. Args. D, 8.

Ref. No.	Term
720	$-\cdot 0006 \cos(3l+l'+2D)$
721	$-\cdot 0097 \cos(3l+l')$
722	$-\cdot 0045 \cos(3l+l'-2D)$
723	$+\cdot 0006 \cos(3i+l'-4D)$
724	$+\cdot 0005 \cos(3l+l'-6D)$
	$+\cdot 0200$

TABLE 9. Args. D, 9.

Ref. No.	Term
725	$+\cdot 0017 \cos(3l-l'+2D)$
726	$+\cdot 0115 \cos(3l-l')$
727	$-\cdot 0017 \cos(3l-l'-2D)$
728	$+\cdot 0002 \cos(3l-l'-4D)$
	$+\cdot 0300$

TABLE 10. Args. D, 16.

Ref. No.	Term
612	$+\cdot 0007 \cos(l+6D)$
613	$+\cdot 0433 \cos(l+4D)$
655	$-\cdot 0003 \cos(l+3D)$
656	$-\cdot 1093 \cos(l+D)$
657	$+\cdot 0118 \cos(l-D)$
658	$-\cdot 0386 \cos(l-3D)$
659	$-\cdot 0003 \cos(l-5D)$
618	$+\cdot 0086 \cos(l-6D)$
619	$+\cdot 0002 \cos(l-8D)$
703	$-\cdot 0100 \cos(2l+D)$
704	$+\cdot 0155 \cos(2l-D)$
631	$-\cdot 3039 \cos(2l-2D)$
705	$-\cdot 0088 \cos(2l-3D)$
706	$-\cdot 0008 \cos(2l-5D)$
633	$+\cdot 0109 \cos(2l-6D)$
634	$+\cdot 0002 \cos(2l-8D)$
664	$+\cdot 0007 \cos(3l+4D)$
665	$+\cdot 0243 \cos(3l+2D)$
744	$-\cdot 0009 \cos(3l+D)$
745	$+\cdot 0017 \cos(3l-D)$
667	$-\cdot 1187 \cos(3l-2D)$
668	$+\cdot 0074 \cos(3l-4D)$
746	$-\cdot 0002 \cos(3l-5D)$
670	$+\cdot 0002 \cos(3l-8D)$
716	$+\cdot 0018 \cos(4l+2D)$
718	$-\cdot 0130 \cos(4l-2D)$
719	$+\cdot 0002 \cos(4l-6D)$
763	$+\cdot 0002 \cos(5l+2D)$
765	$-\cdot 0012 \cos(5l-2D)$
	$+1\cdot 0000$

TABLE 11. Args. D, 17.

Ref. No.	Term
651	$-0''.0009 \cos(2F+2D)$
652	$-\cdot 0124 \cos 2F$
714	$+\cdot 0071 \cos(2F-D)$
653	$-\cdot 1052 \cos(2F-2D)$
715	$-\cdot 0017 \cos(2F-3D)$
654	$+\cdot 0031 \cos(2F-4D)$
	$+\cdot 2000$

TABLE 12. Args. D, 18.

Ref. No.	Term
756	$+\cdot 0002 \cos(2F+l+D)$
694	$-\cdot 0010 \cos(2F+l)$
757	$+\cdot 0010 \cos(2F+l-D)$
695	$-\cdot 0833 \cos(2F+l-2D)$
758	$+\cdot 0002 \cos(2F+l-3D)$
696	$+\cdot 0014 \cos(2F+l-4D)$
759	$-\cdot 0002 \cos(2F+l-5D)$
697	$+\cdot 0002 \cos(2F+l-6D)$
	$+\cdot 1000$

TABLE 13. Args. D, 19.

Ref. No.	Term
762	$+\cdot 0004 \cos(2F-l+3D)$
701	$-\cdot 0112 \cos(2F-l+2D)$
761	$+\cdot 0006 \cos(2F-l+D)$
700	$-\cdot 7136 \cos(2F-l)$
699	$-\cdot 0481 \cos(2F-l-2D)$
760	$-\cdot 0002 \cos(2F-l-3D)$
698	$-\cdot 0005 \cos(2F-l-4D)$
	$+1\cdot 0000$

(*a*) Addition to Arg. 19.

Ref. No.	Term
741, 743	$+0^s.091 \sin l'$

TABLE 14. Args. D, 21.

Ref. No.	Term
739	$-0\cdot 0004 \cos(2F-2l+4D)$
738	$-\cdot 0141 \cos(2F-2l+2D)$
737	$+\cdot 0004 \cos(2F-2l)$
736	$-\cdot 0053 \cos(2F-2l-2D)$
	$+\cdot 0200$

TABLE 15. Arg. 71.

Ref. No.	Term
615	$+186\cdot 5398 \cos l$
630	$+10\cdot 1657 \cos 2l$
666	$+\cdot 6215 \cos 3l$
717	$+\cdot 0401 \cos 4l$
764	$+\cdot 0026 \cos 5l$
	$+200\cdot 0000$

TABLE 16. Arg. 33.

Ref. No.	Term
627	$-\cdot 9781 \cos D$
610	$+28\cdot 2333 \cos 2D$
626	$+\cdot 0023 \cos 3D$
609	$+\cdot 2607 \cos 4D$
608	$+\cdot 0032 \cos 6D$
	$+30\cdot 0000$

TABLE 17. Arg. 72.

Ref. No.	Term
616	$+34\cdot 3117 \cos(2D-l)$
632	$+\cdot 3722 \cos 2(2D-l)$
669	$+\cdot 0046 \cos 3(2D-l)$
	$+40\cdot 0000$

List v (*concl.*).

Table 18. Arg. 73.

Ref. No.	Term
614	$+3''.0861 \cos(2D+l)$
628	$+\ {\cdot}0054 \cos 2(2D+l)$
	$+3{\cdot}1000$

Table 19. Arg. 74.

Ref. No.	Term
623	$+1{\cdot}9178 \cos(2D-l')$
650	$+\ {\cdot}0028 \cos 2(2D-l')$
	$+2{\cdot}0000$

Table 20. Arg. 75.

Ref. No.	Term
735	$+\ {\cdot}0090 \cos(2l+2F-2D+180^{\circ})$
	$+\ {\cdot}0090$

Table 21. Arg. 76.

Ref. No.	Term
629	$+\ {\cdot}2833 \cos(2l+2D)$
	$+\ {\cdot}3000$

Table 22. Arg. 77.

Ref. No.	Term
617	$+0''.6008 \cos(4D-l)$
	$+\ {\cdot}6100$

Table 23. Arg. 78.

Ref. No.	Term
702	$+\ {\cdot}0066 \cos(l'+2F-2D+180^{\circ})$
	$+\ {\cdot}0110$

Table 24. Arg. Sum of preceding inequalities.

$\sin \text{II} + \frac{1}{6}\sin^3 \text{II}$ where

$\sin \text{II} = (\text{Arg.} - 284''.350)(1 - {\cdot}000048)$

Ref. No.	Term
611	$+3422''.540$

List vi. Terms included in the Tables of Sect. VI.

Table P 1. Args. l', 79.

Ref. No.	Term
766	$+0''.822 \sin(V-T+180^{\circ})$
767	$+\ {\cdot}307 \sin(2V-2T+0^{\circ}.2)$
768	$+\ {\cdot}042 \sin(3V-3T+180^{\circ}.7)$
769	$+\ {\cdot}046 \sin(4V-4T+180^{\circ})$
770	$+\ {\cdot}033 \sin(5V-5T+180^{\circ})$
771	$+\ {\cdot}024 \sin(6V-6T+180^{\circ})$
772	$+\ {\cdot}017 \sin(7V-7T+180^{\circ})$
773	$+\ {\cdot}012 \sin(8V-8T+180^{\circ})$
774	$+\ {\cdot}008 \sin(9V-9T+180^{\circ})$
775	$+\ {\cdot}006 \sin(10V-10T+180^{\circ})$
776	$+\ {\cdot}004 \sin(11V-11T+180^{\circ})$
779	$+\ {\cdot}016 \sin(V-T+l'+184^{\circ})$
778	$+\ {\cdot}010 \sin(2V-2T+l'+354^{\circ})$
780	$+\ {\cdot}042 \sin(V-T-l'+358^{\circ})$
781	$+\ {\cdot}348 \sin(2V-2T-l'+166^{\circ}.7)$
782	$+\ {\cdot}176 \sin(3V-3T-l'+168^{\circ}.0)$
783	$+\ {\cdot}004 \sin(5V-5T-l'+169^{\circ})$
784	$+\ {\cdot}006 \sin(6V-6T-l'+168^{\circ})$
785	$+\ {\cdot}004 \sin(7V-7T-l'+168^{\circ})$
787	$+\ {\cdot}003 \sin(V-T+2l'+228^{\circ})$
788	$+\ {\cdot}005 \sin(V-T-2l'+314^{\circ})$
789	$+\ {\cdot}003 \sin(2V-2T-2l'+306^{\circ})$
790	$+\ {\cdot}092 \sin(3V-3T-2l'+140^{\circ}.3)$
791	$+\ {\cdot}026 \sin(4V-4T-2l'+135^{\circ})$
792	$+\ {\cdot}009 \sin(5V-5T-2l'+322^{\circ})$
793	$+\ {\cdot}004 \sin(6V-6T-2l'+132^{\circ})$
794	$+\ {\cdot}026 \sin(5V-5T-3l'+125^{\circ})$
	$+1{\cdot}752$

Table P 2. Args. l', 80.

Ref. No.	Term
950	$+0''.643 \sin(T-J+1^{\circ}.2)$
951	$+\ {\cdot}187 \sin(2T-2J+180^{\circ}.4)$
952	$+\ {\cdot}010 \sin(3T-3J+173^{\circ})$
954	$+\ {\cdot}018 \sin(T-J+l'+14^{\circ})$
953	$+\ {\cdot}006 \sin(2T-2J+l'+357^{\circ})$
955	$+\ {\cdot}087 \sin(T-J-l'+149^{\circ}.7)$
956	$+\ {\cdot}165 \sin(2T-2J-l'+198^{\circ}.1)$
957	$+\ {\cdot}052 \sin(3T-3J-l'+87^{\circ}.6)$
958	$+\ {\cdot}004 \sin(4T-4J-l'+85^{\circ})$
959	$+\ {\cdot}010 \sin(T-J-2l'+89^{\circ})$
960	$+\ {\cdot}005 \sin(2T-2J-2l'+15^{\circ})$
961	$+\ {\cdot}025 \sin(3T-3J-2l'+101^{\circ})$
962	$+\ {\cdot}006 \sin(4T-4J-2l'+355^{\circ})$
963	$+\ {\cdot}003 \sin(4T-4J-3l'+9^{\circ})$
	$+1{\cdot}103$

Table P 3. Args. l', 81.

Ref. No.	Term
1056	$+\ {\cdot}011 \sin(T-M)$
1057	$+\ {\cdot}195 \sin(2T-2M+359^{\circ}.8)$
1058	$+\ {\cdot}014 \sin(3T-3M+183^{\circ})$
1059	$+\ {\cdot}005 \sin(4T-4M+191^{\circ})$
1060	$+\ {\cdot}006 \sin(2T-2M+l')$
1061	$+\ {\cdot}327 \sin(2T-2M-l'+215^{\circ}.2)$
1062	$+\ {\cdot}038 \sin(3T-3M-l'+227^{\circ}.2)$
1063	$+\ {\cdot}048 \sin(4T-4M-l'+227^{\circ}.1)$
1064	$+\ {\cdot}010 \sin(5T-5M-l'+109^{\circ})$

LIST vi (*cont.*).

TABLE P 3 (*cont.*).

Ref. No.	Term
1065	$+ 0''.093 \sin (4T - 4M - 2l' + 94^\circ.5)$
1066	$+ .020 \sin (5T - 5M - 2l' + 94^\circ)$
1067	$+ .014 \sin (6T - 6M - 2l' + 95^\circ)$
1068	$+ .006 \sin (7T - 7M - 2l' + 277^\circ)$
1069	$+ .016 \sin (6T - 6M - 3l' + 322^\circ)$
1070	$+ .013 \sin (7T - 7M - 3l' + 323^\circ)$
1071	$+ .006 \sin (8T - 8M - 3l' + 324^\circ)$
1072	$+ .003 \sin (9T - 9M - 3l' + 145^\circ)$
1393	$+ .003 \sin (8T - 8M - 4l' + 189^\circ)$
1394	$+ .008 \sin (9T - 9M - 4l' + 194^\circ)$
	$+ .763$

TABLE P 4. Args. l', 79.

801, 802	$+35.9 \sin (V - T + 180^\circ)$
800, 803	$+13.9 \sin (2V - 2T)$
799, 804	$+15.2 \sin (3V - 3T)$
798, 805	$+ .7 \sin (4V - 4T)$
797	$+ .8 \sin (5V - 5T + 180^\circ)$
796	$+ .7 \sin (6V - 6T + 180^\circ)$
795	$+ .5 \sin (7V - 7T + 180^\circ)$
816	$+ .4 \sin (V - T + l' + 178^\circ)$
806, 817	$+ 1.4 \sin (2V - 2T + l' + 358^\circ)$
818	$+ .9 \sin (3V - 3T + l')$
807, 815	$+ 2.2 \sin (V - T - l' + 4^\circ)$
808, 814	$+11.7 \sin (2V - 2T - l' + 166^\circ.1)$
809, 813	$+ 9.2 \sin (3V - 3T - l' + 168^\circ)$
810	$+ .7 \sin (4V - 4T - l' + 168^\circ)$
811	$+ .5 \sin (5V - 5T - l' + 348^\circ)$
820, 826	$+ 3.7 \sin (3V - 3T - 2l' + 129^\circ)$
821, 825	$+ 1.0 \sin (4V - 4T - 2l' + 134^\circ)$
822, 824	$+ .8 \sin (5V - 5T - 2l' + 320^\circ)$
823	$+ 2.0 \sin (6V - 6T - 2l' + 141^\circ)$
827, 828	$+ 1.0 \sin (5V - 5T - 3l' + 124^\circ)$
167, 171	$+ 8.8 \sin (3l' + 180^\circ)$
	$+95.6$

TABLE P 5. Args. l', 80.

965, 966	$+38.6 \sin (T - J + 1^\circ)$
964, 967	$+19.7 \sin (2T - 2J)$
968	$+ .7 \sin (3T - 3J + 159^\circ)$
969, 976	$+ 1.5 \sin (T - J + l' + 10^\circ)$
977	$+ 1.0 \sin (2T - 2J + l' + 354^\circ)$
970, 975	$+16.0 \sin (T - J - l' + 157^\circ.1)$
971, 974	$+ 9.4 \sin (2T - 2J - l' + 198^\circ)$
972, 973	$+13.2 \sin (3T - 3J - l' + 87^\circ.1)$
978, 982	$+ 1.8 \sin (2T - 2J - 2l' + 13^\circ)$
979, 981	$+ 1.3 \sin (3T - 3J - 2l' + 101^\circ)$
980	$+ .5 \sin (4T - 4J - 2l' + 356^\circ)$
	$+94.0$

TABLE P 6. Args. l', 81.

1075, 1076	$+ 1.1 \sin (T - M)$
1074, 1077	$+10.4 \sin (2T - 2M)$
1073, 1078	$+ .8 \sin (3T - 3M + 180^\circ)$
1079	$+ .4 \sin (4T - 4M)$

TABLE P 6 (*concl.*).

Ref. No.	Term
1080, 1086	$+ 18.7 \sin (2T - 2M - l' + 211^\circ.1)$
1081, 1085	$+ 2.3 \sin (3T - 3M - l' + 228^\circ)$
1082, 1084	$+ 2.8 \sin (4T - 4M - l' 228^\circ)$
1083	$+ 1.1 \sin (6T - 6M - l' 230^\circ)$
1087, 1093	$+ 4.5 \sin (4T - 4M - 2l' + 94^\circ)$
1088, 1092	$+ 1.3 \sin (5T - 5M - 2l' + 94^\circ)$
1089, 1091	$+ .8 \sin (6T - 6M - 2l' + 95^\circ)$
1090	$+ .8 \sin (8T - 8M - 2l' + 276^\circ)$
1094	$+ .4 \sin (6T - 6M - 3l' + 322^\circ)$
1095, 1096	$+ .8 \sin (7T - 7M - 3l' + 323^\circ)$
	$+ 41.6$

TABLE P 7. Args. l', 79.

801, 802	$+ 10.0 \cos (V - T)$
800, 803	$+ 5.6 \cos (2V - 2T)$
799, 804	$+ 59.6 \cos (3V - 3T + 180^\circ)$
798, 805	$+ 7.6 \cos (4V - 4T + 180^\circ)$
797	$+ 2.8 \cos (5V - 5T + 180^\circ)$
796	$+ 2.4 \cos (6V - 6T + 180^\circ)$
795	$+ 1.6 \cos (7V - 7T + 180^\circ)$
816	$+ 1.2 \cos (V - T + l' + 358^\circ)$
806, 817	$+ 1.2 \cos (2V - 2T + l' + 178^\circ)$
818	$+ 3.2 \cos (3V - 3T + l' + 180^\circ)$
808, 814	$+ 1.6 \cos (2V - 2T - l' + 76^\circ)$
809, 813	$+ 3.6 \cos (3V - 3T - l' + 348^\circ)$
810	$+ 2.4 \cos (4V - 4T - l' + 348^\circ)$
811	$+ 1.6 \cos (5V - 5T - l' + 168^\circ)$
823	$+ 7.2 \cos (6V - 6T - 2l' + 321^\circ)$
167, 171	$+ 14.4 \cos 3l'$
	$+ 98.4$

TABLE P 8. Args. l', 80.

965, 966	$+ 6.0 \cos (T - J + 181^\circ)$
964, 967	$+100.0 \cos (2T - 2J + 180^\circ)$
968	$+ 2.4 \cos (3T - 3J + 339^\circ)$
977	$+ 3.6 \cos (2T - 2J + l' + 174^\circ)$
971, 974	$+ 1.6 \cos (2T - 2J - l' + 18^\circ)$
972, 973	$+ 39.2 \cos (3T - 3J - l' + 267^\circ.1)$
980	$+ 1.6 \cos (4T - 4J - 2l' + 176^\circ)$
	$+149.6$

TABLE P 9. Args. l', 81.

1074, 1077	$+ 2.4 \cos (2T - 2M + 180^\circ)$
1079	$+ 1.2 \cos (4T - 4M + 180^\circ)$
1080, 1086	$+ 6.0 \cos (2T - 2M - l' + 121^\circ)$
1082, 1084	$+ 1.6 \cos (4T - 4M - l' + 48^\circ)$
1083	$+ 4.0 \cos (6T - 6M - l' + 50^\circ)$
1090	$+ 2.8 \cos (8T - 8M - 2l' + 96^\circ)$
1094	$+ 1.2 \cos (6T - 6M - 3l' + 142^\circ)$
	$+16.8$

List vi (*cont.*).

Table P 10. Args. l', 79.

Ref. No.	Term
839, 840	$+\ 7{\cdot}1 \sin (V - T + 180^{\circ})$
838, 841	$+10{\cdot}0 \sin (2V - 2T + 0^{\circ}.4)$
837, 842	$+\ 1{\cdot}2 \sin (3V - 3T + 179^{\circ})$
836, 843	$+\ {\cdot}7 \sin (4V - 4T)$
835	$+\ {\cdot}6 \sin (5V - 5T)$
834	$+\ {\cdot}6 \sin (6V - 6T)$
833	$+\ {\cdot}5 \sin (7V - 7T)$
832	$+\ {\cdot}5 \sin (8V - 8T)$
831	$+\ {\cdot}4 \sin (9V - 9T)$
830	$+\ {\cdot}3 \sin (10V - 10T)$
829	$+\ {\cdot}2 \sin (11V - 11T)$
859	$+\ {\cdot}5 \sin (V - T + l' + 182^{\circ})$
860	$+\ {\cdot}8 \sin (2V - 2T + l' + 359^{\circ})$
861	$+\ {\cdot}2 \sin (3V - 3T + l' + 359^{\circ})$
845	$+\ {\cdot}2 \sin (V - T - l' + 208^{\circ})$
846, 858	$+\ 3{\cdot}4 \sin (2V - 2T - l' + 170^{\circ})$
847	$+\ 2{\cdot}2 \sin (3V - 3T - l' + 168^{\circ}.1)$
848, 857	$+\ {\cdot}7 \sin (4V - 4T - l' + 343^{\circ})$
856	$+\ {\cdot}4 \sin (5V - 5T - l' + 344^{\circ})$
855	$+\ {\cdot}3 \sin (6V - 6T - l' + 338^{\circ})$
854	$+\ {\cdot}3 \sin (7V - 7T - l' + 338^{\circ})$
853	$+\ {\cdot}2 \sin (8V - 8T - l' + 338^{\circ})$
852	$+\ {\cdot}2 \sin (9V - 9T - l' + 338^{\circ})$
851	$+\ {\cdot}2 \sin (10V - 10T - l' + 338^{\circ})$
850	$+\ {\cdot}2 \sin (11V - 11T - l' + 338^{\circ})$
867	$+\ {\cdot}2 \sin (2V - 2T - 2l' + 166^{\circ})$
862, 866	$+\ 1{\cdot}5 \sin (3V - 3T - 2l' + 141^{\circ})$
863	$+\ {\cdot}2 \sin (4V - 4T - 2l' + 137^{\circ})$
864	$+\ {\cdot}2 \sin (5V - 5T - 2l' + 319^{\circ})$
865	$+\ {\cdot}4 \sin (6V - 6T - 2l' + 321^{\circ})$
	$+28{\cdot}0$

Table P 11. Args. l', 80.

985, 986	$+11{\cdot}6 \sin (T - J + 1^{\circ}.4)$
984, 987	$+\ 9{\cdot}1 \sin (2T - 2J + 180^{\circ}.4)$
983, 988	$+\ {\cdot}2 \sin (3T - 3J + 147^{\circ})$
995	$+\ {\cdot}5 \sin (T - J + l' + 7^{\circ})$
996	$+\ {\cdot}4 \sin (2T - 2J + l' + 178^{\circ})$
989, 994	$+\ 3{\cdot}5 \sin (T - J - l' + 87^{\circ})$
990, 993	$+\ 2{\cdot}4 \sin (2T - 2J - l' + 203^{\circ})$
991, 992	$+\ {\cdot}9 \sin (3T - 3J - l' + 268^{\circ})$
1000	$+\ {\cdot}4 \sin (T - J - 2l' + 269^{\circ})$
999	$+\ {\cdot}2 \sin (2T - 2J - 2l' + 359^{\circ})$
997	$+\ {\cdot}3 \sin (3T - 3J - 2l' + 103^{\circ})$
998	$+\ {\cdot}2 \sin (4T - 4J - 2l' + 354^{\circ})$
	$+26{\cdot}2$

Table P 12. Args. l', 81.

1098	$+\ {\cdot}2 \sin (T - M)$
1097, 1099	$+\ 2{\cdot}9 \sin (2T - 2M + 359^{\circ})$
1100	$+\ {\cdot}3 \sin (3T - 3M + 180^{\circ})$
1108	$+\ {\cdot}2 \sin (2T - 2M + l')$
1101, 1107	$+\ 2{\cdot}7 \sin (2T - 2M - l' + 216^{\circ})$
1102, 1106	$+\ {\cdot}5 \sin (3T - 3M - l' + 228^{\circ})$

Table P 12 (*concl.*).

Ref. No.	Term
1103	$+\ {\cdot}5 \sin (4T - 4M - l' + 226^{\circ})$
1104	$+\ {\cdot}2 \sin (5T - 5M - l' + 43^{\circ})$
1105	$+\ {\cdot}2 \sin (6T - 6M - l' + 49^{\circ})$
1109, 1112	$+\ {\cdot}8 \sin (4T - 4M - 2l' + 96^{\circ})$
1110	$+\ {\cdot}2 \sin (5T - 5M - 2l' + 95^{\circ})$
1111	$+\ {\cdot}2 \sin (6T - 6M - 2l' + 93^{\circ})$
	$+\ 8{\cdot}1$

Table P 13. Args. l', 79.

839, 840	$+\ 32{\cdot}0 \cos (V - T)$
838, 841	$+\ 42{\cdot}0 \cos (2V - 2T + 180^{\circ}.4)$
837, 842	$+\ 20{\cdot}0 \cos (3V - 3T + 180^{\circ})$
836, 843	$+\ 1{\cdot}6 \cos (4V - 4T)$
835	$+\ 4{\cdot}8 \cos (5V - 5T)$
834	$+\ 4{\cdot}8 \cos (6V - 6T)$
833	$+\ 3{\cdot}2 \cos (7V - 7T)$
832	$+\ 3{\cdot}2 \cos (8V - 8T)$
831	$+\ 2{\cdot}4 \cos (9V - 9T)$
830	$+\ 2{\cdot}0 \cos (10V - 10T)$
829	$+\ 1{\cdot}2 \cos (11V - 11T)$
859	$+\ 3{\cdot}6 \cos (V - T + l' + 2^{\circ})$
860	$+\ 5{\cdot}6 \cos (2V - 2T + l' + 179^{\circ})$
861	$+\ 1{\cdot}2 \cos (3V - 3T + l' + 179^{\circ})$
845	$+\ 1{\cdot}2 \cos (V - T - l' + 28^{\circ})$
846, 858	$+\ 8{\cdot}8 \cos (2V - 2T - l' + 347^{\circ})$
847	$+\ 15{\cdot}6 \cos (3V - 3T - l' + 348^{\circ}.1)$
848, 857	$+\ {\cdot}8 \cos (4V - 4T - l' + 321^{\circ})$
856	$+\ 2{\cdot}8 \cos (5V - 5T - l' + 344^{\circ})$
855	$+\ 2{\cdot}0 \cos (6V - 6T - l' + 338^{\circ})$
854	$+\ 2{\cdot}0 \cos (7V - 7T - l' + 338^{\circ})$
853	$+\ 1{\cdot}6 \cos (8V - 8T - l' + 338^{\circ})$
852	$+\ 1{\cdot}6 \cos (9V - 9T - l' + 338^{\circ})$
851	$+\ 1{\cdot}6 \cos (10V - 10T - l' + 338^{\circ})$
850	$+\ 1{\cdot}2 \cos (11V - 11T - l' + 338^{\circ})$
867	$+\ 1{\cdot}2 \cos (2V - 2T - 2l' + 166^{\circ})$
862, 866	$+\ 1{\cdot}6 \cos (3V - 3T - 2l' + 141^{\circ})$
863	$+\ 1{\cdot}2 \cos (4V - 4T - 2l' + 317^{\circ})$
864	$+\ 1{\cdot}6 \cos (5V - 5T - 2l' + 139^{\circ})$
865	$+\ 2{\cdot}4 \cos (6V - 6T - 2l' + 321^{\circ})$
	$+104{\cdot}8$

Table P 14. Args. l', 80.

985, 986	$+\ 56{\cdot}4 \cos (T - J + 181^{\circ}.6)$
984, 987	$+\ 6{\cdot}4 \cos (2T - 2J + 5^{\circ})$
983, 988	$+\ 4{\cdot}8 \cos (3T - 3J + 352^{\circ})$
995	$+\ 3{\cdot}6 \cos (T - J + l' + 187^{\circ})$
996	$+\ 2{\cdot}4 \cos (2T - 2J + l' + 358^{\circ})$
989, 994	$+\ 2{\cdot}8 \cos (T - J - l' + 56^{\circ})$
990, 993	$+\ 12{\cdot}4 \cos (2T - 2J - l' + 23^{\circ})$
991, 992	$+\ 18{\cdot}8 \cos (3T - 3J - l' + 268^{\circ})$
1000	$+\ 2{\cdot}4 \cos (T - J - 2l' + 269^{\circ})$
999	$+\ 1{\cdot}2 \cos (2T - 2J - 2l' + 359^{\circ})$
997	$+\ 2{\cdot}0 \cos (3T - 3J - 2l' + 283^{\circ})$
998	$+\ 1{\cdot}2 \cos (4T - 4J - 2l' + 174^{\circ})$
	$+\ 93{\cdot}2$

LIST vi (*cont.*).

TABLE P 15. Args. l', 81.

Ref. No.	Term
1098	$+\ 1\cdot6\cos(T-M+180^\circ)$
1097, 1099	$+\ 16\cdot4\cos(2T-2M+179^\circ)$
1100	$+\ 2\cdot0\cos(3T-3M)$
1108	$+\ 1\cdot2\cos(2T-2M+l'+180^\circ)$
1102, 1106	$+\ 1\cdot2\cos(3T-3M-l'+48^\circ)$
1103	$+\ 3\cdot2\cos(4T-4M-l'+46^\circ)$
1104	$+\ 1\cdot2\cos(5T-5M-l'+223^\circ)$
1105	$+\ 1\cdot2\cos(6T-6M-l'+49^\circ)$
1109, 1112	$+\ 1\cdot2\cos(4T-4M-2l'+96^\circ)$
1110	$+\ 1\cdot6\cos(5T-5M-2l'+275^\circ)$
1111	$+\ 1\cdot6\cos(6T-6M-2l'+273^\circ)$
	$+\ 29\cdot2$

TABLE P 16. Args. l', 79.

879, 880	$+\ 10\cdot8\sin(V-T+180^\circ)$
878, 881	$+\ 21\cdot8\sin(2V-2T)$
877, 882	$+\ 47\cdot9\sin(3V-3T+180^\circ)$
876, 883	$+\ 5\cdot9\sin(4V-4T+180^\circ)$
875	$+\ 2\cdot8\sin(5V-5T+180^\circ)$
874	$+\ 1\cdot6\sin(6V-6T+180^\circ)$
873	$+\ \cdot9\sin(7V-7T+180^\circ)$
872	$+\ \cdot6\sin(8V-8T+180^\circ)$
871	$+\ \cdot5\sin(9V-9T+180^\circ)$
870	$+\ \cdot2\sin(10V-10T+180^\circ)$
886, 896	$+\ \cdot5\sin(V-T+l'+174^\circ)$
885, 897	$+\ 1\cdot2\sin(2V-2T+l'+359^\circ)$
887, 895	$+\ 7\cdot6\sin(2V-2T-l'+168^\circ\!.1)$
888	$+\ 3\cdot6\sin(3V-3T-l'+167^\circ\!.7)$
889, 894	$+\ 2\cdot6\sin(4V-4T-l'+349^\circ)$
893	$+\ 1\cdot7\sin(5V-5T-l'+169^\circ)$
892	$+\ \cdot6\sin(6V-6T-l'+169^\circ)$
891	$+\ \cdot4\sin(7V-7T-l'+169^\circ)$
890	$+\ \cdot2\sin(8V-8T-l'+169^\circ)$
906	$+\ \cdot2\sin(2V-2T-2l'+165^\circ)$
899, 905	$+\ 3\cdot1\sin(3V-3T-2l'+139^\circ)$
900	$+\ \cdot3\sin(4V-4T-2l'+137^\circ)$
901, 904	$+\ \cdot6\sin(5V-5T-2l'+322^\circ)$
903	$+\ 5\cdot8\sin(6V-6T-2l'+321^\circ\!.9)$
902	$+\ \cdot2\sin(7V-7T-2l'+139^\circ)$
908	$+\ \cdot3\sin(5V-5T-3l'+125^\circ)$
168, 172	$+\ 18\cdot7\sin(3l'+180^\circ)$
262	$+\ \cdot5\sin(4l'+180^\circ)$
	$+116\cdot1$

TABLE P 17. Args. l', 80.

1004, 1005	$+\ 19\cdot4\sin(T-J+1^\circ\!.5)$
1003, 1006	$+\ 90\cdot7\sin(2T-2J+180^\circ\!.3)$
1002, 1007	$+\ 2\cdot1\sin(3T-3J+178^\circ)$
1001	$+\ \cdot3\sin(4T-4J+180^\circ)$
1009, 1017	$+\ 2\cdot0\sin(T-J+l'+26^\circ)$

TABLE P 17 (*concl.*).

Ref. No.	Term
1010, 1016	$+\ 8\cdot6\sin(T-J-l'+73^\circ\!.9)$
1011, 1015	$+\ 4\cdot8\sin(2T-2J-l'+201^\circ)$
1012, 1014	$+\ 30\cdot8\sin(3T-3J-l'+267^\circ\!.1)$
1013	$+\ \cdot5\sin(4T-4J-l'+87^\circ)$
1019, 1022	$+\ \cdot7\sin(3T-3J-2l'+96^\circ)$
	$150\cdot7$

TABLE P 18. Args. l', 81.

1117, 1118	$+\ \cdot8\sin(T-M)$
1116, 1119	$+\ 5\cdot5\sin(2T-2M+359^\circ)$
1114	$+\ 1\cdot5\sin(4T-4M+182^\circ)$
1113	$+\ \cdot2\sin(5T-5M+180^\circ)$
1131	$+\ \cdot3\sin(2T-2M+l')$
1121, 1130	$+\ 4\cdot9\sin(2T-2M-l'+220^\circ)$
1122, 1129	$+\ 1\cdot3\sin(3T-3M-l'+228^\circ)$
1123, 1128	$+\ 1\cdot3\sin(4T-4M-l'+226^\circ)$
1126	$+\ 3\cdot1\sin(6T-6M-l'+51^\circ)$
1125	$+\ \cdot2\sin(7T-7M-l'+49^\circ)$
1132, 1137	$+\ 1\cdot9\sin(4T-4M-2l'+96^\circ)$
1133, 1136	$+\ \cdot7\sin(5T-5M-2l'+95^\circ)$
1134	$+\ \cdot4\sin(6T-6M-2l'+94^\circ)$
1135	$+\ 2\cdot4\sin(8T-8M-2l'+97^\circ)$
	$+\ 22\cdot2$

TABLE P 19. Args. l', 79.

879, 880	$+\ 26\cdot2\cos(V-T)$
878, 881	$+\ 4\cdot4\cos(2V-2T+180^\circ)$
877, 882	$+147\cdot4\cos(3V-3T+180^\circ)$
876, 883	$+\ 18\cdot8\cos(4V-4T+180^\circ)$
875	$+\ 8\cdot2\cos(5V-5T+180^\circ)$
874	$+\ 4\cdot8\cos(6V-6T+180^\circ)$
873	$+\ 2\cdot8\cos(7V-7T+180^\circ)$
872	$+\ 1\cdot8\cos(8V-8T+180^\circ)$
871	$+\ 1\cdot4\cos(9V-9T+180^\circ)$
870	$+\ \cdot6\cos(10V-10T+180^\circ)$
886, 896	$+\ 2\cdot6\cos(V-T+l'+2^\circ)$
885, 897	$+\ 2\cdot2\cos(2V-2T+l'+179^\circ)$
887, 895	$+\ 5\cdot8\cos(2V-2T-l'+348^\circ)$
888	$+\ 10\cdot6\cos(3V-3T-l'+347^\circ\!.7)$
889, 894	$+\ 5\cdot4\cos(4V-4T-l'+349^\circ)$
893	$+\ 5\cdot2\cos(5V-5T-l'+169^\circ)$
892	$+\ 1\cdot8\cos(6V-6T-l'+169^\circ)$
891	$+\ 1\cdot0\cos(7V-7T-l'+169^\circ)$
890	$+\ \cdot6\cos(8V-8T-l'+169^\circ)$
906	$+\ \cdot6\cos(2V-2T-2l'+165^\circ)$
899, 905	$+\ 1\cdot0\cos(3V-3T-2l'+139^\circ)$
900	$+\ \cdot8\cos(4V-4T-2l'+317^\circ)$
903	$+\ 17\cdot2\cos(6V-6T-2l'+321^\circ\!.9)$
902	$+\ \cdot6\cos(7V-7T-2l'+139^\circ)$
908	$+\ \cdot8\cos(5V-5T-3l'+305^\circ)$
168, 172	$+\ 53\cdot8\cos 3l'$
262	$+\ 1\cdot4\cos 4l'$
	$+264\cdot8$

LIST vi (*cont.*).

TABLE P 20. Args. l', 80.

Ref. No.	Term
1004, 1005	$+\ 34\cdot8\cos(T-J+181^\circ\!.8)$
1003, 1006	$+228\cdot6\cos(2T-2J+180^\circ\!.3)$
1002, 1007	$+\ 3\cdot4\cos(3T-3J+188^\circ)$
1001	$+\ \cdot8\cos(4T-4J+180^\circ)$
1009, 1017	$+\ 2\cdot4\cos(T-J+l'+135^\circ)$
1008, 1018	$+\ 2\cdot6\cos(2T-2J+l'+1^\circ)$
1010, 1016	$+\ \cdot8\cos(T-J-l'+74^\circ)$
1011, 1015	$+\ 6\cdot2\cos(2T-2J-l'+27^\circ)$
1012, 1014	$+\ 99\cdot4\cos(3T-3J-l'+267^\circ\!.1)$
1013	$+\ 1\cdot4\cos(4T-4J-l'+87^\circ)$
1019, 1022	$+\ \cdot6\cos(3T-3J-2l'+276^\circ)$
1020, 1021	$+\ 1\cdot8\cos(4T-4J-2l'+176^\circ)$
	$+382\cdot4$

TABLE P 21. Args. l', 81.

1117, 1118	$+\ 1\cdot0\cos(T-M+180^\circ)$
1116, 1119	$+\ 10\cdot4\cos(2T-2M+179^\circ)$
1115, 1120	$+\ 2\cdot2\cos(3T-3M+6^\circ)$
1114	$+\ 4\cdot4\cos(4T-4M+182^\circ)$
1113	$+\ \cdot6\cos(5T-5M+180^\circ)$
1131	$+\ \cdot8\cos(2T-2M+l'+180^\circ)$
1121, 1130	$+\ \cdot8\cos(2T-2M-l'+220^\circ)$
1122, 1129	$+\ 1\cdot0\cos(3T-3M-l'+48^\circ)$
1123, 1128	$+\ 2\cdot4\cos(4T-4M-l'+46^\circ)$
1124, 1127	$+\ 1\cdot4\cos(5T-5M-l'+231^\circ)$
1126	$+\ 9\cdot4\cos(6T-6M-l'+51^\circ)$
1125	$+\ \cdot6\cos(7T-7M-l'+49^\circ)$
1132, 1137	$+\ \cdot6\cos(4T-4M-2l'+96^\circ)$
1133, 1136	$+\ \cdot6\cos(5T-5M-2l'+275^\circ)$
1134	$+\ 1\cdot0\cos(6T-6M-2l'+274^\circ)$
1135	$+\ 7\cdot2\cos(8T-8M-2l'+97^\circ)$
	$+\ 38\cdot4$

TABLES P 22, P 25, P 28, P 31, Arg. 82.

	P 22. Addition to Longitude.
1375	$+\ 7^{\circ}\!.261\cos(\Omega+270^\circ)$
	$+\ 8\cdot000$
	P 25. Addition to Arg. 30.
1375 } in *7, 25*	$+\ 0^{\circ}\!.1310\cos(\Omega+270^\circ)$
1401 }	$+\ 0\cdot1444$
	P 28. Addition to Arg. 31.
1375 in *3*	$+\ 0^{\circ}\!.097\cos(\Omega+270^\circ)$
	$+\ 0\cdot107$
	P 31. Addition to Arg. 32.
1375 } in *8*	$+\ 0^{\circ}\!.085\cos(\Omega+270^\circ)$
1401 }	$+\ 0\cdot094$

TABLES P 23, P 26, P 29, P 32.

Ref. No.	Term
1373	P 23. Addition to Longitude.
	$+14^{\circ}\!.270\sin(346^\circ\!.65+132^\circ\!.86t_c)$
	$+15\cdot000$
	P 26. Addition to Arg. 30.
1373 } in *7, 25*	$+\ 0^{\circ}\!.2019\sin(346^\circ\!.65+132^\circ\!.86t_c)$
1400 }	$+\ \cdot2124$
	P 29. Addition to Arg. 31.
1373 in *3*	$+\ 0^{\circ}\!.191\sin(346^\circ\!.65+132^\circ\!.86t_c)$
	$+\ \cdot200$
	P 32. Addition to Arg. 32.
1373 } in *8*	$+\ 0^{\circ}\!.233\sin(346^\circ\!.65+132^\circ\!.86t_c)$
1400 }	$+\ \cdot242$

TABLES P 24, P 27, P 30, P 33.

	P 24. Addition to Longitude.
1374	$+10^{\circ}\!.710\sin(240^\circ\!.7+140^\circ\!.0t_c)$
	$+11\cdot000$
	P 27. Addition to Arg. 30.
1374 in *7, 25*	$+\ 0^{\circ}\!.1502\sin(240^\circ\!.7+140^\circ\!.0t_c)$
	$+\ \cdot1543$
	P 30. Addition to Arg. 31.
1374 in *3*	$+\ 0^{\circ}\!.143\sin(240^\circ\!.7+140^\circ\!.0t_c)$
	$+\ \cdot147$
	P 33. Addition to Arg. 32.
1374 in *8*	$+\ 0^{\circ}\!.176\sin(240^\circ\!.7+140^\circ\!.0t_c)$
	$+\ \cdot181$

1375, 1376, 1407, 1408, 1409	TABLE P 34. Arg. 83.
	$92^{\circ}\!.31\cos(\Omega+79^\circ\!.22+\phi)$
	$+100\cdot00$
	TABLE P 35. Arg. Date.
	Factor of (P 34 − 100°.0)

1413, 1414, 1415	TABLE P 36. Arg. 84.
	$483\cdot2\cos(\Omega+170^\circ\!.05+\psi)$
	TABLE P 37. Arg. Date.
	Factor of P 36

TABLE P 38. Arg. 78.

740, 742	$0\cdot317\cos(l'+2F-2D+180^\circ)$

LIST vi (*cont.*).

TABLE P 39. Arg. Date.

Ref. No.	Term	Sg.
1048	$+0''.284 \sin(3J-2T+2l-2D+172^\circ.5)$	A′
1376	$+\ \cdot 282 \sin(-\Omega+1^\circ.4t_c+264^\circ.0)$	B′
1047	$+\ \cdot 240 \sin(2T-2J-2l+2D+0^\circ.1)$	C′
1382	$+\ \cdot 237 \sin(8V-13T+226^\circ.1)$	D′
1385	$+\ \cdot 126 \sin(20V-21T+l-2D+267^\circ)$	E′
1383	$+\ \cdot 108 \sin(26V-29T-l+68^\circ)$	F′
1379	$+\ \cdot 075 \sin(2D-l+T-3Q+105^\circ)$	G′
931	$+\ \cdot 073 \sin(3V-3T-2l+2D)$	H′
207	$+\ \cdot 025 \sin(2F-2D-2l')$	I′
936	$+\ \cdot 062 \sin(8T-6V+2l-2D+17^\circ.4)$	J′
1387	$+\ \cdot 054 \sin(5V-6T+2D-2F+270^\circ)$	K′
1377	$+\ \cdot 040 \sin(119^\circ t_c+152^\circ)$	L′
1179	$+\ \cdot 038 \sin(-2\Omega)$	M′
1386	$+\ \cdot 033 \sin(12V-8T+l-2D+237^\circ)$	N′
1384	$+\ \cdot 030 \sin(21T-21V+l)$	O′
1397	$+\ \cdot 026 \sin(8T-15M+137^\circ)$	P′
907	$+\ \cdot 025 \sin(13T-15V+2D-l+151^\circ)$	Q′
1150	$+\ \cdot 021 \sin(Sn+273^\circ)$	R′
942	$+\ \cdot 019 \sin(5T-3V+\Omega-1^\circ.4t_c+216^\circ)$	S′
1147	$+\ \cdot 018 \sin(8M-6T+2l-2D+244^\circ)$	T′
1146	$+\ \cdot 017 \sin(5T-6M-2l+2D+331^\circ)$	U′
1399	$+\ \cdot 017 \sin(D-F+2M+165^\circ)$	V′
1389	$+\ \cdot 013 \sin(15V-12T-D+278^\circ)$	W′
1390	$+\ \cdot 013 \sin(23V-25T-D+350^\circ)$	X′
941	$+\ \cdot 011 \sin(4T-3V+l-D+273^\circ)$	Y′
1388	$+\ \cdot 010 \sin(24T-24V+3l-2D)$	Z′
1392	$+\ \cdot 008 \sin(18V-17T+F-D-l+105^\circ)$	a
1395	$+\ \cdot 006 \sin(6T-11M+205^\circ)$	b
1396	$+\ \cdot 006 \sin(7T-13M+161^\circ)$	c
812	$+\ \cdot 006 \sin(23V-24T-l+268^\circ)$	d
1055	$+\ \cdot 006 \sin(2J+\Omega-1^\circ.4t_c+168^\circ)$	e
1054	$+\ \cdot 005 \sin(J+\Omega-1^\circ.4t_c+45^\circ)$	f
1398	$+\ \cdot 004 \sin(17M-9T+63^\circ)$	g
1378	$+\ \cdot 003 \sin(Q-4T+239^\circ)$	h
1391	$+\ \cdot 003 \sin(24T-23V+F+285^\circ)$	i
1381	$+\ \cdot 003 \sin(4Q-5T+l-2D+67^\circ)$	j
1380	$+\ \cdot 003 \sin(4Q-3T+l-2F+113^\circ)$	k
898	$+\ \cdot 003 \sin(17V-16T-2D+l+287^\circ)$	l
1049	$+\ \cdot 003 \sin(4J-2T+2l-2D+163^\circ)$	m
1152	$+\ \cdot 003 \sin(2Sn+297^\circ)$	n
945	$+\ \cdot 016 \sin(5T-3V-\Omega+1^\circ.4t_c+105^\circ)$	A
1148	$+\ \cdot 042 \sin(T-Sn+0^\circ.4)$	B
1149	$+\ \cdot 008 \sin(2T-2Sn+180^\circ)$	B
884	$+\ \cdot 011 \sin(2D-l+18T-18V)$	C
928	$+\ \cdot 007 \sin(2V-2T+2l-2D)$	D
933	$+\ \cdot 004 \sin(5T-4V+2l-2D+92^\circ)$	E
258	$+\ \cdot 010 \sin(2l-2D+3l'+180^\circ)$	F
274	$+\ \cdot 026 \sin(2l-2F+l')$	G
1045	$+\ \cdot 011 \sin(T-J+2l-2D+2^\circ)$	H
946	$+\ \cdot 005 \sin(4T-2V-\Omega+1^\circ.4t_c+105^\circ)$	I
1046	$+\ \cdot 003 \sin(J-T+2l-2D)$	J

TABLE P 39 (*concl.*).

Ref. No.	Term	Sg
280	$+\ 0''.024 \sin(2F-2l+l')$	K
944	$+\ \cdot 009 \sin(4V-6T+\Omega-1^\circ.4t_c+255^\circ)$	L
1044	$+\ \cdot 005 \sin(2T-2J+2l-2D+180^\circ)$	M
206	$+\ \cdot 066 \sin(2F-2D+2l'+180^\circ)$	N, O
929	$+\ \cdot 005 \sin(V-T+2l-2D+180^\circ)$	P
930	$+\ \cdot 003 \sin(2T-2V+2l-2D+180^\circ)$	Q
934	$+\ \cdot 003 \sin(3V-4T+2l-2D+268^\circ)$	R
932	$+\ \cdot 003 \sin(4V-4T-2l+2D+180^\circ)$	S
1151	$+\ \cdot 013 \sin(T-2Sn+283^\circ)$	T
943	$+\ \cdot 003 \sin(5V-7T+\Omega-1^\circ.4t_c+255^\circ)$	U
304	$+\ \cdot 004 \sin(2F-l-D+l')$	V
1145	$+\ \cdot 004 \sin(2T-2M+2l-2D)$	W
935	$+\ \cdot 003 \sin(2V-3T+2l-2D+268^\circ)$	X
1375, 1407, 1408, 1413, 1414 in 52	$+\ \cdot 052 \sin(2F+\Omega-0^\circ.11t_c-2D+349^\circ.7)$	Y
	$+\ 2\cdot 299$	

TABLE P 40. Arg. Date.

Ref. No.	Term	Sg
786	$+\ 6\cdot 3 \sin(18V-16T-l+209^\circ)$	A′
1383 in 7	$+\ 1\cdot 6 \sin(26V-29T-l+68^\circ)$	B′
940	$+\ \cdot 7 \sin(l+4T-3V-D+273^\circ)$	C′
1379 in 7	$+\ 1\cdot 1 \sin(2D-l+T-3Q+105^\circ)$	D′
1053	$+\ \cdot 7 \sin(2l-2D-2T+3J+172^\circ)$	E′
1385 in 7, 849	$+\ 2\cdot 2 \sin(l+20V-21T-2D+267^\circ)$	F′
1156, 1159	$+\ 3\cdot 2 \sin(Sn+263^\circ)$	G′
1376, 1402 in 7	$+15\cdot 6 \sin(\Omega-1^\circ.4t_c+276^\circ)$	H′
1052	$+\ \cdot 9 \sin(2T-2J+2D-2l)$	I′
949	$+\ \cdot 8 \sin(5T-3V+\Omega-1^\circ.4t_c+216^\circ)$	J′
868	$+\ \cdot 5 \sin(13T-15V+2D-l+151^\circ)$	K′
877 a, 938	$+\ 1\cdot 1 \sin(3V-3T+2D-2l)$	L′
285	$+\ \cdot 9 \sin(2F-2D-2l')$	M′
777	$+\ \cdot 4 \sin(21T-21V+l)$	N′
1170	$+\ \cdot 7 \sin(2T-3Sn+2D-2l+271^\circ)$	O′
1382 in 7	$+11\cdot 7 \sin(8V-13T+226^\circ)$	P′
1403, 1377 in 7	$+\ 1\cdot 6 \sin(119^\circ t_c+152^\circ)$	Q′
1405, 1397 in 7	$+\ 1\cdot 1 \sin(8T-15M+137^\circ)$	R′
1153, 1154	$+\ 2\cdot 1 \sin(T-Sn)$	A″
1155	$+\ \cdot 4 \sin 2(T-Sn)$	A″
1165	$+\ 2\cdot 4 \sin(2T-2Sn+2D-2l+180^\circ)$	B″
844	$+\ \cdot 4 \sin(18T-18V+2D-l)$	D″
256	$+\ 1\cdot 5 \sin(2l'+2D-2l+180^\circ)$	E″
1375 in 32, 39	$+\ \cdot 4 \sin(l'+\Omega)$	F″
1397, 1405, 1412 in 8	$+\ \cdot 5 \sin(15M-8T+2l-2D+36^\circ)$	H″
1397, 1405, 1412 in 8	$+\ \cdot 5 \sin(8T-15M+2l-2D+144^\circ)$	I″
1375, 1401 in 32, 39	$+\ \cdot 4 \sin(l'-\Omega+180^\circ)$	J″
1373 in 21	$+\ \cdot 5 \sin(16T-18V+2l-D-1^\circ t_c+331^\circ)$	K″
257	$+\ \cdot 5 \sin(4l-4D-2l')$	L″
1373 in 21	$+\ \cdot 5 \sin(18V-16T-D+1^\circ t_c+209^\circ)$	M″
1157, 1158	$+\ \cdot 8 \sin(T-2Sn+283^\circ)$	N″
269	$+\ \cdot 7 \sin(4l-2F-2D+180^\circ)$	O″

LIST vi (*cont.*).

TABLE P 40 (*concl.*).

Ref. No.	Term	Sg.
1382, 1411 in *8*	$+\ 5{\cdot}4 \sin (2l - 2D + 13T - 8V + 314^{\circ})$	A
1376, 1402 in *8*	$+\ {\cdot}8 \sin (2l - 2D + \Omega - 1^{\circ}.4t_e + 96^{\circ})$	B
1413 in *8*	$+\ 1{\cdot}2 \sin (2l - 2D + \Omega + 180^{\circ})$	C
1410 in *8*	$+\ {\cdot}8 \sin (2l - 2D - 119^{\circ}t_e + 28^{\circ})$	D
1382, 1411 in *8*	$+\ 5{\cdot}4 \sin (2l - 2D - 13T + 8V + 226^{\circ})$	E, F
1171	$+\ {\cdot}8 \sin (2l - 2D + Sn + 273^{\circ})$	G
1373 in *33*	$+\ {\cdot}9 \sin (l - 2D - 16T + 18V + l' + 1^{\circ}t_e + 29^{\circ})$	H
282, 286	$+\ 2{\cdot}5 \sin (2F - 2D + 2l')$	I
253	$+\ {\cdot}8 \sin (4l - 4D + 2l' + 180^{\circ})$	J
1373 in *33*	$+\ {\cdot}9 \sin (3l - 2D + 16T - 18V + l' - 1^{\circ}t_e + 151^{\circ})$	K
1407, 1413 in *103*	$+\ {\cdot}8 \sin (2F - 2D + \Omega + 180^{\circ})$	L
1167	$+\ {\cdot}5 \sin (2l - 2D + 2T - 2Sn + 180^{\circ})$	M
1410 in *8*	$+\ {\cdot}8 \sin (2l - 2D + 119^{\circ}t_e + 152^{\circ})$	N
869	$+\ 1{\cdot}3 \sin (l - 2D + 18V - 16T + 29^{\circ})$	O
1166	$+\ 1{\cdot}8 \sin (2l - 2D + T - Sn)$	P
252	$+\ 2{\cdot}1 \sin (2l - 2D + 2l' + 180^{\circ})$	Q, R
1169	$+\ {\cdot}4 \sin (2l - 2D - 2Sn + T + 283^{\circ})$	S
1168	$+\ {\cdot}8 \sin (2l - 2D - Sn + 269^{\circ})$	T
1413 in *8*	$+\ 1{\cdot}2 \sin (2l - 2D - \Omega + 180^{\circ})$	U
1376, 1402 in *8*	$+\ {\cdot}8 \sin (2l - 2D - \Omega + 1^{\circ}.4t_e + 84^{\circ})$	V
	$+37{\cdot}4$	

TABLE P 41. Arg. Date.

Ref. No.	Term	Sg.
786	$+22{\cdot}0 \cos (18V - 16T - l + 209^{\circ})$	A′
940	$+\ 2{\cdot}0 \cos (4T - 3V + l - D + 93^{\circ})$	C′
1053	$+\ 2{\cdot}0 \cos (2l - 2D - 2T + 3J + 172^{\circ})$	E′
1385 in *7, 849*	$+\ 1{\cdot}2 \cos (20V - 21T + l - 2D + 87^{\circ})$	F′
1052	$+\ 3{\cdot}2 \cos (2T - 2J + 2D - 2l + 180^{\circ})$	I′
868	$+\ 1{\cdot}6 \cos (13T - 15V + 2D - l + 151^{\circ})$	K′
285	$+\ 3{\cdot}2 \cos (2F - 2D - 2l')$	M′
777	$+\ 1{\cdot}2 \cos (21T - 21V + l + 180^{\circ})$	N′
1170	$+\ 2{\cdot}0 \cos (2T - 3Sn + 2D - 2l + 271^{\circ})$	O′
1153, 1154	$+\ 1{\cdot}6 \cos (T - Sn + 180^{\circ})$	} A″
1155	$+\ 1{\cdot}2 \cos (2T - 2Sn + 180^{\circ})$	} A″
1165	$+\ 8{\cdot}4 \cos (2T - 2Sn + 2D - 2l + 180^{\circ})$	B″
1373 in *32, 39*	$+\ 4{\cdot}0 \cos (18V - 16T - l + l' + 1^{\circ}t_e + 209^{\circ})$	C″
844	$+\ 1{\cdot}2 \cos (18T - 18V + 2D - l)$	D″
256	$+\ 4{\cdot}8 \cos (2l' + 2D - 2l)$	E″
1375 in *32, 39*	$+\ 1{\cdot}2 \cos (l' + \Omega + 180^{\circ})$	F″
1373 in *32, 39*	$+\ 4{\cdot}0 \cos (16T - 18V + l + l' - 1^{\circ}t_e + 331^{\circ})$	G″
1397, 1405, 1412 } in *8*	$+\ 1{\cdot}6 \cos (15M - 8T + 2l - 2D + 216^{\circ})$	H″
	$+\ 1{\cdot}6 \cos (8T - 15M + 2l - 2D + 324^{\circ})$	I″
1375 in *32, 39*	$+\ 1{\cdot}2 \cos (l' - \Omega)$	J″
1373 in *21*	$+\ 1{\cdot}6 \cos (16T - 18V + 2l - D - 1^{\circ}t_e + 151^{\circ})$	K″
257	$+\ 1{\cdot}6 \cos (4l - 4D - 2l' + 180^{\circ})$	L″
1373 in *21*	$+\ 1{\cdot}6 \cos (18V - 16T - D + 1^{\circ}t_e + 29^{\circ})$	M″
269	$+\ 2{\cdot}0 \cos (4l - 2F - 2D)$	O″
1382, 1411 in *8*	$+18{\cdot}4 \cos (2l - 2D + 13T - 8V + 134^{\circ})$	A
1376 in *8*	$+\ 2{\cdot}8 \cos (2l - 2D + \Omega - 1^{\circ}.4t_e + 276^{\circ})$	B
1413 in *8*	$+\ 4{\cdot}0 \cos (2l - 2D + \Omega)$	C

TABLE P 41 (*concl.*).

Ref. No.	Term	Sg.
1410 in *8*	$+\ 2{\cdot}8 \cos (2l - 2D - 119^{\circ}t_e + 208^{\circ})$	D
1382, 1411 in *8*	$+\ 18{\cdot}4 \cos (2l - 2D - 13T + 8V + 46^{\circ})$	E, F
1171	$+\ 2{\cdot}8 \cos (2l - 2D + Sn + 93^{\circ})$	G
1373 in *33*	$+\ 3{\cdot}2 \cos (l - 2D - 16T + 18V + l' + 1^{\circ}t_e + 209^{\circ})$	H
282, 286	$+\ 5{\cdot}2 \cos (2F - 2D + 2l' + 180^{\circ})$	I
253	$+\ 2{\cdot}8 \cos (4l - 4D + 2l')$	J
1373 in *33*	$+\ 3{\cdot}2 \cos (3l - 2D + 16T - 18V + l' - 1^{\circ}t_e + 331^{\circ})$	K
1407, 1413 in *103*	$+\ 2{\cdot}8 \cos (2F - 2D + \Omega)$	L
1167	$+\ 1{\cdot}6 \cos (2l - 2D + 2T - 2Sn)$	M
1410 in *8*	$+\ 2{\cdot}8 \cos (2l - 2D + 119^{\circ}t_e + 332^{\circ})$	N
869	$+\ 4{\cdot}4 \cos (l - 2D + 18V - 16T + 209^{\circ})$	O
1166	$+\ 6{\cdot}0 \cos (2l - 2D + T - Sn + 180^{\circ})$	P
252	$+\ 7{\cdot}2 \cos (2l - 2D + 2l' + 180^{\circ})$	Q, R
1169	$+\ 1{\cdot}2 \cos (2l - 2D - 2Sn + T + 103^{\circ})$	S
1168	$+\ 2{\cdot}8 \cos (2l - 2D - Sn + 89^{\circ})$	T
1413 in *8*	$+\ 4{\cdot}0 \cos (2l - 2D - \Omega)$	U
1376 in *8*	$+\ 2{\cdot}8 \cos (2l - 2D - \Omega + 1^{\circ}.4t_e + 264^{\circ})$	V
	$+157{\cdot}3$	

TABLE P 42. Arg. Date.

Ref. No.	Term	Sg.
1382, 1411 in *3*	$+\ 2{\cdot}6 \sin (8V - 13T + 226^{\circ})$	A′
1410 in *3*	$+\ {\cdot}4 \sin (119^{\circ}t_e + 152^{\circ})$	B′
1376 in *3*	$+\ {\cdot}4 \sin (\Omega - 1^{\circ}.4t_e + 276^{\circ})$	D′
1162, 1164	$+\ {\cdot}5 \sin (Sn + 277^{\circ})$	E′
1051	$+\ {\cdot}4 \sin (2l - 2D - 2T + 3J + 173^{\circ})$	F′
1050	$+\ {\cdot}5 \sin (2l - 2D - 2T + 2J)$	G′
925, 937	$+\ {\cdot}3 \sin (2l - 2D - 3V + 3T)$	H′
1160	$+\ {\cdot}6 \sin (T - Sn)$	} A
1161	$+\ {\cdot}3 \sin (2T - 2Sn + 180^{\circ})$	} A
248	$+\ 1{\cdot}8 \sin (4l - 4D + l' + 180^{\circ})$	B
272	$+\ 1{\cdot}6 \sin (2l + 2F - 4D + l')$	C
259	$+\ {\cdot}5 \sin (2l - 2D + 3l' + 180^{\circ})$	D
1373 in *51*	$+\ 1{\cdot}7 \sin (2F - 2D - l - 16T + 18V + 1^{\circ}t_e + 209^{\circ})$	E
261	$+\ {\cdot}2 \sin (2D - 2l + 3l' + 180^{\circ})$	F
273, 275	$+\ 1{\cdot}8 \sin (2l - 2F + l')$	G
1373 in *16*	$+\ {\cdot}6 \sin (18V - 16T - l + 1^{\circ}t_e + l' + 29^{\circ})$	H
279	$+\ 1{\cdot}7 \sin (2F - 2l + l')$	I
205	$+\ {\cdot}2 \sin (2F - 2D + 2l')$	J
1375 in *16*	$+\ {\cdot}4 \sin (\Omega + l')$	K
1373 in *16*	$+\ {\cdot}6 \sin (l + 16T - 18V - 1^{\circ}t_e + l' + 151^{\circ})$	L
1375 in *16*	$+\ {\cdot}4 \sin (\Omega - l')$	M
947	$+\ {\cdot}2 \sin (2F - 2D + 5T - 3V + \Omega - 1^{\circ}.4t_e + 216^{\circ})$	N
1373 in *51*	$+\ 1{\cdot}7 \sin (l + 16T - 18V + 2F - 2D - 1^{\circ}t_e + 331^{\circ})$	O, P
250	$+\ 1{\cdot}1 \sin (4l - 4D - l' + 180^{\circ})$	Q
819	$+\ {\cdot}2 \sin (18V - 16T + l - 2D + 209^{\circ})$	R
1163	$+\ {\cdot}2 \sin (T - 2Sn + 283^{\circ})$	S
278	$+\ {\cdot}2 \sin (2l + 2F - 4D - l')$	T
948	$+\ {\cdot}2 \sin (3V - 5T + \Omega - 1^{\circ}.4t_e + 2F - 2D + 40^{\circ})$	U
290	$+\ {\cdot}2 \sin (4F - 4D + l')$	V
1407, 1413 in *51*	$+\ {\cdot}8 \sin (2F - 2D - \Omega)$	W
	$+\ 22{\cdot}3$	

List vi (*cont.*).

Table P 43. Arg. Date.

Ref. No.	Term	Sg.
1413 in *3*	$+\ 12{\cdot}8 \cos \Omega$	C′
1051	$+\ 2{\cdot}8 \cos (2l-2D-2T+3J+353^\circ)$	F′
1050	$+\ 3{\cdot}6 \cos (2l-2D-2T+2J+180^\circ)$	G′
925, 937	$+\ 4{\cdot}8 \cos (2l-2D-3V+3T+180^\circ)$	H′
1160	$+\ 4{\cdot}0 \cos (T-Sn+180^\circ)$	A
1161	$+\ 2{\cdot}0 \cos (2T-2Sn)$	A
248	$+\ 12{\cdot}8 \cos (4l-4D+l'+180^\circ)$	B
272	$+\ 11{\cdot}6 \cos (2l+2F-4D+l')$	C
259	$+\ 3{\cdot}2 \cos (2l-2D+3l')$	D
1373 in *51*	$+\ 12{\cdot}0 \cos (2F-2D-l-16T+18V+1^\circ t_c+209^\circ)$	E
261	$+\ 1{\cdot}6 \cos (2D-2l+3l')$	F
273, 275	$+\ 5{\cdot}6 \cos (2l-2F+l'+180^\circ)$	G
1373 in *16*	$+\ 4{\cdot}8 \cos (18V-16T-l+1^\circ t_c+l'+209^\circ)$	H
279	$+\ 12{\cdot}0 \cos (2F-2l+l'+180^\circ)$	I
205	$+\ 1{\cdot}6 \cos (2F-2D+2l')$	J
1375 in *16*	$+\ 2{\cdot}4 \cos (\Omega+l'+180^\circ)$	K
1373 in *16*	$+\ 4{\cdot}8 \cos (l+16T-18V-1^\circ t_c+l'+331^\circ)$	L
1375 in *16*	$+\ 2{\cdot}4 \cos (\Omega-l')$	M
947	$+\ 1{\cdot}6 \cos (2F-2D+5T-3V+\Omega-1^\circ.4t_c+216^\circ)$	N
1373 in *51*	$+\ 12{\cdot}0 \cos (l+16T-18V-1^\circ t_c+2F-2D+331^\circ)$	O, P
250	$+\ 8{\cdot}0 \cos (4l-4D-l'+180^\circ)$	Q
819	$+\ 1{\cdot}2 \cos (18V-16T+l-2D+209^\circ)$	R
1163	$+\ 1{\cdot}2 \cos (T-2Sn+103^\circ)$	S
278	$+\ 1{\cdot}6 \cos (2l+2F-4D-l')$	T
948	$+\ 1{\cdot}6 \cos (3V-5T+\Omega-1^\circ.4t_c+2F-2D+40^\circ)$	U
290	$+\ 1{\cdot}2 \cos (4F-4D+l')$	V
1407, 1413 in *51*	$+\ 6{\cdot}4 \cos (2F-2D-\Omega)$	W
	$+172{\cdot}8$	

Table P 44. Arg. Date.

Ref. No.	Term	Sg.
1293, 1295, 1296	$+\ ''{\cdot}92 \sin 2\Omega$	A′
1235, 1247a, 1247c	$+\ {\cdot}86 \sin (\Omega-1^\circ.4t_c+5T-3V+215^\circ.6)$	B′
1204	$+\ {\cdot}76 \sin (5V-6T-2F+2D+270^\circ)$	C′
1287	$+\ {\cdot}39 \sin (\Omega-1^\circ.4t_c+2J+168^\circ)$	D′
1254	$+\ {\cdot}20 \sin (J+37^\circ)$	E′
1281, 1285	$+\ {\cdot}18 \sin (3J-2T+2l-2D+352^\circ)$	F′
1406	$+\ {\cdot}17 \sin (18V-16T-l+1^\circ t_c+209^\circ)$	G′
1252 b	$+\ {\cdot}11 \sin (\Omega-1^\circ.4t_c+2M-T+345^\circ)$	H′
1283	$+\ {\cdot}09 \sin (2T-2J-2l+2D+180^\circ)$	I′
1247	$+\ {\cdot}08 \sin (5V-8T+\Omega-1^\circ.4t_c+67^\circ)$	J′
1286	$+\ {\cdot}08 \sin (\Omega-1^\circ.4t_c+J+34^\circ)$	K′
1246	$+\ {\cdot}33 \sin (5V-8T-\Omega+1^\circ.4t_c+55^\circ)$	A
1265	$+\ {\cdot}23 \sin (2F-2D+T-J)$	B
1288	$+\ {\cdot}20 \sin (2J-\Omega+1^\circ.4t_c+156^\circ)$	C
1182	$+\ {\cdot}13 \sin (2V-3T+267^\circ)$	D
1262	$+\ {\cdot}22 \sin (2F-2D-2T+2J+180^\circ)$	E
1294	$+\ {\cdot}03 \sin (2T+180^\circ)$	F
1272	$+\ {\cdot}03 \sin (2F-2D+2T-J+267^\circ)$	G
1270	$+\ {\cdot}04 \sin (2F-2D+T-2J+303^\circ)$	H
1264	$+\ {\cdot}06 \sin (2F-2D-T+J+180^\circ)$	I
1205	$+\ {\cdot}06 \sin (2F-2D-2V+3T+271^\circ)$	J

Table P 44 (*concl.*).

Ref. No.	Term	Sg.
1180	$+\ 0''.20 \sin (V-T+180^\circ)$	K
1181	$+\ {\cdot}09 \sin (2V-2T)$	K
1261	$+\ {\cdot}06 \sin (2D-2F+3T-3J+180^\circ)$	L
1271	$+\ {\cdot}03 \sin (2F-2D+J+359^\circ)$	M
1251	$+\ {\cdot}04 \sin (2F-2D-T+2M+223^\circ)$	N
1207	$+\ {\cdot}04 \sin (2F-2D-3V+5T+199^\circ)$	O
1203	$+\ {\cdot}04 \sin (2F-2D+3V-4T+268^\circ)$	P
1253	$+\ {\cdot}20 \sin (T-J)$	Q
1248	$+\ {\cdot}07 \sin (2T-2M)$	R
1206	$+\ {\cdot}03 \sin (2F-2D+3V-5T+341^\circ)$	S
1267	$+\ {\cdot}09 \sin (2F-2D+2T-2J+180^\circ)$	T
1202	$+\ {\cdot}08 \sin (2F-2D+2V-3T+269^\circ)$	U
1269	$+\ {\cdot}07 \sin (2F-2D-J+190^\circ)$	V
1252	$+\ {\cdot}04 \sin (2F-2D+T-2M+316^\circ)$	W
1249	$+\ {\cdot}09 \sin (2F-2D+2T-2M)$	X, Y
1407 in *601*	$+\ {\cdot}13 \sin (2F+\Omega-2l+350^\circ.3)$	α
1408 in *603*	$+\ {\cdot}12 \sin (2F+\Omega-2D+l'+350^\circ.3)$	β
1413 in *604*	$+\ {\cdot}06 \sin (2F+\Omega-2D-l'+170^\circ.3)$	γ
1414 in *595*	$+\ {\cdot}10 \sin (2F-2D-\Omega+180^\circ)$	δ
1411 in *595*	$+\ {\cdot}06 \sin (2F-2D+13T-8V+314^\circ)$	ε
1411 in *595*	$+\ {\cdot}06 \sin (2F-2D-13T+8V+226^\circ)$	ζ
*	$+\ {\cdot}04 \sin (T-Sn+180^\circ)$	η
*	$+\ {\cdot}01 \sin (2T-2Sn)$	η
	$+\ 6{\cdot}88$	

Table P 45. Arg. Date.

Ref. No.	Term	Sg.
1293, 1295, 1296	$+\ 4{\cdot}5 \cos 2\Omega$	A′
1235, 1247a, 1247c	$+\ 4{\cdot}2 \cos (\Omega-1^\circ.4t_c-3V+5T+215^\circ.6)$	B′
1204	$+\ 3{\cdot}7 \cos (5V-6T-2F+2D+270^\circ)$	C′
1287	$+\ 1{\cdot}9 \cos (\Omega-1^\circ.4t_c+2J+168^\circ)$	D′
1252 b	$+\ {\cdot}5 \cos (\Omega-1^\circ.4t_c-T+2M+345^\circ)$	H′
1283	$+\ {\cdot}4 \cos (2T-2J-2l+2D+180^\circ)$	I′
1247	$+\ {\cdot}4 \cos (5V-8T+\Omega-1^\circ.4t_c+67^\circ)$	J′
1286	$+\ {\cdot}4 \cos (\Omega-1^\circ.4t_c+J+34^\circ)$	K′
1246	$+\ 1{\cdot}6 \cos (5V-8T-\Omega+1^\circ.4t_c+235^\circ)$	A
1265	$+\ 1{\cdot}1 \cos (2F-2D+T-J+180^\circ)$	B
1288	$+\ 1{\cdot}0 \cos (2J-\Omega+1^\circ.4t_c+336^\circ)$	C
1262	$+\ 1{\cdot}1 \cos (2F-2D-2T+2J)$	E
1264	$+\ {\cdot}3 \cos (2F-2D-T+J)$	I
1205	$+\ {\cdot}3 \cos (2F-2D-2V+3T+91^\circ)$	J
1261	$+\ {\cdot}3 \cos (2D-2F+3T-3J+180^\circ)$	L
1267	$+\ {\cdot}4 \cos (2F-2D+2T-2J)$	T
1202	$+\ {\cdot}4 \cos (2F-2D+2V-3T+89^\circ)$	U
1269	$+\ {\cdot}3 \cos (2F-2D-J+10^\circ)$	V
1249	$+\ {\cdot}4 \cos (2F-2D+2T-2M+180^\circ)$	X, Y
1407 in *601*	$+\ {\cdot}6 \cos (2F+\Omega-2l+170^\circ.3)$	α
1408 in *603*	$+\ {\cdot}6 \cos (2F+\Omega-2D+l'+170^\circ.3)$	β
1413 in *604*	$+\ {\cdot}3 \cos (2F+\Omega-2D-l'+350^\circ.3)$	γ
1414 in *595*	$+\ {\cdot}5 \cos (2F-2D-\Omega)$	δ
1411 in *595*	$+\ {\cdot}3 \cos (2F-2D+13T-8V+134^\circ)$	ε
1411 in *595*	$+\ {\cdot}3 \cos (2F-2D-13T+8V+46^\circ)$	ζ
	$+66{\cdot}9$	

* Two terms inserted by mistake.

List vi (*concl.*).

Table P 46. Arg. Date.

Tabulated every ten days from 1900·0.

Ref. No.	Term	Sg.
270	$+0''.009 \sin(2F+4D-3l+180°)$	A″
283	$+\ .015 \sin(2F+2D-l-2l'+180°)$	B″
913	$+\ .015 \sin(2T-2V+2D+l+180°)$	C″
1030	$+\ .004 \sin(2D+l-J+182°)$	D″
912	$+\ .011 \sin(T-V+2D+l)$	E″
1029	$+\ .003 \sin(3J-2T+2D+l+352°)$	F″
1373 in *6*	$+\ .020 \sin(2D+18V-16T+1°t_e+29°)$	G″
1373 in *9*	$+\ .004 \sin(4D-2l+18V-16T+1°t_e+29°)$	H″
	$+\ .004 \sin(4D-18V+16T-1°t_e+151°)$	I″
255	$+\ .016 \sin(3l-2l')$	J″
284	$+\ .005 \sin(l+2F-2l'+180°)$	K″
917	$+\ .003 \sin(2V-3T+2D+l+269°)$	L″
1026	$+\ .007 \sin(2J-2T+2D+l+359°)$	M″
1027	$+\ .004 \sin(J+2D+l+353°)$	N″
919	$+\ .007 \sin(2T-2V+4D-l)$	O″
914	$+\ .003 \sin(3T-3V+2D+l+180°)$	P″
1031	$+\ .003 \sin(J-2T+2D+l+273°)$	Q″
918	$+\ .006 \sin(T-V+4D-l+180°)$	R″
1035	$+\ .003 \sin(2T-3J+4D-l+7°)$	S″
1138	$+\ .006 \sin(2M-2T+2D+l+180°)$	T″
916	$+\ .004 \sin(4T-3V+2D+l+271°)$	U″
1028	$+\ .005 \sin(2J-T+2D+l+237°)$	V″
1140	$+\ .003 \sin(T-2M+2D+l+93°)$	W″
1139	$+\ .003 \sin(2M-T+2D+l+82°)$	X″
1407, 1408, 1413, 1414 in *105*	$+\ .008 \sin(2F+\Omega-0°.11t_e+2D-l+349°.7)$	Y″
169	$+\ .016 \sin(4D-l-3l')$	A
267	$+\ .033 \sin(3l-2F+2D+180°)$	B
170	$+\ .032 \sin(2D+l-3l')$	C
312	$+\ .004 \sin(5l-2D+l'+180°)$	D
1025	$+\ .021 \sin(J-T+2D+l+178°)$	E
281	$+\ .003 \sin(l+2F+2l')$	F
1373 in *99*	$+\ .005 \sin(18V-16T+1°t_e+2F+209°)$	G
1024	$+\ .005 \sin(T-J+2D+l+1°)$	H
288	$+\ .009 \sin(l+4F-2D)$	I
1373 in *99*	$+\ .005 \sin(16T-18V-1°t_e+2F+2l+331°)$	J
1033	$+\ .009 \sin(J-T+4D-l+358°)$	K
915	$+\ .005 \sin(3T-2V+2D+l+271°)$	L
911	$+\ .004 \sin(2V-2T+2D+l)$	M
1375, 1401 in *6*	$+\ .011 \sin(\Omega+2D+l)$	N
1373 in *6*	$+\ .020 \sin(16T-18V-1°t_e+2D+2l+151°)$	O, P
1375 in *6*	$+\ .011 \sin(2D+l-\Omega+180°)$	Q
1032	$+\ .007 \sin(2T-2J+4D-l+180°)$	R
910	$+\ .004 \sin(3V-3T+2D+l)$	S
1023	$+\ .003 \sin(2T-2J+2D+l+180°)$	T
254	$+\ .003 \sin(6D-3l-2l')$	U
1034	$+\ .005 \sin(2J-2T+4D-l+179°)$	V
909	$+\ .003 \sin(5V-5T+2D+l)$	W
251	$+\ .003 \sin(3l+2l'+180°)$	X
	$+\ .392$	

Table P 47. Arg. Date.

The same terms as in Table P 46 tabulated every ten days from $1900{\cdot}0+2^{d}5$.

Table P 48. Arg. Date.

Tabulated every fourteen days from 1900·0.

Ref. No.	Term	Sg.
208	$+0''.016 \sin(2F+2D-2l'+180°)$	A
247	$+\ .040 \sin(4l+l'+180°)$	B
276	$+\ .016 \sin(2F+4D-2l-l'+180°)$	C
249	$+\ .048 \sin(4l-l')$	D
277	$+\ .053 \sin(2l+2F-l'+180°)$	E
271	$+\ .043 \sin(2l+2F+l')$	F, G
311	$+\ .003 \sin(4F-2l+2D)$	H
939	$+\ .007 \sin(3V-3T+4D+180°)$	I
308	$+\ .010 \sin(4l+2F-2D)$	J
303	$+\ .006 \sin(l+2F+D+l'+180°)$	K
260	$+\ .003 \sin(2l+2D-3l')$	L
1407, 1408, 1413, 1414 in *50*	$+\ .005 \sin(2F+\Omega-0°.11t_e+2D+349°.7)$	M
	$+\ .250$	

Table P 49. Arg. Date.

The same terms as in Table P 48 tabulated every fourteen days from $1900{\cdot}0+1^{d}75$.

Table P 46*a* = P 47*a*.

(Arg. -39) $\cos d{\cdot}36°+39$

for $d = -2{\cdot}0,\ -1{\cdot}5,\ -1{\cdot}0,\ -0{\cdot}5,\ 0{\cdot}0$ (Arg.), $+0{\cdot}5,\ +1{\cdot}0,\ +1{\cdot}5,\ +2{\cdot}0,\ +2{\cdot}5$.

Table P 48*a*.

(Arg. -25) $\cos \tfrac{1}{4}d{\cdot}360°+25$

for $d = -1{\cdot}5,\ -1{\cdot}0,\ -0{\cdot}5,\ 0{\cdot}0$ (Arg.), $+0{\cdot}5,\ +1{\cdot}0,\ +1{\cdot}5$.

Table P 49*a*.

(Arg. -25) $\cos \tfrac{1}{4}(d+0{\cdot}25)\,360°+25$

for $d = -1{\cdot}5,\ -1{\cdot}0,\ -0{\cdot}5,\ 0{\cdot}0$ (Arg.), $+0{\cdot}5,\ +1{\cdot}0,\ +1{\cdot}5$.

Disposal of the Constants in the Tables of Sects. II–VI.

The constants which have been added in most of the tables must be subtracted in some manner. When the sum of the values extracted from the tables is to be added to an angle which requires tabulation, the sum of the constants can be subtracted from the angle before the latter is tabulated. Many of the tables require multiplication by a factor k proportional to the time; in these cases the sum of the constants multiplied by k is subtracted from the mean motion of the angle. Where there is no angle present in the sums, the constants must be subtracted by the computer; if any of the tables require the factor k, the constants of those tables must be subtracted before the values are multiplied by k.

List vii contains a summary of the constants which have been added and the manner of their disposal, the constant of each table having been given in Lists iii–vi. Table 30, Sect. III, contains no added constant, but since the instructions to the computer require the addition of 30 00000 to each value in the table before entry, this constant must be included. The term Ref. No. *606*, not hitherto included, is inserted as a constant in C, the coefficient given in List iβ being divided by 18517 before insertion.

The change to the adopted constants of eccentricity, inclination and parallax.

It was pointed out in Chap. I, that the values of these constants used in constructing the tables were not the same as those finally adopted. It remains to show how the changes have been made.

Constant of eccentricity. The coefficient of the principal elliptic term in Longitude used in the tables is $22639''.500$ while that finally adopted is $22639''.550$. This term is contained in Table 30, Sect. III; the only other term which needs this correction is the evection, contained in Table 32, Sect. III. The factor for correction in both cases is $1 + \cdot 05 \div 22640 = 1 + \cdot 00000221$. The same factor is applied to the corresponding terms in the sine parallax. The changes have been included with the constants as shown in the Factors for these tables in List vii.

Constant of inclination. The coefficient of the principal term in Latitude (when expressed as a sum of harmonic terms) used in the tables is $18461''.350$ while that finally adopted is $18461''.400$. To the required degree of accuracy, it is sufficient to add $0''.050$ to the coefficient of the principal term with argument S and therefore to add to C, $\cdot 05 \div 18517 = + \cdot 00000\,27$. This amount has been subtracted from the sum of the constants present in C as shown in List vii.

Constant of parallax. The tables for the sine parallax were constructed with the value $3422''.700$ for the constant term of this coordinate; the adopted value for this constant is $3422''.540$. These correspond respectively to the values $3419''.596$, $3419''.437$ of $n^{-\frac{2}{3}}(E + M)^{-\frac{1}{3}} = 1/a$, where n is the mean motion of the moon and E, M, the masses of the Earth and Moon.

Denote by $\delta(\sin \Pi)$ the portion of the sine parallax which is deduced from the Tables 1–23 of Sect. V. The sum of the constants in $\delta(\sin \Pi)$ is $284''.350$. Hence with the value of $1/a$ used in the tables

$$\sin \Pi = 3138{\cdot}350 + \delta(\sin \Pi).$$

Hence with the adopted value of $1/a$,

$$\sin \Pi = \{3138{\cdot}350 + \delta(\sin \Pi)\}\, 3419{\cdot}437 \div 3419{\cdot}596.$$

The parallax is obtained from the equation $\Pi = \sin \Pi + \frac{1}{6}\sin^3 \Pi$. Table 24, Sect. V, is constructed from this and the previous equation with $\delta(\sin \Pi)$ as argument and thus furnishes the parallax with the adopted value of $1/a$.

LIST vii. Disposal of the Constants in the Tables of Sections II–VI.
$k = -0{\cdot}0000248t$. Table numbers prefixed by 'P' are from Section VI.

True Longitude.

Tables	Sums of Consts. Units of 0″.01
1–15, III	10980·0 (1 + *k*)
16–22, III	6360·0
23–29, III	70900·0 (1 + *k*)
30–39, III	3764300·0
40–46, III	57700·0
47, III	67000·0 (1 + *k*)
48, 49, III	76·8
P 46–P 49	128·4
P 1–P 3	361·8
P 22–P 24	3400·0
P 39	229·9
Sum	3981436·9 + 148880·0*k*

This sum, with sign changed, has been included in L.

Latitude. Terms in S.

Tables	Sums of Consts. Units of 0″.1
1–11, IV	3540·0 (1 + *k*)
12–16, IV	4120·0
17, 18, IV	11·0
P 23, P 24	260·0
P 34	1000·0
P 44	68·8
23–29, III	7090·0 (1 + *k*)
30–39, III	376430·0
Consts. in L	− 398143·7 − 14888·0*k*
Sum	− 5623·9 − 4258·0*k*

This sum, with sign changed, has been included in − ☊.

Latitude. Terms in N.

Tables	Sum of Consts. Units of 0″.01
19–33, IV	69871·3

This sum is to be subtracted from the sum of the values extracted from the tables.

Latitude. Terms in C.

Tables	Sums of Consts. Units of 10^{-6}
34–43, IV	+ 1400·0
P 36, P 37	0·0
P 45	+ 66·9
Ch. of inclin.	− 2·7
Term No. *606*	− 64·2
Sum	+ 1400·0

This sum is to be subtracted from the sum of the values extracted from the tables.

Sine Parallax.

Tables	Sums of Consts. Units of 0″.001
1–9, V	6000·0
10–14, V	2320·0
15–23, V	276030·0
Sum	284350·0

This sum is accounted for in Table 24, V.

Arguments 30, 70.

Tables	Sums of Consts. Units of 0°.001 of Arg. 30
P 4–P 6	231·2
P 25–P 27	511·1
P 40	37·4
Sum	779·7

− 0°.7797 has been added in Arg. 30 and 2/3 of it, − 0°.5198, in Arg. 70.

Argument 31.

Tables	Sums of Consts. Units of 0°.01 of Arg. 31
P 10–P 12	62·3
P 28–P 30	45·4
P 42	22·3
Sum	130·0

− 1°.300 has been added in Arg. 31 and 1/3 of it, 0°.433, is to be subtracted from Arg. 33 for use in Table 16, V.

Arguments 32, 71.

Tables	Sums of Consts. Units of 0°.01 of Arg. 32
P 16–P 18	289·0
P 31–P 33	51·7
Sum	340·7

− 3°.407 has been added in Arg. 32 and 109/335 of it, − 1°.1085, in Arg. 71.

Factor of Tables 30, III; 15, V.

Tables	Sums of Consts. Units of 10^{-7}
P 7–P 9	264·8
P 41	157·3
Ch. of ecc.	− 22·1
Sum	400·0

This is to be subtracted from the sum of the values extracted from the tables.

Factor of Tables 31, III; 16, V.

Tables	Sums of Consts. Units of 10^{-6}
P 13–P 15	227·2
P 43	172·8
Sum	400·0

This is to be subtracted from the sum of the values extracted from the tables.

Factor of Tables 32, III; 17, V.

Tables	Sums of Consts. Units of 10^{-6}
P 19–P 21	685·6
Ch. of ecc.	− 2·2
Sum	683·4

683 must be subtracted from the sum of the values extracted from the tables.

CHAPTER V

PRECEPTS FOR THE COMPUTATION OF THE ANNUAL EPHEMERIS, WITH EXAMPLES

The general procedure to be followed in order to find the Longitude, Latitude and Parallax of the Moon is shown under the heading 'Notation and Arrangement.' In this scheme the phrase 'sum of values from tables ...' is abbreviated to 'sum of tables ...,' and the number of the section in which the tables are contained follows each group, with the exception of those in Sect. VI all of which are prefixed by the letter P. The instructions to be followed in the use of the tables are contained in the succeeding paragraphs and are illustrated by examples from the ephemeris for the year 1923. At the end of the chapter, estimates are made of the accumulated errors to be expected.

Notation and Arrangement.

The computations at intervals of half a day.

k = − ·0000248 × number of years from 1900·0.

Σ_1 = sum of Tables 1 to 22, III + k (sum of Tables 1 to 15, III) + Cor. to Table 11, III.

Σ_2 = sum of Tables 23 to 29, 31 to 39, III + (Table 30, III + 3000000) + k (sum of Tables 23 to 29, III) + L + A_{11} + A_{12} + A_{13} + A_{14} + A_{15} + A_{16}.

Σ_3 = sum of Tables 40 to 49, III + k (Table 47, III) + Σ_{10} + Σ_1 + sum of Tables P 46 to P 49, VI.

True Longitude = $\Sigma_2 + \Sigma_3$, in units of 0″.01, + nutation*.

Σ_4 = sum of Tables 1 to 16, IV + k (sum of Tables 1 to 11, IV).

S = sum of Tables 17, 18, IV + $\frac{1}{10}\Sigma_2 + \Sigma_4 + \Sigma_{17}$ − ☊, in units of 0″.1.

Σ_5 = sum of Tables 19 to 32, IV + k (sum of Tables 19, 20, IV − 3400) − 69871.

Σ_6 = sum of Tables 34 to 43, IV − 1400, in units of 10^{-6}.

$\Sigma_7 = \Sigma_5$ + Table 33, IV.

$$\textit{Latitude} = \Sigma_7 + \frac{\Sigma_7}{1000} \times \frac{\Sigma_6 + \Sigma_{18}}{1000} \text{ in units of } 0''.01.$$

Σ_8 = sum of Tables 1 to 14, V + k (sum of Tables 1 to 9, V − 6000).

Σ_9 = sum of Tables 15 to 23, V + k (Table 19, V − 2000) + Σ_8 + B_{11} + B_{12} + B_{13} + B_{14} + B_{15} + B_{16}, in units of 0″.001.

Equatorial horizontal parallax = Table 24, V, Argument Σ_9.

* Tables for the nutation are not given; the values applied to the Sun should be used.

The computations at intervals of ten days.

Σ_{10} = sum of Tables P 1, P 2, P 3, P 22, P 23, P 24, P 39 + sec. var. L.

$\Sigma_{11} = \frac{1}{1000}$ (sum of Tables P 4, P 5, P 6, P 25, P 26, P 27, P 40) + sec. var. Arg. 30 + diff. from tab. Arg. 30.

$\Sigma'_{11} = \frac{1}{1500}$ (sum of Tables P 4, P 5, P 6, P 25, P 26, P 27, P 40) + sec. var. Arg. 71 + diff. from tab. Arg. 71.

$\Sigma_{12} = \frac{1}{1000}$ (sum of Tables P 7, P 8, P 9, P 41) − ·400.

Σ'_{12} = Table P 38.

$\Sigma_{13} = \frac{1}{100}$ (sum of Tables P 10, P 11, P 12, P 28, P 29, P 30, P 42) + sec. var. Arg. 31 + diff. from tab. Arg. 31.

$\Sigma'_{13} = \frac{1}{300}$ (sum of Tables P 10, P 11, P 12, P 28, P 29, P 30, P 42 − 130) + sec. var. Arg. 33 + diff. from tab. Arg. 33.

$\Sigma_{14} = \frac{1}{1000}$ (sum of Tables P 13, P 14, P 15, P 43) − ·400 + ·000045 × no. of years from 1900·0.

$\Sigma'_{14} = \Sigma_{14}$.

$\Sigma_{15} = \frac{1}{100}$ (sum of Tables P 16, P 17, P 18, P 31, P 32, P 33) + sec. var. Arg. 32 + diff. from tab. Arg. 32.

$\Sigma'_{15} = \frac{1}{300}$ (sum of Tables P 16, P 17, P 18, P 31, P 32, P 33) + sec. var. Arg. 72 + diff. from tab. Arg. 72.

$\Sigma_{16} = \frac{1}{1000}$ (sum of Tables P 19, P 20, P 21) − ·683 + ·000017 × no. of years from 1900.

$\Sigma'_{16} = \Sigma_{16}$.

$\Sigma_{17} = \frac{1}{10}$ (sum of Tables P 23, P 24) + sum of Tables P 34, P 44 + (Table P 34 − 1000) × Table P 35 + sec. var. of (L − ☊).

Σ_{18} = sum of Tables P 36, P 45 + Table P 37 × Table P 36.

The secular variations are those of Table 3, II.

At intervals of half a day.

$A_{11} = \Sigma_{11} \times$ v, Table 30, III

$A_{12} = \Sigma_{12} \times \frac{\text{Table 30, III}}{10000}$

$A_{13} = \Sigma_{13} \times$ v, Table 31, III

$A_{14} = \Sigma_{14} \times$ f, Table 31, III

$A_{15} = \Sigma_{15} \times$ v, Table 32, III

$A_{16} = \Sigma_{16} \times$ f, Table 32, III

$B_{11} = \Sigma'_{11} \times$ v, Table 15, V

$B_{12} = (\Sigma_{12} + \Sigma'_{12}) \times \frac{\text{Table 15, V} - 200000}{10000}$

$B_{13} = \Sigma'_{13} \times$ v, Table 16, V

$B_{14} = \Sigma'_{14} \times \frac{\text{Table 16, V} - 30000}{1000}$

$B_{15} = \Sigma'_{15} \times$ v, Table 17, V

$B_{16} = \Sigma'_{16} \times \frac{\text{Table 17, V} - 40000}{1000}$

Σ_{11}, Σ_{12}, Σ_{14}, Σ_{16} are carried to three places of decimals, Σ_{13}, Σ_{15}, Σ'_{11} to Σ'_{16} to two places. The A_i, B_i are computed to the nearest unit.

To find the Arguments from the Tables of Section II.

Args. The values to be found from Tables 2, 3 are those for the beginning of any year always called day 0·0; this day is Jan. 0·0 in common years and Jan. 1·0 in leap years (or Jan. 0·5, Jan. 1·5 if the beginning of the astronomical day shall be changed to midnight).

For the years 1900—1999, these values are found in Table 3.

For centuries other than the twentieth, turn to Table 2 and multiply the numbers in column (*a*) by the fraction of the century and those in column (*b*) by the square of this fraction and add to the value for the beginning of the century*; the sum is to be added to the value for the corresponding year of the twentieth century in Table 3. When these fractions change in the course of the year, any changes are to be added to the secular variations in the Σ_i.

D. To the value D at the beginning of the year (Month 0) add an integral number of half-days such that after the subtraction of a period of D, the value of D lies between $\pm\ 0^d.25$; this gives the half-day of the year when Month 1 begins and the value of D on that date. To these add $29^d.5$ or $30^d.0$ and subtract a period of D from the resulting value of D, so choosing the added days that D again lies between $\pm\ 0^d.25$; this gives the half-day of the year when Month 2 begins and the value of D on that date. Continue the process to the end of the year, obtaining each value of D to three places of decimals.

1–22. Each time a period of D is subtracted, add to each of the Arguments 1 to 22 the 'addition for a period of D' shown in the heading of Table 3, subtracting a period of the argument when the computed value exceeds the period; this gives the values of the arguments for the several months. In testing with the values for the beginning of the following year, differences of two units in the last decimal place may be neglected, except in the case of Arg. 1 where the difference of four, five, or six units (and, in fact, all such differences) may be distributed through the year by inspection.

23–47. 51–57 59–62. 71–77. The Arguments 23 to 47, 51 to 57, 59 to 62, 71 to 77 are given in two parts, the first of which is an integral number of half-days and the second a 'column number'; in each argument, $0^d.5$ is equivalent to an integral column number which is given at the top of Table 3. If the computed column number for the beginning of the year exceeds the value for $0^d.5$, subtract this value and add $0^d.5$ to the first part; if, in subtracting a period, the column number becomes negative, add this value and subtract $0^d.5$ from the first part. No further computation of the arguments is needed, but in order to test them occasionally during the year, Table 4 (which is not otherwise needed for the arguments in the computation of the annual ephemeris) may be used to obtain the values at any intervals (120 days will be found convenient). The value at any number of days from the beginning of the year given in this table is to be added to the value at the beginning of the year, previously found; the subtraction of a period and the adjustment of the column number is made as before.

* (*a*), (*b*) are always given in units of the last tabulated place of the argument.

Args.

55. The addition to Argument 55, given in a footnote on pp. 19, 28, II, is to be noticed.

78. Argument 78 is given to the nearest half-day.

30, 49. 63, 65, 67, 69. For the double-entry Tables 48, 49 of Sect. III and 29, 30, 31, 32 of Sect. IV, the values of the arguments are needed only for the beginning of the year; for use in Table 48, Sect. III, the column number of Arg. 30 must be converted into fractions of a day through division by 660. The vertical arguments 49, 63, 65, 67, 69
48, 50, 64, 66, 68, 70. and the horizontal Arguments 48, 50, 64, 66, 68, 70 are obtained for the beginning of the year from the tables of Sect. II in the same manner as D and the double-entry Arguments 1 to 22, respectively. The tables in which they are used are so arranged, however, that no further computation of the arguments is necessary. The testing at intervals is done by computing the arguments at intervals from the values in Table 4 to be added to those at the beginning of the year.

l', 79, 80, 81. The horizontal Arguments 79, 80, 81 of the tables in which l' is the vertical argument are tabulated to correspond to the dates when $l' = 0$ nearest to the beginnings of the years. If l' is negative, $= -\alpha$, at the beginning of any year, the horizontal arguments correspond to that period of l' which begins α days after the beginning of the year. For centuries near the twentieth, l' is small at the beginnings of the years and as its period is nearly a calendar year, no change of the Arguments 79, 80, 81 is needed during the year.

It is necessary to subtract the value of l' at the beginning of the year from
78, 82, 83, 84. Arguments 82, 83, 84, and 78 when used in Table P 38, so that their initial values shall correspond to the time when $l' = 0$.

L, − ☊. The values of L, − ☊ at the beginning of the year are found in the same manner as the arguments. To these values are to be added the motions for successive half-days given in Table 4; these are used when the computation is made from Table 4, II, by writing the former on slips and adding directly to the latter on to the computing sheets. For performing the same process with an arithmometer, the half-daily additions are given to more places of decimals so that accumulated error may be avoided. The secular changes during the year are added separately in the computation of Σ_{10}, Σ_{17}.

23–78. In carrying Arguments 23 to 78 through the year and testing by comparison with the following year certain differences will always occur in certain of the arguments, because the periods used differ slightly from the actual periods, but in every case where this difference causes a sensible change in the function it has been included in the secular variations. The only arguments which may cause trouble are those in which only the nearest column number is given, namely 48, 50, 51, 52, 62, 64, 66, 68, 70, 75 or in Argument 78 which is given to the nearest half-day. In Argument 75 the difference may be four column numbers, in the others one or two; in Argument 78 a difference of a day may occur.

Table Numbers

The Tables of Sections III, IV, V.

30–32, III 15–17, V The tables may be entered on to the computing sheets in any order except 30, 31, 32, III, and 15, 16, 17, V, which must await the formation of Σ_{11}, Σ_{13}, Σ_{15}, Σ'_{11}, Σ'_{13}, Σ'_{15}, respectively.

The half-days of the year should be numbered consecutively on the computing sheets; transformation to calendar dates is made at the end of the work by means of Table 1, Sect. II.

1–22, III 1–16, IV 34–43, IV 1–14, V The four groups of Tables 1 to 22, Sect. III, 1 to 16 and 34 to 43, Sect. IV, and 1 to 14, Sect. V, have the vertical Argument D and all or some of the horizontal Arguments 1 to 22. The computations are made for a period of D (synodic month) at a time; for interpolation purposes the period ($29^d.5306$) is extended from $-0^d.5$ to $30^d.5$. The headings for each month on the computing sheets are these 63 values of D; the nearest days of the year may be put at the foot so that after the interpolation to date the values correspond to the proper days of the year.

Take out the values for each half-day of D, interpolating for the horizontal argument with the given variations; whether the function is tabulated for every value, for every alternate value or for every fourth value of the horizontal argument, the printed variations in all cases correspond to unit change of the argument. The horizontal arguments at the top are to be taken with the values of D at the left; and those at the bottom with the values of D at the right. Test the sign of the variation by comparison with an adjoining column, since the sign given corresponds to only one of the two columns for which its numerical value is the same. The last month of each year should be completed to save labour in the work for the next year.

15, IV 13, V Tables 15, Sect. IV, and 13, Sect. V, have additions to their arguments denoted in each case by (*a*) and tabulated according to the day of the year (properly the time since l' was zero, but the difference is insensible for centuries near the twentieth); these additions merely alter the interpolating factor by 0·01 every few days.

The entries from each table may be tested by comparison of those at the end of one month with the corresponding values at the beginning of the succeeding month; for this purpose it may be noted that the change in the interpolating factor for D is only 0·06.

11, III The correction for an error in Table 11, III, is made in the following way.

The correction has the values ± 2, ± 1, 0 in the adopted units. Insert on consecutive half-days, in the order $+2$, 12 entries; $+1$, 7 entries; 0, 6 entries; -1, 7 entries; -2, 12 entries; -1, 7 entries; 0, 6 entries; $+1$, 7 entries; $+2$, 12 entries; and so on in cyclical order.

The starting place for these entries is obtained from the following table. Find in one of the columns with headings -2, $+2$, the horizontal argument for the month of Table 11 (Arg. 11); the number on the same line in the column with heading D gives the value of D in that month on which the series of entries -2 or $+2$ begins. From this place the entries can be made backward and forward in the cyclical order given above.

Table for finding the correction to Table 11, *Sect. III.*

−2	+2	
Arg. 11	Arg. 11	D
0	22	4^d
1, 2	23, 24	5
3	25	6
4	26, 27	7
5, 6	28	8
7	29	9

−2	+2	
Arg. 11	Arg. 11	D
8	30, 31	10^d
9, 10	32	11
11	33	12
12	34, 35	13
13, 14	36	14
15	37	15

−2	+2	
Arg. 11	Arg. 11	D
16	38, 39	16^d
17, 18	40	17
19	41	18
20, 21	42, 43	19

Thus if Arg. 11 = 28 (the nearest integral value), the entry + 2 begins on the day when $D = 8^d$, the entry + 1 when $D = 8^d - 3^d.5 = 4^d.5$ and when $D = 8^d + 6^d = 14^d$, the entry 0 when $D = 4^d.5 - 3^d = 1^d.5$ and when $D = 14^d + 3^d.5 = 17^d.5$, and so on.

Form the sums Σ_1, Σ_4, Σ_6, Σ_8 of the four groups in the manner shown by their definitions. Compute the first, second and, where necessary as a test, the third differences. Interpolate to the day of the year from the day of D by using as factor twice the value of D at the beginning of the month, this factor being constant through the month*. If Bessel's formula be used, third differences will not produce a sensible change.

The remaining tables of Sects. III, IV, V, both single and double-entry, are entered continuously for a year†. Number the columns on the computing sheets $0^d.0$, $0^d.5$, $1^d.0$, ..., $365^d.0$ and to $366^d.0$ in the years preceding leap years, and carry the work four or five half-days into the following year. The slight changes which occur in the interpolating factors are the only alterations in the arguments for the succeeding year and these can be adopted at any convenient day near the beginning of the year. The functions are all continuous from one year to the next except L in Σ_2, $-$ ☊ in S which change by the amounts of their secular variations for the year, these latter being added in Σ_{10} and Σ_{17} as shown in the scheme of arrangement. The discontinuities at various dates in the entries from Tables 30, 31, 32, III, and 15, 16, 17, V, are explained below.

Table Numbers 23–47, III 17–32, IV 15–23, V

Turn to the table to be entered and note whether the tabulation is made for every value, every second or every fourth value; the interpolating factor will lie between ± 0·5, ± 1·0, ± 2·0 in the respective cases. Enter the day portion and the interpolating factor in the column for arguments on the first sheet for the year, and the integral part of the column number (in red ink) in the left-hand top corner of the space for $0^d.0$.

The value in the table for $0^d.0$ is found in the line and column indicated by the two parts of the argument, the first part being at the left when the second

* The portions factored by k and the correction to Table 11 in Σ_1 may be added after this interpolation has been performed.

† Or for any number of years if the arguments have been previously obtained. The exceptions to this, explained below, are Tables 30, 31, 32, III, and 15, 16, 17, V, and Tables 33, IV, 24, V.

part is at the top and at the right when the second part is at the foot. The interpolating factor is to be multiplied by the value of v on the same line in the column headed 'v' and the product added to the value for the half-day. The sign of v given in the table is that to be used when descending a column and is reversed on ascending; it should be tested by comparison with adjoining columns. The sign is always first plus and then minus throughout every column or vice versâ. The value of v is the rate of change per unit change of the column number.

The values for the successive half-days following day 0ᵈ0 are obtained by following down when the column number is at the top and up when it is at the foot. When the end of the column is reached, the value for the next half-day is the first value in the column indicated by the succession number (abbreviated 'succ.'), the interpolating factor remaining the same. This column is followed down (or up) until its foot (or top) is reached when the succession number indicates the next column to be followed; and so on to the end of the year. Enter on the computing sheets (in red ink) each new column number, as it is reached, in the left-hand top corner of the space for the day on which it begins. A sufficient test against the accidental omission or repetition of any value may be made by comparing the argument at intervals of 120 days as explained in the precepts for finding the arguments.

In ascending to the top of the column headed 0, the succession is down the same column; if the first value is placed in square brackets, it is not to be repeated on the return.

In tables where the column is too long for the page, the word 'cont.' indicates that the column in the next block with the same number is to be followed; this may be indicated by the letter c on the computing sheets. Table Numbers

In Table 24, Sect. IV, no column number is necessary and interpolation is made between successive half-days which follow one another continuously through the table. 24, IV

In Table 28, Sect. IV, no variations are given since they are less than 0·5 per unit change of the column number. 28, IV

Tables 30, 31, 32, Sect. III and 15, 16, 17, Sect. V are entered on the sheets for forming Σ_2, Σ_9, without interpolation with the integral portions of the column numbers. Before using the latter certain integral additions are made after the formation of Σ_{11}, Σ_{13}, Σ_{15}, Σ'_{11}, Σ'_{13}, Σ'_{15}; the method for finding these additions is explained below. The values for successive half-days are then obtained as in the other single-entry tables except those in Table 30, Sect. III, which require the addition of 3×10^6 to every value*. The columns in Tables 31, 32, Sect. III, headed 'f' are only needed in forming A_{14}, A_{16}. 30, 31, 32, III 15, 16, 17, V 30, III 31, 32, III

The double-entry Tables 48, 49, Sect. III and 29, 30, 31, 32, Sect. IV are different in construction and use from the other double-entry tables. First choose the column corresponding to the value of the horizontal argument for the beginning of the year; the tabular vertical argument nearest to that for the beginning of the year is obtained by taking the sum of the day portions at the 48, 49, III 29–32, IV

* Note the remark at the head of the table.

top and side and this gives the line for starting. Twice the difference between the computed and tabular vertical arguments is the factor for interpolation between successive values in a column; this factor is constant through the year. No horizontal interpolation is necessary or possible. The continuation for successive half-days is then made as with the single-entry tables. In testing with arguments formed at intervals, an error of a unit in the column number combined with an error of a small fraction of a day in the vertical argument may appear, but the functions should agree within a unit; this is due to the fact that in passing from one column to the next, the fraction of the day changes. If by changing at the outset to one of the two columns adjoining that given by the argument, the fraction of the day is rendered very small, no sensible error will be caused by the change.

Table Numbers

33, IV The argument of Table 33, Sect. IV, is given in multiples of 100″; the complete period of the table being the circumference of 1296000″, this or a multiple of it must be subtracted from the computed value of S when necessary.

24, V Enter Table 24, Sect. V, with Σ_9 as argument, subtracting the tabular argument next below Σ_9 from Σ_9; the difference divided by 10^3 is the number of seconds to be added to the value of the parallax opposite the tabular argument.

The Tables of Section VI.

P 1–P 21 The Tables P 1 to P 21 are double-entry with l' as the vertical argument, tabulated at intervals of 10 days from $l' = 0^d$ to $l' = 370^d$.

Obtain the 38 values for the year with the horizontal Arguments 79, 80, 81, forming the differences between adjoining columns and interpolating for these arguments.

The interpolations to date for l' and to half-days are not made until various other tables have been inserted in Σ_{10} to Σ_{18} and Σ'_{11} to Σ'_{16}; hence all tables in these sums must commence at the time when $l' = 0$ nearest to the beginning of the year.

P 22, P 25, P 28, P 31, P 34, P 36 Tables P 22, P 25, P 28, P 31, P 34, P 36 are single-entry tables of ordinary form requiring interpolation between successive numbers in a column.

P 35, P 37 The factors obtained from Tables P 35, P 37 are constant through the year.

P 38 Table P 38 is given at 5-day intervals and is to be added to Σ_{12} after the interpolation to halves has been performed. Since $\Sigma_{12} + \Sigma'_{12}$ is needed only to two places of decimals, P 38 = Σ'_{12} is only given to this degree of accuracy.

P 23, P 24, P 26, P 27, P 29, P 30, P 32, P 33 The values in Tables P 23, P 24, P 26, P 27, P 29, P 30, P 32, P 33 are given at intervals of a year beginning at $0^d.0$ of each year. For years other than those tabulated add or subtract the proper multiple of the period from the date. To find the values at intervals of 10 days, direct interpolation for the insertion of 36 values at equal intervals between those for successive years and the placing of these together with the end values under the dates $l' = 0^d, 10^d, \ldots 370^d$ is sufficiently accurate. For centuries very distant from the twentieth, choose these 38 values to correspond to the nearest dates when $l' = 0^d, 10^d, \ldots$.

P 39–P 45 The values in Tables P 39 to P 45 are given at 10-day intervals from the time, nearest to the beginning of each year, when $l' = 0$. No interpolation is required.

For dates outside the period 1800 to 2050*, the values must be computed by the methods given in Chap. IX. Table Numbers

The values in Tables P 46, P 47, P 48, P 49 are given for specific days in each year shown by the sum of the day arguments at the side and top. (For dates outside the period 1800 to 2050* they must be computed by the methods given in Chap. IX.) These tables are of special form; the values at half-day intervals are obtained by means of the instructions which follow. P 46–P 49

In Table P 46, the values are given at 10-day intervals throughout the period 1900–2050. Enter these on the computing sheets. To obtain the intermediate 5-day values, subtract half the sum of the adjoining 10-day values from 78. To obtain the values for the five half-days before and after any 5-day or 10-day value enter Table P 46*a* with that value, the values before and after being the same. P 46, P 46*a*

Table P 47 is treated with the help of Table P 46*a* precisely like Table P 46. P 47

In Table P 48 the values are given at intervals of 14 days. Enter these on the computing sheets under the proper days of the year. To obtain the values at intervals of 7 days, interpolate to halves. To obtain the intermediate 3·5-day values, subtract half the sum of the adjoining 7-day values from 50. To obtain the values for the three half-days before and after any 3·5-day or 7-day or 14-day value, enter Table 48*a* with that value; the values before and after are the same. P 48, P 48*a*

Table P 49 is treated with the help of Table P 49*a* precisely like Table P 48; but the values before and after that which constitutes the argument of P 49*a* are not the same. P 49, P 49*a*

After the tables needed for the formation of Σ_{10} to Σ_{17}, Σ'_{11} to Σ'_{16} have been entered the results are summed and interpolated to halves, with second differences if necessary, so as to give the values at 5-day intervals from the time when $l' = 0$. To these are added the secular variations from the beginning of the year as shown in the scheme of arrangement, and in the cases of Σ_{11}, Σ_{13}, Σ_{15}, Σ'_{11}, Σ'_{13}, Σ'_{15} the fractional parts of the column numbers of Arguments 30, 31, 32, 71, 33, 72 respectively and finally negative integers sufficient to reduce the sums approximately within $\pm$ 0·5. Care should be taken to mark the place where the integer is changed. All the sums are then entered on to the proper half-day computing sheets. The value for the half-day of the year nearest to the date when $l' = 0$ may be taken with sufficient accuracy to be the value for $l' = 0$, and thereafter the values for successive 5 days follow one another to the end of the year. They are then interpolated to tenths in order to obtain the values for successive half-days.

Small discontinuities in some of the Σ_{10} ... Σ_{18} may be noticed between the end of one year and the beginning of the following year, but the only sensible effect is in the Longitude and it is less than the average accumulated errors due to the numerous operations.

The integers subtracted from Σ_{11}, Σ_{13}, Σ_{15}, Σ'_{11}, Σ'_{13}, Σ'_{15} must be respectively added to the column numbers of Arguments 30, 31, 32, 71, 33, 72 before entry of Tables 30, 31, 32, Sect. III, and Tables 15, 16, 17, Sect. V. These are the additions referred to in the precepts for those tables, which can then be entered without interpolation as previously explained. 30–32, III; 15–17, V

* The tables contain the values for 1900 to 2050. Those for 1800–1900 will be published later.

The six sums Σ_{11}, Σ_{13}, Σ_{15}, Σ'_{11}, Σ'_{13}, Σ'_{15} are factors of the variations in Tables 30, 31, 32, Sect. III, 15, 16, 17, Sect. V; these variations can be entered by the use of the arguments previously used to enter these tables.

The six sums Σ_{12}, Σ_{14}, Σ_{16}, $\Sigma_{12} + \Sigma'_{12}$, Σ'_{14}, Σ'_{16} are the factors of the values in the same tables, after the constants added to those values in forming the tables have been subtracted; the degree of accuracy needed is shown in the scheme of the definitions of A_{11} to A_{16}, B_{11} to B_{16}. Table 30, Sect. III, has no added constant; in Tables 31, 32, Sect. III, the columns f (available for several columns of arguments) give the values to the needed degree of accuracy; the values needed from Tables 15, 16, 17, Sect. V, are obtained by subtracting the proper constants from the numbers already entered on to the computing sheet for finding Σ_9, the proper number of digits being dropped.

After the pairs of values needed to find A_{11} to A_{16}, B_{11} to B_{16} have been entered the products may be found from Hedrick's *Interpolation Tables* and entered on the sheets for Σ_2 and Σ_9 respectively.

Cotsworth's *Tables* will be found to be more convenient for obtaining the products of $10^{-3}\,\Sigma_7$ by $10^{-3}\,(\Sigma_6 + \Sigma_{18})$ since some of these factors contain more than three significant figures. Where the latter is the case, the first figure of the factor is 1 and the product may be found from the tables in the form $(a - 1000)\,b + 1000b$, where a, b are the respective factors.

Accumulated Errors.

Every number printed in the tables is liable to an error ranging between plus and minus half the last unit tabulated; a similar error will occur in each interpolation. Hence in summing the entries from n tables, the accumulated error will in general range between $\pm \frac{1}{2}(2n) = \pm n$, in the last digit of the sum. In testing for errors of computation by means of differences, it is desired to know the probability of an error of $\pm k$ units in the last place of a sum from n tables after interpolation. The following table is deduced from Schlesinger's solution* of the problem. An error of $\pm k$ units denotes an error lying between $k \pm \frac{1}{2}$ units or between $-k \pm \frac{1}{2}$ units; n is the number of tables used in the sum.

Number of errors equal to or greater than k units to be expected in 1000 sums from n tables.

$n \backslash k$	1	2	3	4	5	6	7	8	9
5	587	103	7						
10	699	246	53	7					
15	752	344	114	27	5				
20	785	412	172	56	14	3			
25	807	464	222	87	28	7			
30	823	503	265	118	45	14	4		
35	836	535	301	148	63	23	7		
40	847	562	334	176	82	34	12	4	
45	855	584	362	202	101	45	18	6	
50	863	604	387	226	120	57	25	10	3

* *Astron. Jour.* Vol. XXX, p. 183.

For Σ_1, $n = 22$ and the average number of sums in which the error is $\pm$ 3 units or more is about 1 in 5; in Σ_4, 1 in 8; in Σ_6, 1 in 25; in Σ_8, 1 in 10. But these probabilities are somewhat increased by the use of every second and every fourth value of the argument in certain of the tables. If other sums be differenced for testing, their probabilities of error may be read off from the table.

An approximate value for the probability in the final result for the longitude will be obtained by taking $n = 50$. This gives 1 error in 8 of 5 units or more and 1 in 18 of 6 units or more. Owing to the nature of the computations the same results will be approximately true for the latitude. For the parallax, we take $n = 25$ and get errors of 4 units or more in every 11th sum and of 5 units or more in every 36th sum, on the average.

These results can only be regarded as rough guides in testing for errors by means of differences up to the fifth, which should be formed for each coordinate except the parallax for which fourth differences will be found to be sufficient. As a matter of fact, the number of large errors will be found to be greater than that given by the table. Several causes contribute in producing large errors, besides that mentioned above. In certain of the tables the variations change rather rapidly, so that the error of half a unit assumed as the limit in the interpolations will occasionally rise to a little over a unit. In other cases as, for example, in the factors of the C terms in latitude, an accumulated error will be multiplied by a factor greater than unity. However they arise, these errors are all unsystematic and much smaller than those of observation. It is not always possible to judge whether an apparent large irregularity revealed by the differences is due solely to accumulation. Many terms of very short period are present in the tables and at times these may cause the higher differences to be apparently more irregular than would otherwise be expected.

The probable error of a single place in longitude, latitude and parallax is about $\pm$ 0″.02, $\pm$ 0″.02, 0″.0015 respectively. After the last place in each coordinate has been cut off the probable errors may be taken to be $\pm$ 0″.04, $\pm$ 0″.04, $\pm$ 0″.003, respectively. These results are due solely to the actual computation of the quantities which have been placed in the tables. If we take account of the accumulation of similar errors in the theory and of doubtful values of certain of the constants, the respective probable errors may rise to $\pm$ 0″.1, $\pm$ 0″.1, $\pm$ 0″.05. These estimates refer only to the motion of the moon as affected by gravitation and by the great empirical term within about a century of the epoch.

Examples of the computations.

The following examples have been extracted from the computations for the year 1923. In selecting portions to be printed, it was desired to exhibit different features which arise rather than to give the whole work for a few dates. Thus the sums Σ_1, Σ_4, Σ_6, Σ_8 illustrate cases where the month does not start with $D = -0^d.5$ and where the factor for interpolation to date changes sign through 0 or 0.5. Every part of the necessary *written* work is illustrated, any computations not illustrated in the examples being performed mentally or by means of tables.

For the interpolations, Hedrick's *Interpolation Tables* have been found to save much time. They are also most convenient for finding the products A_i, B_i. Cotsworth's *Multiplication Tables* should be used for the set of products mentioned on p. 92 above. No other Tables in addition to those printed in this volume are necessary. An Arithmometer can be efficiently used by any one in finding the half-daily values of L, – ☊, while a Comptometer, in the hands of a practised operator*, will be of assistance in performing the numerous additions.

The longitude and latitude are left expressed in seconds of arc since they are easier to difference in this form for the purpose of testing the calculations. The transformations to degrees, minutes and seconds can be made directly on to the sheets for transformation to right ascension and declination by means of Table 5, Sect. II.

* A computer may make efficient use of the Comptometer without experience of the machine for adding long columns of figures. One column of digits should be added at a time, the 5, 4, 3 keys on which the first, second and third fingers of the right hand are placed, being alone used. The digit 6 is added as 3 + 3, 7 as 3 + 4, etc. The digits 1, 2 are added in combination with the next following digit. After one column is finished, the fingers are passed to the 5, 4, 3 keys on the next column of the machine and the same process is repeated. By proceeding in this way, the complete sum may be formed without taking the eye from the computing sheet.

Arguments, 1923. All arguments for 0^d0 are found in Table 3, Sect. II. The second column of the first block gives the day of the year on which D is nearest to zero and the third column gives the value of D on that day. Month 13 is the same as month 0 of 1924.

Month	Day of Year	Arguments: D	1	2	...
0	−27ᵈ5	+·0534	135·182	27·38	...
1	+ 2·0	+·0228	5·582	51·18	...
2	31·5	−·0078	16·981	74·98	...
3	61·0	−·0384	28·381	98·78	...
4	90·5	−·0690	39·780	122·58	...
5	120·0	−·0995	51·180	146·38	...
6	149·5	−·1301	62·579	14·18	...
7	179·0	−·1607	73·979	37·98	...
8	208·5	−·1913	85·379	61·78	...
9	238·0	−·2219	96·778	85·58	...
10	268·0	+·2475	108·178	109·38	...
11	297·5	+·2169	119·577	133·18	...
12	327·0	+·1863	130·977	0·98	...
13	356·5	+·1557	1·377	24·77	...

Day of year	Arguments: 23		...	30		31		32		...
0·0	9ᵈ0	409ᶠ3	...	18ᵈ5	16ᶠ612	8ᵈ5	211ᶠ17	29ᵈ5	7ᶠ82	...
120·0	6·0	291·3	...	0·5	166·612	10·5	139·17	22·0	176·82	...
240·0	3·0	173·3	...	10·5	22·612	12·5	67·17	15·0	10·82	...
360·0	0·0	55·3	...	20·0	208·612	14·0	289·17	7·5	179·82	...
(1924·0)	6·0	55·3	...	26·0	208·571	5·5	133·34	13·5	179·83	...

Day of year	Arguments: 30	48	...	l′	79	...	82 − l′	...	L	...
0·0	18ᵈ53	11	...	−2·52	4·74	...	5209ᵈ	...	21999666	...
120·0	0·76	31	...	+117·48	"	...	5329	...	72820006	...
240·0	10·54	47	...	+237·48	"	...	5449	...	123640346	...
360·0	20·32	63	...	+357·48	"	...	5569	...	44860686	...
(1924·0)	26·32	63	...	−1·78	50·41	...	5574	...	73321707	...

Ten-day sums. l' (= −2ᵈ52) is to be subtracted from Args. 82, 83, 84, 78. l'=0 on day 2ᵈ5 of the year. s.v. is the sec. var. for the year. δ is the difference between the actual and tabular arguments used. The sums at l' + 5ᵈ are obtained by interpolation of the sums to halves.

Tab.	Args.	l′	0ᵈ	10ᵈ	20ᵈ	...	370ᵈ
P 1	l′, 79 = 4·74		110	109	107	...	239
P 2	l′, 80 = 49·66		38	40	44	...	37
P 3	l′, 81 = 17·10		107	102	96	...	82
P 22	82 − l′ = 5209ᵈ		873	879	886	...	1111
P 23	Date		1922	1923	1924	...	1954
P 24	Date		30	30	30	...	32
P 39	Date, l′		250	256	258	...	251
Σ_{10}	sums		3330	3339	3345	...	3706
	s.v. of L		0	0	0	...	+3
	sums at l′ + 5ᵈ		3335	3342	3346	...	

s.v., Arg. 31 + ·18* s.v., Arg. 33 + ·06*
δ, " + ·17 δ, " + ·98
Addition at 0ᵈ − 1·00 Addition at 0ᵈ − 1·00
... ...

Tab.	Args.	l′	0ᵈ	10ᵈ	...
P 4	l′, 79		90	85	...
P 5	l′, 80		94	85	...
P 6	l′, 81		56	54	...
P 25	82 − l′		158	159	...
P 26	Date		272	272	...
P 27	Date		4	4	...
P 40	Date, l′		51	48	...
$10^3\Sigma_{11}$	sums		725	707	...
	10^3 (s.v. + δ), Arg. 30		−389	−390	...
	sums at l′ + 5ᵈ		716	699	...
$10^2\Sigma'_{11}$	1/15 sums		48	47	...
	10^2 (s.v. + δ), Arg. 71		−42	−42	...
	1/15 sums at l′ + 5ᵈ		48	47	...

Tab.	Args.	l′	0ᵈ	10ᵈ	20ᵈ	...
P 7	l′, 79		110	130	142	...
P 8	l′, 80		228	259	279	...
P 9	l′, 81		20	20	19	...
P 41	Date, l′		150	156	155	...
$10^3\Sigma_{12}$	sums		508	565	595	...
	− 400		−400	−400	−400	...
	sums at l′ + 5ᵈ		539	583	601	...
$10^2\Sigma'_{12}$	P 38, Arg. 78 − l′ = 11ᵈ5		+26	+13	− 3	...
	" at l′ + 5ᵈ		+20	+ 5	−11	...

s.v., Arg. 30 − ·041* s.v., Arg. 71 − ·03*
δ, " + ·612 δ, " + ·58
Addition at 0ᵈ − 1·000 Addition at 0ᵈ − 1·00
... ...

Tab.	Args.	l′	0ᵈ	10ᵈ	20ᵈ	...
P 10	l′, 79		30	29	27	...
P 11	l′, 80		5	7	9	...
P 12	l′, 81		11	11	10	...
P 28	82 − l′		12	12	12	...
P 29	Date		26	26	26	...
P 30	Date		0	0	0	...
P 42	Date, l′		23	23	23	...
$10^2\Sigma_{13}$	sums		107	108	107	...
	10^2 (s.v. + δ), Arg. 31		− 83	− 83	− 82	...
	sums at l′ + 5ᵈ		108	108	108	...
$10^2\Sigma'_{13}$	½ (sums − 130)		− 8	− 7	− 8	...
	10^2 (s.v. + δ), Arg. 33		− 2	− 2	− 2	...
	at l′ + 5ᵈ		− 7	− 7	− 7	...

Tab.	Args.	l′	0ᵈ	10ᵈ	...
P 13	l′, 79		89	104	...
P 14	l′, 80		109	100	...
P 15	l′, 81		51	52	...
P 43	Date, l′		129	125	...
$10^3\Sigma_{14}$	sums		378	381	...
	− 400 + ·045 × 23		− 399	− 399	...
	sums at l′ + 5ᵈ		378	389	...
$\Sigma'_{14} = \Sigma_{14}$					

s.v., Arg. 32 ·00*
δ, " + ·82
Addition at 0ᵈ − 3·00
" " 40ᵈ − 4·00
" " 60ᵈ − 5·00
s.v., Arg. 72 − ·03*
δ, " + ·30
Addition at 0ᵈ − 1·00
... ...

Tab.	Args.	l′	0ᵈ	10ᵈ	20ᵈ	30ᵈ	40ᵈ	50ᵈ	60ᵈ	...
P 16	l′, 79		72	65	64	71	83	101	121	...
P 17	l′, 80		25	49	80	117	155	191	221	...
P 18	l′, 81		30	28	26	24	22	20	19	...
P 31	82 − l′		10	10	10	11	11	11	11	...
P 32	Date		31	31	31	31	31	31	31	...
P 33	Date		1	1	1	1	1	1	1	...
$10^2\Sigma_{15}$	sums		169	184	212	255	303	355	404	...
	10^2 (s.v. + δ), Arg. 32		−218	−218	−218	−218	−318	−318	−418	...
	sums at l′ + 5ᵈ		175	196	232	278	329	380	425	...
$10^2\Sigma'_{15}$	½ sums		56	61	71	85	101	118	135	...
	10^2 (s.v. + δ), Arg. 72		− 70	− 70	− 70	− 70	− 70	− 70	− 70	...
	½ sums at l′ + 5ᵈ		58	65	77	93	110	127	142	...

Tab.	Args.	l′	0ᵈ	10ᵈ	20ᵈ	...
P 19	l′, 79		317	360	382	...
P 20	l′, 80		559	627	672	...
P 21	l′, 81		45	46	47	...
$10^3\Sigma_{16}$	sums		921	1033	1101	...
	− 683 + ·017 × 23		−683	− 683	− 683	...
	sums at l′ + 5ᵈ		982	1072	1118	...
$\Sigma'_{16} = \Sigma_{16}$						

Tab.	Arg.	l′	0ᵈ	10ᵈ	...	360ᵈ	370ᵈ
P 34	83 − l′ = 2013ᵈ		737	729	...	462	455
	1/10 (P 23 + P 24), see Σ_{10}		195	195	...	198	199
P 44	Arg. Date, l′		83	81	...	79	77
Σ_{17}	sums		1015	1005	...	739	731
	P 35 × (P 34 − 1000)		0	0	...	+ 1	+ 1
	sums at l′ + 5ᵈ		1010	1000	...	735	

Tab.	Arg	l′	0ᵈ	10ᵈ	20ᵈ	...
P 36	84 − l′ = 298		+465	+464	+462	...
P 37	× P 36		− 1	− 1	− 1	...
P 45	Arg. Date, l′		71	72	72	...
Σ_{18}	sums		+535	535	533	...
	sums at l′ + 5ᵈ		535	534	532	...

* Annual value, to be multiplied by the fraction of the year.

Formation of $A_{11}, \ldots, A_{16}, B_{11}, \ldots, B_{16}$. Half-day values. In the first column of each pair are the values of $\Sigma_{11}, \Sigma'_{11}, \ldots, \Sigma'_{16}$ from the previous page interpolated to tenths; in the second columns are the quantities which they multiply to produce $A_{11}, \ldots, B_{16}$. Since $\Sigma'_{14}, \Sigma'_{16}$ are respectively equal to Σ_{14}, Σ_{16}, the latter are not repeated. Since the first value on the previous page is that for $2^{d}\!\cdot\!5$, extrapolation is used to find the five previous values of the Σ, or they may be obtained from those of the previous year.

In the second columns, *v* stands for the variation in the respective tables, this variation being taken out with the arguments used for the respective tables in Σ_2, Σ_9; *f* stands for the values in the same tables with a number of figures cut off as shown by the negative power of 10 and, where necessary, the constants of the tables subtracted, or else for the columns labled *f* in the tables.

The horizontal lines below the values for $42^{d}\!\cdot\!0$, $362^{d}\!\cdot\!0$ in the column for A_{15} show two places where the column number of Arg. 32 has been changed by a unit.

Day of year	A_{11}		B_{11}		A_{12}		B_{12}		A_{13}		B_{13}		A_{14}	B_{14}		A_{15}		B_{15}		A_{16}	B_{16}	
	Σ_{11}	*v* 30, III	Σ'_{11}	*v* 15, V	Σ_{12}	$10^{-4}f$ 30, III	$\Sigma_{12}+\Sigma'_{12}$	$10^{-4}f-20$ 15, V	Σ_{13}	*v* 31, III	Σ'_{13}	*v* 16, V	*f* 31, III	Σ_{14}	$10^{-3}f-30$ 16, V	Σ_{15}	*v* 32, III	Σ'_{15}	*v* 17, V	*f* 32, III	Σ_{16}	$10^{-3}f-40$ 17, V
$0^{d}\!\cdot\!0$	+·341	−393	+·06	+77	+·090	−194	+·39	− 9	+·23	+101	−·10	+51	−192	−·021	+17	−·51	+ 59	−·14	−28	+412	+·205	+15
·5	·340	322	,,	82	·094	205	,,	8	,,	128	,,	42	158	,,	22	·50	47	,,	30	430	·212	12
1·0	·339	245	,,	88	·097	215	·38	6	,,	149	,,	32	117	,,	26	·50	34	,,	30	444	·218	8
·5	·338	163	,,	92	·101	221	,,	4	,,	164	,,	19	71	,,	28	·50	21	,,	31	453	·225	5
2·0	·337	− 78	,,	95	·104	225	,,	− 2	,,	171	,,	+ 6	− 22	,,	29	·49	+ 8	,,	31	458	·231	+ 2
·5	·336	+ 11	·06	97	·108	227	·37	+ 1	+·24	170	,,	− 8	+ 29	,,	29	·49	− 5	,,	31	458	·238	− 2
3·0	·335	101	,,	98	·111	225	,,	3	,,	162	,,	21	78	,,	28	·48	19	,,	31	454	·244	5
·5	·334	192	,,	98	·114	220	,,	5	,,	146	,,	33	123	,,	25	·48	32	,,	30	446	·250	8
4·0	·333	283	,,	96	·117	212	·36	7	,,	124	,,	44	163	,,	21	·47	45	,,	29	433	·256	12
·5	·332	371	,,	92	·120	201	,,	9	,,	97	,,	52	196	,,	17	·47	57	,,	28	416	·262	15
5·0	·332	457	,,	87	·124	187	,,	11	,,	64	,,	58	220	,,	11	·46	69	−·13	26	395	·269	18
·5	·331	537	,,	81	·127	171	,,	13	,,	+ 29	,,	61	233	,,	+ 5	·45	80	,,	25	370	·275	20
6·0	·330	611	,,	73	·130	152	·35	15	,,	− 7	,,	62	237	,,	− 1	·44	90	,,	23	342	·281	23
·5	·329	676	,,	63	·133	131	,,	16	,,	43	,,	60	229	,,	7	·44	100	,,	20	310	·287	25
7·0	·328	732	,,	53	·136	108	,,	17	,,	77	,,	55	212	,,	12	·43	108	,,	18	275	·293	27
·5	·327	778	,,	41	·139	83	·34	18	+·25	108	−·09	48	185	,,	17	·43	116	−·12	16	237	·299	29
8·0	·326	811	,,	28	·142	56	,,	19	,,	133	,,	39	149	,,	22	·42	122	,,	13	197	·304	31
...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
40·0	+·266	+554	+·03	−79	+·197	+167	−·07	+13	+·29	−160	−·08	+20	− 86	+·032	−26	+·72	−124	+·27	−12	+182	+·432	−31
·5	·265	475	,,	86	·196	184	·08	11	,,	143	,,	32	130	·032	24	·75	129	·28	9	139	·430	32
41·0	·264	391	,,	91	·195	198	,,	9	,,	120	,,	42	169	·033	20	·77	132	·28	6	95	·429	33
·5	·263	303	,,	95	·195	210	·09	7	·30	91	,,	50	200	·034	16	·80	134	·29	− 3	51	·427	34
42·0	·262	212	,,	97	·194	218	,,	5	,,	59	,,	56	223	·034	10	+·82	135	·30	0	+ 5	·426	34
·5	·261	121	·02	98	·193	224	·10	3	·31	− 23	·07	60	235	·035	− 5	−·15	135	·31	+ 3	− 40	·424	34
43·0	·260	+ 31	,,	97	·192	226	,,	+ 1	,,	+ 13	,,	61	236	·035	+ 1	·12	133	·32	6	85	·422	33
·5	·260	− 58	,,	96	·191	226	,,	− 1	,,	49	,,	59	227	·036	7	·10	130	·33	9	129	·420	33
44·0	·259	145	,,	93	·190	223	·11	3	,,	82	,,	54	208	·036	13	·07	125	·34	11	172	·417	32
·5	·258	227	,,	89	·189	216	,,	5	,,	112	,,	47	179	·037	18	·05	120	·35	14	213	·415	30
...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
361·0	+·356	+ 63	+·09	98	−·180	−226	+·01	+ 2	−·44	− 52	+·01	−59	+226	+·077	− 8	−·59	−133	+·14	+ 5	− 74	−·239	−34
·5	,,	154	,,	98	·179	222	·01	4	,,	86	,,	53	205	,,	14	·61	131	·13	8	118	·235	33
362·0	,,	245	,,	97	·177	216	·01	6	,,	115	,,	45	176	,,	19	−·64	127	·12	10	161	·231	32
·5	,,	335	,,	94	·175	206	·00	8	·45	139	,,	36	138	·078	23	+·33	121	·11	13	203	·227	31
363·0	,,	421	,,	90	·173	194	·00	10	,,	157	,,	25	95	,,	26	·30	115	·10	16	242	·223	29
·5	,,	504	,,	84	·170	178	−·01	12	,,	168	,,	−13	+ 47	,,	27	·28	107	·09	18	279	·219	27
364·0	,,	581	,,	76	·168	160	·02	14	,,	171	,,	0	− 4	,,	28	·25	99	·08	21	314	·215	25
·5	·357	650	,,	67	·165	140	·02	15	,,	167	,,	+12	53	,,	27	·23	89	·07	23	345	·211	23
365·0	,,	710	,,	57	·163	118	·03	17	·46	155	,,	24	101	·079	26	·20	78	·07	25	373	·207	20
·5	,,	760	,,	46	·161	93	·04	18	,,	136	,,	35	144	,,	23	·17	67	·06	26	398	·203	17
366·0	,,	799	,,	33	·158	67	·04	19	,,	111	,,	45	181	,,	19	·15	55	·05	28	418	·198	14
·5	,,	825	,,	20	·156	41	·05	19	,,	81	,,	52	209	,,	14	·13	43	·04	29	435	·194	11
367·0	,,	838	,,	+ 7	·153	− 13	·05	20	,,	47	,,	57	228	,,	9	·10	30	·03	30	447	·189	8
·5	,,	838	,,	− 7	·151	+ 15	·06	20	·47	− 11	·00	60	236	·080	− 3	·08	17	·02	31	455	·185	5
368·0	,,	824	,,	21	·148	42	·06	19	,,	+ 25	,,	60	234	,,	+ 3	·06	− 4	+·01	31	458	·180	− 1
·5	,,	797	,,	34	−·146	69	·07	19	,,	60	,,	58	222	,,	9	·03	+ 10	·00	31	457	·176	+ 2

Computation of Σ_1. k = −·0000248 × 23 = −·00057. Day 0^d0 is Jan. 0·0.

Month 0. Int. fact. for D = +·0534 × 2 = +·107 = *n*.

Tab.	Hor. Args.	D	27^d5	28·0	28·5	29·0	29·5	30·0	30·5
III									
1	1	135·182	4169	4083	4035	4018	4022	4034	4037
2	2	27·38	1187	1439	1656	1815	1899	1901	1821
3	3	86·07	172	130	89	54	30	24	34
4	4	48·64	1458	1547	1668	1810	1968	2129	2285
5	5	60·77	2095	1964	1781	1556	1304	1043	795
6	6	17·72	1793	1831	1859	1879	1890	1891	1881
7	7	70·07	135	88	51	24	11	11	25
8	8	30·45	80	55	34	18	10	10	20
9	9	29·05	62	88	111	128	138	136	126
10	10	37·47	429	424	415	406	397	390	386
11	11	24·24	83	90	103	119	137	152	161
12	12	16·44	58	65	70	71	69	62	54
13	13	11·07	44	39	35	32	30	29	28
14	14	24·56	25	14	7	5	8	16	27
15	15	9·35	82	94	101	103	101	94	83
Sums			11872	11951	12015	12038	12014	11922	11763
16	16	54·409	5380	5272	5194	5131	5071	5013	4968
17	17	25·99	110	137	173	212	247	272	282
18	18	27·60	155	96	43	13	15	48	102
19	19	22·25	364	323	285	246	206	164	125
20	20	88·65	82	99	111	118	123	127	133
21	21	4·26	354	339	318	295	269	245	223
22	22	5·76	31	48	64	74	74	65	49
Σ_1 Sums			18348	18265	18203	18127	18019	17856	17645
Int. to date			−11	−7	−7	−10	−15		
k × 1st sums			−7	−7	−7	−7	−7		
Cor. to Tab. 11			−1	−1	−1	−1	−1		
Day of year			0^d0	0·5	1·0	1·5	2·0		

Month 1. Int. fact. for D = +·0228 × 2 = +·046 = *n*.

Tab.	Hor. Args. D	-0^d5	0·0	0·5	1·0	1·5	2·0	…
III								
1	5·582	4017	4022	4033	4037	4017	3964	…
2	51·18	1822	1902	1898	1814	1654	1437	…
3	87·13	52	30	24	35	60	94	…
4	76·45	1821	1979	2140	2294	2430	2541	…
5	68·78	1541	1288	1028	781	566	397	…
6	48·53	1880	1890	1890	1881	1862	1832	…
7	79·07	23	10	11	26	54	92	…
8	45·25	17	10	12	21	39	61	…
9	34·69	129	138	136	124	105	81	…
10	57·57	406	397	389	385	385	388	…
11	28·18	121	138	153	161	162	156	…
12	0·19	71	68	62	53	42	32	…
13	18·97	32	30	29	29	29	29	…
14	29·72	5	8	17	28	41	54	…
15	9·85	103	101	93	82	69	56	…
Sums		12040	12011	11915	11751	11515	11214	…
16	72·409	5127	5067	5010	4967	4960	5013	…
17	34·68	214	249	273	282	275	253	…
18	36·80	13	17	51	105	164	209	…
19	29·75	243	203	161	123	88	62	…
20	24·15	118	122	127	134	143	154	…
21	5·77	293	268	243	222	206	193	…
22	19·64	75	74	63	47	32	22	…
Σ_1 Sums		18123	18011	17843	17631	17383	17120	…
Int. to date			−7	−9	−11	−12	−12	…
k × 1st sums			−7	−7	−7	−7	−6	…
Cor. to Tab. 11			−1	−1	−1	0	0	…
Day of year			2^d0	2·5	3·0	3·5	4·0	…

Differences and $-\frac{n-1}{4}(\Delta''+\Delta'')$ for cor. of Δ′ with Bessel's formula

	Δ′	Δ″	Cor. to Δ′
27^d5		+53	
28·0	−83	+21	−17
·5	62	−14	−2
29·0	76	32	+10
·5	108	55	19
30·0	163	48	23
·5	211		

	Δ′	Δ″	Cor. to Δ′
-0^d5	−112		
0·0	168	−56	+24
·5	212	44	19
1·0	248	36	+12
·5	263	−15	−3
2·0	…	+27	…
		…	

Computation of Σ_3. The interpolating factors (constant through the year) for Tables 40–47 are placed in the col. of Args.; the integral parts of the column numbers before the values for day 0^d0 and before the values of the days where they change. For the double-entry Tables 48, 49, the column numbers are the values of the 2nd arguments. The change from 74 to 73 in Arg. 50 is made to facilitate interpolation of the first argument, the loss of accuracy being negligible.

Tab.	Args.	Day of year	0^d0	0·5	1·0	1·5	2·0	2·5	…	8·0	8·5	9·0	9·5	10·0	…
III															
40	40	9^d0, -0^c41	176 24495	33524	42976	52351	61150	68905	…	36293	27086	18646	11419	5787	…
41	41	144·0, +·3	8 8319	8406	8491	8576	8660	8742	…	9579	9647	9715	9781	9845	…
42	42	0·0, −·4	81 7945	7890	7781	7621	7412	7156	…	2603	2181	1784	1418	1087	…
43	43	3·0, −·2	87 1845	800	202	123	570	1493	…	5084	3540	2120	992	289	…
44	44	3·5, −·3	97 38	142	335	44 580	828	1032	…	299	539	790	1004	1140	…
45	45	8·0, +·3	52 1598	1798	1914	1931	1848	1673	…	708	1012	1315	1583	1788	…
46	46	0·0, +·1	25 794	723	586	410	232	89	…	534	354	183	57	2	…
47	47	88·5, −·23	15 69896	69322	68747	68172	67597	67022	…	60707	60135	59564	15 58993	58422	…
48	30 = 18·53, 48 = 11^c		11 35	30	28	28	30	34	…	37	22 42	46	46	41	…
49	49 = 5·47, 50 = 74^c		74 − 1 28	34	41	49	57	66	…	58	47	36	27	18	…
P 46	Date		39	39	39	39	39	39	…	39	40	40	40	40	…
P 47	,,		39	40	41	41	42	42	…	35	36	37	38	39	…
P 48	,,		26	26	26	25	25	24	…	26	25	25	24	23	…
P 49	,,		25	25	24	24	24	24	…	24	24	24	24	25	…
Σ_1			18329	18250	18188	18109	17996	17826	…	17341	17686	18034	18383	18709	…
Σ_{10}			3327	3328	3328	3329	3329	3330	…	3335	3336	3336	3336	3337	…
Σ_3 Sum			136778	144377	152747	161408	169839	177497	…	136702	125730	115695	107165	100592	…
Tab. 47 × k			−40	−40	−40	−39	−39	−39	…	−35	−34	−34	−34	−33	…

Computation of Σ_2 *and the Longitude.* The arguments for 0^d0 are shown as in Σ_3; the fractional parts of Args. 30, 31, 32 are included in A_{11}, A_{13}, A_{15}; the additions to their integral parts are obtained from inspection of Σ_{11}, Σ_{13}, Σ_{15}. To every value from Table 30, the number 3000000 has been added. Those values of A_{11}, ..., A_{16} which are negative are placed for convenience of addition in the block to the left of the space for each half-day. The longitude is obtained in units of $0''\!.01$.

The change of column number in Table 32 on day 42·5 is shown by the '+ 1,' changing the column number to 263. With this, A_{16} changes from −111 to + 20.

Tab.	Args.	Day of year		0^d0		0·5		...	34·0		34·5		...	42·0		42·5		43·0		...
III																				
23	23	0^d0	$+0^c3$	409	4086		6441	...		23722		26640	...		8449		5762		3542	...
24	24	1·0	+ ·2	108	4535		4188	...		64		86	...		4809		4578		4246	...
25	25	23·0	+ ·2	172	20456		21065	...		11520		10176	...		673		1204		1880	...
26	26	12·5	− ·33	83	1667		1072	...		1640		2376	...		22797		24073		25248	...
27	27	32·5	− ·3	38	39789		40451	...		38321		39239	...		34027		32544		30968	...
28	28	2·5	+ ·2	92	1231		798	...		1254		1716	...		74		240		532	...
29	29	12·0	− ·2	132	496		366	...		529		696	...		4762		4992		5198	...
Sums					72260		74381	...		77050		80929	...		75591		73393		71614	...
,, × k				− 41		− 43		...	−44		−46		...	−43		42		41		...
A_{11}				134		109		...		185		200	...		56		32		8	...
A_{12}				17		19		...	27		22		...		42		43		43	...
A_{13}					23		29	...		26		18	...	18		7			4	...
A_{14}					4		3	...		4		5	...	8		8		8		...
A_{15}				30		24		...		1	5		...	111			20		16	...
A_{16}					84		91	...		203		202	...		2	17		36		...
30	30	18^d5		16 + 1	1064239		946233	...		1667445		1898171	...		5183327		5238568		5263780	...
31	31	8·5		211 + 1	48401		82175	...		434189	262	458497	...		17194	+1	5164		3726	...
32	32	29·5		7 + 3	872243		890045	...		918511		917251	...		465612		420224		375361	...
33	33	12·5	− ·02	10	6538		7687	...		20552		21377	...		24632		23284		21762	...
34	34	153·0	+ ·04	8	21269		21592	...		39844		40016	...		42066		42167		42262	...
35	35	2·5	− ·37	67	17288		11332	...		26973		32345	...		7886		13308		19436	...
36	36	1·5	+ ·4	42	5524		5104	...		3230		2624	...		3027		3632		4216	...
37	37	7·5	+ ·2	274	4674	64	5801	...		6269		5208	...		7597		7838	335	7710	...
38	38	6·5	+ ·1	140	2853		2932	...		1190	17	1819	...		2255		2705		2925	...
39	39	0·5	+ ·3	13	342		251	...		392		389	...		98		25		2	...
L					21999666		24371417	...		53678762		56050514	...		91626785		93998536		96370288	...
Σ_2 { Sums +					24115408		26419073	...		56874826		59509565	...		97456170		99828939		102183153	...
Σ_2 { ,, −					−222		−195	...		−71		−73	...		−180		−74		−85	...
Σ_3					136738		144337	...		136634		125427	...		116679		125201		132569	...
Nutation					−133		−132	...		−91		−92	...		−106		−108		−109	...
Longitude = sum					24251791		26563083	...		57011298		59634827	...		97572563		99953958		102315528	...

Computation of Σ_4.

Month 9. Int. fact. for D, −·444. Month 10. Int. fact. for D, +·495.

Tab.	Hor. Args.	D	-0^d5	0·0	...	28·5	29·0	29·5	30·0	30·5	Hor. Args. D	-0^d5	0·0	0·5	1·0	...
IV																
1	1	96·78	3035	3044	...	3489	3494	3484	3458	3417	108·18	3494	3483	3456	3414	...
2	2	85·58	567	531	...	575	517	471	440	428	109·38	514	468	439	427	...
3	3	95·61	291	251	...	354	299	256	231	227	96·67	296	254	230	227	...
4	4	50·93	32	30	...	213	239	267	295	321	78·74	241	269	297	323	...
5	5	4·9	148	187	...	162	201	242	279	310	12·9	203	244	281	311	...
6	6	31·0	160	156	...	155	160	164	166	168	61·8	161	163	166	168	...
7	7	51·1	107	112	...	69	70	74	80	85	60·1	70	75	80	86	...
8	8	13·7	27	31	...	35	34	31	27	22	28·5	34	31	26	21	...
9	9	37·8	31	30	...	31	28	24	20	15	1·5	29	25	20	15	...
10	10	58·4	44	44	...	48	48	48	48	48	78·5	48	48	48	48	...
11	11	15·7	35	35	...	31	31	30	30	29	19·6	30	30	29	29	...
Sums			4477	4451	...	5162	5121	5091	5074	5070		5120	5090	5072	5069	...
12	16	216·41	1417	1445	...	1329	1384	1412	1414	1389	234·41	1386	1413	1413	1387	...
13	17	2·20	1154	1148	...	618	610	604	599	595	10·89	610	604	599	595	...
14	18	34·40	0	0	...	85	97	109	122	134	5·60	99	111	123	135	...
15	19 + *a*	13·67	1489	1569	...	1746	1783	1809	1824	1826	21·16	1786	1810	1824	1826	...
16	21	17·9	5	6	...	4	5	6	8	10	19·4	5	6	7	10	...
Σ_4 { Sums			8542	8619	...	8944	9000	9031	9041	9024		9006	9034	9038	9022	...
Σ_4 { Int. to date					...	−33	−22	−11	−1				+5	−5	−16	...
Σ_4 { k × 1st sums					...	− 3	− 3	− 3	−3				−3	−3	− 3	...
Day of year					...	266^d5	267·0	267·5	268·0				268^d0	268·5	269·0	...

Differences and Cor. to Δ′

	Δ′	Δ″	Cor. to Δ′
...	...	...	...
28^d5	+56	−24	−7
29·0	31	25	6
29·5	+10	21	7
30·0	−17	27	
30·5			
-0^d5	+28		
0·0	+ 4	−24	+6
+0·5	−16	20	5
1·0	35	19	3
1·5		2	
...	...	...	...

Computation of Σ_3. The arguments are shown as in Σ_2. The letter '*c*' in Table 24 indicates the beginning of a fresh column in the printed table. Day 366·0 is day 0d0 (Jan. 1·0) of 1924.

Tab.	Args.	Day of year		0d0	0·5	1·0	1·5	2·0	2·5	…	365·0	365·5	366·0	366·5	…
IV															
19	53	31d5 −0d1	4 18	4048	4168	4273	4362	4435	4492	…	3014	2821	2625	2426	…
20	54	11·0 − ·4	10	313	236	169	112	67	33	…	654	763	875	990	…
21	55	28·5 + ·24	70	92262	95479	98293	100680	102614	104078	…	72015	67159	62171	57094	…
22	56	7·0 + ·3	110	367	470	567	647	705	733	…	424	525	614	682	…
23	57	0·5 + ·3		1155	1100	1026	936	832	720	…	930	1021	1096	1152	…
24	58	1738·7	3	2659	2662	2665	2667	2670	*c* 2673	…	4096	4097	4098	4098	…
25	59	54·0 − ·49	93	3445	3374	3302	3231	3161	3091	…	5119	5046	4973	4899	…
26	60	8·0 − ·1	7	231	517	919	1418	1991	2614	…	5458	4997	4451	3845	…
27	61	10·5 − ·1	86	718	538	383	254	154	84	…	119	62	37	42	…
28	62	2·0 ·0	2	226	162	101	51	16	1	…	114 397	375	335	280	…
29	63 = 5d61, 64 = 2d		2	52	53	54	55	56	56	…	24	21	19	16	…
30	65 = 6·7, 66 = 2		1	14	14	14	14	14	14	…	12	12	13	13	…
31	67 = 23·0, 68 = 1		2	11	12	13	14	15	16	…	24	23	23	23	…
32	69 = 8·7, 70 = 2			18	18	18	18	18	18	…	8	7	7	6	…
Σ_3	Sums			105519	108803	111797	114459	116748	118623	…	92294	86929	81337	75566	…
	Constants			−69871	−69871	−69871	−69871	−69871	−69871	…	−69871	−69871	−69871	−69871	…
	k (1st two lines −3400)			−1	−1	−1	−1	−1	−1	…	0	0	0	0	…

Computation of Σ_6. Interpolating factors as in Σ_1.

Month 0. Month 1.

Tab.	Hor. Arg.	D	27d5	28·0	28·5	29·0	29·5	30·0	30·5	Args. D	−0d5	0·0	0·5	1·0	1·5	2·0	…
IV																	
34	1	135·2	113	102	92	83	80	80	84	5·6	83	80	80	84	92	103	…
35	2	27·4	161	159	164	176	192	210	226	51·2	177	193	211	227	239	244	…
36	3	86·1	267	266	256	237	213	187	162	87·1	236	211	185	161	143	133	…
37	4	48·6	20	15	11	6	5	5	7	76·4	6	4	5	6	10	16	…
38	5	60·8	31	37	44	49	51	51	48	68·8	48	51	51	47	42	35	…
39	6	18	10	10	10	10	10	11	11	49	10	10	11	11	11	11	…
40	7	70	15	15	14	13	11	9	7	79	13	11	9	7	6	5	…
41	8	30	12	12	12	12	11	10	9	45	11	10	9	8	8	8	…
42	9	29	8	8	8	9	10	11	12	35	9	10	11	12	12	12	…
43	6	54·41	403	412	423	436	450	465	478	72·41	437	450	465	478	489	497	…
Σ_6	Sums		1040	1036	1034	1031	1033	1039	1044		1030	1030	1037	1041	1052	1064	…
	Int. to date		−1	0	0	0	+1	+1				0	0	0	+1	+1	…
	Consts. (neg.)		1400	1400	…	…	…	…	…	…	…	…	…	…	…	…	…
Σ_{18}			+535	535	535	535	535	+535				+535	535	535	535	535	…
Day of year			0d0	0·5	1·0	1·5	2·0	2·5				2d0	2·5	3·0	3·5	4·0	…

Differences

	Δ′	Δ″	Cor. to Δ′
27d5		+3	
	−4		0
28·0		+2	
	2		0
·5		−1	
	−3		0
29·0		+5	
	+2		−1
·5		+4	
	6		0
30·0		−1	
	5		
·5			
−0d5			
	0		
0·0		+7	
	+7		0
+0·5		−3	
	4		0
1·0		+7	
	11		−1
·5		+1	
	12		0
2·0		−1	
	11		0

Computation of Σ_7 *and the Latitude.* There is no interpolating factor for Tables 17, 18. The last figure of Σ_2 is cut off before entry as shown by the divisor 10. The nearest tabular value corresponding to the Arg. S is written separately, as is the variation on the last line but one; the products of the numbers in this line and the difference between the given and tabular values of S are shown below the tabular values from Table 33. The factor 10^{-3} attached to Σ_7 indicates the dropping of the last three figures of Σ_7 before performing the multiplication by the last line. Multiples of 1296000″ are to be subtracted from S when necessary. This is shown on days 8·0, 8·5 where $\bar{2}704$ on the first lines indicates − 20000000 + 7040000.

Day of year		0d0	0·5	1·0	…	8·0	8·5	…	97·0	97·5	…
Tab. 17, Arg. 51 = 2d	10	11	9	7	…	$\bar{2}$ 704 10	$\bar{2}$ 704 12	…	$\bar{2}$ 704 9	$\bar{2}$ 704 10	…
„ 18, „ 52 = 11d	1	0	0	0	…	6	6	…	5	6	…
Σ_{17}		1018	1017	1017	…	1010	1009	…	930	930	…
Σ_4		8793	8787	8776	…	7238	7168	…	4813	4731	…
$\Sigma_2 \div 10$		2411519	2641888	2875099	…	6360874	6616133	…	9989373	10228698	…
−☊		6688280	6689233	6690186	…	6703531	6704484	…	6873196	6874149	…
Sum = S		910962″1	934093″4	957508″5	…	11266″9	36881″2	…	390832″6	414852″4	…
Σ_7 Tab. 33, Arg. S		− 1771852	− 1821210	− 1847888	…	+ 101299	+ 329206	…	+ 1755936	+ 1675070	…
		+ 99	+ 11	− 5	…	− 297	− 166	…	− 94	+ 182	…
Σ_8		+ 35647	+ 38931	+ 41925	…	+ 35611	+ 31449	…	+ 45156	+ 48171	…
$10^{-3}\,\Sigma_7$ × last line		− 302	− 305	− 305	…	+ 15	+ 29	…	+ 2048	+ 1964	…
Sum = Latitude		−17364″08	−17825″73	−18062″73	…	+1366″28	+3605″18	…	+18030″46	+17253″87	…
Variation of Tab. 33		− 262	− 165	− 63	…	+ 896	+ 883	…	− 287	− 383	…
$(\Sigma_8 + \Sigma_{18})\,10^{-3}$		+ ·174	+ ·171	+ ·169	…	+ ·109	+ ·081	…	+ 1·137	+ 1·140	…

Computation of Σ_8.

Month 1. Int. fact. for D, +·046. **Month 2.** Int. fact. for D, −·016.

Tab.	Hor. Args.	D	−0^d·5	0·0	…	29·0	29·5	30·0	30·5	Hor. Args. D	−0^d·5	0·0	0·5	1·0	…
V															
1	1	5·58	275	265	…	235	290	357	431	16·98	238	295	362	436	…
2	2	51·18	2927	2641	…	3163	2999	2836	2675	74·98	3153	2990	2826	2666	…
3	3	87·13	1193	1416	…	1116	1336	1562	1785	88·19	1130	1350	1576	1798	…
4	4	76·4	691	696	…	663	632	597	561	104·3	661	628	594	560	…
5	5	68·8	63	54	…	54	60	76	100	76·8	54	61	77	102	…
6	6	48·5	110	103	…	142	142	142	141	79·3	143	142	141	141	…
7	7	79·1	39	47	…	35	41	49	56	88·1	36	42	49	56	…
8	8	45·3	14	19	…	34	33	32	29	10·0	34	33	32	29	…
9	9	34·7	36	32	…	27	23	19	19	49·3	26	23	20	18	…
Sums			5348	5273	…	5469	5556	5670	5797		5475	5564	5677	5806	…
10	16	72·41	1235	1268	…	1303	1330	1357	1380	90·41	1305	1332	1359	1380	…
11	17	34·68	305	302	…	199	192	186	178	43·37	198	191	184	178	…
12	18	36·80	132	144	…	179	174	168	160	8·00	179	174	167	160	…
13	19 + *a*	29·76	684	609	…	335	295	265	245	37·30	332	293	264	245	…
14	21	5·8	3	3	…	5	5	7	9	7·3	4	5	7	9	…
Σ_8 Sums			7707	7599	…	7490	7552	7653	7769		7493	7559	7658	7778	…
Σ_8 Int. to date				−4	…	+2	+4						−2	−2	…
Σ_8 k (1st sums − 6000)				0	…	0	0						0	0	…
Day of year				2^d·0	…	31·0	31·5						32^d·0	32·5	…

Differences

	Δ′	Δ″	Cor. to Δ′
…	…	…	…
29^d·0	+18		−22
	62	+44	20
·5	101	39	−13
30·0	116	15	
·5			
−0^d·5	+66		
0·0	99	+33	+13
+0·5	120	21	8
1·0	130	+10	+ 1
1·5	124	− 6	− 4
…	…	…	…

Computation of Σ_9 *and of the equatorial horizontal Parallax.* The next lower Arg. of Table 24 gives the minutes and tens of seconds of the parallax; this Arg. subtracted from Σ_9 gives the seconds and decimals of a second expressed in units of 0″·001. The left-hand blocks of the first seven lines contain the negative values. The arguments are exhibited as in Σ_2: 71, 33, 72 corresponding to 30, 31, 32 in Σ_2. In passing to 1924, the B are here continued from the 1923 group, but the arguments are given their new values: there is no sensible break.

Tab. Arg		Day of year	0^d·0		0·5		1·0		…	365·0		365·5		Args. 1924·0	0·0		0·5		…
B_{11}				5		5		5	…		5		4			3		2	…
B_{12}			−4		−3		−2		…	−1		−1			−1		1		…
B_{13}			5		4		3		…		0		0			0		1	…
B_{14}				0		0	1		…	2		2			2		1		…
B_{15}				4		4		4	…		2		2			1		1	…
B_{16}				3		3		2	…		4		3			3		2	…
k (Tab. 19 − 2000)			1		1		1		…		1		1			1		1	…
V																			
15	71	18^d·5	10 + 1	107455		124972		143694	…		368104		379458	26^d·0	138 + 1	388181		394082	…
16	33	12·5	9 + 1	47413		52009		55640	…		4427		7355	24·0	36	11284		16049	…
17	72	5·5	33 + 1	54804		51638		48366	…		19974		22759	21·5	48 + 1	25718		28823	…
18	73	5·0 + ·1	13	50		350		939	…		26		121	5·5 + 0^d·1	112	530		1209	…
19	74	13·0 − ·2	27	3195		3475		3694	…	10	309		526	9·5 − ·2	56	804		1132	…
20	75	5·0 ·0	13	1		0		0	…		18		17	1·0 ·0	10	16		15	…
21	76	1·0 − ·1	46	396		273		155	…		63		19	3·5 + ·1	48	30		91	…
22	77	0·0 − ·2	37	1201		1140	*c*	1028	…		716		530	3·0 − ·2	31	351		197	…
23	78	9·0		17		17		17	…		14		14	22·0		14		13	…
Σ_8				8186		7993		7836	…		8105		8209			8316		8439	…
Σ_9 Sums of +				222730		241879		261380	…		401768		419018			435252		450057	…
Σ_9 " " −				10		8		7	…		3		3			3		2	…
Next lower Arg. of Tab. 24				221659		241657		251656	…		401641		411640			431638		441637	…
Tab. 24, Arg. Σ_9 = parallax				56′ 1″·061		56′20″·214		56′39″·717	…		59′0″·124		59′17″·375			59′33″·611		59′48″·418	…

CHAPTER VI

THE COMPUTATION OF A SINGLE PLACE.

The construction of the annual ephemeris of the Moon requires the arguments to be calculated only on day 0 of the year and at certain other dates specified in the instructions of Chap. V. In this chapter, precepts are given for obtaining the arguments and thence, the place of the Moon at any date. For a modern place, these precepts are additional to those of Chap. V. For the computation of an ancient place for which a much lower degree of accuracy may be adopted, the precepts of this chapter are intended to be complete, so that reference to other parts of the introduction should be unnecessary.

Illustrations of the computations are afforded by an example in which the arguments needed for a certain ancient place are computed to their full degree of accuracy in order to illustrate the additional work necessary for a modern single place. But the values extracted from the tables of Sects. III to VI are only taken out to the degree of accuracy needed for the ancient place.

Precepts for the formation of the Arguments at any date.

Transform the calendar date and the time of day to days of the year and a fraction of a day and to a fraction of a year by Table 1, Sect. II. Transform also the years and fraction of a year after the beginning of the century to a fraction of a century.

From Table 2, II, take out the values of the arguments and of L, – ☊ for the beginning of the century, noting that for centuries B.C., as well as A.D., the remaining number of years must be positive (e.g. – 381 = – 400 + 19); multiply the numbers in column (*a*)* by the fraction of the century, and those in column (*b*)* by the square of this fraction. To the sum of these add, from Table 3, II, the values for the beginning of the corresponding year of the twentieth century, multiplying the numbers in column (*a*)* by the fraction of the year and adding in the results.

Add further to Arguments D, 23 to 47, 30 (p. 37), 49, 51 to 63, 65, 67, 69, 71 to 78, L, – ☊, the values from Table 4, II, for the integral number of half-days of the year to date. From the same table add to Arguments 1 to 22, the values on the same line as that used for D. Similarly to Arg. 48, add the value on the same line as that used for Arg. 30 in the preceding column. Argument 50 is to be similarly treated with respect to Arg. 49; Arg. 64 to Arg. 63; Arg. 66 to Arg. 65; Arg. 68 to Arg. 67; Arg. 70 to Arg. 69. To Argument *l'*, add the days of the year and the fraction of the day to date, and to Args. 82, 83, 84 add the number of days and fraction of the day to date since *l'* was zero.

* These are expressed in units of the last tabulated place of the argument.

Add further to Arguments D, 49, 58, 63, 65, 67, 69, 78, the fraction of the day to the nearest decimal place required in each, and to Arguments 23 to 47, 51 to 57, 59 to 62, 71 to 77, this fraction of the day, reduced to column number and decimals of a column number by multiplying twice the fraction of the day by the number of parts in half a day for each of these arguments as shown in the headings of the columns of Table 3, II.

If necessary, subtract one or more periods of D from that argument, so that it may become less than the period of D. To each of the Arguments 1 to 22, add the same multiple of 'Addition for a Period of D' given in the headings of Table 3, II. The pairs of Arguments 30 and 48, 49 and 50, 63 and 64, 65 and 66, 67 and 68, 69 and 70, l' and 82, 83, 84, are treated in the same manner as D and any one of the Arguments 1 to 22. When necessary subtract multiples of the periods of the second arguments so as to render their computed values less than their periods.

From the single-entry arguments subtract the necessary multiples of their periods. If, in any argument, the resulting column number is negative, add, from the heading of Table 3, II, the value for $0^d.5$ (or a multiple of it) and subtract $0^d.5$ (or the same multiple of $0^d.5$). Similarly if the resulting column number is greater than the value for $0^d.5$, subtract the necessary multiple of that value and add the same multiple of $0^d.5$. These adjustments are required to bring the argument within the values for which the function is tabulated.

When the arguments for the date have been obtained, the tables of Sects. III to VI are entered and the results are computed in the manner explained in Chap. V, for finding the place at day 0 of any year. One change is to be noticed. Since the secular variations of L, $-\Omega$, and of Arguments 30, 31, 32, 71, 72 from the beginning of the year have already been accounted for in the formation of these quantities, they must be omitted from Σ_{10}, Σ_{17}, Σ_{11}, Σ_{13}, Σ_{15}, Σ'_{11}, Σ'_{15}, respectively.

The precepts given in Chap. V for continuation for successive half-days are not needed in the computation for a single place unless it be required to find also the variation for a small change of the time. To obtain this variation, extract from the tables of Sects. III to V, the values for the half-days preceding and following the given date. Four consecutive values should be extracted from the double-entry tables which have D as the vertical argument so as to permit of the interpolation from the tabular to the computed value of D. Three consecutive values from the tables of Sect. VI are sufficient for all purposes. In the single-entry tables of Sects. III to V, if the value at the date is that for $0^d.0$ in any table containing succession numbers, the value for the previous half-day will be obtained by finding the computed column number of the argument amongst the succession numbers and using the value next to that succession number. If the value at the date is the last of any column, the value for the following half-day is obtained by means of the succession number as explained in Chap. V. The additional labour of finding the values for the two extra half-days is very small compared with the rest of the work. The variation of any coordinate for a small change in the time is obtained by multiplying the mean of the final first differences for that coordinate by the ratio of the change to half a day.

The Computation of an Ancient Place.

The probable errors of ancient observations are so large that considerable abbreviations may be made in computing a position from the Tables for comparison. If the aim be to obtain the Longitude, Latitude and Parallax with probable errors due solely to computation and omission of about 5", 0".5, 0".05, respectively, we can omit coefficients of terms or of groups of terms which are respectively less than 2", 0".2, 0".02. Errors of 10", 1", 0".1 will be rare and indeed much larger errors will not interfere with the accuracy of a comparison with such observations.

Omissions of certain tables require changes in the constants in order to avoid systematic errors. The precepts which follow are so arranged that the respective coordinates may be computed in units of 1", 0".1 and 0".01, instead of the units employed in the Tables.

Precepts.

Form the arguments and L, − ☊, as explained in the earlier part of this chapter, omitting Args. 8 to 11, 13 to 15, 20 to 22, 48 to 52, 63 to 70, 75, 78, *l'*, 79 to 81. Two places of decimals may be dropped in the arguments up to 47 inclusive and one place in the remainder, but mistakes are more easily avoided if they are all computed to the full number given in Sect. II. The additions to Arg. 19 on p. 46 of Sect. IV and p. 33 of Sect. V may be omitted.

Add 0ᶜ.8 to Arg. 30, 1ᶜ.3 to Arg. 31, 3ᶜ.4 to Arg. 32, 0ᶜ.5 to Arg. 71, 1ᶜ.1 to Arg. 72, in order to account for the constants of omitted tables.

Compute the Longitude, Latitude and Parallax from the following scheme, which is constructed on the plan that the last two digits of every entry from the tables of Sect. III and the last digit of every entry from the tables of Sects. IV, V, will be dropped. The dropping of digits from the tables of Sect. VI is indicated by the divisors 10 or 100. The last two digits of L and the last digit of − ☊ are also dropped. The phrase 'sum of Tables...' is an abbreviation for 'sum of values from Tables ....'

Notation and Arrangement.

k = − ·0000248 × time in years from 1900·0.

Σ_1 = Sum of Tables 1 to 7, 16, 19, III + k (Sum of Tables 1 to 7, III),

Σ_2 = Sum of Tables 23 to 29, 31 to 39, III + (Table 30, III + 30000) + k (Sum of Tables 23 to 29, III) + L,

Σ_3 = Sum of Tables 40 to 47, III + k (Table 47, III) + $\frac{1}{100}$ (Sum of Tables P 22, P 23, P 24, VI) + Σ_1 + 24 + 9k,

in which formulae the last two digits of the values from all the tables of Sect. III and of L are supposed to have been dropped;

*True Longitude** = $\Sigma_2 + \Sigma_3$ in units of 1".

Σ_4 = Sum of Tables 1 to 7, 12 to 15, IV + k (Sum of Tables 1 to 7, IV),

* The Nutation is not included.

$S = \Sigma_2 + \Sigma_4 + \frac{1}{100}$ (Sum of Tables P 23, P 24, VI) $+ \frac{1}{10}$ Table P 34, VI
$+ \frac{1}{10}$ Tables P 35 (P 34 – 1000), VI – ☋ + 19 + 9k,
in units of 1″;

Σ_5 = Sum of Tables 19 to 28, IV + k (Sum of Tables 19, 20, IV – 340) – 6980,

Σ_6 = Sum of Tables 34 to 38, 43, IV – 129,

$\Sigma_7 = \Sigma_5$ + Table 33, IV,

in which the last digit of all values from the tables of Sect. IV and of – ☋, has been dropped;

Latitude $= \Sigma_7 + \frac{1}{100} \Sigma_7 \times \frac{1}{1000} (\Sigma_6 + \frac{1}{10}$ Table P 36 $+ \frac{1}{10}$ Tables P 36 × P 37)
in units of 0″.1.

Σ_8 = Sum of Tables 1 to 7, 10 to 13, V + k (Sum of Tables 1 to 7, V – 595),

Σ_9 = Sum of Tables 15 to 19, 21, 22, V + k (Table 19, V – 200) + Σ_8 + 9,

Equatorial Horizontal Parallax = Table 24, V, Arg. Σ_9,
in units of 0″.01; the last digit of all values from the tables of Sect. V has been dropped.

The following tables have been omitted: 8 to 15, 17, 18, 20 to 22, 48, 49, Sect. III; 8 to 11, 16, 29 to 32, 39 to 42, Sect. IV; 8, 9, 14, 20, 23, Sect. V; and all of Sect. VI except P 22, P 23, P 24, P 34, P 35, P 36, P 37.

Digits in the Arguments may be dropped to correspond with those dropped from the Tables.

Most of the tables contain two sets of arguments: arguments at the top are used with those on the left and arguments at the bottom with those on the right. The succession numbers are not needed except when the variations for a small change in the time are to be computed as explained in the earlier part of this chapter.

In entering the double-entry tables which have D as the vertical argument, take as vertical arguments three half-day values nearest to the computed value of D, preceding and following, and interpolate, when necessary, for the horizontal arguments with the given variations. After summing the four groups Σ_1, Σ_4, Σ_6, Σ_8, interpolate the sums to the computed value of D, by using as factor twice the difference between the computed and tabular values of D.

Each single-entry table is entered on the line given by the integral number of days and half-day and in the column given by the column number of its Argument. Interpolation is made between adjacent columns by means of the printed variations. In tables where no column number is used, interpolation is made between successive values.

Table 30, III, requires the addition of 3×10^6 to each value or 3×10^4 after the last two digits have been dropped. The sign to be used is shown in a note at the head of the table.

The printed variations for both double- and single-entry tables are always those for unit change of the argument whether every value, every second or every fourth value of the argument is tabulated. The sign of the interpolated portion should be checked by comparison with an adjoining column.

The argument of Table 33, IV, is given in multiples of 100″; the complete period of the table being 1296000″, this, or a multiple of it, must be subtracted from the computed value of S when necessary. The sign of the value is shown by a note at the head of the table.

Table 24, V, is entered with Σ_9 as argument by subtracting the tabular argument next smaller than Σ_9 from Σ_9; the difference divided by 10^3 (or by 10^2 when the last digit of the argument is dropped) is the number of seconds to be added to the parallax opposite the tabular argument.

The method of obtaining the variation for a small change of the time is explained on p. 102.

Example.

The example which follows gives the complete computation of the Longitude, Latitude and Parallax of the Moon for the date of a lunar eclipse recorded by Ptolemy in the Almagest. It is the same date as that adopted by Newcomb as an example for finding an ancient place of the Sun in his *Tables of the Sun*.

Example. The Moon's place at – 381, Dec. 12, $6^{h}\,56^{m}$.

Date = – 400^{y} + $19^{y}\,346^{d}\,6^{h}\,56^{m}$ = – 400 + $19^{y}\,346^{d}{\cdot}28$ = – 400^{y} + $19^{y}{\cdot}948$ (Table 1, II).
Computation of the Arguments: the tables are in Sect. II.

Tab.	Arg.	D	1	2	3	4	5	6	7	12	16	17	18	19
2	–400	$24^{d}2436$	$4^{c}205$	$145^{c}80$	$14^{c}50$	$104^{c}09$	$99^{c}82$	$127^{c}31$	$15^{c}48$	$15^{c}03$	$227^{c}112$	$35^{c}26$	$22^{c}66$	$59^{c}78$
2	s.v.	– 12	+ 1	– 4	+ 3	– 6	– 7	– 3	+ 3	0	– 65	0	– 1	+ 3
3	1919	13·5522	140·602	109·20	34·15	49·94	52·28	92·02	29·16	20·65	176·402	8·18	32·80	34·78
4	$346^{d}2889$	21·4524	125·396	105·80	11·66	57·91	88·11	74·91	98·98	13·26	198·001	44·59	25·20	6·49
3	–2 Periods	–59·0612	22·800	47·60	2·12	55·62	16·02	61·62	18·00	15·50	36·000	17·38	18·40	15·00
3	–Periods		–282	–312		–248	–256	–264	–100	–48	–502	–102	–76	–76
	Sums	0·1858	11·004	96·36	62·46	19·50	0·16	91·83	61·65	16·44	135·450	3·41	23·05	40·08

Tab.	Arg.	23		24		25		26		27		28		29		30	
2	–400	$8^{d}0$	$475^{c}7$	$10^{d}0$	$158^{c}7$	$22^{d}5$	$26^{c}1$	$20^{d}5$	$5^{c}15$	$26^{d}5$	$10^{c}4$	$3^{d}0$	$93^{c}4$	$27^{d}5$	$166^{c}1$	$21^{d}5$	$79^{c}901$
2	s.v.		– 1·6		– ·4		– 2·9		– 2·56		+ 3·9		– 1·4		+ 2·7		– 5·476
3	1919	10·0	163·3	2·0	20·0	22·5	148·2	12·0	36·76	0·0	152·7	3·0	18·1	14·0	199·7	17·5	274·739
4	346^{d}	7·0	574	19·5	31	12·5	158	18·0	48	32·0	195	0·0	151	24·0	43	15·0	228
3	$0^{d}28$		346·1		96·5		109·2		82·04		149·1		102·8		119·6		190·667
3	–Per.	–15·0	–464	–28·0	–128	–51·0	– 92	–29·5	–86	–34·5	–179			–58·0	–218	–55·0	– 72
3	Adj.	+ 0·5	–599	+ 0·5	–167	+ 0·5	–189			+ 0·5	–258	+1·0	–356	+ 0·5	–207	+ 1·0	–660
	Sums	10·5	494·5	4·0	10·8	7·0	157·6	21·0	83·39	24·5	74·1	7·0	7·9	8·0	106·1	0·0	35·831

Tab.	Arg.	31		32		33		34		35		36		37	
2	–400	$9^{d}0$	$281^{c}10$	$27^{d}0$	$181^{c}44$	$24^{d}0$	$47^{c}70$	$190^{d}5$	$12^{c}54$	$4^{d}0$	$55^{c}96$	$11^{d}0$	$85^{c}5$	$5^{d}0$	$27^{c}1$
2	s.v.		– ·72		+ 4·68		– ·24		– 3·01		– 2·05		+ 1·6		+ 1·1
3	1919	9·5	72·64	0·0	32·78	28·0	15·81	133·5	0·94	2·5	224·57	4·0	7·1	9·0	89·3
4	346^{d}	6·0	234	27·5	255	21·0	32	140·0	3	9·5	11	11·5	111	3·0	98
3	$0^{d}28$		169·87		193·56		56·62		8·09		160·04		67·6		228·8
3	–Per.	–14·5	–156	–31·5	–209	–59·0	–12	–411·0	–22	–9·5	– 63	–15·5	– 95	–10·0	– 67
3	Adj.	+ 1·0	–588	+ 0·5	–335	+ 0·5	–98			+0·5	–277	+ 0·5	–117		
	Sums	11·0	12·89	23·5	123·46	14·5	41·89	53·0	– 0·44	7·0	109·52	11·5	60·8	7·0	377·3

Tab.	Arg.	38		39		40		41		42		43		44		45	
2	–400	$1^{d}5$	$3^{c}4$	$0^{d}0$	$24^{c}7$	$6^{d}0$	$273^{c}18$	$144^{d}0$	$3^{c}2$	$18^{d}5$	$2^{c}5$	$2^{d}0$	$132^{c}0$	$0^{d}5$	$113^{c}0$	$3^{d}0$	$39^{c}9$
2	s.v.		– 2·9		– ·2		+ ·04		+ ·6		+ 2·5		– 1·0		– ·2		+ ·6
3	1919	6·5	172·4	1·0	11·7	4·0	84·63	69·5	7·5	17·5	21·6	8·5	72·4	1·0	164	5·0	78·6
4	346^{d}	11·0	16	8·0	18	19·0	282	172·5	8	23·0	140	8·5	184	6·0	40	2·5	111
3	$0^{d}28$		172·8		17·9		179·69		12·1		87·8		109·2		103·4		76·8
3	–Per.	–14·0	–152	–5·5	–20	–27·0	–132	–346·0	–26	–53·0	–230	–18·0	– 82	–7·0	– 29	–9·5	– 8
3	Adj.			+0·5	–31	+ 1·0	–622					+ 1·0	–378	+1·0	–358	+1·0	–266
	Sums	5·0	209·7	4·0	21·1	3·0	65·54	40·0	5·4	6·0	24·4	2·0	36·6	1·5	33·2	2·0	32·9

Tab.	Arg.	46		47		53		54		55		56		57		58
2	–400	$0^{d}0$	$39^{c}7$	$35^{d}0$	$6^{c}93$	$10^{d}5$	$34^{c}7$	$14^{d}5$	$35^{c}2$	$13^{d}0$	$21^{c}57$	$0^{d}0$	$76^{c}6$	$4^{d}0$	$46^{c}4$	$990^{d}0$
2	s.v.		– ·6		+ ·02		– ·2		– ·2		– ·71		– 0·3		+ 0·5	+ ·7
3	1919	4·0	18·8	88·5	16·69	22·0	28·9	3·5	0·4	20·0	45·29	5·0	54·1	14·0	10·3	277·6
4	346^{d}	10·5	9	346·0	0	27·0	24	19·5	23·0	23·0	50	1·5	6	9·5	7	346
3	$0^{d}28$		39·3		14·44		22·5		27·2		75·11		46·2		64·7	·3
3	–Per.	–13·0	–94	–365·0	–13	–35·0	–32	–29·5	–15	–32·0	–73			–16·0	– 5	
3	Adj.			+ 0·5	–25	+ 1·0	–78	+ 0·5	–47	(Tab. P 29)	– ·03	+1·0	–160	+ 0·5	–112	
	Sums	1·5	12·2	105·0	0·08	25·5	– 0·1	8·5	23·6	24·0	118·23	7·5	22·6	12·0	11·9	1614·6

Tab.	Arg.	59		60		61		62		71		72		73		74	
2	–400	$71^{d}0$	$3^{c}96$	$2^{d}5$	$110^{c}8$	$9^{d}0$	$30^{c}1$	$9^{d}0$	169^{c}	$21^{d}5$	$53^{c}27$	$27^{d}0$	$59^{c}03$	$4^{d}0$	$56^{c}0$	$8^{d}0$	$56^{c}4$
2	s.v.		– ·41		– 2·0		– 1·8		– 3		– 3·66		+ 1·52		– 2·0		– ·2
3	1919	98·5	3·62	4·0	31·1	0·5	16·6	8·5	179	17·5	182·69	8·0	0·42	5·0	171·1	13·5	68·6
4	346^{d}	157·5	3	4·0	32	11·0	14	8·0	15	15·0	152	27·5	83	9·5	11	7·0	68
3	$0^{d}28$		2·89		98·8		30·6		118		127·11		62·98		160·0		41·0
3	–Per.	–188·0	– 2					–19·0	–128	–55·0	– 48	–31·5	– 68	–9·5	– 63	–15·0	– 55
3	Adj.	+ 1·0	–10	+0·5	–171	+0·5	–53	+ 0·5	–205	+ 1·0	–440	+ 0·5	–109	+0·5	–277	+ 1·0	–142
	Sums	140·0	1·06	11·0	99·7	21·0	36·5	7·0	145	0·0	23·41	31·5	29·95	9·5	56·1	14·5	36·8

Tab.	Arg.	76		77		82	83	84	L	−☊
						d	d			
2	−400	$1^{d}5$	$0^{c}7$	$5^{d}0$	$4^{c}4$	2915	2813	2822	1046924″	555686″
2	s.v.		−·6		+·2	0	+1	+1	−64	+66
3	1919	1·0	52·3	1·5	6·4	3745	549	5634	901420	390312
4	346^{d}	11·0	3	3·0	16·0	346	346	346	860520	65959
3	$0^{d}28$		34·1		37·6				13703	55
3	−Per.	−7·0	−15			−6800		−6800	−2592000	
3	Adj.	+0·5	−59	+0·5	−65					
	Sums	7·0	15·5	10·0	−0·4	206	3709	2003	230503	1012078

For Tab. P 23 VI

Date −380·05   k = −·0000248
9 Per. 2438·55   × −2280
Arg. 2058·5   = +·0565

For Tab. P 24 VI

Date −380·05
9 Per. 2314·26
Arg. 1934·2

Computation of the Longitude, Latitude and Parallax.

III Tab.	Arg.	$-0^{d}5$	Date $0^{d}0$	$0^{d}5$
1	11·0	28″	28″	28″
2	96	8	8	8
3	62	2	2	2
4	20	16	15	13
5	0	7	9	12
6	92	5	5	6
7	62	3	3	3
Sum		69	70	72
16	135·5	46	48	49
19	40	7	6	6
Sum		122	124	127
Int. fact., +·37			+1	
k × 1st sum			+4	
Σ_1 = sum			129	
40	$3^{d}0$	66^{c}	471	
41	40·0	5	62	
42	6·0	24	46	
43	2·0	37	52	
44	1·5	33	7	
45	2·0	33	12	
46	1·5	12	4	
47	105·0	0	514	
Σ_{10}			52	
Σ_2 {Sum			1349	
{Tab. 47 × k			+29	

III Tab.	Arg. at date		Value
23	$10^{d}5$	494^{c}	128″
24	4·0	11	20
25	7·0	158	83
26	21·0	83	117
27	24·5	74	154
28	7·0	8	11
29	8·0	106	24
Sum			537
30	0·0	35·8 + ·8	30307
31	11·0	12·9 + 1·3	2350
32	23·5	123·5 + 3·4	4446
33	14·5	42	133
34	53·0	0	210
35	7·0	110	199
36	11·5	61	29
37	7·0	377	38
38	5·0	210	15
39	4·0	21	2
	L		230503
Σ_3 {Sum			268769
{k × 1st sum			+30
Σ_3			1378
Longitude = sum			270177
,, Tab. 5, II			75°2′57″

IV Tab.	Arg.	$-0^{d}5$	Date $0^{d}0$	$0^{d}5$
1	11·0	153″	154″	156″
2	96·4	55	50	46
3	62	22	26	31
4	19·5	23	20	17
5	0	12	15	19
6	92	6	6	6
7	62	6	7	7
Sum		277	278	282
12	135·5	184	196	210
13	3·4	108	107	106
14	23	13	12	10
15	40·1	126	116	106
Sum		708	709	714
Int. fact., +·37			+1	
k × 1st sum			+16	
Σ_4 = sum			726	
Σ_3			268799	
P 34 ÷ 10			11	
P 35 (P 34 − 10^3) ÷ 10			−1	
19 + 9k			20	
−☊			1012078	
S = sum			1281633	

IV Tab.	Arg.	$-0^{d}5$	Date $0^{d}0$	$0^{d}5$
34	11·0	10	9	8
35	96	35	35	35
36	62	15	13	13
37	20	5	5	5
38	0	1	1	1
43	135·5	92	90	90
Sum		158	153	152
Int. fact., +·37			−1	
−Consts.			−129	
P 36 ÷ 10			−14	
P 36 × P 37 ÷ 10			−2	
Sum = C			+7	

VI Tab.	Arg.	Value
P 22 ÷ 100	206^{d}	15
P 23 ÷ 100	2058·5	11
P 24 ÷ 100	1934·2	1
24 + 9k		25
Σ_{10} = sum		52

IV Tab.	Arg. at date		Value
19	$25^{d}5$	$-0^{c}1$	188
20	8·5	23·6	79
21	24·0	118·2	5550
22	7·5	22·6	41
23	12·0	11·9	61
24	$1614^{d}6$		193
25	$140^{d}0$	$1^{c}1$	435
26	11·0	99·7	328
27	21·0	36·5	273
28	7·0	145	21
Sum			7169
−Consts.			−6980
k (1st two lines −340)			−4
Σ_5 = sum			+185
Tab. 33, Arg. S			−12875
Σ_7 = sum			−12690
Σ_7 × C ÷ 10^5			−1
Latitude = sum			−12691
,, Tab. 5, II			21′9″·1

V Tab.	Arg.	$-0^{d}5$	Date $0^{d}0$	$0^{d}5$
1	11·0	24	26	30
2	96	288	295	302
3	62·5	252	260	265
4	20	50	50	51
5	0	32	34	35
6	92	13	14	14
7	62	5	6	6
Sum		664	685	703
10	135·5	77	80	80
11	3·4	8	8	8
12	23·1	2	2	2
13	40·1	26	24	23
Sum		777	799	816
Int. fact., +·37			+7	
k (1st sum −595)			+5	
Σ_8 = sum			811	

V Tab.	Arg. at date		Value
15	$0^{d}0$	$23^{c}4$ + ·5	39735
16	14·5	41·9	5947
17	31·5	29·95 + 1·1	7467
18	9·5	56·1	619
19	14·5	36·8	386
21	7·0	15·5	58
22	10·0	−0·4	121
Sum			54333
k (Tab. 19 − 200)			+10
9 (Const.)			9
Σ_8			811
Σ_9 = sum			55163
Tab. 24, Tab. Arg.			55163
,, Parallax			61′30″·00

CHAPTER VII

TRANSFORMATION TO RIGHT ASCENSION AND DECLINATION (TABLES T 50, T 51, T 52, SECT. VI.)

Let λ, β denote the longitude and latitude of the Moon, α, δ its right ascension and declination and ω the obliquity of the ecliptic at date. We have

$$\sin\delta = \sin\omega \sin\lambda \cos\beta + \cos\omega \sin\beta,$$
$$\cos\delta \sin\alpha = \cos\omega \sin\lambda \cos\beta - \sin\omega \sin\beta,$$
$$\cos\delta \cos\alpha = \cos\beta \cos\lambda.$$

The first and second of these may be written

$$\sin\delta = \sin\omega \cos\beta (\sin\lambda + \tan\beta \cot\omega),$$
$$\cos\delta \sin\alpha = \cos\omega \cos\beta (\sin\lambda - \tan\beta \tan\omega).$$

Put $\omega = \omega_0 + d\omega$ and $\omega_\beta = d\omega \sin 2\beta \operatorname{cosec} 2\omega_0$. Then if we neglect squares of $d\omega$ and ω_β, it is easy to show that

$$\sin\delta = \sin\omega \cos\beta \{\sin\lambda + \tan(\beta - \omega_\beta) \cot\omega_0\} \quad \text{.....................(1)},$$
$$\sin\alpha = \cos\omega \cos\beta \{\sin\lambda - \tan(\beta + \omega_\beta) \tan\omega_0\} \sec\delta \quad \text{............(2)}$$

which with $$\cos\alpha = \cos\beta \cos\lambda \sec\delta \quad \text{...............................(3)}$$

constitute the three equations to be used.

Equation (1) furnishes δ. Equation (2) is used to find α when λ, and therefore approximately α, lies between 0° and 45°, 135° and 225°, or 315° and 360°. Equation (3) is used to find α when λ lies outside of these limits. The loss of accuracy which results from attempting to find an angle from its sine when the latter is near + 1 or − 1 is thus avoided.

In order to shorten the computations three tables are given in Sect. VI. Table T 50 gives ω_β with arguments β, $d\omega$; Table T 51 gives $\tan(\beta - \omega_\beta) \cot\omega_0$ with argument $\beta - \omega_\beta$; and Table T 52 gives $\tan(\beta + \omega_\beta) \tan\omega_0$ with argument $\beta + \omega_\beta$. The value $\omega_0 = 23° 27' 0''.00$ has been chosen as convenient for the present century. Table T 50 has a range of ± 50″ for $d\omega$; since the sign of ω_β is equal to the product of the signs of $d\omega$, β, this range makes the table available for about ± 80 years from 1918 which may be extended to ± 190 years by adding the line for $d\omega = 50''$ whenever $d\omega$ exceeds 50″. For dates outside of these limits, the tables must be recomputed with another value of ω_0.

The double-entry Table T 50 is so arranged that an easy interpolation for the argument β is alone necessary. In Tables T 51, T 52 practically the whole interpolation is performed by adding two numbers present in the tables.

For the transformation of a single place this method has no special advantages.

Precepts.

From Table T 50 find ω_β with the latitude as horizontal argument and the difference $d\omega$ between the obliquity at date and 23° 27′ 0″.00 as vertical argument, disregarding signs; attach to ω_β the sign of the product of the signs of the arguments;

ω_β is printed in units of 0″·01. Interpolate for β between the numbers corresponding to the even seconds of $d\omega$ and add on, from the upper part of the table, the number corresponding to the nearest tenth of a second in the first decimal place of $d\omega$. Errors of two or three units in ω_β are unimportant.

From Table T 51 find the function, which is expressed in units of the seventh decimal place, with $\beta - \omega_\beta$ as argument, attaching to it the sign of $\beta - \omega_\beta$. The difference table permits of interpolation to hundredths of a second of arc of the argument without difficulty. Errors of two or three units in the function are unimportant. Add the natural sine of the longitude λ and take the logarithm of the sum. To this logarithm add log cos ω, log cos β. The sum is log sin δ, from which the declination δ is obtained.

From Table T 52 find the function which is expressed in units of the seventh decimal place, with $\beta + \omega_\beta$ as argument, attaching to it the sign opposite to that of the argument. This table is to be used only for dates when λ lies between 0° and 45°, or between 135° and 225°, or between 315° and 360°. The nearest unit in the function can be obtained from the difference table without difficulty. Add sin λ and take the logarithm of the sum. To this logarithm add log cos ω, log cos β and subtract log cos δ. The sum is log sin α from which α, the right ascension, can be found.

When λ is not between the limits mentioned add log cos λ, log cos β and subtract log cos δ to find log cos α, from which α is found.

Gifford's *Table of Natural Sines* to every second of arc is convenient for finding sin λ, and Shortrede's *Tables of Logarithmic Trigonometrical Functions* to every second of arc for obtaining δ in degree measure and α in time. Little extra labour is caused and accumulating errors are avoided by using λ, β to the computed degree of accuracy, namely, 0″·01.

In the following examples, which are arranged in forms convenient for the ephemeris, the figures in italic type remain unchanged through the year; $d\omega$ changes slowly. The sign of sin α is that of line 4, the sign of δ is that of line 5, and the quadrants in which α, λ lie are close enough to prevent confusion.

Examples.

	1923, 6^d·0.	
	λ	191° 11′ 4″·98
	β	−1° 36′ 27″·87
	$d\omega$, ω_β (Table T 50)	−12″·23, −0″·93
1	Table T 51, Arg. $\beta - \omega_\beta$	+·06471 61
2	sin λ	−·19397 27
3	Table T 52, Arg. $\beta + \omega_\beta$	−·01217 31
4	Sum of lines 2, 3	−·20614 58
5	,, ,, 1, 2	−·12925 66
6	log sin ω	*9·59976 76*
7	log line 5	9·11145 28
8	log cos β	9·99982 90
9	log cos ω	*9·96257 35*
10	log line 4	9·31417 45
12	log cos δ	9·99942 53
13	log sin α = sum of lines 8, 9, 10 minus 12	9·27715 17
15	log sin δ = sum of lines 6, 7, 8	8·71104 94
	α	12^h 43^m 38^s·87
	δ	−2° 56′ 48″·8

	1923, 16^d·5.	
	λ	294° 30′ 30″·14
	β	4° 17′ 35″·93
	$d\omega$, ω_β (Table T 50)	−12″·12, −2″·49
1	Table T 51, Arg. $\beta - \omega_\beta$	+·17309 71
2	sin λ	−·90990 07
5	sum	−·73680 36
6	log sin ω	*9·59976 82*
7	log line 5	9·86735 17
8	log cos β	9·99877 96
11	log cos λ	9·61786 61
12	log cos δ	9·98059 96
14	log cos α = sum of lines 8, 11 minus 12	9·63604 61
15	log sin δ = sum of lines 6, 7, 8	9·46589 95
	α	19^h 42^m 31^s·23
	δ	−16° 59′ 54″·8

CHAPTER VIII

INTERPOLATION OF THE HALF-DAILY VALUES OF THE RIGHT ASCENSION AND OF THE DECLINATION TO HOURLY VALUES. (TABLES U 53 TO U 58, SECT. VI.)

An interpolation to twelfths with fourth differences is required.

Denote two consecutive half-daily values of either coordinate by F_0 and F_1, the first, third and fifth differences between F_0, F_1 by Δ', Δ''', Δ^{v} and the second and fourth differences lying on the same lines as F_0, F_1 by Δ_0'', Δ_1'', Δ_0^{iv}, Δ_1^{iv}. Bessel's formula for any value F_n lying between F_0, F_1 may be written

$$F_n = F_0 + n\Delta' + \tfrac{1}{4} n (n - 1) \{\Delta_0'' + \Delta_1'' - \tfrac{1}{12} (n + 1) (2 - n) (\Delta_0^{iv} + \Delta_1^{iv})\}$$
$$+ \tfrac{1}{6} n (n - 1) (n - \tfrac{1}{2}) \{\Delta''' - \tfrac{1}{20} (n + 1) (2 - n) \Delta^{v}\}$$

as far as fifth differences inclusive.

The required values of n are 1/12, 2/12, ..., 11/12. For the first six of these, $(n + 1) (2 - n)/12$ has the values

$$\tfrac{299}{1728},\ \tfrac{308}{1728},\ \tfrac{315}{1728},\ \tfrac{320}{1728},\ \tfrac{323}{1728},\ \tfrac{324}{1728},$$

and the same values for the latter six, taken in reverse order. Their range is small. If we use the value 318/1728 instead of any one of them, the errors of the whole coefficient of $\Delta_0^{iv} + \Delta_1^{iv}$ will be

$$\tfrac{209}{995328},\ \tfrac{200}{995328},\ \tfrac{81}{995328},\ -\tfrac{64}{995328},\ -\tfrac{175}{995328},\ -\tfrac{216}{995328}.$$

The largest of these produces an error less than $(\Delta_0^{iv} + \Delta_1^{iv})/4600$, and this produces errors which are never greater than $0^{s}.0015$ in right ascension or than $0''.02$ in declination.

The coefficient of Δ^{v} is always less than ·001 and the corresponding maximum errors caused by the neglect of Δ^{v} are always less than $0^{s}.001$ and $0''.01$, respectively*.

The formula may therefore be written

$$F_n = F_0 + n\Delta' + \tfrac{1}{4} n (n - 1) \{\Delta_0'' + \Delta_1'' - 0{\cdot}184 (\Delta_0^{iv} + \Delta_1^{iv})\}$$
$$+ \tfrac{1}{6} n (n - 1) (n - \tfrac{1}{2})\Delta'''.$$

Put $n = p/12$ and replace F_n by F_p. We easily find

$$F_{p+1} - F_p = \tfrac{1}{12}\Delta' + \frac{11 - 2p}{576}\{\Delta_0'' + \Delta_1'' - 0{\cdot}184 (\Delta_0^{iv} + \Delta_1^{iv})\} + \frac{3p^2 - 33p + 55}{10368}\Delta'''.$$

By giving to p the values 0, 1, ..., 11, we obtain the twelve hourly first differences which, by continuous addition to F_0, yield the hourly values.

The terms involving Δ', Δ''' are combined in the double-entry Table U 57, Sect. VI, which has, as arguments, Δ''' and the remainder after Δ', expressed in units of $0^{s}.01$ or $0''.1$, has been divided by 12. In this table, the sums of the two terms for $p = 0, 1, 2, 3, 4, 5$ are given for each pair of arguments, the values for

* The formula shows, nevertheless, that Δ^{v} can be included with Δ''' by means of the common factor 0·11.

$p = 11, 10, 9, 8, 7, 6$ being respectively the same. The second term is placed in the single-entry Table U 58, Sect. VI, having $\Delta_0'' + \Delta_1'' - 0{\cdot}184\,(\Delta_0^{iv} + \Delta_1^{iv})$ as argument; the values of this term, for $p = 0, 1, 2, 3, 4, 5$, are given, those for $p = 11, 10, 9, 8, 7, 6$ being numerically the same but having opposite signs. The Tables U 53 to U 56 are constructed to facilitate the division of Δ' by 12 and the multiplication of $\Delta_0^{iv} + \Delta_1^{iv}$ by 0·184.

Precepts.

Table U 53, Sect. VI, gives the minutes and integral number of seconds of the quotient after division of Δ'* in right ascension by 12. The division of the remainder of Δ', expressed in units of $0^s{\cdot}01$, is obtained from Table U 55. Denote the whole quotient by q and the remainder after the second division by r.

Table U 54 gives the minutes and tens of the seconds of the quotient after division of Δ' in declination by 12. The units and tenths of a second in the quotient q and the remainder r are furnished by Table U 55, the units in this table being $0''{\cdot}1$ for the declination.

Table U 56 gives the product of $\Delta_0^{iv} + \Delta_1^{iv}$ by 0·184, the units of the argument and of the product being $0^s{\cdot}01$ and $0''{\cdot}1$ for right ascension and declination, respectively. This table is so constructed that when the given argument is not found in the table, the value opposite the ***next lower*** tabular argument is to be used.

The arguments of Table U 57 are Δ''', expressed in units of $0^s{\cdot}1$ or of $1''$, and r. The former is tabulated in multiples of 5 and that nearest to the given argument is to be chosen (see below under the sub-head *Accumulated Errors*). The positive set of horizontal arguments is to be used when Δ', Δ''' have the same sign, and the negative set when they have opposite signs. The values in the body of the table are expressed in units of $0^s{\cdot}001$ or of $0''{\cdot}01$.

The argument of Table U 58 is $\Delta_0'' + \Delta_1'' - 0{\cdot}184\,(\Delta_0^{iv} + \Delta_1^{iv})$, expressed in units of $1^s{\cdot}0$ or of $1''$. The values in the body of the table are expressed in units of $0^s{\cdot}001$ or of $0''{\cdot}01$. For brevity in printing, these values are divided into two parts: the first two digits are given in one of the first six columns and the last two in one of the succeeding fifteen columns. The Arguments are printed in Clarendon type on every seventh line and the corresponding values are on the six following lines. To obtain any set of six values, choose the argument next smaller than the given argument in the first six columns and that column amongst the succeeding fifteen columns which has as argument the difference between the chosen tabular argument and the given argument. As usual, a star preceding a value in the second set of columns indicates that the value on the same line in the first set is to be increased by unity (e.g., the argument 517, = 510 + 7, furnishes the six values 987, 808, 628, 449, 269, 90). Interpolation between adjacent columns in the second set is possible but unnecessary. Give a sign to each of the six values opposite to that of the argument.

The half-daily values of the right ascension and declination are supposed to be given to $0^s{\cdot}01$ and $0''{\cdot}1$, respectively, but the computations for the hourly values

* The notations for the differences are explained above.

are carried through to 0ˢ.001 and 0″.01, in order to avoid accumulating errors. Hence, after finding q and r from Tables U 53 to U 56, write a zero after the last digit of q.

Add *numerically* the six values obtained from Table U 57 to q when they have positive signs and subtract them *numerically* from q when they have negative signs, and give the sign of q to the results (unless, in subtracting, the value from the table is numerically greater than q, when the opposite sign is required).

To these six values add *algebraically* the six values obtained from Table U 58 in order. The results are the first six hourly first differences. The second six hourly first differences are obtained by subtracting *algebraically* the six values obtained from Table U 58 from the six values found in the previous paragraph, and reversing the order of the results.

The hourly values are obtained by continuous addition of the twelve interpolated first differences to the half-daily value on the line with Δ_0''.

Tests and Abbreviations of the Computations.

Form the second differences of the hourly values, that is, the first differences of the computed hourly first differences; they should differ by an amount which changes very slowly. Also, the last addition of the twelve first differences should give F_1 exactly to 0ˢ.001 in right ascension and to 0″.01 in declination, that is, the last digit in the computed value of F_1 should always be zero. This arises from the construction of Table U 57, the last units of the values in this table having been so adjusted that the sum of each six has the theoretical value which is a multiple of 5.

In writing down the sums of the values from Table U 57 and q, it is not necessary to write the minutes, seconds and tenths of a second except for the first value in right ascension; the same statement applies to the minutes and seconds in declination. Likewise in using Table U 58, the one or two digits obtained from the first six columns need to be written for the first value only. In forming the sums and differences of the six pairs, the last two digits need only be considered except for the first pair. The test differences are next formed and then the complete values of the hourly first differences are easily filled in. An exception to this abbreviation only occurs in the declination when the hourly first difference changes sign. In right ascension, the number of minutes in columns 1 and 2 of the example need never be entered; if the number of seconds is less than 40 the number of minutes is 2 and if greater, it is 1. Each operation should be carried through the whole year before the next is begun.

Accumulated Errors.

In passing from one half-day to the next, accumulated errors of two or three units in the hourly first differences as revealed by the hourly second differences will be frequent; cases where the errors are greater than four units should be examined. Errors of more than two units between two hourly values within those for a given half-day should also be examined.

The maximum errors in the hourly values arising from the method of interpolation and the tables will never exceed 0s·007 or 0″·07, and will rarely be greater than 0s·003 or 0″·03. This is a higher degree of accuracy than that to which the half-daily values themselves are obtained.

Examples.

In the two examples which follow all the written work which is necessary is exhibited. The figures printed in italic type in the second columns are omitted in the actual computations while those so printed in the third columns are written in after the Δ_p'' have been formed. In adding to obtain the hourly values, the last digit is to be dropped; it is convenient to mark first the places where the penultimate digit is to be increased by unity owing to the accumulation in the sum of the last digits; this is shown in the examples by the sign +. A comma in the value of q separates the added digit zero.

Year 1923.

Day of year	α	Δ′	Δ″	Δ‴	Δiv	Δv
	...					
		...				
3·5	7h 40m 3s·51		...			
		+28m 30s·63		...		
4·0	8 8 34·14		− 6s·40		...	
		24·23		−4s·16		...
4·5	8 36 58·37		10·56		+1s·40	
		13·67		2·76		−0s·06
5·0	9 5 12·04		13·32		1·34	
		0·35		1·42		...
5·5	9 33 12·39		14·74		...	
		27 45·61		...		
6·0	10 0 58·00		...			
		...				
	...					

$$4{\cdot}5\left\{\begin{array}{ll} q = +2^{m}\,21^{s}13{,}0, \quad r = 11, & \Delta_0'' + \Delta_1'' = -238{\cdot}8 \\ \Delta''' = -28, & -{\cdot}184\,(\Delta_0^{iv} + \Delta_1^{iv}) = -\ \ 5{\cdot}0 \end{array}\right.$$

Day	q + Tab. U 57 / Tab. U 58	Δ_p'	Δ_p''	α
4d 12h	+2m 21s·123			8h 36m 58s·37
		+2m 21s·589 +		
13	+ 0·466		− ·076	39 19·96
		·513		
14	+2 *21·132*		77	41 41·47
		·436 +		
15	+ ·381		80	44 2·91
		·356		
16	+2 *21·139*		81	46 24·26
		·275 +		
17	+ ·297		84	48 45·54
		·*191*		
18	+2 *21·144*		84	51 6·73
		·*107* +		
19	+ ·212		86	53 27·84
		·021		
20	+2 *21·148*		89	55 48·86
		20·932		
21	+ ·*127*		90	58 9·79
		·842		
22	+2 *21·149*		91	9 0 30·63
		·751		
23	+ ·042		94	2 51·38
		·657 +		
5 0				9 5 12·04

Year 1923.

Day of year	δ	Δ′	Δ″	Δ‴	Δiv	Δv
	...					
		...				
3·5	+17° 3′ 46″·2		...			
		− 58′ 47″·8		...		
4·0	16 4 58·4		−14′ 31″·0		...	
		1° 13 18·8		+1′ 5″·6		...
4·5	14 51 39·6		13 25·4		+15″·9	
		−1 26 44·2		1 21·5		−2″·9
5·0	13 24 55·4		12 3·9		13·0	
		1 38 48·1		1 34·5		...
5·5	11 46 7·3		10 29·4		...	
		1 49 17·5		...		
6·0	9 56 49·8		...			
		...				
	...					

$$4{\cdot}5\left\{\begin{array}{ll} q = -7'\,13''{\cdot}6{,}0, \quad r = 10, & \Delta_0'' + \Delta_1'' = -1529{\cdot}3, \\ \Delta''' = +82, & -{\cdot}184\,(\Delta_0^{iv} + \Delta_1^{iv}) = -\ \ 5{\cdot}3 \end{array}\right.$$

Day	q + Tab. U 57 / Tab. U 58	Δ_p'	Δ_p''	δ
4d 12h	−7′ 13″·26			+14° 51′ 39″·6
		−6′ 43″·96 +		
13	+ 29·30		−5″·56	44 55·6
		49·52		
14	−7 *13*·49		·52	38 6·1
		55·04		
15	+ *23*·97		·45	31 11·1
		7 0·49 +		
16	−7 *13*·68		·43	24 10·6
		5·92		
17	+ *18*·64		·37	17 4·7
		11·29 +		
18	−7 *13*·81		·32	9 53·4
		16·61		
19	+ *13*·32		·29	2 36·8
		21·90		
20	−7 *13*·91		·23	13 55 14·9
		27·13 +		
21	+ 7·99		·19	47 47·7
		32·32		
22	−7 *13*·95		·14	40 15·4
		37·46		
23	+ 2·66		·10	32 38·0
		42·56 +		
5 0				24 55·4

CHAPTER IX

CONSTRUCTION AND CONTINUATION OF THE TABLES P 39 TO P 49 OF SECT. VI.

These tables have been completed and printed for 150 years from 1900; their continuation for the century 1800 to 1900 will be published separately. This chapter contains an explanation of the methods used in their construction together with precepts for their continuation after 2050 and before 1800 and the additional precepts necessary when a single place of the moon is to be computed for any date outside of the period 1800 to 2050.

Construction of the Tables P 39 *to* P 49, Sect. VI.

As explained in Chap. III the 'remainder' terms have been so arranged that tabulation at intervals of ten or fourteen days is sufficient. It was explained also that Tables P 39 to P 45 were more convenient to use if tabulated from the time when $l' = 0$ near the beginning of each year.

The period of l' is $365^{d}.26$ and two periods are therefore equal to $730^{d}.52$. The method of formation of the tables demands that only integral multiples of ten days be used. If we do this, there will be a break of half a day at the end of every two years. Although this is rarely sensible in the function, since it is only one-twentieth of the interval, a correction to the argument of each term would be required in order to avoid accumulation after several such periods. This break is avoided by making the interval 1/73 of two periods of l', that is, $10^{d}.007$. It is true that the intervals of tabulation do not then exactly correspond to multiples of ten or five days after the time when l' was last zero. But if we take them to so correspond, the maximum error is only one-fortieth of the interval and the first differences of the function are never so large as to make this error sensible. In the first year of each biennial period, the computed values can therefore be taken to correspond with the values for each ten days after $l' = 0$; in the second year, these values fall half-way between the ten-'day' intervals from $l' = 0$, and have therefore to be interpolated to halves before being placed in the tables.

In the explanation which follows, the phrase ten 'days' means the interval of $10^{d}.007$ and a 'year' means a period of l'.

The terms placed in the remainder tables (List vi, Chap. IV) have such small coefficients that the secular variations of their arguments can be neglected. Each argument therefore contains a constant part and a part proportional to the time. Let its change in ten 'days' be denoted by m (in degrees) and form the convergents of the fraction $m/360$. A convergent is to satisfy two conditions: it must be sufficiently near to $m/360$ so that no sensible error shall be caused by its use for two 'years,' and it must furnish a sufficient number of divisions of the angle so that every value of the term shall be represented within the required degree of accuracy, since in the method used to form the tables no interpolation of any term is to be required. Suppose the coefficient contains a of the adopted units. The maximum rate of change of a sine is 2π times the rate at which the angle, expressed in parts of 360°, is described. Hence if every unit of change of the term is to be represented there must be $2\pi a$ or $6a$ divisions of the 360° which constitute the range of the angle. In general, this extent of division has been adopted, but since the computations were made to one place further than that given in the tables, a division into fewer parts was made for certain of the terms in order to abbreviate the computations.

Suppose that the adopted convergent is p/q. This means that in a run of q ten-'day' intervals, p periods of the argument are described, and since p, q are prime to one another, it also means that there are q divisions of the circumference; thus the above criterion for q is its near equality to $6a$. The other condition—that there shall be no sensible error in a run of two 'years'—requires that $73\,(360p/q - m)$, which is the error of the argument in degrees in two 'years,' shall give an error of less than a unit in the term.

Let the term be tabulated for each one of these q divisions of 360°. It is required to so rearrange them that there shall be a ten-'day' interval between successive values. Since p divisions are equivalent to ten 'days,' they must be arranged in the order 0, pth, $2p$th, ..., subtracting q from this ordinal number whenever the multiple of p exceeds q. Since p is prime to q, all the q values will be placed. In this new arrangement, the values are numbered 0, 1, 2, ..., $q - 1$. These will be called the 'index numbers'; an addition of a unit to the index number advances the argument by ten 'days,' the index q being equivalent to 0.

It will be necessary to know what is the change in the index number for a change from one of the q divisions to the next. This is the value of j obtained by finding the least pair of positive integers j, s which satisfy the indeterminate equation $jp - sq = 1$; for p divisions are equivalent to ten 'days,' and some multiple of the p divisions, less a multiple of the whole period, is to be equivalent to one division. Since p is generally small, this is most easily solved by inspection. In particular, if $p = 1$ then $s = 0$, $j = 1$; and if $p = 2$, q is odd and $s = 1$, $j = \frac{1}{2}(q + 1)$.

The computation of the arguments is carried out in terms of the q divisions arranged in their original order, that is, according to the increase of the argument expressed in q parts of 360°. Any given argument will consist of an integral number of these parts plus a fraction of a part. Fractions not being admissible, we take the nearest integral number of parts and multiply it by j to get the index number, subtracting integral multiples of q if necessary.

In carrying the argument forward beyond the biennial period, there will be an accumulation of error owing to the use of the convergent instead of the actual motion. The fraction of a part will therefore alter and at certain dates will pass through 0·5; when this happens, one part is to be added to (or subtracted from) the argument and therefore the index number is to be changed by addition (or subtraction) of the integer j. The dates when this will happen are easily found. After finding a date when the fraction is passing through 0·5, we compute from the difference between the convergent and the actual motion the number of biennial periods before it will happen again and thence all the dates at which an addition of j units must be made to the index number. At all other dates the index number changes regularly, the number $q - 1$ being followed by the number 0. This method, however, ceases to be useful if the index number has to be adjusted frequently. It is better in such cases to enter a multiplication table with the error of the motion at the end of each biennial table as argument and to note where the multiples of the fraction of a part pass through 0·5 and thus to obtain the dates at which the index number is to be increased or diminished by j units.

For performing the summation, the special device elsewhere described* was used. The method of adaptation of this device, which avoids the continual rewriting of the tabular values of the terms, is described in the precepts below.

It will be noticed that several terms have been divided into two parts. This was rendered necessary because no suitable convergent gave a value of q small enough to be conveniently placed on the frame. Two devices were adopted. In one of them, different convergents, one less and one greater than the actual motion, were used, the combination being so taken as to give the needed accuracy. In the other, the same convergent was used, but when the fraction of q was between ·25 and ·75, for one this fraction was put equal to unity and for the other it was neglected. When the period of any term is very long, the number q becomes too large for convenient use. Hence for one group of terms a twenty-'day' interval was used and the convergent for the motion was so chosen that 73 of such values (covering four periods of l') could be computed without adjustment of the index number. A similar device is used in the formation of Tables P 46, P 47. The sums were interpolated to halves before addition to those with a ten-'day' interval. For groups of terms having very long periods, a 400-'day' interval was adopted and the values at these intervals were computed directly from a traverse table. After summation and interpolation to fortieths, they were added in with the previous groups.

The Tables P 46 to P 49 differ from P 39 to P 45 in the fact that they are computed for calendar dates, instead of from the time when $l' = 0$. Hence the ten-day intervals of P 46, P 47 and the 14-day intervals of P 48, P 49 are intervals of true mean solar days and their values run continuously at the given intervals throughout the whole period of computation.

The convergents of certain of the terms of Tables P 46, P 47 are so chosen that the values for 50 of the ten-day intervals can be computed without adjustment of the index number. Another group has a 20-day interval with convergents which also permit a run of 50 such intervals without adjustment; this group after summation is interpolated to halves and then added to the previous group. A single term is computed at intervals of 500 days: the term can be summed with the former group by putting its values at intervals of 500 days on a band and keeping the same value throughout the run of 50 intervals. The convergents of the terms of Tables P 48, P 49 are so chosen that the values for 50 of the 14-day intervals can be summed without adjustment of the index number.

* *Monthly Notices, R.A.S.*, vol. LXXII, pp. 454–463.

The terms which have been used to form Tables P 39 to P 49 are given in List vi of Chap. IV. Besides the reference number showing the origin of each term, a signification letter (Sg.) is attached to each term present in a table. These letters also indicate the interval of tabulation: A to Z and α to γ indicate terms tabulated originally at ten-'day' or ten-day or 14-day intervals; A″ to Y″ at double these intervals; and A′ to Z′, a to n at the long intervals.

The coefficients given in List vi of Chap. IV are expressed in the same units as those of the actual Tables P 39 to P 49. Partly to avoid loss of accuracy due to accumulation of errors without greatly increasing the work, and partly owing to a change of plan in the course of the work, the units used in the calculations and given in Lists viii, ix are not all the same as those of List vi, Chap. IV. These units are shown by the factor which each set of sums requires before insertion in the tables; the factors are given in the precepts below.

Each term before tabulation has had a constant equal to its coefficient added in order that all the tabulated values may be positive with certain exceptions noted below. Table P 40 has had $419 \times \cdot 132 = 55\cdot 3$ subtracted from each sum*; in Table P 41 the amount subtracted is $45 \times 0\cdot 4 = 18\cdot 0$. In Table P 43 the two terms in A (see List ix) which have 15 as the sum of their coefficients have had 8 instead of 15 added, these numbers referring to the units used in List ix; and, in the same units, 90 has been added to the term W. In the Table P 44 the sum of the coefficients of the two terms constituting K (see List ix) is 29 in the units of that list; the constant used is 25 instead of 29. Also in the same units, 5 has been added to the term Y of this table (to take the place of the constant of the two small terms η in List vi, Chap. IV, which have been erroneously included in the values for 1900 to 2050).

Precepts for the continuation of Tables P 39 *to* P 49, Sect. VI.

In Tables P 39 to P 45 the 'year' begins at the time when $l' = 0$ nearest to the beginning of the calendar year and the 'day' is 1/365 of the period of l'. These 'days' are, however, entered as calendar days after the nearest calendar half-day when $l' = 0$, the error thus caused being insensible. There are three intervals used, one of 10 'days,' one of 20 'days' and one of 400 'days,' the sums in the two latter groups being interpolated to 10-'day' intervals.

Table P 39.

Group A′ *to* Z′, a *to* n. The third column of the data for this group in List viii at the end of this chapter contains the angles at the commencement of the 'year' 2050. By adding multiples of the motions in the fourth column, the angles at intervals of 400 days from this epoch are obtained. The last column gives the coefficients of the sines of these angles whence, by a traverse table or by direct calculation, the value of every term at each date is obtained. Add to each value the coefficient of the term, so that every value is positive and lies between 0 and

* Owing to an error discovered too late to permit of a change in the sum of the constants of Table P 40, this subtracted constant has rendered a few of the values in this table negative.

twice the coefficient. Sum the values for each date, interpolate to halves with second differences and then to twentieths, so as to get the sums at 10-'day' intervals. The same procedure is used to obtain the sums before 1800, but the multiples of the motions must be subtracted.

Group A *to* Y. The period of any term of this group is divided into q/p parts where q, p are shown in the second and third columns of the table for this group in List viii; this means that p periods of the term are divided into q parts. The argument in terms of these q parts at the beginning of the 'year' 2050 is given in the fifth column and the motion in two 'years,' in terms of the same units, is in the sixth column. The index number i is the argument required and it is computed every two 'years.' To find it at multiples of two 'years' from 2050 add the same multiples of the motion in two 'years' or periods of l' to the value at 2050 in the fifth column, subtract such multiples of q as will render the result positive and less than q; choose the integer nearest to this result and multiply this integer by the value of j shown in the seventh column. After again subtracting multiples of q, the index number for the date is obtained.

The same procedure is followed for the 'years' preceding 1800, except that the motions must be subtracted instead of added. In order to assist the computer, the index numbers for 1800, 2050 are given in the last two columns of the list.

Example. The value of the argument when $l' = 0$ nearest the beginning of the year 2050 for the term K is 36.61. The motion in two periods of l' is 54.697. The values at $l' = 0$ for 2050, 2052, 2054, ... are 36.61, 9.31, 64.00, ... The nearest integers to these are 37, 9, 64, ... Hence the index numbers are 67, 3, 76, ...

The terms are tabulated according to index number in List ix, the first value under the letter always corresponding to the index number 0, and the succeeding values to the index numbers 1, 2, ..., $q - 1$. An unbroken column of this list contains 70 values. To assist in finding the value corresponding to any index number of any term, the second head-line (in Clarendon type) gives the index number of the value immediately below it.

The value of the term (with its added constant) is obtained by choosing the value in List ix corresponding to the index number. The values for the succeeding 72 ten-'day' intervals are the succeeding values in order from this one, the last under the letter being always followed by the first. The sums of the values for each 10-'day' interval are then formed and are added to the values of the previous group.

Example. The index numbers of the term K at 2050, 2052, 2054 were found to be 67, 3, 76, ... The values of the term at 2050 and at 10-'day' intervals thereafter are 31, 26, ..., 31, 36. The values at 2052 and at 10-day intervals thereafter are 39, 43, ..., 1, 0. The values at 2054 and at 10-day intervals thereafter are 0, 2, ... It will be noticed that though there is a break in the index number between the end of the biennial period 2050–2052 and the beginning of 2052 the values of the term run continuously within the limits of error.

Owing to the use of a convergent, small discontinuities will sometimes occur between the end of one two-'year' period and the beginning of the next, but the errors thus produced may either be neglected or may be nearly eliminated by taking the mean of the summation forward and a summation backward in time as was done for testing in performing the tabulation from 1800 to 2050.

After the sums of all the terms in the table, have been formed, the first 38 values of each two-'year' period are entered under the arguments 0^d, 10^d, ..., 370^d of that year, the values having been first multiplied by 0·1 and the nearest integer taken. The values for the corresponding arguments of the second year are obtained by interpolating the last 37 values to halves, that to be put under the argument 0^d being midway between the 37th and 38th values, the last digit being cut off as before. It is advisable to sum the 74th set (which is really the first set of the next two-'year' period) both before and after the adjustment of the index numbers, as a test. It is also useful in the interpolation to halves.

The continual rewriting of the values in List ix for the formation of the sums is avoided by the device referred to earlier in this chapter. The q values of each term with their index numbers are written in order on cards mounted on an endless band containing q cards. All the bands constituting the group can then be placed on the ruler and the frame, and they are then so adjusted that the index number of each term for the beginning of any two-'year' period shows on the face of the ruler. After summation of the values on the face of the ruler, the latter is turned so as to carry all the bands to the succeeding index numbers. The values are again summed and the process continued until all the 73 sums have been obtained. At the end of any two-year period certain of the index numbers will require change for the beginning of the next period, which is treated in the same way. The device is not used for the terms summed at intervals of 400 'days.'

Certain pairs of terms in List viii are bracketed. When these terms have the same values of q, p and the same initial values expressed in parts, the same index numbers are to be used if the fraction of a part lies between $\pm$ ·25. If, however, the fraction lies outside these limits, the index number of one term is computed by taking the fraction equal to unity and the other by neglecting it.

Tables P 40, P 41.

Group A′ *to* R′. The arguments at intervals of 400 days are obtained in the same way as those of the first group of Table P 39. For Table P 40, use the coefficients given in the fifth column of the data for Tables P 40, P 41 in List viii with the sines of the angles. For Table P 41, use the coefficients given in the sixth column of the data with the cosines of the angles. From the terms in Table P 40, subtract the constant 419 and from those in P 41 subtract the constant 45. Then proceed with each set as with the first group of Table P 39, up to the interpolation to intervals of 10 'days.'

Group A″ *to* O″. The index numbers are obtained in the same way as those of the second group of Table P 39. The interval is, however, 20 'days,' and the index numbers are found at intervals of four 'years' so that there are still 73 values which may be obtained without a recomputation of the index numbers. For Table P 40, these values are obtained from the tabulation of these terms under the heading for this table in List ix; and similarly for Table P 41. They are found and summed in the same manner as those in the second group of Table P 39. After the summation, interpolation must be made to halves, with second differences if necessary; the sums for each table are thus obtained at intervals of ten 'days.' As the first epoch is 2052, the 37 values back to 2050 are obtained by going backwards from the epoch values in List ix.

Group A *to* V. The index numbers are obtained from List viii and the values for each table from the tabulations in List ix, precisely like those of the second group of Table P 39. A missing term in any of the groups in List ix indicates that the coefficient of that term is insensible in that particular group.

The three groups for each table are then summed. Multiply each sum for Table P 40 by 0·132, choose the nearest integer to the result and enter for the continuation of Table P 40 as explained for Table P 39. Multiply each sum for Table P 41 by 0·4, choose the nearest integer to the result and enter for the continuation of Table P 41.

Tables P 42, P 43.

The computation for these tables is similar to that for Tables P 40, P 41. There is, however, no group with terms at intervals of 20 days. After the sums of the two groups for each table have been formed, those for Table P 42 are to be multiplied by 0·0588 and the nearest integer chosen before entry; those for Table P 43 are to be multiplied by 0·4 and the nearest integer chosen before entry.

Tables P 44, P 45.

The two groups in these tables are treated like the first and third groups of Tables P 40, P 41. The constant 411 is to be added to Table P 45. After the sums of the two groups for each table have been obtained, each sum is to be multiplied by 0·1 and the nearest integer chosen before entry. The error noted in the *Errata* does not occur in List viii.

Tables P 46, P 47.

In these tables the tabulation is made continuously at intervals of 10 mean solar days, the epochs for Table P 46 being 13 days after the beginning of the calendar year 2050 and 4 days after that of 1800, these being the times at which exact multiples of ten days from the original epoch, 1900·0, occur. For Table P 47, the epochs are $2^{d}.5$ later in each case.

The index numbers for the two tables as found from List viii are different, but the tabulation in List ix is the same. This arises from the fact that the coefficients and periods of terms present in both tables are the same but that the epochs differ by 90°, and by the motions in $2^{d}.5$.

There is one term in each table as shown in List viii computed directly at intervals of 500 days. The coefficient of this is so small that the term may be kept constant during this period and added as a constant to the Group A to X during the run of 50 ten-day intervals which can be summed in this group without recomputation of the index number.

The Group B″ to Y″ is computed at intervals of 20 days, the index numbers being computed at intervals of 1000 days, so that 50 sums are obtained after each computation of the index numbers. The work is otherwise the same as that for the second group of Table P 39. After the sums have been obtained, interpolation to halves gives them at intervals of ten days.

The Group A to X is computed at intervals of ten days, the index numbers being computed at intervals of 500 days. The long period term A″ is added in with this group as explained above.

After the addition of the groups for each table, the sums are multiplied by 0·1 and the nearest integers chosen. The results are then entered under the proper days of the years, these being at intervals of ten days from the epochs.

Tables P 48, P 49.

The interval used in these tables is 14 mean solar days and the index numbers are computed at intervals of 700 days. There is only one group of terms for each table. The epochs for Table P 48 are 9^d after the beginning of 2050 and 2^d before that of 1800. The epochs for Table P 49 are $1^d\!.75$ later; this addition, to the degree of accuracy required, is written and used as 2^d. In other respects the computation is the same as that for Tables P 46, P 47. After the sums have been formed, they are multiplied by 0·1, the nearest integer chosen, and then entered under the proper days of the calendar year.

Additional Precepts for the computation of a single place.

Find from the tables of Sect. II the calendar date when l' was last zero before the given date and compute the number of days to the date since this time; this number may be taken to be either calendar days or the 'days' equal to the 1/365 part of the period of l'. Compute also the number of 'days' and calendar days from the various epochs near 2050 or near 1800, used in List viii.

The arguments and values of the groups of terms which are tabulated at intervals of 400 'days' and 500 calendar days are then found from the data of List viii in the manner explained above.

Find the index numbers for the beginning of the next preceding two-'year' period. Add to each index number the integer i', where the number of days at the beginning of this period is put equal to $10i' + d'$. Find the sums for these index numbers of the terms in List ix and obtain at the same time the sums for the preceding and following index numbers. Interpolate for d' days.

For the groups in Tables P 40, P 41 which are computed at intervals of 20 days the method is the same except that the number of days from the beginning of the preceding four-'year' period is put equal to $20i' + d'$.

For Tables P 46 to P 49 a similar procedure with the respective intervals of 10 days, 20 days and 14 days and respective periods of 500 days, 1000 days and 700 days is followed, but no interpolation between the final 10-day or 14-day sums is to be made.

The rest of the work, including the various constants to be added and the factors to be used, is the same as that given in the preceding precepts.

List viii. Data for Tables of Remainder Terms.

The symbol d' stands for 1/365 of the period of l'.

Data for Table P 39.

Sg.	Args. at l'=0 for 1800	Args. at l'=0 for 2050	Motion in $400d'$	Coef. of sin
A′	328°·9	231°·6	10°·6246	284
B′	230·0	29·0	21·2120	282
C′	286·5	51·0	22·6357	240
D′	84·9	101·8	1·6513	237
E′	349·6	55·4	11·3331	126
F′	112·0	98·4	3·0966	108
G′	240·2	12·1	10·0466	75
H′	26·6	256·5	40·4598	73
I′	132·4	92·0	42·4309	25
J′	56·3	135·2	8·2366	62
K′	262·2	269·9	7·9238	54
L′	92·5	30·0	1·3041	40
M′	293·4	244·4	42·3931	38
N′	100·9	149·8	9·6818	33
O′	240·5	219·3	47·2510	30
P′	323·0	29·1	9·7596	26
Q′	352·6	252·6	39·0144	25
R′	35·9	212·3	13·3934	21
S′	315·5	105·3	27·4844	19
T′	175·5	129·7	10·8452	18
U′	45·5	34·4	14·1551	17
V′	24·8	169·1	3·7884	17
W′	122·5	311·8	5·5636	13
X′	53·2	259·5	7·2148	13
Y′	292·5	151·9	4·1182	11
Z′	213·9	322·8	6·7912	10
a	76·0	205·0	22·6571	8
b	42·7	355·3	59·7602	6
c	352·8	2·2	34·7598	6
d	17·2	312·8	51·7928	6
e	7·7	262·8	45·3084	6
f	161·8	29·9	12·0482	5
g	243·0	120·1	15·2407	4
h	305·4	313·7	60·0036	3
i	7·8	320·4	13·9972	3
j	358·2	234·6	49·9570	3
k	112·1	30·7	7·5331	3
l	75·1	89·7	60·0293	3
m	42·2	331·9	43·8848	3
n	182·9	175·6	26·7869	3

Data for Table P 39.

Sg.	q	p	Args. at l'=0 for 1800	Args. at l'=0 for 2050	Motion in 2 per. of l'	j	i at l'=0 for 1800	i at l'=0 for 2050
			q	q	q			
A	206	1	78·1	139·7	73·0057	1	78	140
B	189	5	177·3	85·1	176·17	38	111	17
C	164	1	122·0	52·9	72·92	1	122	53
D	157	13	86·46	129·26	7·8784	145	67	22
E	134	1	44·89	42·41	72·876	1	45	42
F	130	17	104·11	40·17	71·248	23	52	10
G	109	2	101·70	60·33	36·29	55	51	30
H	95	7	33·69	75·03	36·050	68	32	65
I	91	2	45·87	16·90	55·096	46	23	54
J	85	2	21·95	71·35	60·912	43	11	78
K	82	3	5·49	36·61	54·697	55	29	67
L	81	1	13·16	19·87	72·6276	1	13	20
M	81	8	72·69	21·01	17·082	71	80	33
N	80	9	69·43	60·44	17·2082	9	61	60
O	80	9	69·43	60·44	17·2082	9	70	69
P	76	5	70·36	62·03	60·7332	61	14	58
Q	70	1	38·57	20·63	3·2164	1	39	21
R	55	4	7·79	43·69	16·56	14	2	11
S	50	1	34·95	35·98	22·8084	1	35	36
T	39	1	14·87	15·75	33·71	1	15	16
U	34	1	9·77	25·58	5·0226	1	10	26
V	33	2	7·17	11·58	14·5554	17	20	6
W	27	2	15·20	6·23	11·3762	14	21	3
X	18	1	0·30	5·17	0·9029	1	0	5
Y	160	9	69·10	141·91	17·2231	89	61	158

Data for Tables P 40, P 41.

Sg.	Args. at l'=0 for 1800	Args. at l'=0 for 2050	Motion in $400d'$	Coef. of sin	Coef. of cos
A′	34°·0	4°·0	1°·4452	48	+55
B′	112·0	98·4	3·0966	12	0
C′	292·5	151·9	4·1182	5	− 5
D′	240·2	12·1	10·0466	8	0
E′	328·4	231·1	10·6246	5	+ 5
F′	349·6	55·4	11·3331	17	− 3
G′	25·9	202·3	13·3934	24	0
H′	230·0	29·1	21·2120	118	0
I′	286·4	50·9	22·636	7	− 8
J′	315·5	105·2	27·4844	6	0
K′	352·6	252·6	39·0144	4	+ 4
L′	26·6	256·5	40·460	8	0
M′	132·4	92·0	42·431	7	+ 8
N′	240·5	219·3	47·251	3	− 3
O′	354·3	3·8	48·976	5	+ 5
P′	84·9	101·8	1·6513	89	0
Q′	92·5	30·0	1·3041	12	0
R′	323·0	29·0	9·760	8	0

LIST viii (*cont.*).

Data for Tables P 40, P 41.

Sg.	q	p	Args. at $l'=0$ for 1800	Args. at $l'=0$ for 2052	Motion in 4 per. of l'	j	i at $l'=0$ for 1800	i at $l'=0$ for 2052
			q	q	q			
A″	189	10	177·0	72·1	163·34	19	150	45
B″	115	1	8·40	104·14	72·71	1	8	104
C″	109	6	10·18	2·6	1·61	91	38	55
D″	82	1	61·0	62·9	72·92	1	61	63
E″	81	1	16·13	11·6	73·22	1	16	12
F″	77	4	7·13	42·9	60·46	58	21	30
G″	73	4	66·2	71·8	71·92	55	53	36
H″	73	7	64·6	51·6	72·80	21	51	70
I″	71	7	15·4	36·0	13·85	61	63	66
J″	69	4	28·1	65·6	14·84	52	7	51
K″	62	3	34·57	9·6	33·06	21	53	24
L″	59	5	35·50	42·13	11·35	12	7	32
M″	41	2	10·0	28·78	23·07	21	5	35
N″	39	2	14·9	10·45	28·42	20	27	5
O″	38	3	27·88	28·25	28·96	13	22	22

Data for Tables P 40, P 41.

Sg.	q	p	Args. at $l'=0$ for 1800	Args. at $l'=0$ for 2050	Motion in 2 per. of l'	j	i at $l'=0$ for 1800	i at $l'=0$ for 2050
			q	q	q			
A	165	8	93·27	4·41	89·05	62	156	83
B	106	5	70·17	77·22	46·695	85	14	79
C	106	5	94·70	102·78	46·705	85	19	63
D	103	5	56·0	23·23	55·77	62	73	87
{E	103	5	55·26	9·37	57·31	62	11	43
{F	102	5	54·71	9·28	56·72	41	11	63
G	101	5	40·45	40·25	62·21	81	8	8
H	92	7	82·26	29·92	51·10	79	38	70
I	80	9	29·43	20·44	17·208	9	21	20
J	79	12	8·02	9·33	7·60	33	27	60
K	79	6	16·40	62·63	42·71	66	29	50
L	71	4	68·18	29·55	7·64	18	17	43
M	69	7	46·56	14·31	28·44	10	56	2
N	41	2	22·86	36·58	22·74	21	32	39
O	41	2	36·70	13·13	22·77	21	39	27
P	40	3	9·51	10·33	19·21	27	30	30
{Q	29	3	23·23	8·96	15·895	10	27	3
{R	29	3	23·23	8·96	15·895	10	27	3
S	27	2	18·4	5·75	11·13	14	9	3
T	21	1	14·85	15·23	10·087	1	15	15
U	20	1	14·17	12·97	13·11	1	14	13
V	20	1	8·80	7·79	13·12	1	9	8

Data for Tables P 42, P 43.

Sg.	Args. at $l'=0$ for 1800	Args. at $l'=0$ for 2050	Motion in $400d'$	Coef. of sin	Coef. of cos
A′	84°·84	101°·59	1°·65	44	0
B′	92·5	29·99	1·30	6	0
C′	326·7	122·19	21·20	0	+32
D′	230·0	28·9	21·21	6	0
E′	39·94	216·33	13·39	8	0
F′	329·43	232·03	10·62	7	− 7
G′	106·40	230·90	22·64	9	+ 9
H′	206·6	76·5	40·46	5	+12

Data for Tables P 42, P 43.

Sg.	q	p	Args. at $l'=0$ for 1800	Args. at $l'=0$ for 2050	Motion in 2 per. of l'	j	i at $l'=0$ for 1800	i at $l'=0$ for 2050
			q	q	q			
A	189	5	177·08	84·89	176·17	38	111	17
B	169	21	17·21	19·94	16·24	161	33	9
C	157	21	105·00	10·12	119·815	15	5	150
D	130	17	104·11	40·17	71·248	23	52	10
E	121	7	55·80	32·87	26·92	52	8	22
F	119	4	23·70	82·25	53·78	30	6	80
G	109	2	101·70	60·33	36·29	55	51	30
H	109	3	64·70	56·26	0·80	73	58	55
I	82	3	5·49	36·61	54·697	55	29	67
J	80	9	29·43	20·44	17·208	9	21	20
K	77	2	7·13	50·87	68·72	39	42	64
L	73	2	66·18	71·82	72·47	37	33	36
M	69	2	28·12	57·92	7·42	35	14	29
N	67	4	16·35	36·72	23·74	17	4	26
{O	52	3	40·27	38·45	10·80	35	48	30
{P	52	3	40·27	38·45	10·80	35	31	13
Q	43	3	4·38	5·07	4·13	29	30	16
R	41	2	16·20	33·61	22·77	21	8	17
S	39	1	14·87	15·75	33·70	1	15	16
T	38	3	25·41	2·45	29·00	13	21	26
U	19	1	7·42	18·62	16·36	1	7	0
V	7	1	5·15	3·58	3·012	1	5	4
W	152	9	41·80	90·44	49·029	17	106	10

LIST viii (*cont.*).

Data for Tables P 44, P 45.

Sg.	Args. at $l'=0$ for		Motion in 400d'	Coef. of	
	1800	2050		sin	cos
A′	113°·4	64°·4	42°·393	92	−45
B′	315·09	104·88	27·484	86	+42
C′	262·23	269·92	7·924	76	+37
D′	7·68	262·89	45·308	39	+19
E′	119·83	146·94	33·259	20	0
F′	148·4	51·0	10·625	18	0
G′	34·0	4·0	1·445	17	0
H′	24·89	169·14	3·788	11	+ 5
I′	105·3	230·9	22·635	9	+ 4
J′	25·25	191·90	29·136	8	+ 4
K′	153·84	18·94	12·048	8	+ 4

Data for Tables P 44, P 45.

Sg.	q	p	Args. at $l'=0$ for		Motion in 2 per. of l'	j	i at $l'=0$ for	
			1800	2050			1800	2050
			q	q	q			
A	201	1	170·43	39·04	72·918	1	170	39
B	169	14	70·32	38·99	7·86	157	5	39
C	164	1	131·06	64·18	72·938	1	131	64
D	145	1	103·41	68·94	72·805	1	103	69
E	132	1	101·82	106·27	72·90	1	102	106
F	73	4	4·14	4·47	0·0025	55	1	1
G	73	8	31·84	18·47	3·397	64	4	57
H	62	5	1·71	47·55	54·43	25	50	22
I	61	2	50·0	47·59	23·405	31	25	24
J	59	3	8·80	16·20	42·067	20	3	25
K	58	1	36·24	0·42	14·5614	1	36	0
L	57	1	15·78	9·69	15·9107	1	16	10
M	50	3	29·76	27·90	19·18	17	10	26
N	50	3	0·18	36·68	17·09	17	0	29
O	49	3	5·02	41·55	22·635	33	18	14
P	49	4	10·23	11·80	47·4405	37	27	3
Q	40	1	1·93	39·01	33·257	1	2	39
R	39	1	10·22	16·45	34·06	1	10	16
S	37	2	4·93	6·03	35·82	19	21	3
T	37	4	35·67	26·12	32·483	28	9	25
U	31	2	2·69	22·82	22·23	16	17	27
V	18	1	11·98	8·60	0·837	1	12	9
W	18	1	4·13	4·94	1·5905	1	4	5
{X	12	1	7·56	8·13	1·0606	1	7	8
{Y	12	1	7·56	8·13	1·0606	1	8	8
α	130	1	17·0	10·2	72·746	1	17	10
β	239	20	103·115	212·04	25·7273	12	41	154
γ	104	3	96·87	40·27	11·195	35	67	48
δ	152	9	118·14	14·71	49·0285	17	30	103
ϵ	52	3	32·87	24·61	10·75	35	11	43
ζ	121	7	73·00	65·07	27·04	52	45	113

Data for Table P 46.

Sg.	Args. at		Motion in 500^d	Coef. of sin
	1800 +4^d	2050 +13^d		
A″	101°·3	21°·4	13°·360	9

Data for Table P 46.

Sg.	q	p	Args. at		Motion in 1000^d	j	i at	
			1800 +4^d	2050 +13^d			1800 +4^d	2050 +13^d
			q	q	q			
B″	92	1	84·7	58·7	50·088	1	85	59
C″	84	1	22·5	34·7	49·805	1	22	35
D″	66	5	20·3	10·4	51·956	53	4	2
E″	65	3	58·5	28·3	19·856	22	63	31
F″	65	1	24·5	16·5	49·735	1	24	16
G″	62	5	38·8	29·5	1·745	25	45	43
H″	60	1	11·8	52·8	49·726	1	12	53
I″	59	1	52·1	24·3	50·087	1	52	24
J″	59	4	19·5	45·0	23·570	15	5	26
K″	58	5	52·3	41·7	18·128	35	22	20
L″	53	5	40·0	23·7	37·386	32	8	26
M″	50	1	29·4	27·0	49·798	1	29	27
N″	47	4	11·5	11·7	11·698	12	38	3
O″	47	4	2·6	20·8	12·410	12	36	17
P″	45	1	16·4	27·5	5·384	1	16	28
Q″	41	1	2·4	3·6	9·300	1	2	4
R″	39	2	16·4	16·4	21·508	20	8	8
S″	38	3	23·5	30·9	35·883	13	33	23
T″	34	1	8·8	0·4	15·426	1	9	0
U″	31	1	21·0	14·0	19·163	1	21	14
V″	29	1	25·0	26·9	21·514	1	25	27
W″	13	1	3·6	4·6	10·979	1	4	5
X″	12	1	3·3	·5	2·298	1	3	1
Y″	21	2	3·5	1·0	16·464	11	12	11

Data for Table P 46.

Sg.	q	p	Args. at		Motion in 500^d	j	i at	
			1800 +4^d	2050 +13^d			1800 +4^d	2050 +13^d
			q	q	q			
A	232	21	191·61	109·98	122·057	221	208	182
B	161	5	74·36	0·75	88·947	129	47	129
C	143	6	72·04	88·45	13·964	24	12	110
D	85	14	16·07	16·65	19·959	79	74	68
E	66	1	30·88	30·03	49·864	1	31	30
F	59	9	26·55	19·00	37·276	46	3	48
G	51	5	26·49	14·60	45·853	41	46	3
H	46	3	4·36	44·24	12·076	31	32	30
I	45	7	36·86	26·10	35·056	13	31	23
J	41	4	34·13	30·90	36·448	31	29	18
K	30	1	25·63	12·01	20·188	1	26	12
L	30	1	24·32	29·17	19·961	1	24	29
M	27	2	8·04	0·19	19·483	14	4	0
N	26	1	3·24	16·09	24·322	1	3	16
{O	25	1	23·49	23·60	0·099	1	23	23
{P	25	1	23·49	23·60	0·099	1	24	24
Q	24	1	10·58	19·22	1·982	1	11	19
R	24	1	7·90	14·46	2·101	1	8	14
S	11	1	4·75	5·83	6·356	1	5	6
T	11	1	7·15	5·05	5·677	1	7	5
U	9	1	1·23	2·73	5·271	1	1	3
V	17	1	6·97	15·26	15·750	1	7	15
W	8	1	5·57	4·62	2·323	1	6	5
X	7	1	6·16	2·58	1·227	1	6	3

LIST viii (*concl.*).

Data for Table P 47.

Sg.	Args. at 1800 $+6^{d}.5$	Args. at 2050 $+15^{d}.5$	Motion in 500^{d}	Coef. of sin
A′	191°.4	111°.5	13°.360	9

Data for Table P 47.

Sg.	q	p	Args. at 1800 $+6^{d}.5$	Args. at 2050 $+15^{d}.5$	Motion in 1000^{d}	j	i at 1800 $+6^{d}.5$	i at 2050 $+15^{d}.5$
B″	92	1	61°.8	35°.8	50°.088	1	62	36
C″	84	1	43.6	55.8	49.805	1	44	56
D″	66	5	37.4	27.5	51.956	53	47	32
E″	65	3	10.1	45.0	19.856	22	25	15
F″	65	1	8.4	0.4	49.735	1	8	0
G″	62	5	54.9	45.7	1.745	25	11	34
H″	60	1	56.9	37.9	49.726	1	57	38
I″	59	1	37.5	9.7	50.087	1	38	10
J″	59	4	34.8	1.3	23.570	15	53	15
K″	58	5	9.4	56.8	18.128	35	25	23
L″	53	5	0.8	37.6	37.386	32	32	50
M″	50	1	17.1	14.6	49.798	1	17	15
N″	47	4	23.7	23.9	11.698	12	6	6
O″	47	4	38.3	9.5	12.410	12	33	26
P″	45	1	5.3	16.3	5.384	1	5	16
Q″	41	1	33.3	34.5	9.300	1	33	35
R″	39	2	6.9	6.8	21.508	20	23	23
S″	38	3	33.3	2.8	35.883	13	11	1
T″	34	1	17.4	9.1	15.426	1	17	9
U″	31	1	28.9	21.8	19.163	1	29	22
V″	29	1	3.4	5.2	21.514	1	3	5
W″	13	1	6.9	8.0	10.979	1	7	8
X″	12	1	6.5	3.7	2.298	1	6	4
Y″	21	2	9.1	6.5	16.464	11	15	14

Data for Table P 47.

Sg.	q	p	Args. at 1800 $+6^{d}.5$	Args. at 2050 $+15^{d}.5$	Motion in 500^{d}	j	i at 1800 $+6^{d}.5$	i at 2050 $+15^{d}.5$
A	232	21	138°.80	57°.22	122°.057	221	95	69
B	161	5	115.87	42.24	88.947	129	152	105
C	143	6	37.76	54.21	13.964	24	54	9
D	85	14	40.83	41.41	19.959	79	9	9
E	66	1	47.64	46.78	49.864	1	48	47
F	59	9	43.55	35.99	37.276	46	18	4
G	51	5	40.49	28.59	45.853	41	8	16
H	46	3	16.62	10.48	12.076	31	21	34
I	45	7	4.86	39.10	35.056	13	20	12
J	41	4	4.38	1.15	36.448	31	1	31
K	30	1	18.38	4.76	20.188	1	18	5
L	30	1	2.07	6.92	19.961	1	2	7
M	27	2	15.29	7.50	19.483	14	21	4

Data for Table P 47.

Sg.	q	p	Args. at 1800 $+6^{d}.5$	Args. at 2050 $+15^{d}.5$	Motion in 500^{d}	j	i at 1800 $+6^{d}.5$	i at 2050 $+15^{d}.5$
N	26	1	9°.99	22°.84	24°.322	1	10	23
{O	25	1	4.99	5.09	0.099	1	5	5
{P	25	1	4.99	5.09	0.099	1	5	5
Q	24	1	16.83	1.47	1.982	1	17	1
R	24	1	14.15	20.71	2.101	1	14	21
S	11	1	7.72	8.84	6.356	1	8	9
T	11	1	10.13	8.05	5.677	1	10	8
U	9	1	8.23	0.73	5.271	1	8	1
V	17	1	2.98	11.27	15.750	1	3	11
W	8	1	7.82	6.87	2.323	1	0	7
X	7	1	1.16	4.58	1.227	1	1	5

Data for Table P 48.

Sg.	q	p	Args. at 1800 -2^{d}	Args. at 2050 $+9^{d}$	Motion in 700^{d}	j	i at 1800 -2^{d}	i at 2050 $+9^{d}$
A	221	22	62°.5	127°.5	215°.905	211	33	46
B	184	13	79.4	65.2	98.081	85	91	5
C	178	23	103.3	70.4	81.940	31	167	34
D	167	1	93.6	112.9	50.072	1	94	113
E	147	1	74.2	114.0	49.882	1	74	114
{F	121	10	120.7	36.9	20.839	109	0	40
{G	119	10	118.6	36.3	20.495	12	0	75
H	99	1	71.9	58.6	49.984	1	72	59
I	63	2	17.9	17.8	36.961	32	9	9
J	53	6	15.6	6.6	34.748	9	38	10
K	20	1	7.0	17.7	9.446	1	7	18
L	20	3	16.9	10.9	10.651	7	19	17
M	40	1	9.1	36.5	9.881	1	9	37

Data for Table P 49.

Sg.	q	p	Args. at 1800 0^{d}	Args. at 2050 $+11^{d}$	Motion in 700^{d}	j	i at 1800 0^{d}	i at 2050 $+11^{d}$
A	221	22	10°.2	75°.0	215°.905	211	121	134
B	184	13	127.0	112.8	98.081	85	123	37
C	178	23	61.8	28.8	81.940	31	142	9
D	167	1	52.0	71.3	50.072	1	52	71
E	147	1	111.1	3.9	49.882	1	111	4
{F	121	10	31.1	68.4	20.839	109	112	31
{G	119	10	30.6	67.3	20.495	12	15	78
H	99	1	47.3	34.1	49.984	1	47	34
I	63	2	2.4	2.3	36.961	32	1	1
J	53	6	29.6	20.6	34.748	9	5	30
K	20	1	12.1	2.8	9.446	1	12	3
L	20	3	12.3	6.2	10.651	7	4	2
M	40	1	39.1	26.5	9.881	1	39	27

LIST ix. Tabulation of Remainder Terms according to Index Number.

Terms in Table P 39.

A	A	A	B	B	B	C	C	C	D	D	E	E	F	F	G	H	H	I	J	K	K	L	M	NO	P
0	70	140	0	70	140	15	85	155	55	125	35	105	35	105	40	0	70	40	15	0	70	55	40	25	10
16	30	2	50	8	14	17	10	7	5	13	8	0	5	0	0	11	20	2	5	24	15	1	3	3	1
16	29	1	60	13	10	17	9	8	2	10	8	0	0	2	0	16	22	2	5	29	10	1	7	18	0
17	29	1	69	18	7	18	9	8	0	6	8	0	2	10	0	20	21	3	5	35	6	0	9	41	0
17	29	1	77	26	6	18	8	8	0	3	8	0	8	17	1	22	19	3	4	39	3	0	10	60	1
18	28	1	84	35	5	18	8	9	2	1	8	0	16	20	2	22	14	4	4	43	1	0	9	66	3
18	28	1	89	44	7	19	8	9	6	0	8	0	20	17	3	19	9	5	4	46	0	0	7	56	5
19	28	1	92	54	10	19	7	10	9	1	8	0	18	9	4	15	5	5	3	48	0	0	4	36	7
19	27	0	94	63	15	19	7	10	12	4	8	1	10	2	6	10	1	6	3	48	2	0	1	14	8
20	27	0	95	72	21	19	7	11	14	8	8	1	3	0	8	5	0	7	2	47	5	0	0	1	10
20	27	0	93	80	30	20	6	—	14	11	8	1	0	5	10	2	1	7	2	45	9	0	1	4	10
21	26	0	91	86	39	20	6		12	13	7	1	3	12	13	0	4	8	1	42	13	0	3	20	10
21	26	0	86	91	48	20	5		9	14	7	1	11	19	16	1	9	8	1	38	19	1	6	43	8
22	26	0	82	93	58	20	5		5	13	7	1	18	20	19	4	14	9	1	33	—	1	9	61	7
22	25	0	78	95	67	21	5		2	10	7	1	20	14	22	8	18	9	0	28		1	10	66	5
23	25	0	72	94	75	21	4	D	0	7	7	1	15	6	25	13	21	10	0	22	L	2	9	54	3
23	24	0	68	92	83	21	4	7	0	3	7	2	8	1	28	18	22	10	0	17	9	2	7	33	1
23	24	0	63	89	88	21	4	10	2	1	7	2	1	1	30	21	20	10	0	12	10	3	4	12	0
24	23	0	58	85	92	21	3	13	5	0	7	2	0	7	33	22	17	10	0	7	10	3	1	0	0
24	23	0	54	80	94	21	3	14	9	1	6	2	6	15	36	21	12	10	0	4	11	4	0	5	1
25	23	0	50	76	95	22	3	13	12	4	6	2	14	20	39	17	7	10	0	1	12	4	1	23	2
25	22	0	45	71	94	22	3	11	14	7	6	2	19	18	42	13	3	10	0	0	12	5	3	46	4
26	22	0	41	66	91	22	2	7	14	11	6	3	19	11	44	8	0	9	1	0	13	6	6	62	6
26	21	0	36	61	87	22	2	4	12	13	6	3	13	4	46	3	0	9	1	1	14	6	8	65	8
26	21	1	31	56	83	22	2	1	9	14	6	3	5	0	48	1	2	8	1	4	14	7	10	52	9
27	20	1	26	52	78	22	2	0	5	13	5	3	0	3	49	0	6	8	2	7	15	8	10	30	10
														—			—								
27	20	1	22	48	73	22	1	1	2	10	5	3	2		50	2		7	2	12	15	8	7	10	10
27	19	1	17	44	69	22	1	4	0	7	5	3	9		51	5		7	2	17	16	—	4	0	9
28	19	1	12	39	64	22	1	7	0	3	5	4	16		52	10		6	3	22	16		2	6	7
28	18	1	9	34	59	22	1	10	2	1	5	4	20		52	15		5	3	28	17		0	25	5
28	18	2	6	29	54	22	1	13	5	0	5	—	17	G	52	19	I	4	4	33	17	M	0	48	3
29	17	2	5	25	50	22	1	14	9	1	4		10	26	51	22	5	4	4	38	17	5	2	63	1
29	17	2	6	20	46	22	0	13	12	4	4		3	29	51	22	6	3	4	42	18	8	5	64	0
29	16	2	8	15	42	22	0	11	14	—	4		0	32	50	20	6	3	5	45	18	10	8	50	0
30	16	2	12	11	37	22	0	7	14		4		4	35	48	16	7	2	5	47	18	10	10	28	1
30	16	3	17	8	32	21	0	4	12	E	4	F	11	38	46	11	8	1	5	48	18	8	10	8	2
30	15	3	24	6	27	21	0	1	9	4	3	10	18	40	44	6	8	1	6	48	18	5	8	0	4
30	15	3	33	5	23	21	0	0	5	4	3	17	20	43	42	2	9	1	6	46	18	2	5	8	6
30	14	4	42	7	18	21	0	1	2	4	3	20	15	45	40	0	9	0	6	43	18	0	2	28	8
31	14	4	52	9	13	21	0	3	0	5	3	16	7	47	37	1	9	0	6	39	18	0	0	50	9
31	13	4	61	14	9	21	0	6	0	5	3	9	1	48	34	3	10	0	6	35	18	2	0	64	10
31	13	5	70	20	7	20	0	10	2	5	2	2	1	50	31	7	10	0	6	29	17	5	2	63	10
31	12	5	78	28	5	20	0	13	5	5	2	0	6	51	28	12	10	0	6	24	17	8	—	48	9
31	12	5	85	37	6	20	0	14	8	5	2	5	14	52	25	17	10	0	6	19	17	10		25	7
31	11	6	90	46	8	20	0	13	12	5	2	13	20	52	22	21	10	1	5	13	16	10	N	6	5
32	11	6	93	56	11	19	0	11	14	6	2	19	19	52	19	22	10	1	5	9	16	8	O	0	3
32	10	6	95	65	16	19	0	8	14	6	2	19	12	52	17	21	9	1	5	5	16	6	33	10	2
32	10	7	94	74	22	19	1	4	12	6	2	14	5	51	14	18	9	2	4	2	15	3	54	30	0
32	9	7	93	81	31	19	1	1	9	6	1	6	0	50	11	14	9	2	4	0	15	0	66	52	0
32	9	8	90	87	40	18	1	0	6	6	1	0	2	49	9	8	8	3	3	0	14	0	61	65	0
32	9	8	86	92	—	18	1	1	2	6	1	1	9	47	7	4	7	4	3	1	13	2	43	62	2
32	8	9	81	94		18	1	3	0	7	1	8	17	45	5	1	7	4	2	3	13	4	20	46	3
32	8	9	77	95		17	1	6	0	7	1	15	20	43	3	0	6	—	2	6	12	7	4	23	5
32	7	9	72	94		17	2	10	2	7	1	20	17	41	2	1	6		2	10	11	9	1	5	7
32	7	10	67	92		17	2	13	5	7	1	18	10	38	1	5	5		1	15	11	10	14	0	9
32	6	10	62	88	C	16	2	14	8	7	1	11	2	35	0	10	4	J	1	20	10	9	36	12	10
																								—	
32	6	11	57	84	11	16	2	13	11	7	0	3	0	33	0	15	3	3	1	26	9	6	56		10
32	6	11	53	79	11	15	3	11	14	7	0	0	4	30	0	19	3	3	0	31	9	3	66		9
32	5	12	49	74	12	15	3	8	14	7	0	3	12	27	0	21	2	4	0	36	8	1	60		8
32	5	12	44	70	12	15	3	4	12	8	0	10	18	24	1	22	2	4	0	41	7	0	41		6
32	5	13	40	65	13	14	3	2	10	8	0	18	20	21	2	20	1	5	0	44	7	1	18	P	4
31	4	13	35	60	13	14	4	0	6	8	0	20	15	18	4	16	1	5	0	47	6	4	3	5	2
31	4	14	30	55	14	14	4	0	3	8	0	16	7	15	5	11	0	5	0	48	5	7	2	7	1
31	4	14	26	51	14	13	4	3	1	8	0	8	1	12	7	6	0	6	0	48	5	9	16	9	0
31	3	15	21	47	14	13	5	6	0	8	0	2	1	10	9	2	0	6	0	47	4	10	38	10	0
31	3	15	16	43	15	12	5	9	1	8	0	0	7	8	12	0	0	6	1	44	3	9	58	10	1
31	3	16	12	38	15	12	5	12	4	8	0	5	15	6	14	0	0	6	1	41	3	6	66	9	3
30	2	—	8	33	15	11	6	14	8	8	0	13	20	4	17	3	0	6	1	36	2	3	58	8	—
30	2		6	28	16	11	6	14	11	8	0	19	18	2	20	7	0	6	2	31	2	1	38	6	
30	2		5	24	16	11	7	12	13	8	0	19	12	1	23	12	1	6	2	26	2	0	16	4	
30	2		6	19	17	10	7	8	14	8	0	13	4	1	—	17	1	6	3	20	1	1	2	2	
																			—						

LIST ix (*cont.*).

Terms in Table P 39 (*concl.*).

Q	R	S	T	V	X	Y	Y
0	0	10	25	10	15	65	135
3	3	6	3	2	0	9	23
3	4	6	2	1	1	2	10
4	5	6	1	0	2	0	2
4	6	6	0	0	—	6	0
4	6	6	0	1	Y	17	5
4	5	6	0	2	52	32	15
5	4	6	1	3	79	50	30
5	3	6	1	5	86	68	48
5	2	5	2	6	97	84	66
5	1	5	4	7	103	96	83
5	0	5	5	8	103	103	95
6	0	4	7	8	96	103	102
6	1	4	9	7	84	97	104
6	2	4	11	6	68	86	98
6	3	3	—	5	50	70	87
6	5	3		4	32	52	72
6	6	3		2	17	34	54
6	6	2		1	6	18	36
6	6	2		0	0	7	20
6	5	2	U	0	2	1	8
6	4	1	3	1	9	1	1
6	2	1	4	3	21	8	1
6	1	1	4	—	38	20	7
6	0	0	5		56	36	18
6	0	0	5	W	74	54	34
							—
5	0	0	5	4	89	72	
5	1	0	6	6	99	87	
5	2	0	6	7	104	98	
5	4	0	6	8	102	104	
5	5	0	6	8	94	102	
4	6	0	6	7	81	95	
4	6	0	6	5	64	83	
4	6	0	5	4	46	66	
4	5	1	5	2	29	48	
3	4	1	5	1	14	30	
3	2	1	4	0	4	15	
3	1	2	4	0	0	5	
2	0	2	3	1	3	0	
2	0	2	2	3	11	2	
2	0	3	2	5	25	10	
		—					
2	1		1	7	42	23	
1	3		1	8	60	40	
1	4		1	8	77	58	
1	5		0	7	92	75	
1	6	T	0	6	101	90	
1	6	13	0	4	104	100	
0	5	15	0	3	101	104	
0	4	17	0	1	92	101	
0	3	19	0	0	77	93	
0	2	21	1	0	60	79	
0	1	22	1	1	42	62	
0	0	24	1	3	25	44	
0	0	25	2	—	11	27	
0	1	25	2		3	12	
0	2	26	—	X	0	3	
	—						
0		26		3	4	0	
0		26		4	14	3	
0		25		5	29	12	
0		24		5	46	27	
0	S	23	V	6	64	44	
1	3	22	4	6	81	62	
1	3	20	5	6	94	79	
1	4	18	7	5	102	93	
1	4	16	8	4	104	101	
1	4	14	8	3	99	104	
2	5	12	8	2	89	100	
2	5	10	7	1	74	90	
2	5	8	6	0	56	75	
2	6	6	4	0	38	58	
3	6	4	3	0	21	40	
—							

Terms in Table P 40.

A″	A″	A″	B″	B″	D″	E″	F″	F″	H″	I″	J″	K″	L″	N″
0	70	140	15	85	35	20	5	75	65	60	55	50	55	15
19	6	25	31	0	4	22	6	1	8	2	6	6	1	0
26	3	21	32	0	4	22	6	2	8	4	6	5	0	1
32	2	18	32	0	4	22	5	—	6	7	6	4	1	2
35	4	15	33	0	4	22	5		3	8	5	2	2	3
36	8	11	34	0	3	22	4	H″	1	8	4	1	—	5
34	15	7	34	0	3	21	3	4	0	6	3	1		7
32	22	4	35	1	3	21	2	6	0	4	2	0		9
28	28	2	35	1	3	21	1	8	2	2	1	0		10
24	33	2	35	1	3	20	0	8	—	0	0	0		11
20	35	5	35	1	2	20	0	7	I″	0	0	1	M″	12
17	36	11	36	2	2	19	0	5	4	2	0	2	4	12
14	34	18	36	2	2	18	0	2	6	—	0	3	5	11
10	30	25	36	3	2	18	1	0	8		1	—	6	10
6	26	31	36	4	1	17	2	0	8		2		7	8
3	22	35	36	4	1	16	3	1	6	J″	—	L″	8	6
2	19	36	36	5	1	16	4	3	4	3		4	8	5
3	16	35	36	6	1	15	5	5	2	4		6	8	3
7	12	32	36	6	1	14	5	7	0	5		7	7	1
12	9	28	36	7	1	13	6	8	0	6		8	6	0
20	5	24	35	8	0	12	6	7	1	6	K″	7	5	0
27	2	21	35	9	0	11	6	5	4	6	4	6	4	0
32	2	18	35	10	0	11	5	3	6	5	5	4	3	1
36	4	14	34	10	0	10	5	1	8	5	6	2	2	2
36	8	11	34	11	0	9	4	0	8	4	7	0	1	4
34	15	7	33	12	0	8	3	0	7	3	8	0	0	—
31	23	4	33	13	0	7	2	2	5	2	8	1	0	
27	30	2	32	14	0	6	1	4	2	1	8	2	0	
24	34	2	31	15	0	6	0	7	0	0	7	4	0	
20	36	6	31	16	0	5	0	8	0	0	7	6	1	
17	36	11	30	17	0	4	0	8	1	0	6	8	2	O″
				—										
14	33	18	29		0	4	0	6	3	1	4	8	3	5
10	29	26	29		0	3	1	4	6	2	3	7	5	7
6	26	31	28		0	2	2	2	7	3	2	5	6	9
3	22	35	27		0	2	3	0	8	4	1	3	7	10
2	19	36	26	D″	0	1	3	0	7	5	0	1	8	10
3	16	35	25	3	1	1	4	1	5	6	0	0	8	8
7	12	32	24	3	1	1	5	3	2	6	0	0	8	6
13	8	28	23	3	1	0	6	6	1	6	0	1	8	3
20	4	24	22	4	1	0	6	7	0	6	1	3	7	1
27	2	21	21	4	1	0	6	8	1	5	2	5	6	0
33	3	18	20	4	1	0	6	7	3	4	3	7	5	0
36	5	14	19	4	2	0	5	5	5	3	4	8	4	1
36	10	10	18	5	2	0	4	3	7	2	6	8	3	3
34	16	6	18	5	2	0	3	1	8	1	7	7	2	6
31	23	4	17	5	2	0	2	0	7	0	7	5	1	8
27	30	2	16	5	3	1	1	1	5	0	8	3	0	10
23	34	3	15	5	3	1	1	2	3	0	8	1	0	10
20	36	6	14	5	—	1	0	5	1	1	8	0	0	9
17	35	12	13	6		2	0	7	0	1	7	0	1	7
13	32	—	12	6	E″	2	0	8	1	2	6	1	2	5
9	29		11	6	11	3	1	8	3	4	5	3	3	3
6	25		10	6	12	3	1	6	5	5	4	5	—	1
3	21		9	6	13	4	2	4	7	5	3	7		0
2	18		8	6	14	5	3	2	8	6	2	8		0
4	15	B″	7	6	14	5	4	0	7	6	1	8	N″	2
7	12	18	7	6	15	6	5	0	6	6	0	7	6	4
14	8	19	6	6	16	7	6	1	3	5	0	5	8	7
22	4	20	5	6	17	8	6	4	1	4	0	3	10	9
28	2	21	5	6	17	8	6	6	0	3	1	1	11	10
33	3	22	4	6	18	9	6	8	1	2	1	0	12	10
35	5	23	3	6	19	10	5	8	2	1	2	0	12	9
36	10	24	3	6	19	—	4	7	5	0	4	2	12	7
34	16	25	2	6	20		3	5	7	0	5	4	11	4
30	24	26	2	6	20		2	3	8	0	6	6	9	2
26	31	26	1	5	21	F″	1	1	8	0	7	7	7	0
23	34	27	1	5	21	3	1	0	6	1	8	8	6	0
20	36	28	1	5	21	4	0	1	3	2	8	8	4	1
17	35	29	0	5	22	5	0	3	1	3	8	6	2	3
13	32	30	0	5	22	5	0	5	0	4	8	4	1	—
9	29	30	0	5	22	6	1	7	0	5	7	2	0	

List ix (*cont.*).

Terms in Table P 40 (*concl.*).

A	A	A	B	C	C	D	D	E	F	F	G	H	I	I	J	K	L	M	N	P	Q	S	V
0	70	140	40	0	70	30	100	65	30	100	65	30	5	75	60	45	30	25	20	0	25	25	15
41	66	1	2	9	17	8	1	38	24	8	12	14	12	26	10	10	0	3	5	14	4	1	0
53	56	6	4	12	16	6	3	41	18	14	12	12	2	13	12	7	0	1	7	20	1	2	0
64	43	14	5	14	14	4	4	42	12	—	11	10	1	3	9	4	0	0	9	25	0	—	1
73	31	24	7	16	12	2	—	41	7		10	7	8	0	3	1	1	1	10	28	3		2
79	19	36	9	17	10	1	E	38	3	G	9	3	20	7	0	0	3	3	11	27	—	T	4
														—									—
82	10	49	10	18	7	0	21	34	0	6	7	1	32		2	0	5	5	12	24		6	
81	3	60	11	18	4	0	27	28	0	8	5	0	38		7	2	7	7	12	18		8	
76	0	70	12	17	2	0	33	22	2	9	4	1	34		11	5	9	8	11	12		9	
68	1	78	12	15	1	1	38	15	5	11	2	3	23		11	8	11	7	10	6		11	
57	5	81	12	13	0	2	41	10	9	12	1	6	10	J	7	11	12	5	9	2	R	12	
45	13	82	11	11	0	4	42	5	15	12	0	9	1	6	2	13	12	3	7	0	8	12	
32	23	78	9	8	1	6	41	1	21	12	0	12	1	11	0	14	12	1	6	2	13	12	
21	35	71	7	5	2	7	39	0	27	11	0	14	9	12	4	13	11	0	4	6	16	11	
11	47	61	6	3	4	9	35	1	33	10	1	14	22	8	9	11	9	1	2	12	15	10	
4	59	50	5	1	7	11	29	3	37	8	3	13	33	2	12	8	7	3	1	18	12	9	
0	69	37	3	0	10	12	23	7	39	6	5	10	38	0	10	5	5	5	0	24	7	7	
1	77	25	1	0	12	12	17	12	40	4	6	7	33	3	4	2	3	7	0	27	3	5	
4	81	14	0	0	14	12	11	18	39	3	8	4	22	8	0	0	1	8	0	28	0	3	
12	82	6	0	2	16	11	6	25	36	1	10	1	9	12	1	0	0	7	1	25	1	2	
22	79	1	0	4	17	10	2	31	32	0	11	0	1	10	—	2	0	5	3	20	5	1	
33	72	0	1	6	18	9	0	36	26	0	12	0	1	5		5	1	2	4	14	10	0	
46	63	3	2	8	18	7	0	40	20	0	12	2	10	1		8	2	1	—	8	14	0	
58	51	9	3	11	17	5	2	42	14	1	12	5	23	1		11	3	0		3	16	0	
68	39	18	5	14	15	3	6	42	8	2	11	8	34	5		13	5	1		0	15	1	
76	26	29	7	16	13	2	11	40	4	4	9	11	38	10	K	14	7	3	O	1	11	3	
		—																					
81	16		8	17	10	1	17	36	1	6	8	13	32	12	7	13	9	6	10	4	5	4	
82	7		10	18	7	0	24	31	0	7	6	14	20	9	10	11	11	8	13	10	1	—	
79	2		11	18	5	0	30	25	1	9	4	13	8	3	13	8	12	8	16	16	0		
73	0		11	17	3	1	35	19	3	11	2	11	1	0	14	5	12	7	18	22	2		
64	2	B	12	16	1	2	39	13	7	12	1	7	2	2	14	2	11	5	19	26	6	U	
53	8	6	12	14	0	3	41	7	13	12	0	4	12	7	12	0	10	2	20	28	11	9	
40	16	7	11	11	0	5	42	3	19	12	0	2	25	12	9	0	8	0	20	26	15	12	
28	27	9	10	8	1	6	41	1	25	11	0	0	35	11	6	1	6	0	18	22	16	14	
17	39	11	8	6	2	8	37	0	31	10	1	0	38	6	3	4	4	1	16	16	13	16	
8	52	12	6	4	4	10	32	1	35	8	3	2	31	1	1	—	2	4	14	10	9	18	
2	63	12	5	2	6	11	27	4	38	7	4	5	19	0	0		1	6	11	4	4	18	
0	72	12	3	1	—	12	20	9	40	5	—	8	7	4	1		0	8	8	1	1	18	
2	79	11	2	0		12	14	15	40	3		11	0	10	3		0	8	5	0	0	16	
7	82	10	1	0		12	8	—	37	2		13	3	12	6		1	7	3	3	3	14	
15	81	9	0	1	D	11	4	F	33	1	H	14	13	9	10	L	2	4	1	8	—	12	
																				—			
26	77	7	0	3	6	10	1	20	28	0	7	13	26	4	12	6	4	2	0			9	
38	69	5	1	5	8	8	0	26	22	0	10	11	36	0	14	8	—	0	0			6	
50	58	4	2	8	9	6	1	32	16	1	13	8	37	1	14	10		0	1			4	
62	46	2	3	11	11	4	4	36	11	2	14	5	30	6	12	11		2	3			2	
71	34	1	5	13	12	3	8	39	6	3	14	2	18	11	9	12	M	—	6	Q	S	0	
78	22	1	6	15	12	1	13	40	2	5	12	0	6	11	6	12	4		9	8	3	0	
82	12	0	8	17	12	0	20	39	0	7	9	0	0	7	3	11	6		12	13	4	0	
81	5	0	10	18	11	0	26	37	0	9	6	2	4	2	1	10	8		15	16	5	2	
77	1	1	11	18	10	0	32	33	2	10	3	4	15	0	0	8	8		17	15	6	4	
70	0	2	12	17	8	1	37	27	6	11	1	7	28	3	1	6	6	N	19	12	6	6	
																						—	
60	4	4	12	16	7	2	40	21	11	12	0	11	37	9	3	4	4	6	20	7	5		
48	11	6	11	14	5	4	42	15	16	12	1	13	37	12	6	2	1	8	20	3	4		
36	20	7	11	12	3	5	42	9	22	11	3	14	29	10	9	1	0	9	19	1	3		
24	32	9	10	9	2	7	39	5	28	10	7	13	16	5	12	0	0	11	17	0	1		
13	44	10	8	6	1	9	35	2	33	9	10	11	5	1	14	0	2	12	15	5	0	V	
5	56	11	7	4	0	10	30	0	37	7	12	8	0	1	14	1	4	12	12	10	0	6	
1	67	12	5	2	0	11	24	0	40	5	14	5	5	6	13	3	7	12	9	14	0	8	
0	75	12	3	1	1	12	18	3	40	3	14	2	16	11	10	5	8	11	6	16	1	10	
3	80	11	2	0	2	12	12	7	38	2	12	0	29	12	7	7	8	10	4	15	2	11	
10	82	10	1	0	3	11	7	12	35	1	9	0	37	8	4	9	6	8	2	11	4	12	
19	80	9	0	1	5	10	3	18	31	0	6	1	37	3	1	10	3	6	0	5	5	12	
30	74	7	0	3	7	9	0	24	25	0	3	4	28	0	0	11	1	5	0	1	6	12	
43	65	6	0	5	8	7	0	29	19	1	1	—	15	2	0	12	0	3	1	0	6	11	
55	54	4	1	7	10	5	2	34	13	2	0		4	8	2	12	0	2	2	2	6	10	
66	42	2	3	10	11	4	5	38	7	3	1	I	0	12	5	11	2	1	4	6	5	8	
74	29	1	5	13	12	2	10	40	3	5	3	19	6	11	9	9	5	0	7	11	3	6	
80	18	0	—	15	12	1	16	40	1	7	6	31	18	6	12	7	7	0	—	15	2	4	
82	9	0		17	12	0	22	38	0	9	9	38	30	1	14	5	8	1		16	1	2	
80	3	1		18	11	0	29	34	1	10	12	35	37	0	14	3	7	2		13	0	1	
75	0	1		18	9	0	34	29	4	11	14	25	36	5	13	1	6	3		9	0	0	

List ix (*cont.*).

Terms in Table P 41.

A″	A″	A″	B″	B″	C″	C″	D″	E″	F″	G″	H″	I″	J″	K″	L″	M″	O″	A	A	A	B	C	C	D	D
0	70	140	15	85	35	105	60	45	30	20	15	10	5	0	5	10	35	0	70	140	40	0	70	30	100
0	11	9	35	20	19	12	3	23	6	2	8	0	4	0	8	8	4	0	82	35	2	0	13	14	3
1	10	8	34	21	20	15	3	23	5	4	8	1	5	0	8	8	2	2	89	22	1	0	16	14	1
3	8	8	34	22	20	18	3	22	5	7	7	3	5	1	7	7	1	8	92	12	0	2	18	14	0
6	5	9	33	23	18	19	3	22	4	11	5	5	6	2	6	7	—	18	91	4	0	4	19	13	—
9	3	10	32	24	16	—	4	21	3	14	2	7	6	3	4	6		30	85	0	1	6	20	11	E
10	0	11	31	26	13		4	21	2	17	1	8	6	4	2	4		44	76	1	2	9	20	9	0
11	0	11	30	27	10		4	20	1	19	0	8	5	5	0	3		58	64	6	4	12	19	7	1
10	1	9	29	28	6		4	20	0	20	1	6	4	6	0	2		70	51	14	6	15	17	5	4
9	4	7	28	29	3		4	19	0	20	3	3	3	7	1	1		81	37	25	8	17	14	3	9
8	7	4	27	30	1	D″	5	18	0	18	5	1	2	8	2	0		88	24	39	10	19	11	2	15
8	10	1	26	31	0	6	5	17	0	16	7	0	1	8	4	0		92	13	53	12	20	9	1	22
8	11	0	24	32	0	6	5	16	1	13	8	0	0	8	6	0		91	5	66	13	20	6	0	29
10	10	0	23	33	1	6	5	15	2	10	7	2	0	7	8	0		86	1	77	14	19	3	0	35
11	9	3	22	34	4	6	5	15	3	6	6	4	0	7	8	1		77	1	86	14	18	1	1	41
10	9	6	21	34	7	6	5	14	4	3	3	7	1	6	7	2		66	5	91	14	15	0	2	44
9	8	8	20	35	10	6	6	13	5	1	1	8	1	5	5	3		53	13	92	13	13	0	4	46
6	9	10	18	36	14	6	6	12	5	0	0	8	2	3	3	4		39	24	88	12	10	1	6	45
3	9	10	17	37	17	6	6	11	6	0	0	6	3	2	1	6		25	37	81	10	7	2	8	43
1	10	10	16	38	19	5	6	10	6	1	2	4	4	1	0	7		14	51	70	8	4	4	10	39
0	11	9	15	38	20	5	6	9	6	3	4	2	5	1	0	7		6	64	58	6	2	7	12	33
1	10	8	14	39	20	5	6	8	5	6	6	0	6	0	1	8		1	76	44	4	1	10	13	26
3	7	8	13	40	19	5	6	7	5	10	8	0	6	0	3	8		0	85	30	2	0	13	14	19
6	4	9	12	40	17	5	—	6	4	13	8	2	6	0	5	8		4	91	18	1	0	15	14	12
9	1	10	11	40	14	5		5	3	16	6	4	5	1	7	7		12	92	8	0	1	18	13	6
10	0	11	10	41	10	4	E″	5	2	18	4	6	4	2	8	6		22	89	2	0	3	19	12	3
11	0	10	9	41	7	4	0	4	1	20	2	8	3	3	8	5		35	82	—	1	6	20	10	0
10	1	9	8	41	4	4	0	3	0	20	0	8	2	4	7	4		49	72		2	9	20	8	0
9	4	6	7	42	1	4	0	3	0	19	0	6	1	5	5	3		63	59		3	11	19	6	2
8	7	3	6	42	0	4	0	2	0	17	1	4	0	6	3	2		75	46		5	14	17	4	6
8	10	1	5	42	0	3	1	2	0	14	3	2	0	7	1	1		84	32	B	7	17	15	2	11
9	11	0	5	—	1	3	1	1	1	11	6	0	0	8	0	0		90	19	0	9	19	12	1	18
10	10	1	4		3	3	1	1	2	7	7	0	0	8	0	—		92	9	0	11	20	9	0	25
10	9	3	3		6	3	2	1	2	4	8	2	1	8	1			90	3	1	13	20	6	0	32
10	9	6	2		10	2	2	0	3	2	7	4	2	7	3			83	0	2	14	19	4	1	38
8	8	9	2	C″	13	2	3	0	4	0	5	6	3	6	5	O″		73	2	4	14	18	2	2	42
6	9	10	2	20	16	2	3	0	5	0	3	8	4	5	7	0		61	7	6	14	16	0	3	45
3	9	11	1	19	18	2	4	—	6	1	1	8	5	4	8	1		47	17	8	13	13	—	5	46
0	10	10	1	18	20	2	5		6	3	0	7	6	3	8	2		33	29	10	12	10		7	45
0	11	8	1	15	20	1	6		6	6	1	4	6	2	6	4		21	42	12	10	7		9	41
1	10	8	0	12	19	1	6	F″	0	9	2	2	6	1	4	7		10	56	13	8	5	D	11	36
4	7	8	0	8	17	1	7	0	5	12	5	0	5	0	2	9		3	69	14	6	2	0	13	30
7	4	9	0	5	14	1	8	0	4	15	7	0	4	0	1	10		0	80	14	4	1	0	14	23
9	1	10	0	2	11	1	9	1	3	18	8	1	3	0	0	10		1	88	13	2	0	1	14	16
11	0	11	0	1	7	1	10	1	2	20	8	3	2	1	0	8		6	92	12	1	0	3	14	10
11	0	10	0	0	4	0	11	2	1	20	6	6	1	1	2	6		15	91	11	0	1	5	13	5
10	3	9	0	0	2	0	12	3	1	19	4	8	1	2	4	4		27	87	9	0	3	7	12	2
9	5	6	0	2	0	0	13	4	0	17	2	8	0	3	6	2		40	79	7	0	5	9	10	0
8	8	3	1	5	0	0	14	5	—	15	0	7	0	5	7	0		54	67	5	1	8	11	8	1
8	10	1	1	8	1	0	15	6		12	0	5	0	6	8	0		67	54	3	3	11	12	5	3
9	11	—	1	11	3	0	15	6	G″	8	1	3	1	7	8	1		79	40	1	5	14	13	3	8
10	10		2	14	6	0	16	6	0	5	4	1	2	8	6	3		87	27	0	7	16	14	2	14
10	9		2	17	9	0	17	6	1	2	6	0	3	8	4	6		91	15	0	9	18	14	1	21
10	8		3	19	12	0	18	5	2	1	8	1	4	8	2	8		92	6	0	11	20	13	0	28
8	8		3	20	15	0	19	4	5	—	8	3	5	8	1	9		88	1	1	12	20	12	0	34
6	9	B″	4	20	18	0	20	3	8	H″	7	5	6	7	—	10		80	0	2	13	20	10	1	40
3	10	42	5	18	20	0	20	2	12	0	5	7	6	6		9		69	3	4	14	18	8	2	44
0	11	42	5	15	20	0	21	2	15	1	3	8	6	5		8		56	10	6	14	16	6	4	46
0	11	42	6	12	19	0	21	1	17	3	1	7	5	4		6		42	21	8	13	14	4	6	46
1	9	42	7	9	17	0	22	0	19	5	—	5	5	3		3		29	33	10	12	11	2	8	44
4	7	41	8	6	14	1	22	0	20	7	I″	3	4	2	M″	1		17	47	12	10	8	1	10	40
7	4	41	9	3	11	1	23	0	20	8	0	1	3	1	0	0		7	61	13	8	5	0	12	34
9	1	41	10	1	8	1	23	0	18	8	1	—	2	0	0	0		2	73	14	6	3	0	13	28
11	0	40	11	0	5	1	24	1	15	6	3		1	—	1	2		0	83	14	4	1	1	14	21
11	0	40	12	0	2	1	24	2	12	4	5		0		2	4		3	90	14	2	0	2	14	14
10	3	40	13	2	0	1	24	3	9	1	7	J″	—	L″	3	6		9	92	13	1	0	3	13	8
9	6	39	14	4	0	2	24	4	6	0	8	0		0	4	8		19	90	11	0	1	5	12	3
8	8	38	15	7	1	2	24	5	3	0	7	0		1	5	10		32	84	9	—	2	8	11	1
8	10	38	16	11	2	2	24	5	1	2	5	1		2	6	10		46	75	7		5	10	9	0
9	10	37	17	14	5	2	24	6	0	4	3	2		4	7	9		59	63	5		7	12	7	2
10	10	36	18	17	8	2	24	6	0	6	1	3		6	8	7		72	49	3		10	13	5	5

List ix (*cont.*).

Terms in Table P 41 (*concl.*).

E	F	F	G	H	I	I	J	K	L	M	N	P	Q	S	V
65	30	100	65	30	5	75	60	45	30	25	20	0	25	25	15
10	46	4	6	10	25	25	2	15	10	8	0	0	1	1	7
16	46	1	8	13	19	25	8	16	7	7	0	2	6	0	5
23	44	—	10	15	10	20	13	15	5	4	1	6	11	—	3
30	40		12	16	2	11	13	13	3	2	2	13	16		1
36	34	G	13	15	0	3	8	9	1	0	4	20	—	T	0
41	28	0	14	12	4		2	6	0	0	6	26		0	
45	21	0	14	9	12		0	2	0	2	8	29		0	
46	14	1	13	5	21		4	0	1	4	10	30		1	
45	8	3	12	2	26		10	0	3	6	12	27		2	
42	3	5	11	0	25	J	14	2	5	8	13	22	R	4	
38	1	7	9	0	18	0	12	4	7	8	14	15	18	7	
32	0	9	6	2	9	3	5	8	10	6	14	8	16	9	
25	2	11	4	5	2	9	1	12	12	4	13	3	11	11	
18	5	13	2	9	0	14	1	15	13	2	12	0	6	12	
11	10	14	1	13	5	12	7	16	14	0	11	1	1	13	
6	17	14	0	15	13	7	12	15	14	0	9	4	0	14	
2	24	14	0	16	21	1	14	13	13	2	7	10	2	14	
0	31	13	1	15	26	1	9	10	11	4	5	17	8	13	
0	37	11	2	13	24	5	3	6	9	7	3	24	13	12	
3	42	9	3	9	17	12	—	3	7	8	1	28	17	11	
6	45	7	5	5	8	14		1	4	8	0	30	18	9	
12	46	5	7	2	1	10		0	2	6	—	28	15	7	
19	45	3	9	0	0	4		1	1	4		24	9	4	
26	42	2	11	0	5	0		4	0	1		17	4	2	
33	37	1	13	2	14	2	K	7	0	0	O	10	0	1	
39	31	0	14	5	22	8	0	11	1	0	0	4	0	0	
43	24	0	14	9	26	13	1	14	3	2	1	1	4	—	
45	17	1	14	12	24	13	3	16	5	5	2	0	9		
46	10	2	13	15	16	8	7	16	8	7	4	3	15		
44	5	4	11	16	7	2	11	14	10	8	7	8	18	U	
41	2	6	9	15	1	0	14	11	12	8	11	15	17	0	
35	0	9	7	13	1	4	16	7	13	6	14	22	13	0	
29	1	11	5	10	6	11	16	3	14	3	17	27	8	2	
22	3	12	3	6	15	14	14	1	14	1	19	30	2	4	
15	8	13	1	3	23	11	11	—	13	0	21	29	0	7	
9	14	14	0	0	26	5	7		11	1	22	26	1	10	
4	21	14	—	0	23	0	4		8	2	22	20	6	13	
1	28	13		1	15	1	1		6	5	20	13	11	16	
—	34	12		4	6	7	0		4	7	18	6	16	18	
F	40	10	H	8	1	13	1	L	2	8	15	2	—	20	
0	44	8	0	12	1	14	3	0	0	7	12			20	
1	46	6	1	15	7	9	6	0	—	5	9			20	
4	46	4	3	16	16	3	10	2		3	6			18	
9	43	2	7	16	24	0	13	4		1	3			16	
15	39	1	11	13	26	3	15	6	M	—	1	Q	S	13	
22	33	0	14	10	22	10	16	8	0		0	18	0	10	
29	27	0	16	6	14	14	15	11	1		0	16	0	7	
36	20	1	16	3	5	12	12	13	3		1	11	1	4	
41	13	2	14	1	0	6	8	14	5		3	6	2	2	
44	7	4	11	0	1	1	4	14	7	N	6	1	4	0	
46	3	6	7	1	8	1	2	13	8	0	9	0	5		
45	0	8	4	4	17	6	0	12	7	0	12	2	6		
43	0	10	1	7	24	12	0	10	5	1	15	8	6		
38	2	12	0	11	26	14	2	8	2	3	18	13	5		
32	6	13	1	14	21	10	6	5	1	5	20	17	4	V	
25	12	14	3	16	13	3	9	3	0	7	22	18	3	0	
18	18	14	6	16	5	0	13	1	1	9	22	15	2	0	
12	25	13	10	14	0	3	15	0	3	11	21	9	1	1	
6	32	12	13	11	2	9	16	0	6	12	19	4	0	3	
2	38	10	16	7	9	14	15	1	8	13	17	0	0	5	
0	43	8	16	3	18	13	12	2	8	14	14	0	1	7	
0	45	6	15	1	25	7	9	4	7	14	11	4	2	9	
3	46	4	12	—	26	1	5	7	5	13	7	9	3	11	
7	44	2	8		21	0	2	9	2	12	4	15	4	13	
13	41	1	4	I	12	5	0	11	0	10	2	18	5	14	
20	36	0	1	0	4	11	0	13	0	8	1	17	6	14	
27	29	0	0	3	0	14	2	14	1	6	—	13	6	14	
33	22	1	0	11	2	11	5	14	4	4		8	5	13	
39	15	2	3	20	10	4	9	13	6	2		2	4	11	
43	9	4	6	25	19	0	12	12	8	1		0	2	9	

Terms in Table P 42.

A	A	A	B	B	B	C	C	D	D
0	70	140	15	85	155	50	120	30	100
13	10	0	7	19	60	2	37	4	12
13	11	2	28	2	50	3	54	11	16
13	12	3	50	2	28	20	53	15	15
14	13	5	60	18	8	43	36	15	10
14	13	7	53	41	0	56	14	11	3
15	13	8	33	57	10	50	0	4	0
16	13	10	11	58	31	30	6	0	2
18	13	11	0	42	52	8	26	1	8
20	13	12	7	20	60	0	47	6	14
22	13	12	27	3	51	10	56	13	16
24	15	13	49	2	29	32	46	16	13
25	16	13	60	17	8	52	24	14	7
26	18	13	54	40	0	55	5	8	2
26	19	13	34	57	9	40	1	2	0
25	21	13	12	59	—	18	15	0	4
24	23	14	0	43		2	38	3	10
22	25	15	6	21		3	54	9	15
19	25	16	26	3		21	53	14	16
15	26	18	48	1		44	35	16	11
12	26	20	60	16	C	56	13	12	5
9	25	22	54	39	28	49	0	6	1
7	23	24	35	56	49	29	6	1	1
4	21	25	13	59	56	8	27	0	6
2	17	26	0	44	44	0	48	5	12
1	15	25	5	22	22	11	56	11	16
1	11	25	24	4	4	34	45	15	15
0	9	24	47	1	2	52	23	15	9
1	5	22	59	15	17	55	4	10	3
2	3	19	55	38	40	39	1	4	0
4	1	16	36	56	55	17	16	0	2
6	0	13	14	60	52	1	39	1	
8	0	10	0	46	33	4	54	7	
10	1	7	5	23	11	22	52	13	
11	1	4	23	4	0	45	34	16	
12	3	2	46	1	8	56	12	14	E
13	5	1	59	14	29	48	0	8	29
13	7	0	56	37	50	27	7	2	39
13	8	0	37	55	56	7	—	0	48
13	10	0	14	60	43	0		3	55
13	12	2	0	46	21	12	D	9	58
14	13	4	4	24	3	35	8	15	57
14	13	6	22	5	2	53	14	16	53
15	13	8	45	1	18	54	16	12	45
16	13	10	59	13	41	38	13	6	35
18	13	11	56	36	55	16	7	1	25
19	13	12	38	55	51	1	1	1	15
21	13	12	16	60	32	4	0	5	7
23	14	13	1	47	10	24	4	11	2
24	15	13	4	25	0	46	10	16	0
26	16	—	21	6	9	56	15	15	2
26	18		44	0	30	48	15	10	8
26	20		59	12	50	26	11	4	16
25	22		57	34	56	6	5	0	26
24	23		39	54	42	0	0	2	36
21	25	B	17	60	20	13	1	7	46
18	25	30	1	48	3	36	6	13	53
15	26	51	3	26	2	53	12	16	57
12	26	60	20	6	19	54	16	14	58
9	25	52	43	0	42	37	14	8	54
6	22	31	58	11	55	15	9	2	48
4	20	9	57	33	51	1	3	0	38
1	17	0	40	53	31	5	0	3	28
0	14	8	18	60	9	25	2	10	18
0	11	29	2	49	0	46	8	15	9
1	8	50	3	27	10	56	14	16	3
1	5	60	19	7	31	47	16	12	0
3	2	52	42	0	51	25	13	5	1
4	1	32	58	10	55	5	6	1	6
6	0	10	58	32	41	1	1	1	13
8	0	0	41	53	19	14	0	5	23

LIST ix (*cont.*).

Terms in Table P 42 (*concl.*).

E	E	F	G	G	H	H	I	J	K	L	M	N	O	P	Q	S	T	W	W
35	105	50	0	70	25	95	50	35	20	10	0	0	0	15	30	10	35	30	100
33	42	0	31	61	1	4	4	2	5	22	6	4	15	4	29	6	0	0	7
43	50	0	35	60	0	2	7	5	4	22	7	5	20	7	35	6	1	2	12
51	56	0	38	59	0	1	12	7	3	21	8	7	25	12	38	6	2	5	17
56	58	0	42	57	0	1	18	8	3	20	9	8	28	17	37	6	—	10	22
58	56	0	45	55	0	0	25	7	2	18	10	8	30	22	33	5	U	15	26
56	51	1	48	53	1	0	31	4	1	17	11	8	30	26	26	5	4	20	28
50	43	1	51	50	2	0	38	1	1	15	11	7	27	28	18	5	5	24	28
41	33	2	53	47	4	1	44	0	0	13	12	6	23	28	10	4	6	27	26
31	23	3	56	44	5	2	49	1	0	11	12	5	19	26	4	4	7	28	23
21	13	4	58	41	7	3	53	3	0	10	12	3	13	23	0	3	8	27	18
11	5	4	59	37	8	4	56	6	0	8	12	2	8	19	1	3	8	24	13
4	1	5	60	34	10	6	58	8	0	6	11	1	4	14	4	2	8	20	8
1	0	6	61	30	12	7	58	8	1	4	11	0	1	9	11	2	7	15	4
0	3	7	62	27	14	9	56	6	1	3	10	0	0	5	—	1	6	10	1
4	10	7	62	23	16	—	53	4	2	2	9	1	1	2	R	1	5	5	0
11	19	8	62	20	18		49	1	3	1	8	2	4	0	3	1	3	2	1
20	—	8	61	16	19		44	0	4	0	7	3	8	0	4	0	2	0	4
30		8	60	13	20		38	1	5	0	6	4	13	2	5	0	1	0	8
41		8	58	11	21		31	3	6	0	5	6	19	6	5	0	0	2	13
49	F	8	56	8	22	I	25	6	6	0	4	7	23	11	6	0	0	6	18
55	4	7	54	6	22	29	18	8	7	1	3	8	27	16	6	0	0	11	23
58	5	7	51	4	22	36	12	8	8	2	2	8	30	21	6	0	1	16	26
57	6	6	49	2	22	42	7	6	9	3	1	8	30	24	6	0	2	21	28
52	6	5	46	1	21	47	4	3	10	5	1	7	28	27	5	1	3	25	28
44	7	4	42	0	20	52	1	1	11	6	0	6	25	28	4	1	—	27	26
34	7	3	39	0	19	55	0	0	11	8	0	4	20	27	3	1		28	22
24	8	3	35	0	17	57	1	1	12	10	0	3	15	24	2	2		27	17
14	8	2	32	1	16	58	3	3	12	12	0	1	10	21	1	2		24	12
6	8	1	28	2	14	57	6	6	12	14	0	0	5	16	1	3		19	7
1	8	1	25	3	12	54	11	8	12	16	1	0	2	11	0	—	V	15	3
0	7	0	21	4	10	51	16	8	12	17	2	0	0	6	0		3	10	1
3	7	0	18	6	8	46	22	6	11	19	2	1	0	2	0		5	5	0
9	6	0	15	9	6	40	—	3	11	20	3	2	3	0	0		6	2	1
17	6	0	12	11	5	33		1	10	21	4	3	7	0	1		4	0	4
28	5	0	9	14	3	27	J	0	9	22	5	5	11	2	2	T	2	0	9
38	4	1	7	17	2	20	4	1	9	22	7	6	17	5	3	4	0	3	13
47	3	1	5	20	1	14	7	4	8	22	8	7	22	9	3	6	1	6	18
54	2	2	3	24	0	9	8	6	7	22	9	8	26	—	4	7	—	11	23
58	2	3	2	27	0	5	7	8	6	21	10	8	29		5	8		16	26
57	1	4	1	—	0	2	5	8	5	20	10	8	30	Q	6	8	W	21	28
54	0	5	0		0	0	2	6	4	19	11	7	29	19	6	6	14	25	28
47	0	5	0		1	0	0	3	3	18	12	5	26	27	6	5	19	27	25
37	0	6	0		2	2	0	1	2	16	12	4	22	34	6	3	24	28	22
27	0	7	1		3	5	2	0	1	14	12	2	17	37	5	1	27	27	17
17	0	7	2	H	4	9	4	1	1	12	12	1	11	38	5	0	28	24	12
								—											
8	1	8	3	11	6	14	7		0	11	12	0	7	34	4	0	27	19	7
2	1	8	5	13	8	20	8		0	9	11	0	3	28	3	1	25	14	3
0	2	8	7	15	10	27	7		0	7	11	0	0	20	2	3	21	9	1
2	3	8	10	16	12	33	5		0	5	10	1	0	12	1	5	16	4	0
7	3	8	13	18	14	40	2	K	0	4	9	2	2	5	0	6	11	1	1
15	4	7	16	19	15	46	0	6	1	2	8	4	5	1	0	8	6	0	4
25	5	6	19	20	17	51	0	7	1	1	7	5	10	0	0	8	3	1	9
35	6	6	22	21	18	54	2	8	2	0	6	6	—	3	0	7	0	3	—
45	7	5	26	22	20	57	5	9	2	0	5	7		9	1	6	0	7	
52	7	4	29	22	21	58	7	10	3	0	4	8	P	16	1	4	2	12	
57	8	3	33	22	22	57	8	10	4	0	3	8	14	24	2	2	5	17	
58	8	2	36	21	22	55	7	11	5	1	2	7	19	32	—	1	10	22	
55	8	2	40	21	22	52	5	11	—	2	1	6	23	36		0	15	25	
49	8	1	43	20	22	47	2	12		3	1	5	26	38		0	19	28	
40	8	1	46	18	21	42	0	12	L	4	0	3	28	36	S	2	24	28	
30	7	0	49	17	20	36	0	12	11	6	0	2	28	31	3	3	27	26	
20	7	0	52	15	19	29	2	12	13	7	0	1	26	23	3	5	28	23	
10	6	0	55	13	18	22	5	12	15	9	0	0	22	15	4	7	27	18	
4	5	0	57	11	16	16	7	11	16	—	1	0	17	7	4	8	25	13	
0	5	1	59	9	14	11	8	11	18		1	0	12	2	5	8	21	9	
1	4	1	60	8	13	6	7	10	19		2	1	7	0	5	7	16	4	
5	3	2	61	6	11	3	4	9	20		3	3	4	2	5	5	11	1	
12	2	2	62	4	9	1	2	8	21		4	—	1	6	6	3	6	0	
22	1	3	62	3	7	0	0	7	22		5		0	14	6	2	2	1	
32	1	—	62	2	5	1	0	6	22		—		1	22	6	0	0	3	

Terms in Table P 43.

A	A	A	B	B
0	70	140	15	85
3	1	7	53	2
3	1	5	64	20
3	2	3	56	44
2	2	1	35	61
1	2	0	11	62
1	3	1	0	45
1	3	1	7	21
1	2	1	29	3
2	2	1	52	2
2	2	2	64	18
4	2	3	57	43
7	1	3	36	61
9	0	3	12	62
12	1	2	0	46
15	1	2	7	22
17	3	2	28	3
20	5	1	51	2
22	7	0	64	17
23	10	1	58	42
23	13	1	37	60
23	15	2	13	63
21	18	4	0	47
20	20	6	6	23
17	22	8	26	4
14	23	11	50	1
11	23	14	63	16
8	22	17	58	40
6	20	20	38	60
4	18	22	14	63
2	15	23	1	48
1	13	23	5	24
1	10	23	25	5
0	7	22	49	1
1	5	20	63	15
2	3	17	59	39
2	1	15	39	59
2	1	12	15	63
3	0	9	1	49
3	1	7	5	25
3	2	4	24	5
3	2	2	48	1
2	2	2	63	14
1	2	1	60	38
1	3	1	40	58
1	3	1	16	63
0	2	1	1	50
1	2	2	4	26
2	2	3	23	6
4	1	3	47	0
7	1	—	63	13
9	0	[illegible]	60	37
12	1		42	58
15	2		17	64
18	3		2	51
20	5	B	3	28
22	8	64	22	7
23	10	55	46	0
23	13	32	62	12
22	16	10	61	36
21	19	0	43	57
19	21	9	18	64
17	23	31	2	52
13	23	54	3	29
10	23	64	21	7
8	22	56	45	0
5	20	34	62	11
3	18	11	61	35
2	15	0	44	56
1	12	8	20	64
0	9	30	2	53

List ix (*cont.*).

Terms in Table P 43 (*concl.*).

B	C	C	D	D	E	E	F	G	G	H	H	I	J	K	L	M	N	O	P	Q	S	T	W	W
155	50	120	30	100	35	105	50	0	70	25	95	50	35	20	10	0	0	0	15	30	10	35	30	100
30	18	57	1	1	60	57	6	0	17	17	21	16	8	12	14	0	8	30	25	37	3	4	109	120
8	42	41	0	6	56	50	5	0	19	15	20	10	8	12	16	0	8	29	28	30	4	6	114	122
0	57	17	5	12	49	41	4	0	20	13	18	5	6	11	18	0	7	26	30	22	4	8	119	122
11	54	1	11	16	40	30	3	1	21	10	16	2	3	11	19	1	6	22	30	14	4	—	121	119
34	34	4	16	14	29	20	2	1	23	8	14	0	1	10	21	2	4	17	27	6	5	U	122	115
56	11	24	15	9	18	10	2	2	24	7	12	0	0	10	22	2	3	11	24	1	5	8	120	109
64	0	47	10	3	9	4	1	3	25	5	10	1	1	9	23	3	2	6	19	0	6	8	117	103
54	8	58	4	0	3	0	1	4	26	3	8	4	3	8	24	4	1	3	13	3	6	7	112	98
31	30	50	0	2	0	1	0	6	27	2	6	8	6	7	24	5	0	0	8	8	6	6	106	93
9	52	28	2	8	1	5	0	7	27	1	4	14	8	6	24	6	0	0	4	16	6	5	100	91
0	58	7	7	14	6	13	0	8	28	0	3	20	8	5	23	7	1	2	1	25	6	4	95	90
10	45	0	13	16	14	23	0	10	28	0	2	27	6	4	23	8	2	5	0	33	6	2	92	92
32	21	13	16	13	24	34	1	11	28	0	1	33	3	3	22	9	3	10	1	38	6	1	90	95
55	3	36	14	7	35	44	1	13	28	0	0	40	1	2	20	10	5	15	4	—	6	0	91	100
—	2	55	8	1	46	52	2	15	28	1	—	46	0	2	19	11	6	20	8	R	5	0	93	106
	19	56	2	0	53	58	2	16	27	2		52	1	1	17	12	7	25	13	6	5	0	98	112
	43	40	0	4	59	—	3	18	26	4		56	4	0	15	12	8	28	19	6	4	0	103	117
	57	16	3	10	60		4	19	26	5		59	6	0	13	12	8	30	24	5	4	1	109	120
	53	1	9	15	57		5	21	25	7		60	8	0	11	12	8	30	27	5	4	2	115	122
C	33	5	15	15	51	F	6	22	23	9	I	60	8	0	9	12	7	27	30	4	3	4	119	121
58	10	25	16	11	42	0	6	23	22	11	0	58	6	0	7	11	5	24	30	3	3	5	122	119
48	0	47	12	4	32	0	7	25	21	13	1	55	3	0	5	11	4	19	28	2	2	6	122	114
26	9	58	6	0	21	0	8	26	19	15	3	50	1	1	3	10	2	13	25	1	2	7	120	109
5	32	49	1	1	12	1	8	26	18	17	7	44	0	2	2	9	1	8	20	1	1	8	116	103
1	52	27	1	6	4	1	8	27	16	19	12	38	1	2	1	8	0	4	15	0	1	—	110	97
15	57	6	5	13	0	2	8	28	15	21	18	31	4	3	0	7	0	1	10	0	1		105	93
38	44	0	12	16	0	3	8	28	13	22	24	24	7	4	0	6	0	0	5	0	0		100	90
56	20	14	16	14	4	4	7	28	11	23	31	18	8	5	0	5	1	1	2	0	0		95	90
55	3	37	15	9	12	4	7	28	10	24	38	12	7	6	0	4	2	4	0	1	0		91	92
37	3	55	10	3	21	5	6	28	8	24	44	7	5	7	1	3	4	8	0	2	—	V	90	96
14	20	56	3		32	6	5	27	7	24	50	3	2	8	2	2	5	13	3	3		6	91	101
0	44	38	0		42	7	5	27	6	24	55	1	0	9	3	1	6	19	6	4		5	94	107
6	57	15	2		51	7	4	26	4	23	58	—	0	10	5	1	7	24	11	4		2	98	112
27	52	1	7		57	8	3	25	3	22	60		2	10	7	0	8	27	17	5		0	104	117
49	32	5	13	E	60	8	2	24	2	21	60	J	4	11	9	0	8	30	22	6	T	0	110	121
58	9	26	16	60	59	8	2	23	1	19	59	8	7	11	11	0	7	30	26	6	8	2	115	122
47	0	48	13	58	53	8	1	21	1	17	56	7	8	12	13	0	6	28	29	6	8	5	119	121
25	10	—	7	52	46	8	0	20	0	15	52	5	7	12	15	1	5	25	—	6	6	—	122	118
5	33		2	44	35	7	0	19	0	13	46	2	5	12	17	1	4	20		5	4		122	114
1	53	D	0	34	24	7	0	17	—	11	40	0	2	12	19	2	2	15	Q	4	2	W	120	108
16	57	0	3	23	14	6	0	15		9	33	0	0	12	20	3	1	10	40	4	1	122	115	102
40	43	3	10	13	6	5	0	14		7	27	2	0	11	22	4	0	5	38	3	0	121	110	97
56	19	9	15	5	1	4	1	12		5	20	5	2	11	23	5	0	2	33	2	0	118	105	93
55	2	14	16	1	0	3	1	11		4	14	7	5	10	23	6	0	0	25	1	1	113	99	90
36	3	16	12	0	3	3	2	9	H	2	8	8	7	9	24	7	1	0	16	0	3	107	94	90
13	21	13	5	4	9	2	3	8	0	1	4	7		8	24	8	2	3	8	0	5	102	91	92
0	45	6	1	10	18	1	3	6	0	0	1	4		7	24	9	4	6	3	0	7	97	90	97
7	58	1	1	20	29	1	4	5	1	0	0	2		6	23	10	5	11	0	0	8	92	91	102
28	52	0	6	30	40	0	5	4	2	0	0	0		5	22	11	7	17	1	1	8	90	94	107
50	30	4	12	41	49	0	6	3	3	0	2	0	K	4	21	11	8	22	6	1	7	90	99	113
58	8	11	16	50	56	0	7	2	4	1	5	2	0	4	19	12	8	26	14	2	6	93	105	118
47	0	15	15	57	60	0	7	1	6	2	10	5	0	3	18	12	8	29	22	3	4	97	110	121
24	11	15	9	60	59	0	8	1	8	3	16	7	0	2	16	12	7	—	30	4	2	102	115	—
4	34	10	3	59	55	1	8	0	10	5	22	8	1	1	14	12	6		37	5	0	108	120	
1	54	4	0	54	48	2	8	0	12	7	29	7	1	1	12	12	5	P	40	5	0	114	122	
17	57	0	2	47	38	2	8	0	14	8	36	4	2	0	10	11	3	30	39	6	0	118	122	
41	42	1	8	37	27	3	8	0	16	10	42	1	3	0	8	10	2	29	35	—	2	121	119	
57	18	7	14	26	17	4	7	1	18	13	48	0	4	—	6	9	1	26	28		4	122	115	
54	2	13	16	15	8	5	7	1	20	15	53	1	4		4	8	0	22	19		6	121	110	
35	4	16	13	7	2	5	6	2	21	17	57	3	5	L	3	7	0	17	11	S	7	117	104	
12	22	14	7	2	0	6	5	3	22	18	59	6	6	0	2	6	1	11	4	0	8	112	98	
0	46	8	2	0	2	7	4	4	23	20	60	8	7	0	1	5	2	6	0	0	8	107	94	
8	58	2	0	2	7	7	4	5	24	21	59	8	8	1	0	4	3	3	0	0	7	101	91	
29	51	0	4	8	15	8	3	6	24	22	57	6	9	2	—	3	4	0	4	0	5	96	90	
51	29	3	10	17	26	8	2	8	24	23	53	4	10	3		2	6	0	11	1	3	92	91	
58	8	9	15	27	37	8	1	9	23	24	48	1	11	4		2	7	2	19	1	1	90	95	
46	0	14	16	38	47	8	1	11	22	24	42	0	11	6		1	8	5	28	1	0	90	100	
22	12	16	11	48	54	8	0	12	21	24	36	1	12	8		0	—	10	35	2	0	93	105	
4	35	12	5	55	59	7	0	14	20	23	29	3	12	10		0		15	39	2	1	97	111	
2	54	6	0	59	60	6	—	15	18	22	22	6	12	12		—		20	40	3	2	103	116	

List ix (*cont.*).

Terms in Table P 44.

A	A	A	B	B	B	C	C	D	D	E	E	F	G	G	I	J	K	L	M	N	P	Q	S	T	W
0	70	140	5	75	145	40	110	10	80	0	70	5	0	70	0	5	10	20	30	45	5	20	0	30	5
33	60	2	35	45	25	40	2	18	9	22	18	6	3	0	6	12	50	11	0	0	6	20	3	18	8
34	59	2	23	45	36	40	2	19	8	23	17	6	5	0	7	12	50	10	1	0	4	17	4	16	7
35	59	1	12	39	44	40	2	19	8	24	16	5	6	1	8	11	49	10	2	0	2	14	5	11	6
36	58	1	3	28	46	40	1	20	7	25	15	4	6	—	9	9	48	9	3	1	1	11	6	5	5
37	57	1	0	17	42	40	1	20	7	26	14	3	4	H	10	8	46	9	4	3	0	8	6	1	4
38	57	1	3	7	33	40	1	21	6	27	13	2	2	4	11	6	44	8	5		0	6	6	0	3
39	56	0	11	1	22	40	1	21	6	28	12	1	0	6	12	4	42	8	6		2	4	6	3	2
40	55	0	22	1	10	39	1	22	5	29	11	0	0	7	12	2	40	7	6		4	2	5	—	1
41	54	0	34	7	3	39	0	22	5	30	10	0	1	8	12	1	38	6	6		6	1	4		0
42	54	0	42	17	0	39	0	23	4	31	9	0	3	8	12	0	36	6	6	O	7	0	3	U	0
43	53	0	46	29	4	39	0	23	4	32	8	0	5	6	11	0	34	5	5	4	8	0	2	8	1
44	52	0	43	39	12	39	0	23	4	33	8	1	6	4	11	0	32	4	4	6	8	0	1	11	2
45	51	0	36	45	24	38	0	24	3	34	7	2	6	2	10	1	30	4	3	7	7	1	0	14	3
46	50	0	24	45	35	38	0	24	3	35	6	3	4	1	9	3	28	3	2	8	5	2	0	16	—
47	49	0	13	39	43	38	0	24	3	36	5	4	2	0	8	5	27	3	1	8	3	4	0	16	
48	48	0	4	29	46	37	0	24	2	36	5	5	1	0	6	7	26	2	0	8	1	6	0	15	
49	48	0	0	18	43	37	0	25	2	37	4	5	0	1	5	8	26	2	0	7	0	8	1	13	
50	47	1	2	7	34	36	0	25	2	38	3	6	1	3	4	10	25	1	0	6	0	11	2	10	
51	46	1	10	1	23	36	0	25	1	39	3	6	2	5	3	11	25	1	1	4	1	14	3	7	
51	45	1	21	1	11	35	1	25	1	39	2	6	4	7	2	12	25	1	2	3	3	17	3	4	X
52	44	1	33	6	3	35	1	26	1	40	2	5	6	8	1	12	25	0		1	5		4	2	5
53	43	2	42	16	0	34	1	26	1	41	2	4	6	8	0	11	25	0		0	7		5	0	7
54	42	2	46	28	3	34	1	26	1	41	1	3	5	7	0	10	24	0		0	8		6	0	9
55	41	2	44	39	12	33	1	26	0	42	1	2	3	5	0	9	24	0		0	8		6	1	10
55	40	3	36	45	—	33	2	26	0	42	1	1	1	3	0	7	23	0	N	1	7	R	6	3	9
56	39	3	25	45		32	2	26	0	42	0	1	0	1	1	5	22	0	4	2	5	7	5	6	7
57	38	4	13	40		31	2	26	0	43	0	0	1	0	1	3	20	0	5	3	3	8	5	10	5
58	37	4	4	30		31	3	26	0	43	0	0	2	0	2	2	18	1	7	5	1	9	4	13	3
58	36	5	0	18		30	3	26	0	43	0	0	4	1	3	1	16	1	8	6	0	10	3	15	1
59	35	5	2	8	C	30	4	26	0	44	0	1	6	2	4	0	14	1	8	7	0	11	2	16	0
60	34	6	9	1	20	29	4	26	0	44	0	2	6	4	5	0	12	2	8	8	1	12	1	16	1
60	32	6	20	0	21	28	5	26	0	44	0	2	5	6	7	1	10	2	7	8	2	13	0	14	3
61	31	7	32	6	22	27	5	26	0	44	0	4	3	8	8	2	8	3	6	7	4	13	0	12	—
61	30	8	41	15	22	27	6	25	0	44	0	4	1	8	9	4	6	3	5	6	6	14	0	9	
62	29	8	46	27	23	26	6	25	0	44	1	5	0	7	10	5	4	4	3	5	8	14	0	6	
62	28	9	44	38	24	25	7	25	0	44	1	6	0	6	11	7	2	5	2	3	8	14	1	3	
63	27	10	37	45	25	25	7	25	1	44	1	6	2	4	11	9	1	5	1	2	7	14	2	1	
63	26	11	26	46	25	24	8	25	1	44	2	6	4	2	12	11	0	—	0	1	6	14	—	0	
64	25	11	14	41	26	23	9	24	1	43	2	5	6	1	12	12	0		0	0	4	13		0	
64	24	12	5	31	27	22	9	24	1	43	2	5	6	0	12	12	0	M	1	0	2	12	T	2	Y
64	23	13	0	19	27	22	10	24	2	43	3	4	5	0	12	12	1	3	2	1	0	12	9	5	9
65	22	14	2	8	28	21	10	23	2	42	3	3	3	2	11	11	2	4	3	2	0	11	15	—	11
65	21	15	9	1	29	20	11	23	2	42	4	2	1	4	10	10	4	5	5	3	1	10	18		12
65	20	15	20	0	30	19	12	23	2	42	5	1	0	6	9	8	7	6	6	5	2	9	17		13
65	19	16	31	5	30	18	13	22	3	41	5	0	0	7	8	6	10	6	7	6	—	8	13	V	12
66	18	17	41	15	31	18	13	22	3	41	6	0	2	8	7	4	14	6	8	7		6	7	7	11
66	18	18	46	26	31	17	14	22	3	40	7	0	4	8	6	3	17	5	8	8		5	2	9	9
66	17	19	45	37	32	16	15	21	4	39	8	1	5	7	4	1	21	4	8	8		4	0	11	7
66	16	20	38	44	33	15	15	21	4	39	8	1	6	5	3	0	—	3	7	8		3	2	13	6
66	15	21	27	46	33	15	16	20	5	38	9	2	5	3	2	0	L	2	5	7	Q	2	7	14	5
66	14	22	15	41	34	14	17	20	5	37	10	3	3	1	1	0	6	1	4	5	20	2	13	14	6
66	13	23	5	32	34	13	18	19	6	36	11	4	1	0	1	1	7	0	3	4	23	1	17	13	7
66	12	24	0	20	35	13	19	19	6	36	12	5	0	0	0	2	7	0	1	2	26	0	18	11	—
66	12	25	1	9	35	12	19	18	7	35	13	6	0	1	0	4	8	0	0	1	29	0	14	9	
66	11	26	8	2	36	11	—	18	7	34	14	6	2	3	0	—	9	0	0	0	32	0	8	7	
66	10	27	19	0	36	10		17	8	33	15	6	4	5	0		9	1	0	0	34	0	3	5	
65	9	28	31	5	37	10		17	8	32	16	6	5	7	1		10	2	1	0	36	0	0	3	
65	9	29	40	14	37	9		16	9	31	17	5	6	8	2		10	3	2	1	38	1	1	1	
65	8	30	46	26	38	9		16	9	30	18	4	5	8	3		11	4	3	2	39	1	6	0	
65	7	31	45	37	38	8	D	15	10	29	19	3	4	7	4	K	11	5	5	—	40	2	12	0	
64	7	32	38	44	38	7	13	14	10	28	20	2	2	6	5	25	11	6	6		40	3	17	1	
64	6	—	28	46	39	7	14	14	11	27	21	1	0	4	—	29	12	6	7		40	4	18	3	
63	5		16	42	39	6	14	13	11	26	—	0	0	2		33	12	6	8		39	5	15	5	
63	5		6	33	39	6	15	13	12	25		0	1	0		36	12	5	8		38	6	10	—	
63	4	B	1	21	39	5	15	12	12	24	F	0	3	0	J	40	12	4	7	P	36	—	4	W	
63	4	23	1	10	39	5	16	12		23	3	0	5	1	6	43	12	3	6	4	34		0	4	
62	3	34	7	2	40	4	16	11		22	4	1	6	2	8	46	12	2	5	6	32		1	5	
62	3	43	18	0	40	4	17	10		21	5	2	6	—	10	48	12	1	3	7	29		5	6	
61	3	46	30	4	40	3	17	10		20	6	—	4		11	49	11	0	2	8	26		11	7	
61	2	43	40	13	40	3	18	9		19	6		2		12	50	11	0	1	8	23		16	8	

List ix (*cont.*).

Terms in Table P 44 (*concl.*).

α	α	β	β	β	β	γ	δ	δ	δ	ζ	ζ
0	70	0	70	140	210	35	0	70	140	0	70
13	10	12	3	0	7	6	10	18	20	6	8
14	9	18	8	1	2	7	14	19	18	8	10
14	9	22	14	4	0	8	17	20	15	10	11
15	8	24	20	9	1	9	19	19	12	11	12
15	8	22	23	16	5	10	20	17	8	12	12
16	7	18	24	21	11	11	19	14	5	12	11
17	6	12	21	24	17	11	18	10	2	11	10
17	6	6	16	23	22	12	15	6	1	9	8
18	5	2	10	20	24	12	12	3	0	7	6
18	5	0	4	14	23	12	8	1	1	5	4
19	4	2	1	8	18	12	5	0	3	3	2
20	4	6	0	3	12	11	2	1	6	1	0
20	3	12	3	0	6	11	0	2	—	0	0
21	3	18	8	1	2	10	0	5		0	0
21	3	23	14	4	0	9	1	8	ε	0	1
22	2	24	20	10	1	8	4	12	6	2	3
22	2	22	23	16	6	7	7	15	8	3	5
23	2	18	24	21	12	6	10	18	10	5	7
23	1	12	21	24	18	5	14	20	11	8	9
23	1	6	16	23	22	4	17	20	12	10	11
24	1	1	10	20	24	3	19	19	12	11	12
24	1	0	4	14	22	2	20	16	11	12	12
24	0	2	1	8	18	1	19	13	9	12	11
25	0	7	0	3	12	1	18	10	7	11	10
25	0	13	3	0	6	0	15	6	5	10	8
25	0	19	8	1	2	0	11	3	3	8	6
25	0	23	15	4	0	0	8	1	1	6	4
26	0	24	20	10	2	0	4	0	0	4	2
26	0	22	23	16	6	1	2	1	0	2	1
26	0	17	24	21	—	1	0	2	0	1	0
26	0	11	21	24		2	0	5	1	0	0
26	0	5	16	23		3	1	9	3	0	1
26	0	1	9	19		4	4	12	5	1	2
26	0	0	4	14		5	7	16	7	3	4
26	1	2	1	8	γ	6	11	18	9	5	7
26	1	7	0	3	6	7	14	20	11	7	9
26	1	13	3	0	7	8	17	20	12	9	10
26	1	19	9	1	8	9	19	19	12	11	12
26	2	23	15	5	9	10	20	16	11	12	12
25	2	24	20	10	10	10	19	13	10	12	12
25	2	22	24	17	11	11	17	9	8	12	11
25	3	17	24	22	11	12	14	6	6	10	9
25	3	11	21	24	12	12	11	3	4	8	7
24	3	5	15	23	12	12	7	1	2	6	5
24	4	1	9	19	12	12	4	0	1	4	3
24	4	0	4	13	12	12	1	1	0	2	1
23	5	2	0	7	11	11	0	3	0	1	0
23	5	7	0	2	11	10	0	6	1	0	0
23	6	13	3	0	10	10	2	9	3	0	1
22	6	19	9	1	9	9	4	13	5	1	2
22	7	23	15	5	8	8	8	16	7	2	4
21	8	24	21	11	7	7	11	19	9	4	—
21	8	22	24	17	6	6	15	20	11	6	
20	9	17	24	22	5	5	18	20	12	8	
20	9	11	20	24	4	4	19	18	12	10	
19	10	5	15	23	3	3	20	16	12	11	
18	11	1	9	19	2	2	19	12	11	12	
18	11	0	3	13	2	1	17	9	9	12	
17	12	2	0	7	1	1	14	5	7	11	
17	12	7	0	2	0	0	10	2	5	9	
	—										
16		14	4	0	0	0	7	1	3	7	
15		19	9	1	0	0	4	0	1	5	
15		23	15	5	0	0	1	1	0	3	
14		24	21	11	0	1	0	3	0	1	
14		21	24	17	1	1	0	6	1	0	
13		16	23	22	2	2	2	10	2	0	
12		10	20	24	2	3	5	13	4	1	
12		5	15	23	3	4	8	16	—	3	
11		1	8	19	4	5	12	19		4	
11		0	3	13	5	—	15	20		6	

Terms in Table P 45.

A	A	A	B	B	B	C	C	E	E	I	J	L	T
0	70	140	5	75	145	40	110	10	80	15	20	25	35
0	25	21	20	8	0	10	15	1	20	6	0	0	3
0	26	21	22	14	2	10	14	1	19	6	0	0	1
0	26	20	21	19	6	10	14	2	19	6	1	0	—
0	26	20	17	22	12	11	14	2	19	6	2	0	
0	27	19	11	22	17	11	13	2	18	5	2	0	U
0	27	19	6	19	21	12	13	3	18	5	3	0	0
0	28	18	2	14	22	12	13	3	17	4	4	0	0
0	28	18	0	8	20	12	12	3	17	4	5	0	1
0	28	17	1	3	16	13	12	4	16	3	6	0	3
1	29	17	5	0	10	13	12	4	16	2	6	1	4
1	29	16	10	0	5	13	11	5	16	2	6	1	6
1	29	16	16	3	1	14	11	5	15	1	6	1	7
1	29	15	20	8	0	14	10	6	15	1	5	1	8
1	30	15	22	14	2	14	10	6	14	0	4	2	8
2	30	14	21	19	6	15	10	6	14	0	3	2	7
2	30	14	17	22	11	15	9	7	13	0	2	2	6
2	30	13	12	22	17	15	9	7	13	0	2	2	5
2	31	13	6	19	21	16	8	8	12	0	1	3	3
2	31	12	2	14	22	16	8	8	12	0	0	3	2
3	31	12	0	8	20	16	8	9	11	1	0	3	1
3	31	11	1	3	16	17	7	9	10	1	0	4	0
3	31	11	5	0	11	17	7	10	10	2	0	4	0
4	31	10	10	0	5	17	7	10	9	2	1	4	1
4	32	10	16	3	1	17	6	11	9	3	2	5	2
4	32	10	20	8	—	18	6	12	8	4	3	5	3
5	32	9	22	13		18	6	12	8	4	4	5	5
5	32	9	21	18		18	5	13	7	5	5	5	6
5	32	8	17	21		18	5	13	7	5	5	6	7
6	32	8	12	22		19	5	14	6	6	6	6	8
6	32	7	7	19	C	19	4	14	6	6	6	6	8
7	32	7	2	15	0	19	4	15	6	6	6	6	7
7	32	7	0	9	0	19	4	15	5	6	5	6	6
7	32	6	1	4	0	19	3	16	5	6	5	—	4
8	32	6	4	1	0	19	3	16	4	6	4		3
8	32	5	10	0	0	20	3	16	4	5	3	T	1
9	32	5	15	3	0	20	3	17	3	5	2	0	0
9	32	5	20	7	0	20	2	17	3	4	1	1	—
10	32	4	22	13	0	20	2	18	3	4	0	3	
10	32	4	21	18	0	20	2	18	2	3	0	6	
10	31	4	18	21	1	20	2	19	2	3	—	8	V
11	31	3	13	22	1	20	1	19	2	2		8	0
11	31	3	7	20	1	20	1	19	1	1		6	0
12	31	3	2	15	1	20	1	20	1	1		4	1
12	31	2	0	9	1	20	1	20	1	1		1	1
13	31	2	1	4	1	20	1	20	1	0	L	0	2
13	30	2	4	1	2	20	1	21	1	0	6	1	3
14	30	2	9	0	2	20	0	21	0	—	6	3	4
14	30	2	15	2	2	20	0	21	0		6	5	5
15	30	1	20	7	2	20	0	21	0		6	7	6
15	29	1	22	13	3	20	0	21	0	J	6	8	6
16	29	1	21	18	3	20	0	22	0	0	6	7	6
16	29	1	18	21	3	19	0	22	0	0	5	5	5
17	29	1	13	22	3	19	0	22	—	1	5	2	5
17	28	0	7	20	4	19	0	22		1	5	0	4
18	28	0	3	15	4	19	—	22	I	2	5	0	3
18	28	0	0	10	4	19		22	0	3	4	2	2
19	27	0	1	4	5	19		22	0	4	4	5	1
19	27	0	4	1	5	18		22	0	5	4	7	0
20	26	0	9	0	5	18		22	1	5	3	8	—
20	26	0	15	2	6	18	E	22	1	6	3	7	
21	26	0	19	7	6	18	0	22	1	6	3	5	
21	·25	—	22	12	6	17	0	22	2	6	2	3	
22	25		21	17	7	17	0	22	3	5	2	1	
22	24		18	21	7	17	0	21	3	5	2	0	
23	24	B	13	22	7	17	0	21	4	4	2	1	
23	24	0	8	20	8	16	0	21	4	3	1	4	
24	23	1	3	16	8	16	0	21	5	2	1	6	
24	23	5	0	10	8	16	1	21	5	1	1	8	
24	22	11	0	5	9	15	1	20	6	0	1	8	
25	22	16	3	1	9	15	1	20	6	0	0	6	

List ix (*cont.*).

Terms in Table P 45 (*concl.*).

XY	α	α	β	β	β	γ	γ	δ	δ	ε	ζ
0	55	125	60	130	205	25	95	55	125	40	55
0	11	0	0	2	6	4	3	5	9	4	2
1	11	0	1	0	3	4	3	7	10	5	3
2	12	0	4	0	1	3	2	9	10	6	4
4	12	0	7	2	0	2	2	10	9	6	5
6	12	0	10	5	1	1	1	10	8	6	6
7	12		12	8	3	1	1	10	7	5	6
8	12		12	10	6	1	0	9	5	5	6
7	12		11	12	9	0	0	7	3	4	6
6	12		8	12	11	0	0	6	1	3	5
4	12	β	5	10	12	0	—	4	0	2	4
2	12	0	2	7	11	0		2	0	1	3
1	12	1	0	4	9	0		1	0	0	2
—	12	3	0	2	6	0		0	1	—	1
	12	6	1	0	3	1		0	3		0
α	12	9	4	0	1	1	δ	1	4	ζ	0
0	12	11	7	2	0	1	0	2	6	0	0
0	12	12	10	5	1	2	0	4	8	0	1
0	12	11	12	8	3	2	1	5	9	1	2
0	12	9	12	10	6	3	3	7	10	2	3
0	11	6	11	12	9	3	5	9	10	3	4
0	11	3	8	12	11	4	6	10	9	4	5
0	11	1	5	10	12	4	8	10	8	5	5
0	11	0	2	7	11	5	9	10	6	5	6
0	11	1	0	4	9	5	10	9	5	6	6
1	11	3	0	1	6	6	10	7	3	6	6
1	10	6	1	0	3	6	9	5	1	6	5
1	10	9	4	0	1	6	8	4	0	5	4
1	10	11	7	2	0	6	6	2	—	4	3
1	10	12	10	5	1	6	4	1		3	2
1	10	11	12	8	3	6	3	0	ε	2	1
2	9	9	12	11	6	6	1	0	0	1	0
2	9	6	10	12	9	5	0	1	0	0	0
2	9	3	8	12	11	5	0	2	1	0	0
2	9	1	5	10	12	4	0	4	2	0	0
2	8	0	2	7	11	4	1	6	3	1	1
3	8	1	0	4	9	3	3	7	4	1	2
3	8	3	0	1	6	3	5	9	5	2	3
3	8	6	2	0	3	2	7	10	5	3	4
3	7	9	4	0	1	2	8	10	6	4	5
4	7	11	7	2	—	1	9	10	6	5	6
4	7	12	10	5		1	10	9	6	6	6
4	6	11	12	8		1	10	7	5	6	6
4	6	9	12	11		0	9	5	4	6	5
5	6	6	10	12		0	8	3	3	5	4
5	6	3	8	12	γ	0	6	2	2	4	3
5	5	1	5	10	0	0	4	1	1	3	2
6	5	0	2	7	0	0	2	0	0	2	1
6	5	1	0	4	0	0	1	0	0	1	1
6	4	3	0	1	0	1	0	1	0	0	0
6	4	6	2	0	1	1	0	2	1	0	0
7	4	9	4	0	1	1	1	4	1	0	0
7	4	11	7	2	2	2	2	6	2	0	1
7	3	12	10	5	2	2	3	8	3	1	2
8	3	11	12	8	3	3	5	9	4	2	3
8	3	8	12	11	3	4	7	10	5	3	4
8	3	5	10	12	4	4	8	10	6	4	5
8	2	2	8	12	4	5	9	9	6	5	6
9	2	1	5	10	5	5	10	8	6	6	6
9	2	0	2	7	5	5	10	7	5	6	6
9	2	1	0	4	5	6	9	5	4	6	5
9	2	4	0	1	6	6	8	3	3	5	5
10	1	7	2	0	6	6	6	2	2	5	4
10	1	10	5	1	6	6	4	1	1	4	3
10	1	12	8	2	6	6	2	0	1	3	2
10	1	12	10	5	6	6	1	0	0	2	1
10	1	11	12	8	6	5	0	1	0	1	0
11	1	8	12	11	5	5	0	2	0	0	—
11	0	5	10	12	5	5	1	4	1	0	
11	0	2	7	11	5	4	2	6	2	0	
11	0	0	4	9	4	4	3	8	3	1	

Terms in Tables P 46, P 47.

B″	B″	C″	D″	E″	F″	G″	H″	I″	J″	K″	M″	N″
0	70	45	25	25	25	25	30	35	40	45	0	15
15	0	12	2	20	5	22	4	2	0	2	7	8
16	0	11	3	21	5	31	4	1	0	4	8	7
17	0	10	5	22	5	38	3	1	3	7	9	5
18	1	9	7	22	4	40	3	1	8	9	10	3
19	1	8	8	20	4	37	2	1	14	10	10	1
20	1	7	8	18	4	30	2	0	21	10	11	0
21	2	6	7	16	3	20	2	0	27	8	12	0
22	2	5	6	13	3	10	1	0	3·	6	12	1
23	3	4	4	9	3	3	1	0	32	3	13	3
24	3	3	2	6	3	0	1	0	30	1	13	5
24	4	3	1	4	2	2	1	0	26	0	14	7
25	5	2	0	2	2	9	0	0	20	1	14	8
26	6	1	0	0	2	18	0	0	13	2	14	8
27	6	1	1	0	1	28	0	0	7	—	14	7
27	7	1	3	1	1	36	0	1	2	L″	14	5
28	8	0	5	2	1	40	0	1	0	3	14	3
28	9	0	6	4	1	39	0	1	1	5	13	1
29	10	0	8	7	1	33	0	1	4	6	13	0
29	11	0	8	10	0	24	0	2	9	6	12	0
29	12	0	7	13	0	14	0	2	—	5	12	1
30	13	0	6	16	0	6	1	2		4	11	3
30	14	0	5	19	0	1	1	3		2	10	5
30	—	1	3	21	0	1	1	3		0	10	7
30		1	1	22	0	6	1	4		0	9	8
30	C″	1	0	22	0	14	2	—	K″	1	8	8
30	15	2	0	21	0	24	2		5	2	7	6
30	16	3	1	20	0	33	2		8	4	6	4
29	17	3	3	18	0	39	3		9	5	5	2
29	18	4	4	15	0	40	3		10	6	4	1
29	19	5	6	12	0	36	4	J″	9	6	4	0
28	20	6	7	8	1	28		16	7	5	3	0
28	21	7	8	5	1	18		23	4	3	2	2
27	22	8	8	3	1	9		28	2	1	2	—
27	23	9	6	1	1	2		31	0	0	1	
26	24	10	5	0	1	0	I″	32	0	0	1	O″
25	25	11	3	0	2	3	4	30	1	1	0	7
24	26	12	1	1	2	10	4	25	3	3	0	11
23	27	13	0	3	2	—	5	19	6	4	0	13
23	27	14	0	5	2		5	12	8	6	0	14
22	28	—	1	8	3	H″	6	6	10	6	0	13
21	29		2			4	6	2	10	5	0	10
20	29		—			4	6	0	8	4	1	7
19	29					5	7	1	6	2	1	3
18	30					5	7	5	3	1	2	1
17	30	D″	E″	F″	G″	6	7	11	1	0	2	0
16	30	4	11	3	20	6	7	18	0	0	3	1
15	30	6	14	3	30	6	8	24	0	2	4	4
14	30	7	17	4	37	7	8	29	2	3	4	8
13	30	8	19	4	40	7	8	32	4	5	5	11
12	30	8	21	4	38	7	8	32	7	6	6	14
11	29	7	22	4	31	7	8	29	9	6		14
10	29	5	22	5	22	8	8	23	10	5		12
9	29	3	21	5	12	8	8	17	9	3		9
8	28	2	19	5	4	8	8	10	8	1		6
7	27	0	17	5	0	8	8	5	5	0	N″	2
6	27	0	14	5	1	8	7	1	2	0	4	0
6	26	1	10	6	7	8	7	0	1	1	6	0
5	25	2	7	6	16	8	7	2	0	2	8	2
4	24	4	4	6	26	8	7	7	1	4	8	5
3	23	5	2	6	34	8	6	13	3	5	7	9
3	22	7	1	6	39	7	6	19	6	6	6	12
2	21	8	0	6	39	7	5	25	8	6	4	14
2	20	8	0	6	34	7	5	30	10	4	2	14
1	19	7	1	6	26	7	5	32	10	2	0	12
1	18	5	3	6	16	6	4	31	9	1	0	8
1	17	3	6	6	7	6	4	27	7	0	1	5
0	16	2	9	6	1	6	3	22	4	0	3	2
0	15	1	12	6	0	5	3	15	2	1	5	0
0	14	0	15	5	4	5	3	9	0	—	7	0
0	13	0	18	5	12	4	2	3	0		8	3

List ix (*cont.*).

Terms in Tables P 46, P 47 (*concl.*).

O″	Q″	R″	T″	V″	Y″	A	A	A	A	B	B	C	C	D	E	F	G	H	I	K	M	P	R	V
35	5	30	15	10	15	0	70	140	210	45	115	20	90	15	0	0	5	20	40	15	15	0	10	5
6	5	5	8	9	11	16	30	2	17	53	19	5	0	5	21	3	5	10	18	9	7	10	11	10
10	5	3	7	8	7	25	23	0	25	47	13	10	3	1	23	5	2	9	15	7	8	13	9	9
13	6	1	6	8	3	31	14	3	31	41	8	17	7	0	25	6	0	7	7	5	8	15	7	8
14	6	0	5	7	0	32	6	11	32	35	5	25	14	3	27	4	0	5	1	4	7	17	5	6
13	6	0	4	6	1	28	1	19	28	28	2	33	21	7	29	1	2	3	2	2	6	19	3	4
11	6	0	3	4	3	21	0	27	20	22	0	42	29	8	31	0	4	1		1	4	20	2	2
7	6	1	2	3	—	12	5	32	11	16	0	49	38	5	32	1	7	0		0	3	20	1	1
4	6	2	1	2		4	13	31	4	11	1	56	46	1	34	4	9	0		0	1	20	0	0
1	6	4	1	2		0	22	26	0	7	3	60	53	0	35	6	10	1		0	0	19	0	0
0	5	—	0	1		1	29	17	2	3	6	63	58	3	37	5	9	2	J	0	0	18	0	1
1	5		0	0		7	32	9	8	1	11	64	62	7	38	3	6	4	5	1	1	16	1	2
3	5		0	0		16	30	2	16	0	16	62	64	8	39	0	3	6	8	2	2	14	2	3
—	5		0	0		24	23	0	25	0	22	59	63	5	40	0	1	8	10	4	—	11	3	—
	4		1	0		30	15	3	31	2	28	53	61	1	41	3	0	9	10	5		8	5	
P″	4	S″	1	1		32	6	10	32	4	34	46	56	0	41	5	1	10	8	7	N	6	—	W
3	3	3	2	1		28	1	19	28	8	41	38	50	3	42	6	4	10	5		11	4		3
3	3	4	3	2		21	0	27	20	13	47	30	42	6	42	4	7	9	2		14	2		5
4	2	5	4	3		12	5	32	11	18	52	22	34	8	42	1	9	8	0		16	1		6
4	2	6	5	4		4	13	31	4	24	57	14	26	6	42	0	10	6	0		18	0		5
5	1	6	—	—		0	21	26	0	30	61	8	18	2	41	1	9	4	2	L	20	0	S	3
5	1	5				1	29	18	1	37	64	3	11	0	41	4	7	2	4	5	21	0	4	1
5	1	3				7	32	9	7	43	66	1	5	2	40	6	3	1	7	6	22	1	6	0
5	1	2				15	30	2	—	49	66	0	2	6	39	5	1	0	9	7	22	3	8	1
6	0	1				24	24	0		54	65	2	0	8	38	3	0	0	10	8	21	5	8	—
6	0	0	U″	W″		30	15	3	B	59	63	6	1	6	37	0	1	1	9	9	20	7	7	
6	0	0	4	3		32	7	10	33	62	60	11	4	2	35	0	3	3	6	9	18		5	
6	0	1	5	4		29	1	19	39	65	56	18	8	0	34	2	6	—	3	10	16		3	
6	0	2	6	5		22	0	27	46	66	51	26	15	2	32	5	9		1	10	14		1	
6	0	3	6	6		13	4	31	51	66	45	35	22	6	31	6	10		0	10	11		0	
6	0	5	7	6		5	12	31	56	65	39	43	31	8	29	4	9	I	1	10	8	Q	0	X
6	1	6	7	5		0	21	26	60	62	32	50	39	6	27	2	7	9	3	9	6	11	2	3
5	1	6	8	4		1	28	18	63	58	26	57	47	2	25	0	4	16	7	9	4	14	—	5
5	1	5	8	2		6	32	9	65	54	20	61	54	0	23	1	1	17	9	8	2	17		6
5	2	4	8	1		15	30	3	66	48	14	64	59	2	21	4	0	11	10	7	1	19		4
4	2	3	8	0		23	24	0	65	42	9	64	63	6	19	6	1	3	9	6	0	21	T	2
4	3	2	8	0		30	16	3	64	36	5	62	64	8	17	6	3	0	7	5	0	22	3	0
4	—	1	7	1		32	7	9	61	30	2	58	63	6	15	3	6	5	4	4	1	22	5	1
3		0	7	2		29	1	18	57	24	1	52	60	2	13	1	8	14	1	3	2	22	6	—
3		0	6	—		22	0	26	52	18	0	45	55	0	11	0	10	18	0	2	4	21	6	
2	R″	1	5	X″		13	4	31	46	12	1	37	49	2	10	2	10	14	1	1	6	19	5	
2	6	2	4	3		5	12	31	40	8	3	28	41	5	8	5	8	6	3	0	8	17	4	
2	8	4	4	5		0	21	27	34	4	6	20	33	8	7	6	5	0	6	0	—	14	2	
1	10	5	3	6		1	28	19	27	1	10	13	24	7	5	5	2	2	8	0		11	1	
1	11	6	2	6		6	32	10	21	0	15	7	16	3	4	2	0	10	10	0		8	0	
1	12	6	1	6		14	31	3	15	0	20	3	10	0	3	0	0	17	10	1	O	5	0	
0	12	5	1	5		23	25	0	10	1	27	0	5	1	2	1	2	17	8	1	10	3	1	
0	12	4	0	3		30	16	2	6	4	—	0	1	5	1	3	—	10	5	2	12	1	—	
0	11	3	0	1		32	7	9	3	7		2	0	8	1	6		2	2	3	15	0		
0	9	1	0	0		29	1	18	1	12		6	1	7	0	6		0	0	4	17	0		
0	7	0	0	0		22	0	26	0	17	C	12	4	3	0	3	H	7	0	—	18	0	U	
0	6	0	0	0		13	4	31	0	23	32	20	9	0	0	1	5	15	2		19	1	3	
0	4	1	1	1		5	11	32	2	29	40	28	16	1	0	0	7	18	—		20	3	5	
0	2	2	1	—		1	20	27	5	36	48	36	24	5	1	2	9	13			20	5	6	
1	1	—	2			1	28	19	9	42	55	44	—	8	1	5	10	5			19	8	6	
1	0	T″	2	Y″		6	32	10	14	48	60	52	D	7	2	6	10	0	K	M	17	—	4	
1	0	6	3	8		14	31	3	19	53	63	58	4	3	3	5	9	3	9	4	16		2	
1	1	7	—	13		23	25	0	25	58	64	62	7	0	4	2	8	11	11	6	14		0	
2	2	8		15		29	16	2	32	62	63	64	8	1	5	0	6	18	13	7	11		0	
2	3	9		16		32	8	9	38	64	59	64	4	5	7	1	4	16	14	8	9		1	
3	5	10	V″	13		29	2	17	44	66	54	61	1	8	8	—	2	8	16	8	6	R	—	
	7	11	5	9		23	0	26	50	66	48	57	0	7	10		1	1	17	7	4	7		
	9	11	6	5		14	4	31	55	65	40	51	4	4	11		0	1	18	5	3	9		
	10	12	7	1		6	11	32	60	63	31	44	7	0	13		0	8	18	4	1	11		
	11	12	8	0		1	20	27	63	59	23	36	8	1	15		1	16	18	2	0	12		
Q″	12	12	9	2		1	28	19	65	55	15	27	4	4	17	G	2	18	18	1	0	13	V	
3	12	12	9	6		5	32	11	66	50	9	19	1	8	19	5	4	12	17	0	1	14	5	
3	11	11	10	10		13	31	3	66	44	4	12	0	7	—	8	6	4	16	0	2	14	7	
4	10	11	10	14		22	25	0	64	38	1	6	3	4		10	8	0	14	1	3	14	8	
4	8	10	10	16		29	17	2	61	31	0	2	7	0		10	9	4	13	3	5	13	9	
5	6	9	10	15		32	8	8	58	25	1	0	8	1		8	10	13	11	5	8	12	10	

List ix (*concl.*).

Terms in Tables P 48, P 49.

A	A	A	A	B	B	C	C	C	D	D	E	E	E	F	G	G	H	H	I	K	M
0	**70**	**140**	**210**	**55**	**125**	**5**	**75**	**145**	**35**	**105**	**5**	**75**	**145**	**65**	**10**	**80**	**25**	**95**	**60**	**10**	**30**
16	13	10	7	14	5	3	1	0	94	13	64	50	48	38	3	0	6	2	3	6	10
25	23	20	16	29	17	0	2	4	95	12	66	47	51	28	11	1	6	2	4	4	10
31	30	28	26	47	33	7	11	15	95	11	69	45	—	17	22	8	6	3	6	2	10
31	32	32	31	63	51	19	24	27	95	10	71	43		7	33	18	6	3	—	1	9
26	28	30	31	75	66	30	31	32	96	9	73	41	F	1	40	29	6	—	J	0	9
16	19	22	25	80	77	31	30	27	96	8	75	38	22	1	42	37	6		10	0	8
7	10	13	16	78	80	24	19	15	96	7	77	36	33	6	38	42	6		17	0	8
1	2	4	6	67	76	11	7	4	96	6	79	34	41	15	30	41	6		20	1	7
1	0	0	1	52	64	2	0	0	96	5	81	32	44	27	19	34	6		18	2	7
6	4	2	1	35	48	1	3	7	96	4	83	30	41	37	9	24	5	I	13	4	6
16	12	9	7	18	31	10	14	19	96	4	85	28	33	43	2	13	5	7	6		
25	22	19	—	6	15	23	26	29	95	3	87	26	23	44	0	4	5	8	1		
31	30	28		0	4	31	32	32	95	2	88	24	12	39	4	0	5	10	0		
31	32	32		2	0	30	28	24	95	2	90	22	3	29	12	2	5	11	4		
26	28	30	B	12	4	20	16	12	94	1	91	20	0	18	23	9	5	12	11	L	
17	20	23	40	27	15	8	4	2	94	1	93	19	2	8	33	19	5	13	17	3	
7	10	13	57	44	31	0	0	1	93	1	94	17	10	1	40	30	5	14	20	5	
1	2	4	71	61	48	3	6	9	92	0	96	15	21	0	42	38	4	14	18	6	
1	0	0	79	73	64	13	18	22	92	0	97	14	32	5	38	42	4	14	12	4	
6	4	2	79	80	76	25	29	31	91	0	98	12	40	14	29	40	4	14	5	1	
15	12	9	72	78	80	32	32	30	90	0	99	11	44	25	18	33	4	13	1	0	
25	22	19	58	69	77	28	25	21	89	0	100	10	42	36	8	23	4	13	1	1	
31	29	27	41	55	66	17	13	8	88	0	101	8	34	42	1	12	3	12	5	4	
31	32	32	24	37	51	5	2	1	87	0	102	7	24	44	0	4	3	11	12	6	
26	28	30	10	20	33	0	1	2	86	1	103	6	13	39	5	0	3	9	18	5	
17	20	23	1	7	17	5	8	13	85	1	104	5	4	30	13	2	3	8	20	3	
8	10	13	1	1	5	17	21	25	84	1	104	4	0	19	24	9	3	7	17	1	
1	3	5	7	1	0	28	30	32	83	2	105	3	2	9	34	20	3	5	11	0	
0	0	0	20	10	2	32	31	29	81	2	105	2	9	2	41	31	2	4	4	2	
6	3	2	37	24	13	26	22	18	80	3	106	2	20	0	42	39	2	3	0	5	
15	12	9	55	41	28	14	9	6	79	3	106	1	31	4	37	42	2	2	1	6	
24	21	18	69	58	45	3	1	0	77	4	106	1	40	13	28	40	2	1	7	5	
31	29	27	78	72	62	0	2	4	76	5	106	1	44	24	17	32	2	0	13	2	
32	32	32	80	79	74	7	12	—	74	5	106	0	42	35	7	22	1	0	19	0	
27	29	30	73	79	80	20	24	D	73	6	106	0	35	42	1	11	1	0	20	1	
18	21	24	61	71	78	30	32	48	71	7	105	0	25	44	0	3	1	0	16		
8	11	14	44	57	68	31	29	50	70	8	105	0	14	40	5	0	1	1	9		
1	3	5	27	40	53	23	19	52	68	9	105	0	5	31	14	3	1	2	3		
0	0	0	12	23	36	10	7	53	66	10	104	0	0	20	25	10	1	3	0		
5	3	1	2	9	19	1	0	55	65	11	104	1	2	10	35	—	1	4	2	M	
14	11	8	0	1	7	1	4	57	63	13	104	1	8	2	41		1	5	8	5	
24	21	18	6	1	0	10	15	59	61	14	103	2	19	0	41		0	6	15	4	
31	29	27	18	8	2	23	27	60	60	15	102	2	30	4	36		0	8	19	3	
32	32	32	35	22	11	31	32	62	58	16	101	3	39	12	26		0	9	19	3	
27	29	31	52	39	25	30	27	64	56	18	99	4	44	23	16	H	0	10	15	2	
18	21	24	67	56	43	20	15	66	54	19	98	5	43	34	7	3	0	11	8	2	
8	11	14	78	70	60	7	4	67	53	21	96	6	36	42	1	3	0	12	2	1	
2	3	5	80	79	73	0	0	69	51	22	95	7	26	44	1	3	0	13	0	1	
0	0	0	75	79	79	3	6	70	49	24	94	8	15	41	6	4	0	14	3	0	
5	3	1	63	73	79	14	18	72	47	26	92	9	5	32	16	4	0	14	9	0	
14	11	8	47	60	70	26	29	74	45	27	91	10	0	21	26	4	0	14	16	0	
23	20	17	29	43	56	32	32	75	43	29	89	12	1	11	36	4	0	14	20	0	
30	29	26	14	25	39	28	25	77	42	30	87	13	7	3	41	4	0	13	19	0	
32	32	32	3	11	22	17	12	78	40	32	86	15	17	0	41	4	0	12	14	1	
27	29	31	0	2	8	5	2	80	38	34	84	16	29	3	35	5	0	11	7	1	
18	22	24	4	0	1	0	1	81	36	36	82	18	38	11	26	5	0	10	2	2	
9	12	15	16	7	1	5	9	82	35	37	80	19	43	—	15	5	0	9	0	2	
2	4	6	32	19	9	17	22	83	33	39	78	21	43		6	5	0	7	3	3	
0	0	0	49	36	23	28	31	85	31	41	76	23	37		1	5	0	6	—	3	
5	3	1	65	53	—	32	32	86	30	43	74	25	27	G	1	5	1	5	K	4	
13	10	7	76	68		25	21	87	28	44	72	27	16	21	7	5	1	3	6	5	
23	20	17	80	78		13	9	88	26	46	70	29	6	32	17	6	1	2	8	6	
30	28	26	76	80		3	1	89	25	—	68	31	1	39	28	6	1	1	10	7	
32	32	31	65	74		0	2	90	23		65	33	1	42	37	6	1	1	11	7	
28	30	31	49	62	C	8	12	91	22	E	63	35	7	39	42	6	1	0	12	8	
19	22	25	32	45	16	20	25	91	20	53	61	37	16	31	41	6	1	0	12	8	
9	12	15	16	28	28	30	32	92	19	55	59	40	28	20	35	6	2	0	12	9	
2	4	6	4	13	32	31	29	93	17	58	56	42	37	10	25	6	2	0	11	9	
0	0	1	0	2	26	23	18	93	16	60	54	44	43	2	14	6	2	1	10	10	
4	2	1	3	0	14	10	6	94	15	62	52	46	43	0	5	6	2	2	8	10	

CHAPTER X

CHANGES OF THE FUNDAMENTAL CONSTANTS

Future observations or investigations of past observations may demand small changes in the values of the constants which have been adopted in this work. The following precepts have been devised to facilitate the computations.

Arguments 1 to 22.

The total change in any one of these arguments is equal to

$$\text{Direct change in the Arg.} - \frac{\text{motion of Arg. in a per. of D}}{\text{period of D}} \times \text{change in D.}$$

Suppose that one of the Arguments L, ϖ, ☊, L′ or ϖ' receives an addition $f(t_c)$ expressed in seconds of arc and Julian centuries. Then the direct changes in D and in any one of the horizontal arguments 1 to 22 are $\mu f(t_c)$, $\mu' f(t_c)$, where μ has the values 1, 0, 0, − 1 or 0 according as the addition is to L, ϖ, ☊, L′ or ϖ', and μ' is the corresponding integer for the horizontal argument, according to its composition. To express the change in the units used for Arguments 1 to 22, we must divide by 1296000 and multiply by the number of parts into which the argument is divided. Hence the formula for the change in the argument is

$$f(t_c)\,\{\mu' \times \text{no. of parts in Arg.} - \mu \times \text{'addition for a period of D'}\} \div 1296000.$$

In the precepts which follow, the factors of $f(t_c)$ have been tabulated ready for use. The factor 1000 has been introduced in order to avoid numerous zeros after the decimal point.

Precepts. Let the addition to L, ϖ, ☊, L′ or ϖ' be denoted by

$$1000\,(a_0 + a_1 t_c + a_2 t_c^2 + a_3 t_c^3),$$

where a_0, a_1, a_2, a_3 are expressed in seconds of arc and t_c is the number of Julian centuries from 1900·0. Then the change in any one of the Arguments 1 to 22 is given by

$$q\,(a_0 + a_1 t_c + a_2 t_c^2 + a_3 t_c^3),$$

where q has the values given in List Xα, according as the change is in L, ϖ, ☊, L′ or ϖ'. If more than one of these angles are changed, add the corresponding changes in the arguments.

LIST Xα. Values of q for Arguments 1 to 22, due to a change in L, ϖ, ☊, L′, ϖ'.

Arg.	L	ϖ	☊	L′	ϖ'	Arg.	L	ϖ	☊	L′	ϖ'
1	−0°·009	0	0	+0°·100	−0°·109	12	−0°·006	−0°·018	−0°·037	+0°·068	−0°·018
2	− ·018	−0°·120	0	+ ·222	− ·120	13	− ·006	+ ·034	− ·068	+ ·062	− ·034
3	− ·001	+ ·090	0	− ·001	− ·090	14	− ·004	− ·025	− ·049	+ ·045	+ ·025
4	− ·022	− ·191	0	+ ·266	− ·096	15	− ·000	+ ·022	− ·043	·000	+ ·022
5	− ·006	− ·198	0	+ ·093	+ ·099	16	− ·014	− ·194	0	+ ·180	0
6	− ·024	− ·102	0	+ ·282	− ·204	17	− ·007	0	− ·079	+ ·072	0
7	− ·007	+ ·077	0	+ ·070	− ·154	18	− ·007	− ·029	− ·059	+ ·081	0
8	− ·011	− ·116	0	+ ·143	− ·039	19	− ·006	+ ·059	− ·117	+ ·053	0
9	− ·004	− ·097	0	+ ·060	+ ·032	20	− ·023	− ·145	− ·145	+ ·266	0
10	− ·016	0	−0°·123	+ ·170	− ·062	21	− ·001	+ ·086	− ·086	− ·001	0
11	− ·003	0	− ·068	+ ·031	+ ·034	22	− ·011	− ·083	− ·056	+ ·128	0

Arguments D, 23 to 47, 51 to 62, 71 to 78, *l'*, 82, 83, 84.

For an argument expressed in days and parts, the change, expressed in seconds of arc, must be multiplied by the number of parts in a period and divided by 1296000. For those arguments expressed in days only, the change is multiplied by the period in days and divided by 1296000. In the precepts with the List xβ, the change is made by means of the product of two factors.

Precepts. Let the addition to L, ϖ, ☊, L′ of ϖ′ be denoted as before. Then the corresponding change in any argument is given by

$$qi\,(a_0 + a_1t_c + a_2t_c^2 + a_3t_c^3),$$

where q, i have the values given in List xβ. If more than one of the five fundamental arguments are changed, multiply the changes by the proper factors i and add; then multiply by the factor q. The results will be found expressed in parts except for those arguments which are expressed in days only.

LIST xβ. Values of q, i for D, l' and the single-entry arguments.

Arg.	q	Values of i for change in L	ϖ	☊	L′	ϖ′
D	$0^{d}023$	1	0	0	−1	0
23	$14^{f}224$	2	0	0	−3	1
24	3·657	2	0	0	−1	−1
25	7·473	1	−1	0	1	−1
26	6·531	1	−1	0	−1	1
27	13·874	1	1	0	−3	1
28	2·712	3	−1	0	−3	1
29	9·348	1	1	0	−1	−1
30	14·0324	1	−1	0	0	0
31	6·6991	2	0	0	−2	0
32	16·4460	1	1	0	−2	0
33	4·466	1	0	0	−1	0
34	4·448	0	−2	0	2	0
35	4·110	3	−1	0	−2	0
36	2·872	2	2	0	−4	0
37	6·163	3	1	0	−4	0
38	3·289	4	−2	0	−2	0
39	0·279	5	−1	0	−4	0
40	6·530	2	0	−2	0	0
41	5·616	0	0	−2	2	0
42	6·305	1	1	−2	0	0
43	2·657	3	−1	−2	0	0
44	1·956	4	0	−2	−2	0
45	1·956	3	1	−2	−2	0
46	0·718	4	−2	−2	0	0
47	$14^{f}092$	0	0	0	1	−1
51	0·374	2	−2	−2	2	0
52	0·103	1	−1	−2	3	−1
53	2·131	1	0	1	−3	1
54	2·151	1	0	1	−1	−1
55	6·476	1	0	1	−2	0
56	1·251	3	0	1	−4	0
57	2·769	2	1	1	−4	0
58	$1^{d}690$	0	1	−1	0	0
59	$1^{f}452$	0	−1	−1	2	0
60	3·923	2	−1	1	−2	0
61	2·282	1	−2	1	0	0
62	3·055	3	−2	1	−2	0
71	9·355	1	−1	0	0	0
72	5·351	1	1	0	−2	0
73	4·110	3	−1	0	−2	0
74	1·686	2	0	0	−3	1
75	0·296	2	−2	−2	2	0
76	0·649	4	−2	0	−2	0
77	1·012	3	1	0	−4	0
78	$0^{d}091$	0	0	−2	3	−1
l'	0·282	0	0	0	1	−1
82	5·247	0	0	−1	0	0
83	,,	0	0	−1	0	0
84	,,	0	0	−1	0	0

Arguments 48, 49, 50, 63 to 70, 79, 80, 81.

Any probable changes will not sensibly affect the tables in which these arguments are used.

Changes in L, −☊, ϖ.

The actual changes in these elements, expressed in seconds of arc, are to be added to the values given in Sect. II after multiplication by 100, 10, 1, respectively, since the respective units there adopted are 0″·01, 0″·1, 1″.

Change of the Moon's Eccentricity.

An addition of 1″ to the adopted coefficient of the principal elliptic term in longitude (22639″·550) requires an addition to the factors of the tables for this term and for the evection (the only term affected by any probable change) of 1/22640 = ·0000442. Hence the Precept: Add 442 per 1″ of change in the coefficient of the principal elliptic term in longitude to the sum $1000\Sigma_{12}$, in the notation of Chap. V, which constitutes a factor of Tables 30, Sect. III, 15, Sect. V, and add 44 per 1″ of change to the terms, $1000\Sigma_{16}$, $1000\Sigma'_{16}$, which constitute the factors of Tables 32, III and 17, V, respectively.

Change of the Moon's Inclination.

An addition of 1″ to the adopted coefficient of the principal term in latitude (18461″.400, when the latitude is expressed as a sum of harmonic terms) requires an addition to the factor of the principal term with Arg. S of 1/18520 = ·000054.

Hence the Precept: Add 54 to Σ_6 (Chap. V) for each second of change in the coefficient of the principal term in latitude.

Change of the Constant of Parallax.

The adopted constant of sine parallax is 3419″.4363, corresponding to the value 3422″.5400 of the constant term in the sine of the Moon's equatorial horizontal parallax. Any change is made by multiplying the computed parallax by the ratio of the new constant to the adopted constant.

Changes of the Constants of the Parallactic Terms.

These are computed with

$$\alpha_1 = \frac{a}{a'} \cdot \frac{E-M}{E+M} = \cdot 00251273 \text{ with } \frac{1}{a} = 3419''.4363,\ \frac{1}{a'} = 8''.80549,\ \frac{E}{M} = 81\cdot 53.$$

Any probable change will affect only Table 47, Sect. III. After the new α_1 has been computed, multiply the values in this table by the new $\alpha_1 \div 0\cdot 00251273$, subtract 67000 times this fraction and add 67000.

Change of the Ellipticity of the Earth's Figure.

The adopted value is 1/294. An addition of a units to the denominator of this fraction is approximately accounted for if we multiply the coefficients of the terms affected by $1 - 2a/294$. The tables which require this factor are P 22, P 25, P 28, P 31, P 34, P 36, Sect. VI, with sufficient accuracy. After the products have been formed, the constants $5\cdot 4a$, $1\cdot 0a$, $0\cdot 1a$, $0\cdot 1a$, $6\cdot 8a$, 0, must be added to the respective tables.

Changes in the Masses of Venus, Jupiter or Mars.

The adopted masses are respectively 1/408000, 1/1047·35, 1/3093500 that of the Sun. The first is a factor of Tables P 1, P 4, P 7, P 10, P 13, P 16, P 19, P 23, P 26, P 29, P 32, Sect. VI, the second a factor of Tables P 2, P 5, P 8, P 11, P 14, P 17, P 20 and the third a factor of P 3, P 6, P 9, P 12, P 15, P 18, P 21. If C be the constant added to any one of these tables (see Chap. IV, List vi), m_0, one of the adopted masses, m_1, the new value of the same, the value in the table is to be changed by means of the formula

$$\text{New value} = \frac{m_1}{m_0} \text{ printed value} + \frac{m_0 - m_1}{m_0} \text{C}.$$

Change of the Empirical Term.

Substitute for Table P 24, Sect. VI, a table of the new term in units of 0″.01 with the added constant 1100 (11″.00). For Tables P 27, P 30, P 33, substitute the new table multiplied by the respective factors 0·1403, 0·0134, 0·0164.

SECTION II

TABLES
OF
ARGUMENTS AND MEAN LONGITUDES

TABLE 1. Conversion of Calendar Dates.

Day	Date	C	B	Part of year	Min.	Part of day	Sec.	Part of day
d		*C*	*B*	*y*		*d*		*d*
0	Jan.	0	1	0·000	1	0·0006944	1	0·0000116
10		10	11	0·027	2	0·0013889	2	0·0000231
20		20	21	0·055	3	0·0020833	3	0·0000347
30		30	31	0·082	4	0·0027778	4	0·0000463
40	Feb.	9	10	0·110	5	0·0034722	5	0·0000579
50		19	20	0·137	6	0·0041667	6	0·0000694
60	Mar.		1	0·164	7	0·0048611	7	0·0000810
70			11	0·192	8	0·0055556	8	0·0000926
80			21	0·219	9	0·0062500	9	0·0001042
90			31	0·246	10	0·0069444	10	0·0001157
100	April		10	0·274	11	0·0076389	11	0·0001273
110			20	0·301	12	0·0083333	12	0·0001389
120			30	0·329	13	0·0090278	13	0·0001505
130	May		10	0·356	14	0·0097222	14	0·0001620
140			20	0·383	15	0·0104167	15	0·0001736
150			30	0·411	16	0·0111111	16	0·0001852
160	June		9	0·438	17	0·0118056	17	0·0001968
170			19	0·465	18	0·0125000	18	0·0002083
180			29	0·493	19	0·0131944	19	0·0002199
190	July		9	0·520	20	0·0138889	20	0·0002315
200			19	0·548	21	0·0145833	21	0·0002431
210			29	0·575	22	0·0152778	22	0·0002546
220	Aug.		8	0·602	23	0·0159722	23	0·0002662
230			18	0·630	24	0·0166667	24	0·0002778
240			28	0·657	25	0·0173611	25	0·0002894
250	Sept.		7	0·684	26	0·0180556	26	0·0003009
260			17	0·712	27	0·0187500	27	0·0003125
270			27	0·739	28	0·0194444	28	0·0003241
280	Oct.		7	0·767	29	0·0201389	29	0·0003356
290			17	0·794	30	0·0208333	30	0·0003472
300			27	0·821	31	0·0215278	31	0·0003588
310	Nov.		6	0·849	32	0·0222222	32	0·0003704
320			16	0·876	33	0·0229167	33	0·0003819
330			26	0·904	34	0·0236111	34	0·0003935
340	Dec.		6	0·931	35	0·0243056	35	0·0004051
350			16	0·958	36	0·0250000	36	0·0004167
360			26	0·986	37	0·0256944	37	0·0004282
370			36	1·013	38	0·0263889	38	0·0004398
					39	0·0270833	39	0·0004514
					40	0·0277778	40	0·0004630
					41	0·0284722	41	0·0004745
					42	0·0291667	42	0·0004861
					43	0·0298611	43	0·0004977
					44	0·0305556	44	0·0005093
					45	0·0312500	45	0·0005208
					46	0·0319444	46	0·0005324
					47	0·0326389	47	0·0005440
					48	0·0333333	48	0·0005556
					49	0·0340278	49	0·0005671
					50	0·0347222	50	0·0005787
					51	0·0354167	51	0·0005903
					52	0·0361111	52	0·0006019
					53	0·0368056	53	0·0006134
					54	0·0375000	54	0·0006250
					55	0·0381944	55	0·0006366
					56	0·0388889	56	0·0006481
					57	0·0395833	57	0·0006597
					58	0·0402778	58	0·0006713
					59	0·0409722	59	0·0006829
					60	0·0416667	60	0·0006944

Hour	Part of day
	d
1	0·0416667
2	0·0833333
3	0·1250000
4	0·1666667
5	0·2083333
6	0·2500000
7	0·2916667
8	0·3333333
9	0·3750000
10	0·4166667
11	0·4583333
12	0·5000000

TABLE 2. Additions to the Arguments for the Centuries of the Julian and Gregorian Calendars.

Arg.	D	(*a*)	1	(*a*)	2	(*a*)	3	(*a*)	Arg.
Julian	*d*		*c*		*c*		*c*		Julian
−2000 *B*	5·1826 −	101	17·521 +	3	142·71 −	33	38·71 +	25	−2000
−1900 *B*	0·8351	99	18·826	3	98·56	32	73·69	25	−1900
−1800 *B*	26·0184	96	8·731	3	30·61	31	107·60	24	−1800
−1700 *B*	21·6714	94	10·036	3	142·48	30	26·57	23	−1700
−1600 *B*	17·3246	91	11·341	3	98·35	29	61·54	23	−1600
−1500 *B*	12·9781	89	12·646	3	54·22	29	96·49	22	−1500
−1400 *B*	8·6318	87	13·951	3	10·10	28	15·44	22	−1400
−1300 *B*	4·2857	84	15·256	3	122·00	27	50·39	21	−1300
−1200 *B*	29·4705	82	5·162	3	54·10	26	84·27	20	−1200
−1100 *B*	25·1249	79	6·467	3	10·01	25	3·20	20	−1100
−1000 *B*	20·7796	76	7·773	3	121·92	24	38·13	19	−1000
− 900 *B*	16·4346	74	9·078	3	77·85	23	73·05	18	− 900
− 800 *B*	12·0898	72	10·383	3	33·79	23	107·96	18	− 800
− 700 *B*	7·7452	69	11·689	3	145·73	22	26·87	17	− 700
− 600 *B*	3·4009	67	12·994	3	101·68	21	61·77	17	− 600
− 500 *B*	28·5874	64	2·899	3	33·84	20	95·61	16	− 500
− 400 *B*	24·2436	61	4·205	3	145·80	19	14·50	15	− 400
− 300 *B*	19·9001	59	5·510	3	101·78	18	49·38	15	− 300
− 200 *B*	15·5568	57	6·815	3	57·77	18	84·26	14	− 200
− 100 *B*	11·2137	54	8·120	3	13·76	17	3·13	13	− 100
0 *B*	6·8709	51	9·425	3	125·76	16	38·00	13	0
+ 100 *B*	2·5284	48	10·730	3	81·77	15	72·85	12	+ 100
200 *B*	27·7168	46	0·635	3	13·99	14	106·65	12	200
300 *B*	23·3748	44	1·940	3	126·01	13	25·49	11	300
400 *B*	19·0330	41	3·245	3	82·05	13	60·33	10	400
500 *B*	14·6915	38	4·550	3	38·09	12	95·16	10	500
600 *B*	10·3503	35	5·855	2	150·14	11	13·99	9	600
700 *B*	6·0094	33	7·159	2	106·20	10	48·81	8	700
800 *B*	1·6687	30	8·463	2	62·27	9	83·62	8	800
900 *B*	26·8588	27	139·367	2	150·55	8	1·37	7	900
1000 *B*	22·5187	25	140·671	2	106·63	7	36·17	6	1000
1100 *B*	18·1788	22	0·975	2	62·73	7	70·96	6	1100
1200 *B*	13·8392	19	2·279	2	18·83	6	105·75	5	1200
1300 *B*	9·4998	16	3·583	1	130·94	5	24·53	4	1300
1400 *B*	5·1607	14	4·886	1	87·06	4	59·30	4	1400
1500 *B*	0·8219 −	11	6·189 +	1	43·19 −	3	94·06 +	3	1500
Gregorian									Gregorian
1500	20·3525 −	11	135·789 +	1	19·39 −	3	93·00 +	3	1500
1600 *B*	16·0140	8	137·092 +	1	131·53	2	11·76	2	1600
1700	10·6757	6	138·395	0	87·68	1	46·52	1	1700
1800	5·3377 −	3	139·698	0	43·84 −	1	81·26 +	1	1800
1900	0·0000	0	0·000	0	0·00	0	0·00	0	1900
2000 *B*	25·1932 +	2	130·902	0	88·37 +	1	33·67 −	1	2000
2100	19·8560	5	132·204	0	44·56	2	68·39	1	2100
2200	14·5191	8	133·506	0	0·75	3	103·11	2	2200
2300	9·1825	11	134·808 −	1	112·95	4	21·82	3	2300
2400 *B*	4·8462	13	136·109	1	69·16	5	56·53	4	2400
2500	29·0407	16	126·010	1	1·58	5	90·16	4	2500
2600	23·7049	19	127·311	2	113·80	6	8·85	5	2600
2700	18·3694	22	128·611	2	70·04	7	43·53	6	2700
2800 *B*	14·0342	25	129·911	2	26·28	8	78·21	6	2800
2900	8·6993 +	28	131·211 −	3	138·54 +	9	112·88 −	7	2900

Table 2 (*cont.*). Additions to the Arguments for the Centuries of the Julian and Gregorian Calendars.

Arg.	4	(a)	5	(a)	6	(a)	7	(a)	8	(a)	9	(a)	10	(a)	11	(a)	12	(a)	Arg.
Julian	c		c		c		c		c		c		c		c		c		Julian
−2000	87·46	−52	58·48	−54	5·16	−28	45·80	+22	24·80	−32	10·39	−27	73·95	+6	29·74	+3	17·16	−3	−2000
−1900	16·12	51	110·46	53	101·02	27	76·88	21	31·41	31	15·17	26	56·72	6	19·44	3	4·97	3	−1900
−1800	40·98	50	26·45	52	34·07	26	98·96	21	23·24	30	14·32	26	19·38	6	5·21	3	9·04	3	−1800
−1700	93·67	49	78·47	51	129·95	25	30·03	20	29·87	29	19·12	25	2·14	6	38·91	3	20·85	3	−1700
−1600	22·36	47	2·49	49	93·83	25	61·09	20	36·51	29	23·92	24	64·90	6	28·62	3	8·67	3	−1600
−1500	75·07	46	54·53	48	57·71	24	92·15	19	43·16	28	28·73	24	47·66	6	18·32	3	20·49	3	−1500
−1400	3·79	45	106·58	47	21·61	23	23·21	19	49·82	27	33·54	23	30·41	5	8·02	3	8·30	3	−1400
−1300	56·52	43	30·65	45	117·51	23	54·26	18	6·48	26	38·36	22	13·17	5	41·72	3	20·12	3	−1300
−1200	81·46	42	74·72	44	50·61	22	76·31	18	48·36	26	37·55	22	55·82	5	27·48	3	0·19	3	−1200
−1100	10·22	41	126·81	43	14·52	21	7·35	17	5·04	25	0·38	21	38·58	5	17·18	3	12·01	2	−1100
−1000	62·99	40	50·91	41	110·44	21	38·38	16	11·73	24	5·22	20	21·33	5	6·88	2	23·83	2	−1000
− 900	115·78	38	103·03	40	74·37	20	69·41	16	18·42	23	10·06	20	4·08	5	40·58	2	11·66	2	− 900
− 800	44·58	37	27·17	39	38·31	19	0·43	15	25·12	22	14·92	19	66·82	5	30·27	2	23·48	2	− 800
− 700	97·39	36	79·31	37	2·25	19	31·45	15	31·83	22	19·78	18	49·57	4	19·97	2	11·30	2	− 700
− 600	26·21	34	3·47	36	98·20	18	62·47	14	38·55	21	24·65	18	32·32	4	9·66	2	23·13	2	− 600
− 500	51·24	33	47·63	35	31·35	17	84·48	14	30·48	20	23·88	17	74·96	4	39·42	2	3·20	2	− 500
− 400	104·09	32	99·82	33	127·31	16	15·48	13	37·22	19	28·76	16	57·70	4	29·11	2	15·03	2	− 400
− 300	32·96	30	24·02	32	91·28	16	46·48	13	43·96	18	33·65	16	40·44	4	18·80	2	2·85	2	− 300
− 200	85·84	29	76·23	30	55·26	15	77·47	12	0·71	18	38·54	15	23·18	4	8·50	2	14·68	2	− 200
− 100	14·73	28	0·46	29	19·24	14	8·46	12	7·47	17	1·44	14	5·92	3	42·19	2	2·51	2	− 100
0	67·63	26	52·70	28	115·23	14	39·44	11	14·24	16	6·35	14	68·65	3	31·88	2	14·34	2	0
+ 100	120·55	25	104·96	26	79·23	13	70·42	11	21·01	15	11·26	13	51·38	3	21·56	2	2·17	2	+ 100
200	21·68	24	21·22	25	12·43	12	92·39	10	13·00	14	10·54	12	14·02	3	7·31	1	6·25	1	200
300	74·62	22	73·50	23	108·44	12	23·35	9	19·79	14	15·47	12	76·75	3	41·00	1	18·08	1	300
400	3·58	21	125·80	22	72·46	11	54·31	9	26·59	13	20·40	11	59·48	3	30·69	1	5·91	1	400
500	56·55	20	50·11	21	36·49	10	85·26	8	33·40	12	25·34	10	42·20	2	20·37	1	17·75	1	500
600	109·54	18	102·44	19	0·52	9	16·21	8	40·22	11	30·29	9	24·93	2	10·06	1	5·58	1	600
700	38·54	17	26·78	18	96·56	9	47·15	7	47·04	10	35·25	9	7·65	2	43·74	1	17·42	1	700
800	91·55	15	79·14	16	60·61	8	78·09	7	3·87	9	40·21	8	70·37	2	33·42	1	5·25	1	800
900	116·77	14	123·50	15	125·86	7	0·02	6	45·91	9	39·54	7	32·99	2	19·17	1	9·34	1	900
1000	45·81	13	47·88	13	89·92	7	30·95	5	2·76	8	2·52	7	15·71	2	8·85	1	21·18	1	1000
1100	98·86	11	100·28	12	53·99	6	61·87	5	9·62	7	7·50	6	78·43	1	42·53	1	9·01	1	1100
1200	27·93	10	24·70	10	18·07	5	92·78	4	16·49	6	12·49	5	61·14	1	32·21	1	20·85	1	1200
1300	81·01	8	77·13	9	114·15	4	23·68	4	23·37	5	17·49	4	43·86	1	21·89	+1	8·69	−1	1300
1400	10·11	7	1·57	7	78·24	4	54·58	3	30·25	4	22·50	4	26·57	1	11·56	0	20·53	0	1400
1500	63·22	− 6	54·03	− 6	42·34	− 3	85·48	+ 2	37·14	− 3	27·51	− 3	9·28	+1	1·24	0	8·38	0	1500
Gregorian																			Gregorian
1500	35·41	− 6	46·02	− 6	11·53	− 3	76·48	+ 2	22·34	− 3	21·87	− 3	69·18	+1	41·30	0	0·62	0	1500
1600	88·54	4	98·49	5	107·64	2	7·37	2	29·24	3	26·89	2	51·89	+1	30·98	0	12·47	0	1600
1700	17·68	3	22·98	3	71·75	1	38·25	1	36·15	2	31·92	1	34·59	0	20·65	0	0·31	0	1700
1800	70·83	− 1	75·48	− 2	35·87	− 1	69·13	+ 1	43·07	− 1	36·96	− 1	17·30	0	10·33	0	12·16	0	1800
1900	0·00	0	0·00	0	0·00	0	0·00	0	0·00	0	0·00	0	0·00	0	0·00	0	0·00	0	1900
2000	25·37	+ 1	44·52	+ 2	65·32	+ 1	21·87	− 1	42·14	+ 1	41·41	+ 1	42·60	0	29·73	0	4·10	0	2000
2100	78·57	3	97·07	3	29·47	1	52·73	1	49·08	2	4·47	1	25·30	0	19·40	0	15·94	0	2100
2200	7·78	4	21·64	5	125·62	2	83·58	2	6·03	3	9·53	2	8·00	−1	9·08	0	3·79	0	2200
2300	61·00	6	74·22	6	89·77	3	14·42	2	13·00	3	14·60	3	70·69	1	42·75	0	15·64	0	2300
2400	114·24	7	126·81	8	53·94	4	45·26	3	19·97	4	19·68	4	53·38	1	32·41	0	3·49	0	2400
2500	15·69	9	43·41	9	119·30	4	67·10	4	12·15	5	19·13	4	15·98	1	18·14	−1	7·59	+1	2500
2600	68·96	10	96·04	11	83·48	5	97·92	4	19·13	6	24·23	5	78·67	1	7·81	1	19·44	1	2600
2700	122·24	12	20·68	12	47·67	6	28·74	5	26·13	7	29·33	6	61·36	1	41·48	1	7·29	1	2700
2800	51·54	13	73·33	14	11·86	7	59·56	6	33·14	8	34·44	7	44·04	2	31·14	1	19·14	1	2800
2900	104·85	+15	126·01	+15	108·06	+ 7	90·36	− 6	40·15	+ 9	39·56	+ 8	26·72	−2	20·81	−1	7·00	+1	2900

Table 2 (*cont.*). Additions to the Arguments for the Centuries of the Julian and Gregorian Calendars.

Arg.	13	(a)	14	(a)	15	(a)	16	(a)	17	(a)	18	(a)	19	(a)	20	(a)	21	(a)	22	(a)	Arg.
Julian	c		c		c		c		c		c		c		c		c		c		Julian
−2000	5·89	+13	14·93	−4	24·79	+8	198·428	−532	40·81	+4	22·45	−5	0·73	+22	35·84	−33	12·27	+28	6·18	−20	−2000
−1900	9·27	12	30·09	4	26·42	8	125·061	519	29·35	4	2·80	5	5·87	21	53·76	32	32·42	27	2·53	20	−1900
−1800	4·75	12	8·09	4	27·55	8	33·707	507	9·20	4	11·96	5	3·50	21	42·20	31	51·06	27	21·00	19	−1800
−1700	8·13	12	23·25	4	1·18	7	211·366	494	48·73	4	30·31	5	8·63	20	60·14	30	15·20	26	17·35	19	−1700
−1600	11·50	12	6·41	4	2·81	7	138·037	481	37·27	4	10·67	5	13·75	20	78·09	29	35·33	25	13·70	18	−1600
−1500	14·87	11	21·57	4	4·44	7	64·722	468	25·81	3	29·03	5	18·86	19	2·05	29	55·46	25	10·06	18	−1500
−1400	18·23	11	4·74	4	6·06	7	242·419	455	14·34	3	9·39	4	23·97	19	20·01	28	19·58	24	6·43	17	−1400
−1300	21·60	11	19·90	4	7·68	7	169·129	442	2·88	3	27·75	4	29·08	18	37·98	27	39·69	23	2·80	17	−1300
−1200	17·06	10	29·91	4	8·80	6	77·852	429	33·72	3	36·91	4	26·68	18	26·46	26	2·29	23	21·30	16	−1200
−1100	20·42	10	13·08	3	10·42	6	4·589	416	22·25	3	17·28	4	31·77	17	44·45	26	22·39	22	17·68	16	−1100
−1000	23·77	10	28·25	3	12·04	6	182·338	403	10·78	3	35·64	4	36·86	17	62·45	25	42·48	21	14·07	15	−1000
−900	27·12	9	11·42	3	13·65	6	109·100	390	50·31	3	16·01	4	41·95	16	80·46	24	6·57	21	10·46	15	−900
−800	30·46	9	26·59	3	15·26	6	35·876	377	38·84	3	34·37	4	47·03	16	4·47	23	26·65	20	6·86	14	−800
−700	33·81	9	9·76	3	16·87	5	213·665	363	27·37	3	14·74	3	52·10	15	22·49	22	46·72	19	3·26	14	−700
−600	37·15	8	24·94	3	18·48	5	140·467	350	15·90	3	33·11	3	57·17	14	40·52	21	10·78	18	35·66	13	−600
−500	32·59	8	2·95	3	19·59	5	49·283	337	46·74	2	4·29	3	54·73	14	29·06	21	29·33	18	18·20	13	−500
−400	35·92	8	18·13	3	21·19	5	227·112	323	35·26	2	22·66	3	59·78	13	47·10	20	49·38	17	14·61	12	−400
−300	39·25	8	1·30	3	22·79	5	153·955	310	23·79	2	3·03	3	64·83	13	65·16	19	13·42	16	11·03	12	−300
−200	42·58	7	16·48	2	24·39	4	80·811	296	12·31	2	21·41	3	69·88	12	83·22	18	33·46	16	7·46	11	−200
−100	1·91	7	31·66	2	25·99	4	7·680	283	0·83	2	1·78	3	74·92	12	7·29	17	53·49	15	3·89	11	−100
0	5·23	7	14·84	2	27·58	4	185·563	269	40·36	2	20·16	3	3·95	11	25·37	16	17·51	14	0·33	10	0
+100	8·55	6	30·02	2	1·18	4	112·460	255	28·88	2	0·54	2	8·98	11	43·46	16	37·53	13	32·77	10	+100
200	3·96	6	8·04	2	2·27	4	21·371	242	8·71	2	9·72	2	6·50	10	32·05	15	0·02	13	15·34	9	200
300	7·27	6	23·23	2	3·86	3	199·295	228	48·22	2	28·10	2	11·52	9	50·16	14	20·02	12	11·79	9	300
400	10·58	5	6·41	2	5·45	3	126·233	214	36·74	2	8·49	2	16·53	9	68·27	13	40·01	11	8·25	8	400
500	13·89	5	21·60	2	7·03	3	53·185	200	25·26	1	26·87	2	21·54	8	86·39	12	4·00	11	4·71	8	500
600	17·19	5	4·78	2	8·61	3	231·151	186	13·77	1	7·26	2	26·54	8	10·52	11	23·98	10	1·18	7	600
700	20·49	4	19·97	1	10·19	3	158·131	172	2·29	1	25·65	2	31·53	7	28·66	11	43·95	9	33·66	6	700
800	23·78	4	3·16	1	11·77	2	85·125	158	41·80	1	6·03	2	36·52	7	46·81	10	7·92	8	30·14	6	800
900	19·18	4	13·19	1	12·85	2	245·133	144	21·62	1	15·22	1	34·00	6	35·46	9	26·36	8	12·74	5	900
1000	22·46	3	28·38	1	14·43	2	172·156	130	10·14	1	33·62	1	38·98	5	53·63	8	46·31	7	9·23	5	1000
1100	25·75	3	11·57	1	16·00	2	99·192	116	49·65	1	14·01	1	43·95	5	71·80	7	10·25	6	5·72	4	1100
1200	29·03	2	26·77	1	17·57	2	26·243	101	38·16	1	32·40	1	48·91	4	89·98	6	30·19	5	2·22	4	1200
1300	32·31	2	9·96	1	19·14	1	204·308	87	26·66	1	12·80	1	53·87	4	14·17	5	50·11	5	34·73	3	1300
1400	35·58	2	25·16	−1	20·70	1	131·387	73	15·17	+1	31·19	1	58·82	3	32·37	4	14·03	4	31·24	3	1400
1500	38·85	+1	8·36	0	22·27	+1	58·480	−58	3·68	0	11·59	−1	63·77	+2	50·58	−4	33·94	+3	27·76	−2	1500
Gregorian																					Gregorian
1500	30·95	+1	3·20	0	21·77	+1	40·480	−58	45·99	0	2·39	−1	56·27	+2	21·08	−4	32·43	+3	13·88	−2	1500
1600	34·22	1	18·40	0	23·33	+1	218·588	44	34·49	0	20·79	0	61·21	2	39·30	3	52·34	2	10·40	2	1600
1700	37·48	+1	1·60	0	24·89	0	145·711	29	23·00	0	1·19	0	66·15	1	57·53	2	16·23	2	6·93	1	1700
1800	40·74	0	16·80	0	26·44	0	72·848	−15	11·50	0	19·60	0	71·08	+1	75·76	−1	36·12	+1	3·46	−1	1800
1900	0·00	0	0·00	0	0·00	0	0·000	0	0·00	0	0·00	0	0·00	0	0·00	0	0·00	0	0·00	0	1900
2000	39·35	0	10·04	0	1·05	0	160·166	+15	30·81	0	9·21	0	73·42	−1	82·75	+1	18·36	−1	18·66	+1	2000
2100	42·60	−1	25·25	0	2·60	0	87·347	29	19·31	0	27·61	0	2·33	1	7·01	2	38·23	2	15·21	1	2100
2200	1·85	1	8·45	0	4·15	−1	14·543	44	7·81	0	8·02	0	7·23	2	25·28	3	2·08	2	11·77	2	2200
2300	5·09	1	23·66	0	5·70	1	192·754	59	47·31	0	26·43	+1	12·13	2	43·56	4	21·93	3	8·33	2	2300
2400	8·33	2	6·87	+1	7·24	1	119·980	74	35·80	−1	6·84	1	17·02	3	61·85	5	41·77	4	4·90	3	2400
2500	3·67	2	16·92	1	8·29	1	29·220	89	15·61	1	16·05	1	14·41	4	50·65	5	4·10	5	23·59	3	2500
2600	6·90	3	0·13	1	9·83	2	207·475	104	4·10	1	34·47	1	19·29	4	68·96	6	23·92	5	20·17	4	2600
2700	10·12	3	15·34	1	11·36	2	134·746	119	43·59	1	14·88	1	24·16	5	87·27	7	43·74	6	16·75	4	2700
2800	13·35	3	30·56	1	12·90	2	62·031	134	32·09	1	33·30	1	29·03	6	11·60	8	7·55	7	13·34	5	2800
2900	16·57	−4	13·77	+1	14·43	−2	240·332	+149	20·58	−1	13·72	+1	33·89	−6	29·94	+9	27·35	−8	9·93	+6	2900

TABLE 2 (*cont.*). Additions to the Arguments for the Centuries of the Julian and Gregorian Calendars.

Arg.	23		(a)	24		(a)	25		(a)	26		(a)	27		(a)	28		(a)	Arg.
Julian	d	c		d	c		d	c		d	c		d	c		d	c		Julian
−2000	3·0	323·8	− 124	6·5	149·0	− 33	3·0	0·0	− 242	25·0	11·22	− 2098	8·0	77·8	+ 326	1·5	138·0	− 111	−2000
−1900	14·0	201·0	121	2·5	76·8	32	17·0	8·3	236	11·5	58·22	2049	13·5	86·0	318	4·0	155·3	108	−1900
−1800	9·5	213·5	119	12·5	68·6	31	5·0	160·3	230	28·0	49·71	2000	19·0	93·3	310	6·5	172·9	106	−1800
−1700	5·0	226·2	116	8·0	163·6	30	19·0	169·8	224	14·5	97·69	1951	24·5	99·9	302	9·5	12·8	103	−1700
−1600	0·5	230·2	113	4·0	91·7	29	7·5	133·9	218	1·5	4·16	1902	30·0	105·6	294	2·0	75·9	100	−1600
−1500	11·5	117·5	111	0·0	19·8	29	21·5	144·6	212	17·5	139·13	1852	0·5	189·5	286	4·5	94·3	98	−1500
−1400	7·0	131·0	108	10·0	12·0	28	10·0	110·0	206	4·5	46·58	1802	6·0	193·6	278	7·0	112·9	95	−1400
−1300	2·5	144·7	106	5·5	107·3	27	24·0	121·9	200	21·0	40·53	1752	11·5	196·9	269	9·5	131·9	92	−1300
−1200	13·5	23·7	103	1·5	35·7	26	12·5	88·4	194	7·5	90·99	1702	17·0	199·3	261	2·5	18·1	90	−1200
−1100	9·0	38·0	100	11·5	28·1	25	1·0	55·5	188	24·0	85·95	1653	22·5	200·9	253	5·0	37·5	87	−1100
−1000	4·5	52·6	97	7·0	123·7	24	15·0	69·2	182	10·5	137·41	1594	28·0	201·7	245	7·5	57·2	84	−1000
− 900	0·0	67·4	94	3·0	52·3	24	3·5	37·5	176	27·0	133·46	1555	33·5	201·6	237	0·0	122·2	82	− 900
− 800	10·5	546·6	91	13·0	45·0	23	17·5	52·4	170	14·0	43·89	1495	4·5	21·8	229	2·5	142·5	79	− 800
− 700	6·0	562·0	87	8·5	140·8	22	6·0	21·9	164	0·5	96·91	1443	10·0	20·1	221	5·0	163·1	76	− 700
− 600	1·5	578·0	84	4·5	69·7	21	20·0	38·1	158	17·0	94·47	1390	15·5	17·7	213	8·0	5·9	73	− 600
− 500	12·5	459·2	81	0·0	165·7	20	8·5	8·8	152	4·0	6·54	1337	21·0	14·5	205	0·5	72·0	71	− 500
− 400	8·0	475·7	78	10·0	158·7	19	22·5	26·1	146	20·5	5·15	1284	26·5	10·4	197	3·0	93·4	68	− 400
− 300	3·5	492·5	74	6·0	87·8	19	10·5	187·1	140	7·0	60·30	1230	32·0	5·6	188	5·5	115·0	65	− 300
− 200	14·5	374·7	71	2·0	17·1	18	25·0	16·7	133	23·5	59·98	1176	2·5	78·9	180	8·0	137·0	62	− 200
− 100	10·0	392·3	68	12·0	10·4	17	13·0	178·9	127	10·0	116·20	1122	8·0	72·4	172	1·0	26·2	59	− 100
0	5·5	410·1	65	7·5	106·7	16	1·5	152·7	121	26·5	116·95	1069	13·5	65·1	163	3·5	48·7	56	0
+ 100	1·0	428·2	62	3·5	36·2	15	15·5	173·1	115	13·5	32·24	1016	19·0	57·0	155	6·0	71·5	54	+ 100
200	12·0	311·7	59	13·5	29·8	14	4·0	148·2	109	0·0	90·06	962	24·5	47·9	146	8·5	94·6	51	200
300	7·5	330·4	56	9·0	126·4	13	18·0	169·9	102	16·5	92·42	908	30·0	38·0	137	1·0	163·0	48	300
400	3·0	349·4	53	5·0	56·1	13	6·5	146·2	96	3·5	9·31	854	0·5	106·3	128	4·0	8·6	45	400
500	14·0	233·7	50	0·5	152·9	12	20·5	169·1	90	20·0	12·75	799	6·0	94·6	120	6·5	32·6	42	500
600	9·5	253·3	47	10·5	146·8	11	9·0	146·6	84	6·5	72·74	744	11·5	82·1	111	9·0	56·8	39	600
700	5·0	273·2	44	6·5	76·8	10	23·0	170·8	77	23·0	77·27	688	17·0	68·7	103	1·5	126·3	36	700
800	0·5	293·4	40	2·5	6·8	9	11·5	149·7	71	9·5	138·35	632	22·5	54·4	94	4·0	151·2	33	800
900	11·5	179·0	37	12·5	1·0	8	0·0	129·1	65	26·5	2·00	575	28·0	39·3	86	6·5	176·3	30	900
1000	7·0	199·9	33	8·0	98·2	8	14·0	155·2	58	13·0	64·21	518	33·5	23·4	77	9·5	23·7	27	1000
1100	2·5	221·2	29	4·0	28·5	7	2·5	135·9	52	29·5	70·99	461	4·0	85·6	69	2·0	94·4	24	1100
1200	13·5	107·9	25	14·0	22·9	6	16·5	163·3	45	16·0	134·34	404	9·5	68·0	61	4·5	120·4	21	1200
1300	9·0	129·9	22	9·5	120·4	5	5·0	145·3	39	3·0	56·27	347	15·0	49·6	52	7·0	146·7	18	1300
1400	4·5	152·4	18	5·5	50·9	4	19·0	174·0	32	19·5	64·78	289	20·5	30·3	44	0·0	40·4	15	1400
1500	0·0	175·2	− 15	1·0	148·6	− 3	7·5	157·3	− 26	6·0	129·87	− 232	26·0	10·2	+ 35	2·5	67·3	− 12	1500
Gregorian																			Gregorian
1500	5·5	40·2	− 15	5·5	45·6	− 3	23·5	14·3	− 26	26·0	73·87	− 232	16·0	10·2	+ 35	2·5	22·3	− 12	1500
1600	1·0	63·3	11	1·0	143·3	3	11·5	187·2	20	12·5	139·53	175	21·0	247·2	26	5·0	49·5	9	1600
1700	10·5	550·9	7	10·0	138·1	2	25·0	28·8	13	28·5	7·77	117	25·5	225·3	18	6·5	77·0	6	1700
1800	5·0	574·8	− 4	5·0	69·0	− 1	12·5	14·1	− 7	14·0	74·60	− 58	30·0	202·6	+ 9	8·0	104·9	− 3	1800
1900	0·0	0·0	0	0·0	0·0	0	0·0	0·0	0	0·0	0·00	0	0·0	0·0	0	0·0	0·0	0	1900
2000	10·5	488·6	+ 3	9·5	162·1	+ 1	14·0	32·6	+ 7	16·5	11·98	+ 59	5·0	233·5	− 9	2·5	28·4	+ 3	2000
2100	5·0	513·4	7	4·5	93·2	2	1·5	19·8	13	2·0	80·55	118	9·5	208·0	18	4·0	57·2	6	2100
2200	15·0	403·6	10	13·5	88·5	3	14·5	53·6	20	17·5	93·70	176	14·0	181·7	27	5·5	86·3	9	2200
2300	9·5	429·2	13	8·5	19·8	3	2·0	42·2	26	3·5	21·43	235	18·5	154·5	37	7·0	115·7	12	2300
2400	5·0	455·1	17	4·0	118·2	4	16·0	77·4	33	20·0	35·76	294	24·0	126·3	46	0·0	12·4	16	2400
2500	15·0	346·3	21	13·0	113·7	5	3·5	67·2	40	5·5	106·67	354	28·5	97·2	55	1·5	42·4	19	2500
2600	9·5	372·9	25	8·0	45·3	6	16·5	103·7	46	21·0	122·19	415	33·0	67·2	64	3·0	72·7	22	2600
2700	4·0	399·9	28	2·5	143·9	7	4·0	94·9	53	7·0	52·32	476	2·5	115·4	73	4·5	103·3	25	2700
2800	15·0	292·3	32	12·5	139·6	8	18·0	132·8	60	23·5	69·05	537	8·0	83·6	81	7·0	134·3	28	2800
2900	9·5	320·1	+ 36	7·5	71·5	+ 8	5·5	125·3	+ 66	9·5	0·40	+ 598	12·5	51·0	− 90	8·5	165·6	+ 32	2900

TABLE 2 (*cont.*). Additions to the Arguments for the Centuries of the Julian and Gregorian Calendars.

Arg.	29		(*a*)	30		(*a*)	(*b*)	31		(*a*)	32		(*a*)	33		(*a*)	34		(*a*)	Arg.
Julian	*d*	*c*		*d*	*c*			*d*	*c*		*d*	*c*		*d*	*c*		*d*	*c*		Julian
-2000	14·5	185·6	+217	26·5	307·328	-45178	-82	5·0	107·25	-590	11·5	231·42	+3856	5·0	35·75	-197	124·5	9·05	-2474	-2000
-1900	19·0	176·0	212	14·5	42·267	44102	81	0·5	196·95	576	16·5	198·68	3765	0·5	65·65	192	0·0	3·15	2416	-1900
-1800	23·5	165·9	207	2·0	108·283	43023	80	11·0	148·79	563	21·5	165·03	3672	26·0	3·60	188	81·0	8·83	2357	-1800
-1700	28·0	155·3	202	17·0	211·380	41941	78	6·5	238·76	549	26·5	130·45	3578	21·5	33·59	183	162·5	1·10	2298	-1700
-1600	3·5	35·2	197	4·5	279·560	40856	76	2·5	34·87	536	31·5	94·92	3483	17·0	63·63	179	37·5	10·97	2239	-1600
-1500	8·0	23·6	192	20·0	54·827	39768	74	12·5	281·11	522	4·5	184·45	3387	12·5	93·71	175	119·0	4·42	2179	-1500
-1400	12·5	11·5	187	7·5	125·184	38675	72	8·5	77·49	509	9·5	147·02	3292	8·5	25·83	170	200·0	12·47	2118	-1400
-1300	16·5	205·8	182	22·5	232·636	37578	69	4·0	168·00	496	14·5	108·64	3196	4·0	56·00	166	75·5	10·13	2057	-1300
-1200	21·0	192·7	176	10·0	305·188	36475	66	14·5	120·64	482	19·5	69·30	3100	29·0	92·21	161	157·0	5·40	1996	-1200
-1100	25·5	179·0	171	25·5	84·846	35367	63	10·0	211·42	468	24·5	29·01	3004	25·0	24·47	156	32·5	4·28	1935	-1100
-1000	1·0	55·7	166	13·0	159·616	34252	60	6·0	8·34	453	29·0	322·76	2910	20·5	54·78	151	114·0	0·76	1874	-1000
- 900	5·5	41·0	160	0·5	235·503	33131	57	1·5	99·41	438	2·5	71·56	2816	16·0	85·14	146	195·0	11·86	1813	- 900
- 800	10·0	25·7	155	16·0	18·514	32005	54	12·0	52·63	422	7·5	28·42	2722	12·0	17·55	141	70·5	12·56	1752	- 800
- 700	14·5	9·9	150	3·5	96·654	30872	52	7·5	144·01	406	12·0	319·34	2628	7·5	48·01	136	152·0	10·88	1690	- 700
- 600	18·5	200·5	144	18·5	211·929	29735	50	3·0	235·55	390	17·0	274·32	2533	3·0	78·52	131	27·5	12·82	1629	- 600
- 500	23·0	183·6	139	6·0	292·343	28594	48	13·5	189·25	374	22·0	228·35	2439	28·5	17·08	125	109·0	12·37	1567	- 500
- 400	27·5	166·1	133	21·5	79·901	27448	46	9·0	281·10	358	27·0	181·44	2344	24·0	47·70	120	190·5	12·54	1505	- 400
- 300	3·0	39·2	128	9·0	162·606	26300	45	5·0	79·12	343	0·0	259·58	2247	19·5	78·37	115	66·5	2·33	1443	- 300
- 200	7·5	20·6	122	24·0	282·460	25148	43	0·5	171·29	327	5·0	210·75	2149	15·5	11·10	110	148·0	3·74	1380	- 200
- 100	12·0	1·5	117	12·0	37·468	23994	42	11·0	125·62	312	10·0	160·95	2050	11·0	41·87	105	23·5	8·79	1316	- 100
0	16·0	188·9	111	27·0	159·631	22838	41	6·5	218·10	298	15·0	110·15	1950	6·5	72·70	100	105·0	11·47	1252	0
+ 100	20·5	168·6	106	14·5	246·952	21678	39	2·5	16·72	284	20·0	58·36	1850	2·5	5·57	95	187·0	0·78	1188	+ 100
200	25·0	147·8	100	2·5	5·434	20515	37	12·5	265·48	269	25·0	5·56	1749	27·5	42·49	90	62·5	7·74	1124	200
300	0·5	17·5	94	17·5	131·081	19349	35	8·5	64·39	255	29·5	286·75	1647	23·0	73·46	85	144·0	12·34	1059	300
400	4·5	202·6	89	5·0	221·897	18178	32	4·0	157·44	241	3·0	22·91	1544	19·0	6·48	80	20·0	6·59	994	400
500	9·0	180·1	83	20·5	19·886	17002	30	14·5	112·63	226	7·5	302·05	1441	14·5	37·54	75	101·5	12·49	929	500
600	13·5	157·1	77	8·0	113·054	15820	27	10·0	205·96	211	12·5	245·16	1339	10·0	68·66	70	183·5	5·03	864	600
700	18·0	133·5	71	23·0	243·406	14633	24	6·0	5·45	196	17·5	187·25	1237	6·0	1·82	65	59·5	1·23	799	700
800	22·5	109·3	66	11·0	8·949	13439	21	1·5	99·09	180	22·5	128·32	1136	1·5	33·03	60	141·0	9·09	734	800
900	27·0	84·5	60	26·0	141·689	12239	18	12·0	54·88	164	27·5	68·37	1035	26·5	70·30	55	17·0	6·59	668	900
1000	2·0	157·1	54	13·5	239·631	11034	15	7·5	148·84	147	0·5	133·42	934	22·5	3·62	50	99·0	1·75	602	1000
1100	6·5	131·1	48	1·5	8·782	9822	13	3·0	242·97	130	5·5	71·46	833	18·0	34·99	44	180·5	11·57	536	1100
1200	11·0	104·6	42	16·5	145·147	8606	11	13·5	199·26	113	10·5	8·49	732	13·5	66·42	38	56·5	11·04	470	1200
1300	15·5	77·4	36	4·0	246·730	7386	9	9·0	293·73	97	15·0	279·51	631	9·0	97·91	32	138·5	8·18	404	1300
1400	20·0	49·7	30	19·5	55·534	6162	7	5·0	94·36	80	20·0	214·52	529	5·0	31·46	26	14·5	8·97	338	1400
1500	24·5	21·4	+24	7·0	159·565	-4935	-6	0·5	189·17	-64	25·0	148·51	+426	0·5	63·06	-21	96·5	7·43	-271	1500
Gregorian																				Gregorian
1500	14·5	21·4	+24	24·5	195·568	-4935	-6	5·5	51·17	-64	15·0	148·51	+426	20·0	69·06	-21	86·5	7·43	-271	1500
1600	18·5	199·4	18	12·0	300·827	3705	4	1·0	146·13	47	20·0	81·46	321	16·0	2·71	16	168·5	6·56	204	1600
1700	22·0	169·9	12	26·5	113·317	2472	3	10·5	103·26	31	24·0	13·37	215	10·5	34·42	11	43·5	9·36	136	1700
1800	25·5	139·8	+6	13·0	221·040	-1238	-2	5·0	198·55	-15	27·5	279·22	+108	5·0	66·18	-5	124·5	9·84	-68	1800
1900	0·0	0·0	0	0·0	0·000	0		0·0	0·00	0	0·0	0·00	0	0·0	0·00	0	0·0	0·00	0	1900
2000	4·0	175·6	-6	15·0	146·199	+1241	+2	10·0	251·60	+15	4·5	263·71	-108	25·0	37·86	+5	82·0	1·84	+69	2000
2100	7·5	143·6	12	1·5	257·641	2486	4	5·0	53·35	30	8·5	191·32	217	19·5	69·78	10	163·0	4·37	138	2100
2200	11·0	111·0	18	16·0	76·329	3735	7	14·5	11·25	45	12·5	117·85	326	14·5	3·75	15	38·0	10·60	207	2200
2300	14·5	77·8	25	2·5	190·269	4989	9	9·0	107·30	61	16·5	43·29	436	9·0	35·77	20	119·5	0·51	277	2300
2400	19·0	44·0	31	18·0	11·467	6249	12	4·5	203·51	77	21·0	302·63	545	4·5	67·84	25	201·5	5·12	346	2400
2500	22·5	9·5	37	4·5	127·927	7515	16	14·0	161·87	93	25·0	225·89	653	29·0	7·96	31	76·5	13·42	416	2500
2600	25·5	181·4	44	18·5	281·656	8787	19	8·5	258·40	110	29·0	148·06	761	23·5	40·14	36	158·0	5·42	485	2600
2700	0·0	36·7	50	5·5	70·660	10065	22	3·5	61·10	128	1·0	195·15	869	18·0	72·37	42	33·5	1·11	555	2700
2800	4·5	0·3	56	20·5	226·946	11350	25	14·0	19·98	145	6·0	115·16	976	14·0	6·66	48	115·5	8·51	625	2800
2900	7·5	170·3	-63	7·5	18·518	+12639	+27	8·5	117·03	+162	10·0	34·10	-1084	8·5	39·01	+54	197·0	2·60	+694	2900

TABLE 2 (*cont.*). Additions to the Arguments for the Centuries of the Julian and Gregorian Calendars.

Arg.	35		(a)	36		(a)	37		(a)	38		(a)	39		(a)	40		(a)	41		(a)	Arg.
Julian	*d*	*c*		*d*	*c*		*d*	*c*		*d*	*c*		*d*	*c*		*d*	*c*		*d*	*c*		Julian
−2000	3·0	93·52	−1687	11·5	80·9	+134	7·0	233·5	+90	2·0	117·8	−241	3·5	28·7	−14	2·0	288·13	+27	143·5	14·9	+52	−2000
−1900	5·5	69·25	1647	0·5	91·4	131	5·5	312·9	88	0·5	185·4	235	3·5	14·6	14	8·5	102·30	27	100·5	2·7	51	−1900
−1800	8·0	45·39	1607	5·5	79·7	128	4·0	392·0	85	6·5	30·7	229	3·5	0·6	13	1·0	161·47	26	57·0	11·3	49	−1800
−1700	0·5	235·92	1567	10·5	67·6	125	3·0	74·9	83	5·0	99·5	224	3·0	17·6	13	7·0	286·63	26	13·5	19·8	48	−1700
−1600	3·0	212·85	1527	15·5	55·2	121	1·5	153·6	81	3·5	168·8	218	3·0	3·7	13	0·0	34·78	25	143·5	20·2	47	−1600
−1500	5·5	190·18	1487	4·5	64·4	118	0·0	232·1	79	2·0	238·8	212	2·5	20·7	12	6·0	159·93	25	100·5	7·5	46	−1500
−1400	8·0	167·91	1447	9·5	51·3	115	8·5	377·4	77	1·0	10·4	206	2·5	6·8	12	12·0	285·08	24	57·0	15·7	44	−1400
−1300	1·0	83·05	1406	14·5	37·9	112	7·5	59·5	75	6·5	157·5	200	2·0	24·0	12	5·0	33·22	24	14·0	2·7	43	−1300
−1200	3·5	61·58	1365	3·5	46·2	108	6·0	137·3	72	5·0	229·2	194	2·0	10·1	11	11·0	158·35	23	144·0	2·6	42	−1200
−1100	6·0	40·53	1324	8·5	32·2	105	4·5	214·9	70	4·0	2·5	188	1·5	27·3	11	3·5	217·47	22	100·5	10·4	41	−1100
−1000	8·5	19·89	1282	13·5	17·8	102	3·0	292·3	68	2·5	75·4	182	1·5	13·6	11	10·0	31·59	22	57·0	18·0	39	−1000
− 900	1·0	213·67	1240	2·5	25·1	98	1·5	369·5	66	1·0	148·9	176	1·0	30·9	10	2·5	90·70	21	14·0	4·5	38	− 900
− 800	3·5	193·87	1197	7·5	10·0	95	0·5	50·5	64	7·0	0·0	170	1·0	17·2	10	8·5	215·81	21	144·0	3·9	37	− 800
− 700	6·0	174·49	1154	12·0	111·6	92	9·0	194·2	61	5·5	74·7	164	1·0	3·5	9	1·0	274·91	20	100·5	11·2	36	− 700
− 600	8·5	155·55	1111	1·5	0·9	88	7·5	270·7	59	4·0	150·0	158	0·5	20·9	9	7·5	89·01	19	57·0	18·3	34	− 600
− 500	1·5	74·04	1068	6·0	101·9	85	6·0	347·0	57	2·5	225·9	152	0·5	7·3	9	0·0	148·10	19	14·0	4·3	33	− 500
− 400	4·0	55·96	1025	11·0	85·5	82	5·0	27·1	55	1·5	3·4	146	0·0	24·7	8	6·0	273·18	18	144·0	3·2	32	− 400
− 300	6·5	38·31	981	0·0	90·7	78	3·5	102·9	52	0·0	80·5	140	0·0	11·2	8	12·5	87·25	17	100·5	10·0	30	− 300
− 200	9·0	21·10	938	5·0	73·7	75	2·0	178·5	50	5·5	234·3	134	5·5	17·7	8	5·0	146·32	17	57·0	16·6	29	− 200
− 100	1·5	218·32	895	10·0	56·3	71	0·5	253·9	48	4·5	13·6	128	5·5	4·3	7	11·0	271·38	16	14·0	2·0	28	− 100
0	4·0	201·97	852	15·0	38·5	68	9·5	0·1	45	3·0	92·6	122	5·0	21·9	7	4·0	19·43	15	144·0	0·4	26	0
+ 100	6·5	186·05	809	4·0	42·4	64	8·0	75·0	43	1·5	172·2	115	5·0	8·5	7	10·0	144·48	14	100·5	6·6	25	+ 100
200	9·0	170·56	766	9·0	23·9	61	6·5	149·7	41	0·0	252·4	109	4·5	26·2	6	2·5	203·52	14	57·0	12·7	24	200
300	2·0	92·49	723	14·0	5·1	58	5·0	224·1	38	6·0	110·2	103	4·5	12·9	6	9·0	17·55	13	13·5	18·6	22	300
400	4·5	77·86	680	3·0	8·0	55	3·5	298·3	36	4·5	191·6	97	4·0	30·6	6	1·5	76·58	12	143·5	16·4	21	400
500	7·0	63·65	637	7·5	105·5	51	2·0	372·3	34	3·0	273·7	90	4·0	17·4	5	7·5	201·59	12	100·5	1·1	20	500
600	9·5	49·88	593	12·5	85·6	47	1·0	50·1	31	2·0	57·4	84	4·0	4·2	5	0·0	260·60	11	57·0	6·6	18	600
700	2·0	250·55	549	1·5	87·4	43	9·5	190·6	29	0·5	140·8	78	3·5	22·0	4	6·5	74·60	10	13·5	12·0	17	700
800	4·5	237·66	504	6·5	66·9	40	8·0	263·9	27	6·5	1·7	71	3·5	8·9	4	12·5	199·60	9	143·5	9·3	15	800
900	7·0	225·22	459	11·5	46·0	36	6·5	336·9	24	5·0	86·3	65	3·0	26·8	4	5·0	258·59	8	100·0	14·4	14	900
1000	0·0	150·23	414	0·5	46·7	33	5·5	13·7	22	3·5	171·6	59	3·0	13·8	3	11·5	72·57	8	56·5	19·4	13	1000
1100	2·5	138·69	368	5·5	25·1	29	4·0	86·2	20	2·0	257·5	52	3·0	0·7	3	4·0	131·54	7	13·5	3·3	11	1100
1200	5·0	127·62	322	10·5	3·1	26	2·5	158·6	17	1·0	45·0	46	2·5	18·8	3	10·0	256·50	6	143·5	0·0	10	1200
1300	7·5	117·00	275	15·0	97·7	22	1·0	230·6	15	6·5	208·2	39	2·5	5·8	2	3·0	4·45	5	100·0	4·5	9	1300
1400	0·5	43·85	229	4·0	97·0	18	9·5	369·5	12	5·0	296·0	33	2·0	23·9	2	9·0	129·40	4	56·5	9·0	7	1400
1500	3·0	34·16	− 183	9·0	74·0	+ 15	8·5	45·1	+10	4·0	85·5	− 26	2·0	11·1	− 2	1·5	188·34	+ 3	13·0	13·3	+ 6	1500
Gregorian																						Gregorian
1500	2·5	97·16	− 183	15·0	52·0	+ 15	8·5	112·1	+10	1·0	161·5	− 26	3·5	20·1	− 2	5·0	254·34	+ 3	3·0	13·3	+ 6	1500
1600	5·0	87·93	137	4·0	50·5	11	7·0	183·4	7	7·0	27·7	20	3·5	7·3	1	11·5	68·27	3	133·0	9·4	4	1600
1700	6·5	79·16	91	8·0	26·7	7	4·5	254·5	5	4·5	117·4	13	2·0	25·5	− 1	3·0	127·19	2	88·5	13·4	3	1700
1800	8·0	70·85	− 45	12·0	2·5	+ 4	2·0	325·4	+ 2	2·0	207·9	− 7	1·0	12·7	0	8·0	252·10	+ 1	44·0	17·3	+ 1	1800
1900	0·0	0·00	0	0·0	0·0	0	0·0	0·0	0	0·0	0·0	0	0·0	0·0	0	0·0	0·00	0	0·0	0·0	0	1900
2000	2·0	269·60	+ 46	4·5	92·1	− 4	8·5	137·4	− 2	5·5	167·8	+ 7	5·5	7·3	0	6·0	124·89	− 1	129·5	16·6	− 1	2000
2100	3·5	262·66	92	8·5	66·8	7	6·0	207·5	5	3·0	260·2	13	4·0	25·7	+ 1	11·0	249·78	2	85·0	20·0	3	2100
2200	5·0	256·18	138	12·5	41·2	11	3·5	277·3	7	1·0	54·3	20	3·0	13·1	1	2·5	308·66	3	41·0	2·3	4	2200
2300	6·5	250·16	185	0·5	37·1	15	1·0	347·0	10	5·5	224·1	27	2·0	0·5	2	8·0	122·52	4	169·5	18·4	6	2300
2400	9·0	244·61	231	5·5	10·7	19	0·0	20·3	13	4·5	19·5	33	1·5	19·0	2	0·5	181·38	5	126·5	0·4	7	2400
2500	1·0	176·52	278	9·0	100·9	22	7·5	156·4	15	2·0	114·6	40	0·5	6·5	2	5·5	306·23	5	82·0	3·3	9	2500
2600	2·5	171·90	326	13·0	73·8	26	5·0	225·3	18	6·5	286·4	47	5·0	14·1	3	11·0	120·07	6	37·5	6·0	10	2600
2700	4·0	167·76	374	1·0	68·2	30	2·5	293·9	20	4·5	83·9	54	4·0	1·7	3	2·5	178·90	7	166·5	0·5	12	2700
2800	6·5	164·10	423	6·0	40·3	34	1·0	362·2	23	3·0	181·1	61	3·5	20·3	3	8·5	303·72	8	123·0	2·9	13	2800
2900	8·0	160·93	+ 473	10·0	12·0	− 38	9·0	101·3	− 25	0·5	278·9	+ 67	2·5	8·0	+ 4	0·5	51·53	− 9	78·5	5·2	− 15	2900

TABLE 2 (*cont.*). Additions to the Arguments for the Centuries of the Julian and Gregorian Calendars.

Arg.	42		(a)	43		(a)	44		(a)	45		(a)	46		(a)	47		(a)	48	Arg.
Julian	d	c		d	c		d	c		d	c		d	c		d	c			Julian
−2000	5·0	133·9	+206	1·0	171·7	−84	3·5	95·7	−16	5·0	72·9	+47	0·5	60·8	−46	50·5	3·61	−17	31	−2000
−1900	2·5	124·5	201	1·5	2·3	82	4·5	146·7	16	1·5	18·8	45	4·5	34·0	45	49·5	5·21	15	89	−1900
−1800	0·0	114·7	196	1·5	22·1	80	6·0	18·7	16	7·0	105·6	44	1·5	28·4	44	48·5	6·83	12	148	−1800
−1700	24·5	67·4	191	1·5	42·2	78	0·0	40·7	15	3·5	51·3	43	5·5	1·9	43	47·5	8·48	10	43	−1700
−1600	22·0	56·6	186	1·5	62·4	76	1·0	91·8	15	9·5	4·8	42	2·0	64·5	42	46·5	10·15	7	102	−1600
−1500	19·5	45·2	181	1·5	82·8	74	2·0	142·9	14	5·5	83·3	41	6·0	38·3	40	45·5	11·86	4	156	−1500
−1400	17·0	33·4	176	1·5	103·4	72	3·5	15·1	14	2·0	28·7	40	3·0	33·1	39	44·5	13·59	− 1	55	−1400
−1300	14·5	21·1	171	1·5	124·2	70	4·5	66·3	14	7·5	114·9	39	0·0	28·0	38	43·5	15·36	+ 1	110	−1300
−1200	12·0	8·3	166	1·5	145·3	68	5·5	117·6	13	4·0	60·0	38	4·0	2·1	37	42·5	17·15	4	9	−1200
−1100	9·0	147·0	161	1·5	166·5	66	6·5	168·9	13	0·5	5·0	36	0·5	65·3	36	41·5	18·97	6	63	−1100
−1000	6·5	133·2	156	1·5	187·9	64	1·0	12·2	12	6·0	90·9	35	4·5	39·6	35	40·5	20·80	7	121	−1000
− 900	4·0	118·8	151	2·0	20·6	62	2·0	63·6	12	2·5	35·7	34	1·5	35·0	34	39·5	22·64	8	21	− 900
− 800	1·5	104·0	146	2·0	42·5	60	3·0	115·0	12	8·0	121·4	33	5·5	9·5	33	38·5	24·50	9	75	− 800
− 700	26·0	51·6	141	2·0	64·5	58	4·0	166·4	11	4·5	65·9	32	2·5	5·1	31	38·0	1·36	9	133	− 700
− 600	23·5	35·8	135	2·0	86·8	55	5·5	38·9	11	1·0	10·4	31	6·0	47·8	30	37·0	3·21	9	28	− 600
− 500	21·0	19·4	130	2·0	109·3	53	6·5	90·4	10	6·5	95·7	29	3·0	43·7	29	36·0	5·07	9	86	− 500
− 400	18·5	2·5	125	2·0	132·0	51	0·5	113·0	10	3·0	39·9	28	0·0	39·7	28	35·0	6·93	9	140	− 400
− 300	15·5	137·0	120	2·0	155·0	49	1·5	164·6	10	8·5	125·0	27	4·0	14·7	27	34·0	8·79	9	40	− 300
− 200	13·0	119·1	115	2·0	178·1	47	3·0	37·3	9	5·0	68·9	26	1·0	10·9	25	33·0	10·64	9	94	− 200
− 100	10·5	100·6	109	2·5	12·4	45	4·0	89·0	9	1·5	12·8	25	4·5	54·3	24	32·0	12·50	10	152	− 100
0	8·0	81·6	104	2·5	36·0	43	5·0	140·7	8	7·0	97·5	24	1·5	50·7	23	31·0	14·37	11	47	0
+ 100	5·5	62·1	99	2·5	59·8	40	6·5	13·5	8	3·5	41·1	22	5·5	26·3	22	30·0	16·25	12	105	+ 100
200	3·0	42·1	93	2·5	83·8	38	0·5	36·3	7	9·0	125·6	21	2·5	22·9	21	29·0	18·13	13	4	200
300	0·5	21·5	88	2·5	108·0	36	1·5	88·2	7	5·5	69·0	20	6·0	66·7	20	28·0	20·03	14	58	300
400	24·5	115·3	83	2·5	132·5	34	2·5	140·1	7	2·0	12·2	19	3·0	63·7	18	27·0	21·94	15	116	400
500	22·0	93·7	77	2·5	157·2	32	4·0	13·1	6	7·5	96·3	18	0·0	60·7	17	26·0	23·87	16	10	500
600	19·5	71·5	72	2·5	182·1	29	5·0	65·1	6	4·0	39·3	16	4·0	36·8	16	25·5	0·80	16	68	600
700	17·0	48·8	67	3·0	18·2	27	6·0	117·1	5	0·0	115·2	15	1·0	34·1	15	24·5	2·73	16	122	700
800	14·5	25·5	61	3·0	43·5	25	0·0	140·2	5	6·0	66·0	14	5·0	10·5	14	23·5	4·66	16	21	800
900	12·0	1·7	56	3·0	69·0	23	1·5	13·3	4	2·5	8·6	13	2·0	8·0	12	22·5	6·59	15	75	900
1000	9·0	129·3	50	3·0	94·8	21	2·5	65·5	4	8·0	92·1	11	5·5	52·7	11	21·5	8·51	13	133	1000
1100	6·5	104·4	45	3·0	120·8	18	3·5	117·7	4	4·5	34·5	10	2·5	50·4	10	20·5	10·41	11	32	1100
1200	4·0	78·9	39	3·0	147·0	16	4·5	170·0	3	0·5	109·7	9	6·5	27·3	9	19·5	12·29	9	85	1200
1300	1·5	52·9	34	3·0	173·5	14	6·0	43·3	3	6·5	59·9	8	3·5	25·3	7	18·5	14·16	7	143	1300
1400	25·5	141·3	28	3·5	11·2	11	0·0	66·6	2	3·0	1·9	6	0·5	23·5	6	17·5	16·00	5	38	1400
1500	23·0	114·2	+ 23	3·5	38·1	− 9	1·0	119·0	− 2	8·5	84·8	+ 5	4·5	0·7	− 5	16·5	17·83	+ 4	95	1500
Gregorian																				Gregorian
1500	13·0	114·2	+ 23	2·5	79·1	− 9	5·0	177·0	− 2	8·0	92·8	+ 5	1·0	47·7	− 5	6·5	17·83	+ 4	91	1500
1600	10·5	86·5	17	2·5	106·2	7	6·5	50·4	1	4·5	34·5	4	5·0	25·1	4	5·5	19·64	3	149	1600
1700	7·0	58·2	11	1·5	133·6	5	6·5	102·9	− 1	9·0	117·1	3	1·0	23·6	3	3·5	21·44	2	44	1700
1800	3·5	29·4	+ 6	0·5	161·2	− 2	6·5	155·4	0	4·5	58·6	+ 1	4·0	1·2	− 1	1·5	23·22	+ 1	101	1800
1900	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	0·00	0	0	1900
2000	24·0	85·0	− 6	0·0	28·1	+ 2	1·0	52·6	0	5·5	82·2	− 1	3·5	45·9	+ 1	364·0	14·77	− 1	54	2000
2100	20·5	54·5	11	8·0	97·4	5	1·0	105·3	+ 1	1·0	23·3	3	6·5	23·9	3	362·0	16·53	1	111	2100
2200	17·0	23·4	17	7·0	125·9	7	1·0	158·0	1	5·5	105·3	4	2·5	23·0	4	360·0	18·29	2	6	2200
2300	13·0	143·8	23	6·0	154·6	9	1·5	31·7	2	1·0	46·2	5	5·5	1·3	5	358·0	20·04	3	63	2300
2400	10·5	111·5	29	6·0	183·6	12	2·5	84·5	2	6·5	127·9	6	2·5	0·7	6	357·0	21·78	5	117	2400
2500	7·0	78·7	34	5·5	23·8	14	2·5	137·3	3	2·0	68·5	8	5·0	47·2	8	355·0	23·51	7	15	2500
2600	3·5	45·3	40	4·5	53·3	16	3·0	11·2	3	7·0	17·0	9	1·0	46·9	9	353·5	0·21	9	69	2600
2700	0·0	11·3	46	3·5	83·0	19	3·0	64·1	4	2·0	90·3	10	4·0	25·6	10	351·5	1·89	12	126	2700
2800	24·0	91·8	52	3·5	113·0	21	4·0	117·1	4	8·0	38·5	12	1·0	25·6	12	350·5	3·54	15	20	2800
2900	20·5	56·6	− 58	2·5	143·2	+24	4·0	170·1	+ 5	3·0	111·6	−13	4·0	4·6	+13	348·5	5·16	−18	78	2900

TABLE 2 (*cont.*). Additions to the Arguments for the Centuries of the Julian and Gregorian Calendars.

Arg.	49	50	51 (a)			52		53 (a)			54 (a)			55 (a)			56 (a)			57 (a)			Arg.
Julian	d	c	d	c		d	c	d	c		d	c		d	c		d	c		d	c		Julian
− 2000	9·98	63	10·0	2	− 2	21·0	1	22·0	2·0	− 19	26·5	15·2	− 20	24·5	12·59	− 583	1·0	20·7	− 22	2·0	28·8	+ 40	− 2000
− 1900	11·10	13	8·0	5	2	5·5	0	3·5	9·7	19	11·0	8·6	19	7·5	48·75	570	2·5	77·7	22	12·0	61·7	39	− 1900
− 1800	12·22	64	6·0	8	2	12·0	1	20·5	10·4	18	25·0	17·0	19	23·0	28·04	556	4·5	54·8	21	6·0	89·6	38	− 1800
− 1700	13·35	15	4·0	12	2	18·5	2	2·0	18·1	18	9·5	10·5	18	6·0	64·48	543	6·5	31·9	21	0·5	5·3	37	− 1700
− 1600	0·84	15	2·0	15	2	3·0	0	19·0	18·9	17	23·5	19·0	18	21·5	44·04	530	8·5	9·1	20	10·5	38·0	36	− 1600
− 1500	1·97	67	0·5	0	2	9·5	1	0·5	26·7	17	8·0	12·6	17	4·5	80·73	517	0·0	45·3	20	4·5	65·6	35	− 1500
− 1400	3·09	17	11·0	13	2	16·0	2	17·5	27·6	16	22·0	21·2	17	20·0	60·56	504	2·0	22·6	19	14·5	98·0	34	− 1400
− 1300	4·21	69	9·0	17	2	0·5	1	34·5	28·5	16	6·5	14·9	16	3·0	97·51	491	4·0	0·0	19	9·0	13·4	33	− 1300
− 1200	5·34	19	7·5	1	2	7·0	2	16·0	36·5	16	20·5	23·6	16	18·5	77·60	477	5·5	57·4	18	3·0	40·7	32	− 1200
− 1100	6·46	70	5·5	5	2	14·0	0	33·0	37·5	15	5·0	17·4	15	1·5	114·82	463	7·5	34·8	17	13·0	72·9	31	− 1100
− 1000	7·59	21	3·5	9	2	20·5	1	15·0	6·5	15	19·0	26·2	15	17·0	95·19	448	9·5	12·3	17	7·0	100·0	30	− 1000
− 900	8·71	72	1·5	13	2	5·0	0	32·0	7·6	14	3·5	20·1	14	0·5	2·70	433	1·0	48·9	16	1·5	14·9	29	− 900
− 800	9·84	23	12·5	7	1	11·5	1	13·5	15·7	14	17·5	29·0	14	15·5	113·37	418	3·0	26·5	16	11·5	46·8	28	− 800
− 700	10·96	74	10·5	11	1	18·0	2	30·5	16·9	13	2·0	23·0	13	31·0	94·18	402	5·0	4·2	15	5·5	73·6	27	− 700
− 600	12·09	25	8·5	15	1	2·5	1	12·0	25·1	13	16·0	32·0	13	14·5	2·15	386	6·5	61·9	15	15·5	105·3	26	− 600
− 500	13·21	76	7·0	0	1	9·0	1	29·0	26·4	12	0·5	26·1	12	29·5	113·28	370	8·5	39·7	14	10·0	19·9	25	− 500
− 400	0·71	76	5·0	4	1	15·5	2	10·5	34·7	12	14·5	35·2	12	13·0	21·57	355	0·0	76·6	14	4·0	46·4	24	− 400
− 300	1·83	27	3·0	8	1	0·0	1	27·5	36·1	11	28·5	44·4	11	28·5	3·02	340	2·0	54·5	13	14·0	77·7	23	− 300
− 200	2·96	79	1·0	13	1	6·5	2	9·5	5·5	11	13·0	38·6	11	11·5	41·62	325	4·0	32·4	12	8·0	104·0	22	− 200
− 100	4·08	29	12·0	8	1	13·5	0	26·5	7·0	10	27·5	0·9	10	27·0	23·37	310	6·0	10·4	12	2·5	18·2	21	− 100
0	5·21	81	10·0	12	1	20·0	1	8·0	15·5	10	11·5	42·2	10	10·0	62·27	295	7·5	68·5	11	12·5	49·3	20	0
+ 100	6·34	31	8·0	16	1	4·5	0	25·0	17·1	9	26·0	4·6	9	25·5	44·31	280	9·5	46·6	11	6·5	75·3	19	+ 100
200	7·46	83	6·5	2	1	11·0	1	6·5	25·7	9	10·0	46·0	9	8·5	83·50	266	1·5	3·8	10	0·5	101·2	18	200
300	8·59	33	4·5	6	1	17·5	2	23·5	27·4	8	24·5	8·5	8	24·0	65·83	252	3·0	62·1	10	11·0	19·9	17	300
400	9·71	85	2·5	11	1	2·0	1	5·0	36·1	8	9·0	3·0	8	7·0	105·30	238	5·0	40·4	9	5·0	45·6	16	400
500	10·84	36	0·5	15	1	8·5	2	22·0	37·9	7	23·0	12·6	7	22·5	87·91	224	7·0	18·7	8	15·0	76·2	15	500
600	11·97	87	11·5	11	1	15·5	0	4·0	7·7	7	7·5	7·2	7	5·5	127·66	209	8·5	77·1	8	9·0	101·6	14	600
700	13·10	38	9·5	15	1	22·0	1	21·0	9·5	6	21·5	16·9	6	21·0	110·56	194	0·5	34·6	7	3·5	15·0	13	700
800	0·59	38	8·0	1	1	6·5	0	2·5	18·4	6	6·0	11·6	6	4·5	20·62	178	2·5	13·2	7	13·5	45·2	12	800
900	1·72	90	6·0	6	− 1	13·0	1	19·5	20·4	5	20·0	21·4	5	20·0	3·83	162	4·0	71·8	6	7·5	70·4	11	900
1000	2·85	40	4·0	10	0	19·5	2	1·0	29·4	5	4·5	16·2	5	3·0	44·20	146	6·0	50·4	5	1·5	95·4	10	1000
1100	3·97	92	2·0	15	0	4·0	1	18·0	31·5	4	18·5	26·1	4	18·5	27·74	129	8·0	29·1	5	12·0	13·4	9	1100
1200	5·10	43	0·5	1	0	10·5	2	0·0	1·6	4	3·0	21·0	4	1·5	68·44	112	10·0	7·9	4	6·0	38·2	8	1200
1300	6·23	94	11·0	16	0	17·5	1	17·0	3·8	3	17·0	31·0	3	17·0	52·31	95	1·5	45·7	4	0·0	62·9	6	1300
1400	7·36	45	9·5	2	0	2·0	0	34·0	6·0	3	1·5	26·1	3	0·0	93·35	78	3·5	24·6	3	10·0	92·5	5	1400
1500	8·49	96	7·5	7	0	8·5	1	15·5	15·3	− 2	15·5	36·2	− 2	15·5	77·56	− 62	5·5	3·6	− 2	4·5	5·0	+ 4	1500
Gregorian																							Gregorian
1500	12·12	46	10·0	17	0	21·0	0	5·5	15·3	− 2	5·5	36·2	− 2	5·5	77·56	− 62	5·5	24·6	− 2	10·5	10·0	+ 4	1500
1600	13·25	98	8·5	3	0	5·0	2	22·5	17·7	2	19·5	46·3	2	21·0	61·93	46	7·5	3·6	2	4·5	34·4	3	1600
1700	13·38	49	5·5	8	0	11·0	0	3·0	27·1	1	3·0	41·5	1	3·0	103·46	30	8·0	62·7	1	13·5	63·7	2	1700
1800	13·50	100	2·5	14	0	16·5	1	19·0	29·5	− 1	16·5	4·7	− 1	17·5	88·15	− 15	9·0	41·8	− 1	6·5	87·9	+ 1	1800
1900	0·00	0	0·0	0	0	0·0	0	0·0	0·0	0	0·0	0·0	0	0·0	0·00	0	0·0	0·0	0	0·0	0·0	0	1900
2000	1·13	52	10·5	15	0	6·5	1	17·0	2·6	+ 1	14·0	10·3	+ 1	15·0	115·00	+ 15	1·5	59·3	+ 1	10·0	29·0	− 1	2000
2100	1·26	2	8·0	2	0	12·0	2	33·0	5·2	1	27·0	20·7	1	29·5	100·15	30	2·5	38·6	1	3·0	52·8	2	2100
2200	1·39	54	5·0	7	0	18·0	0	13·5	14·9	2	10·5	16·2	2	12·0	12·45	46	3·5	18·0	2	12·0	81·6	3	2200
2300	1·52	5	2·0	13	0	1·0	2	29·5	17·6	2	23·5	26·7	2	26·0	127·90	61	4·0	77·4	2	5·0	105·2	4	2300
2400	2·65	56	0·0	18	0	8·0	1	11·0	27·4	3	8·0	22·2	3	9·5	40·50	77	6·0	56·9	3	15·5	21·7	6	2400
2500	2·78	7	10·0	15	0	13·5	2	27·0	30·2	3	21·0	32·8	3	24·0	26·27	93	7·0	36·5	4	8·5	45·1	7	2500
2600	2·91	59	7·5	2	0	19·5	0	8·0	1·1	4	4·5	28·5	4	6·0	69·20	110	8·0	16·1	4	1·5	68·4	8	2600
2700	3·04	9	4·5	7	0	2·5	2	24·0	4·0	5	17·5	39·2	4	20·5	55·30	127	8·5	75·8	5	10·5	96·6	9	2700
2800	4·17	61	2·5	13	+ 1	9·5	0	5·5	14·0	5	2·0	34·9	5	3·5	98·56	145	0·5	34·6	6	5·0	7·7	10	2800
2900	4·30	12	0·0	0	+ 1	15·0	1	21·5	17·1	+ 6	15·0	45·7	+ 5	18·0	85·01	+ 162	1·5	14·4	+ 6	14·0	35·7	− 11	2900

TABLE 2 (*cont.*). Additions to the Arguments for the Centuries of the Julian and Gregorian Calendars.

Arg.	58	(*a*)	59		(*a*)	60		(*a*)	61		(*a*)	62		(*a*)	63	64	65	66	Arg.
Julian	*d*		*d*	*c*		*d*	*c*		*d*	*c*		*d*	*c*		*d*	*c*	*d*	*c*	Julian
−2000	1340·4	+55	41·0	0·56	−337	10·5	166·6	−162	10·0	24·8	−147	6·5	177	−22	6·61	26	20·8	22	−2000
−1900	634·9	53	54·5	1·54	329	11·0	135·9	158	6·5	17·1	144	2·5	144	22	1·83	16	5·2	3	−1900
−1800	2119·9	52	68·0	2·59	321	11·5	105·6	154	3·0	9·7	140	8·0	176	21	29·18	0	15·7	27	−1800
−1700	1414·2	51	81·5	3·73	313	12·0	75·7	150	27·0	45·7	137	4·0	144	21	24·40	26	0·1	8	−1700
−1600	708·4	49	95·0	4·94	304	12·5	46·2	146	23·5	39·0	133	0·0	113	20	19·62	16	10·6	32	−1600
−1500	2·4	48	109·0	1·24	296	13·0	17·1	143	20·0	32·7	130	5·5	147	20	14·84	6	21·1	11	−1500
−1400	1486·8	47	122·5	2·62	288	13·0	159·3	139	16·5	26·8	126	1·5	117	19	10·06	32	5·5	37	−1400
−1300	780·6	46	136·0	4·08	280	13·5	131·0	135	13·0	21·2	123	7·0	152	19	5·28	22	16·0	16	−1300
−1200	74·2	44	150·0	0·62	272	14·0	103·0	131	9·5	15·9	119	3·0	123	18	0·50	12	0·5	42	−1200
−1100	1558·2	43	163·5	2·24	263	14·5	75·5	127	6·0	11·0	115	8·5	159	18	27·85	32	11·0	21	−1100
−1000	851·6	42	177·0	3·95	255	0·0	94·3	123	2·5	6·5	112	4·5	131	17	23·07	22	21·5	0	−1000
− 900	144·9	40	2·5	3·75	247	0·5	67·6	119	26·5	45·4	108	0·5	104	16	18·29	13	5·9	26	− 900
− 800	1628·5	39	16·5	0·62	239	1·0	41·2	115	23·0	41·6	104	6·0	141	16	13·52	3	16·4	5	− 800
− 700	921·4	37	30·0	2·58	230	1·5	15·2	110	19·5	38·2	101	2·0	115	15	8·74	28	0·8	31	− 700
− 600	214·3	36	43·5	4·62	222	1·5	160·7	106	16·0	35·1	97	7·5	154	15	3·96	19	11·3	10	− 600
− 500	1697·5	35	57·5	1·75	213	2·0	135·6	102	12·5	32·4	93	3·5	129	14	31·31	3	21·8	34	− 500
− 400	990·0	33	71·0	3·96	205	2·5	110·8	98	9·0	30·1	90	9·0	169	14	26·53	29	6·2	15	− 400
− 300	282·4	32	85·0	1·26	196	3·0	86·5	94	5·5	28·2	86	5·0	145	13	21·75	19	16·7	39	− 300
− 200	1765·2	31	98·5	3·64	188	3·5	62·6	90	2·0	26·7	82	1·0	122	12	16·97	9	1·1	20	− 200
− 100	1057·4	29	112·5	1·11	179	4·0	39·1	86	26·5	15·5	78	6·5	163	12	12·19	0	11·6	44	− 100
0	349·4	28	126·0	3·67	170	4·5	16·0	82	23·0	14·7	75	2·5	141	11	7·41	25	22·1	23	0
+ 100	1831·7	26	140·0	1·31	162	4·5	164·3	78	19·5	14·3	71	8·0	184	11	2·63	15	6·6	4	+ 100
200	1123·4	25	153·5	4·04	153	5·0	142·0	73	16·0	14·3	67	4·0	163	10	29·98	0	17·1	28	200
300	415·0	23	167·5	1·85	144	5·5	120·2	69	12·5	14·6	63	0·0	142	10	25·20	25	1·5	9	300
400	1896·9	22	181·0	4·75	135	6·0	98·8	65	9·0	15·3	59	5·5	186	9	20·43	16	12·0	33	400
500	1188·2	20	7·0	0·74	126	6·5	77·8	61	5·5	16·4	55	1·5	167	8	15·65	6	22·5	12	500
600	479·4	19	20·5	3·82	118	7·0	57·2	56	2·0	17·9	52	7·5	8	8	10·87	32	6·9	38	600
700	1960·9	18	34·5	1·99	109	7·5	37·1	52	26·5	9·7	48	3·0	195	7	6·09	22	17·4	17	700
800	1251·8	16	48·5	0·24	100	8·0	17·4	48	23·0	12·0	44	9·0	36	7	1·31	12	1·8	43	800
900	542·5	15	62·0	3·59	91	8·0	169·1	44	19·5	14·7	40	5·0	20	6	28·66	32	12·3	22	900
1000	2023·6	13	76·0	2·02	82	8·5	150·2	39	16·0	17·7	36	1·0	4	5	23·88	22	22·8	1	1000
1100	1314·0	12	90·0	0·55	73	9·0	131·8	35	12·5	21·2	32	6·5	52	5	19·10	13	7·2	27	1100
1200	604·2	10	103·5	4·16	64	9·5	113·8	31	9·0	25·0	28	2·5	37	4	14·32	3	17·7	6	1200
1300	2084·8	9	117·5	2·86	55	10·0	96·2	26	5·5	29·2	24	8·0	87	4	9·54	28	2·2	32	1300
1400	1374·8	7	131·5	1·66	46	10·5	79·1	22	2·0	33·8	20	4·0	73	3	4·77	19	12·7	11	1400
1500	664·7	+ 6	145·5	0·54	− 37	11·0	62·4	− 18	26·5	28·9	− 16	0·0	60	− 2	32·12	3	23·2	35	1500
Gregorian																			Gregorian
1500	654·7	+ 6	135·5	0·54	− 37	1·0	62·4	− 18	16·5	28·9	− 16	9·0	188	− 2	22·12	3	13·2	35	1500
1600	2134·9	4	149·0	4·52	28	1·5	46·1	13	13·0	34·3	12	5·0	175	2	17·34	29	23·7	14	1600
1700	1423·4	3	162·0	3·59	18	1·0	30·3	9	8·5	40·1	8	0·0	163	1	11·56	19	7·1	40	1700
1800	711·8	+ 1	175·0	2·75	− 9	0·5	14·9	− 4	4·0	46·4	− 4	5·0	11	− 1	5·78	10	16·6	19	1800
1900	0·0	0	0·0	0·00	0	0·0	0·0	0	0·0	0·0	0	0·0	0	0	0·00	0	0·0	0	1900
2000	1479·6	− 2	13·5	4·34	+ 9	0·0	156·5	+ 5	24·0	50·0	+ 4	5·5	54	+ 1	27·35	20	10·5	24	2000
2100	767·5	3	26·5	3·78	19	14·5	96·5	9	20·0	4·5	8	0·5	44	1	21·57	10	20·0	3	2100
2200	55·3	5	39·5	3·31	28	14·0	82·9	14	15·5	12·4	12	5·0	99	2	15·79	0	3·4	29	2200
2300	1533·4	6	52·5	2·94	37	13·5	69·8	18	11·0	20·6	16	0·0	91	2	10·01	26	12·9	8	2300
2400	821·9	8	66·5	2·66	47	14·0	57·1	22	7·5	29·3	20	5·5	148	3	5·23	16	23·4	32	2400
2500	109·2	9	79·5	2·47	56	13·5	44·8	27	3·0	38·4	25	0·5	141	4	31·58	1	6·8	13	2500
2600	1586·9	11	92·5	2·38	66	13·0	33·0	32	26·5	37·9	29	5·0	198	4	25·80	26	16·4	37	2600
2700	873·9	12	105·5	2·38	75	12·5	21·7	37	22·0	47·8	33	0·0	192	5	20·03	17	25·9	16	2700
2800	161·7	14	119·5	2·47	85	13·0	10·9	41	19·0	5·2	37	6·0	46	6	15·25	7	10·3	42	2800
2900	1638·9	−15	132·5	2·67	+ 94	12·5	0·5	+ 45	14·5	16·0	+ 41	1·0	42	+ 6	9·47	32	19·8	21	2900

TABLE 2 (*cont.*). Additions to the Arguments for the Centuries of the Julian and Gregorian Calendars.

Arg.	67	68	69	70	71		(a)	72		(a)	73		(a)	74		(a)	75		Arg.
Julian	d	c	d	c	d	c		d	c		d	c		d	c		d	c	Julian
−2000	17·6	21	8·8	21	26·5	204·88	−3017	11·5	75·30	+1254	3·0	93·5	−169	3·0	38·4	−15	10·0	1	−2000
−1900	4·0	3	12·5	2	14·5	28·18	2946	16·5	64·64	1225	5·5	69·2	165	14·0	23·8	14	8·0	4	−1900
−1800	18·1	25	16·2	25	2·0	72·19	2874	21·5	53·69	1195	8·0	45·4	161	9·5	25·3	14	6·0	7	−1800
−1700	4·5	7	19·8	6	17·0	140·92	2802	26·5	42·44	1164	0·5	235·9	157	5·0	26·8	14	4·0	9	−1700
−1600	18·5	29	23·5	29	4·5	186·37	2729	31·5	30·88	1133	3·0	212·8	153	0·5	28·3	13	2·0	12	−1600
−1500	5·0	11	27·1	10	20·0	36·55	2656	4·5	60·01	1102	5·5	190·2	149	11·5	13·9	13	0·5	0	−1500
−1400	19·0	34	3·1	35	7·5	83·46	2583	9·5	47·84	1071	8·0	167·9	145	7·0	15·5	13	11·0	10	−1400
−1300	5·5	16	6·8	16	22·5	155·09	2510	14·5	35·35	1040	1·0	83·0	141	2·5	17·1	12	9·0	13	−1300
−1200	19·5	38	10·4	38	10·0	203·46	2436	19·5	22·55	1009	3·5	61·6	136	13·5	2·8	12	7·5	1	−1200
−1100	5·9	20	14·1	19	25·5	56·56	2362	24·5	9·44	978	6·0	40·5	132	9·0	4·5	12	5·5	4	−1100
−1000	20·0	0	17·7	0	13·0	106·41	2288	29·0	105·01	947	8·5	19·9	128	4·5	6·3	11	3·5	7	−1000
− 900	6·4	24	21·4	23	0·5	157·00	2213	2·5	23·28	916	1·0	213·7	124	0·0	8·0	11	1·5	10	− 900
− 800	20·4	4	25·0	4	16·0	12·34	2138	7·5	9·25	885	3·5	193·9	120	10·5	64·8	11	12·5	6	− 800
− 700	6·9	28	1·0	29	3·5	64·44	2062	12·0	103·90	855	6·0	174·5	115	6·0	66·7	10	10·5	9	− 700
− 600	20·9	9	4·7	10	18·5	141·29	1986	17·0	89·25	824	8·5	155·5	111	1·5	68·6	10	8·5	12	− 600
− 500	7·3	33	8·3	33	6·0	194·90	1910	22·0	74·30	793	1·5	74·0	107	12·5	54·5	9	7·0	0	− 500
− 400	21·4	13	12·0	14	21·5	53·27	1833	27·0	59·03	762	4·0	56·0	102	8·0	56·4	9	5·0	3	− 400
− 300	7·8	37	15·6	36	9·0	108·40	1757	0·0	84·46	731	6·5	38·3	98	3·5	58·4	9	3·0	7	− 300
− 200	21·8	17	19·3	17	24·0	188·31	1680	5·0	68·57	700	9·0	21·1	94	14·5	44·4	8	1·0	10	− 200
− 100	8·3	41	22·9	40	12·0	24·98	1603	10·0	52·37	668	1·5	218·3	90	10·0	46·5	8	12·0	6	− 100
0	22·3	21	26·6	21	27·0	106·42	1526	15·0	35·84	635	4·0	202·0	85	5·5	48·6	8	10·0	9	0
+ 100	8·8	4	2·6	4	14·5	164·63	1448	20·0	18·99	602	6·5	186·1	81	1·0	50·8	7	8·0	13	+ 100
200	22·8	26	6·2	27	2·5	3·62	1370	25·0	1·81	569	9·0	170·6	77	12·0	36·9	7	6·5	1	200
300	9·2	8	9·9	8	17·5	87·39	1292	29·5	93·30	536	2·0	92·5	72	7·5	39·1	6	4·5	5	300
400	23·2	30	13·5	31	5·0	147·93	1214	3·0	7·45	503	4·5	77·9	68	3·0	41·4	6	2·5	8	400
500	9·7	12	17·2	12	20·5	13·26	1136	7·5	98·28	470	7·0	63·7	64	14·0	27·7	6	0·5	12	500
600	23·7	34	20·8	34	8·0	75·37	1057	12·5	79·77	436	9·5	49·9	59	9·5	30·0	5	11·5	8	600
700	10·2	16	24·5	15	23·0	162·27	978	17·5	60·92	403	2·0	250·6	55	5·0	32·4	5	9·5	12	700
800	24·2	39	0·5	40	11·0	5·97	898	22·5	41·75	370	4·5	237·7	50	0·5	34·8	5	8·0	1	800
900	10·6	21	4·1	21	26·0	94·46	818	27·5	22·24	337	7·0	225·2	46	11·5	21·3	4	6·0	4	900
1000	24·7	1	7·8	2	13·5	159·75	737	0·5	43·41	304	0·0	150·2	41	7·0	23·8	4	4·0	8	1000
1100	11·1	25	11·4	25	1·5	5·85	656	5·5	23·25	271	2·5	138·7	37	2·5	26·3	3	2·0	12	1100
1200	25·1	5	15·1	6	16·5	96·76	575	10·5	2·76	238	5·0	127·6	32	13·5	12·9	3	0·5	1	1200
1300	11·6	29	18·8	29	4·0	164·49	494	15·0	90·94	205	7·5	117·0	28	9·0	15·5	3	11·0	13	1300
1400	25·6	9	22·4	10	19·5	37·02	412	20·0	69·80	172	0·5	43·8	23	4·5	18·1	2	9·5	2	1400
1500	12·1	33	26·1	32	7·0	106·38	− 330	25·0	48·32	+ 138	3·0	34·2	− 18	0·0	20·8	− 2	7·5	6	1500
Gregorian																			Gregorian
1500	2·1	33	16·1	32	24·5	130·38	− 330	15·0	48·32	+ 138	2·5	97·2	− 18	5·5	4·8	− 2	10·0	14	1500
1600	16·1	14	19·7	13	12·0	200·55	248	20·0	26·50	104	5·0	87·9	14	1·0	7·5	1	8·5	3	1600
1700	1·5	38	22·4	36	26·5	75·54	165	24·0	4·35	70	6·5	79·2	9	10·5	65·3	− 1	5·5	7	1700
1800	14·6	18	25·0	17	13·0	147·36	− 83	27·5	90·85	+ 35	8·0	70·9	− 5	5·0	68·1	0	2·5	11	1800
1900	0·0	0	0·0	0	0·0	0·00	0	0·0	0·00	0	0·0	0·0	0	0·0	0·0	0	0·0	0	1900
2000	14·0	22	3·7	23	15·0	97·47	+ 83	4·5	85·80	− 35	2·0	269·6	+ 5	10·5	57·8	0	10·5	12	2000
2100	27·0	2	6·3	4	1·5	171·76	166	8·5	62·25	71	3·5	262·7	9	5·0	60·8	+ 1	8·0	1	2100
2200	12·5	26	9·0	27	16·0	50·89	249	12·5	38·34	106	5·0	256·2	14	15·0	47·8	1	5·0	6	2200
2300	25·5	7	11·6	8	2·5	126·85	333	16·5	14·08	142	6·5	250·2	18	9·5	50·9	2	2·0	10	2300
2400	12·0	31	15·3	30	18·0	7·64	417	21·0	98·47	177	9·0	244·6	23	5·0	54·0	2	0·0	14	2400
2500	25·0	11	18·0	11	4·5	85·28	502	25·0	73·50	213	1·0	176·5	28	15·0	41·1	3	10·0	12	2500
2600	10·4	35	20·6	34	18·5	187·77	587	29·0	48·17	248	2·5	171·9	33	9·5	44·2	3	7·5	1	2600
2700	23·5	15	23·3	15	5·5	47·11	672	1·0	63·49	283	4·0	167·8	37	4·0	47·4	3	4·5	6	2700
2800	9·9	39	26·9	38	20·5	151·30	758	6·0	37·47	318	6·5	164·1	42	15·0	34·7	4	2·5	10	2800
2900	22·9	19	1·9	21	7·5	12·35	+ 844	10·0	11·09	− 353	8·0	160·9	+ 47	9·5	38·0	+ 4	12·5	8	2900

Table 2 (*cont.*). Additions to the Arguments for the Centuries of the Julian and Gregorian Calendars.

Arg.	76			77			78	l'	79	80	81	82	(a)	83	(a)	84	(a)	Arg.
Julian	d	c		d	c		d	d	c	c	c	d		d		d		Julian
−2000	2·0	23·2	−47	7·0	38·3	+15	114·0	+50·60	31·95	55·10	40·34	3138	+3	2932	+8	2948	+8	−2000
−1900	0·5	36·6	46	5·5	51·4	14	84·0	49·64	72·31	23·76	28·07	5674	3	5475	8	5491	8	−1900
−1800	6·5	6·1	45	4·0	64·3	14	54·5	48·67	39·67	65·44	15·81	1411	3	1219	8	1234	7	−1800
−1700	5·0	19·6	44	3·0	12·3	14	25·0	47·71	7·03	34·12	3·54	3948	3	3762	7	3776	7	−1700
−1600	3·5	33·3	43	1·5	25·2	13	112·5	46·74	47·39	2·78	64·28	6484	3	6305	7	6319	7	−1600
−1500	2·0	47·1	42	0·0	38·1	13	83·0	45·78	14·75	44·41	52·01	2220	3	2048	7	2061	7	−1500
−1400	1·0	2·0	41	8·5	62·0	13	53·5	44·82	55·11	13·02	39·75	4757	2	4591	7	4604	7	−1400
−1300	6·5	31·1	40	7·5	9·8	12	23·5	43·85	22·47	54·62	27·48	493	2	334	7	346	7	−1300
−1200	5·0	45·2	38	6·0	22·5	12	111·5	42·89	62·83	23·22	15·22	3029	2	2876	7	2888	7	−1200
−1100	4·0	0·5	37	4·5	35·3	12	82·0	41·92	30·19	64·84	2·95	5565	2	5419	7	5430	7	−1100
−1000	2·5	14·9	36	3·0	48·0	11	52·0	40·96	70·55	33·48	63·69	1301	2	1161	7	1172	7	−1000
− 900	1·0	29·4	35	1·5	60·7	11	22·5	40·00	37·91	2·16	51·42	3837	2	3703	7	3714	6	− 900
− 800	7·0	0·0	34	0·5	8·3	10	110·5	39·03	5·27	43·84	39·16	6373	2	6246	7	6256	6	− 800
− 700	5·5	14·7	32	9·0	31·9	10	80·5	38·07	45·63	12·51	26·89	2109	2	1988	6	1997	6	− 700
− 600	4·0	29·6	31	7·5	44·4	10	51·0	37·10	12·99	54·16	14·63	4644	2	4530	6	4539	6	− 600
− 500	2·5	44·6	30	6·0	57·0	9	21·0	36·14	53·35	22·78	2·36	380	2	272	6	280	6	− 500
− 400	1·5	0·7	29	5·0	4·4	9	109·0	35·17	20·71	64·38	63·10	2915	2	2813	6	2822	6	− 400
− 300	0·0	15·9	28	3·5	16·9	9	79·5	34·21	61·07	32·97	50·83	5451	2	5355	6	5363	6	− 300
− 200	5·5	46·2	26	2·0	29·3	8	49·5	33·25	28·43	1·58	38·57	1186	2	1096	6	1104	5	− 200
− 100	4·5	2·7	25	0·5	41·7	8	20·0	32·28	68·79	43·22	26·30	3722	1	3637	5	3645	5	− 100
0	3·0	18·3	24	9·5	0·0	7	108·0	31·32	36·15	11·88	14·04	6257	1	6178	5	6185	5	0
+ 100	1·5	34·0	23	8·0	12·3	7	78·0	30·35	3·51	53·56	1·77	1992	1	1919	5	1926	5	+ 100
200	0·0	49·8	22	6·5	24·6	7	48·5	29·39	43·87	22·24	62·51	4527	1	4460	5	4466	5	200
300	6·0	21·7	20	5·0	36·8	6	18·5	28·43	11·23	63·90	50·24	262	1	200	5	206	4	300
400	4·5	37·8	19	3·5	49·0	6	106·5	27·46	51·59	32·53	37·98	2797	1	2740	4	2745	4	400
500	3·0	54·0	18	2·0	61·1	6	76·5	26·50	18·96	1·13	25·71	5332	1	5280	4	5285	4	500
600	2·0	11·3	17	1·0	8·2	5	47·0	25·53	59·32	42·72	13·45	1067	1	1020	4	1024	4	600
700	0·5	27·8	15	9·5	31·3	5	17·5	24·57	26·68	11·33	1·18	3602	1	3560	4	3564	4	700
800	6·5	0·3	14	8·0	43·3	4	105·0	23·60	67·04	52·95	61·92	6137	1	6099	3	6103	3	800
900	5·0	17·0	13	6·5	55·3	4	75·5	22·64	34·40	21·60	49·65	1871	1	1838	3	1841	3	900
1000	3·5	33·9	12	5·5	2·3	4	45·5	21·68	1·76	63·28	37·39	4406	1	4377	3	4380	3	1000
1100	2·0	50·8	10	4·0	14·2	3	16·0	20·71	42·12	31·96	25·12	140	+1	115	3	118	3	1100
1200	1·0	8·9	9	2·5	26·0	3	103·5	19·75	9·48	0·63	12·86	2675	0	2653	2	2656	2	1200
1300	6·5	41·1	8	1·0	37·9	2	74·0	18·78	49·84	42·27	0·59	5209	0	5191	2	5194	2	1300
1400	5·0	58·4	6	9·5	60·7	2	44·0	17·82	17·20	10·88	61·33	943	0	929	2	931	2	1400
1500	4·0	16·9	− 5	8·5	7·4	+ 2	14·5	+16·86	57·56	52·48	49·06	3477	0	3466	+2	3468	+1	1500
Gregorian																		Gregorian
1500	1·0	31·9	− 5	8·5	18·4	+ 2	4·5	+ 6·86	57·56	52·48	49·06	3467	0	3456	+2	3458	+1	1500
1600	7·0	5·5	4	7·0	30·1	1	92·0	5·89	24·92	21·08	36·80	6001	0	5994	1	5995	1	1600
1700	4·5	23·2	3	4·5	41·8	+ 1	61·5	3·93	65·28	62·69	24·53	1734	0	1729	+1	1730	+1	1700
1800	2·0	41·0	− 1	2·0	53·4	0	30·5	+ 1·96	32·64	31·33	12·27	4267	0	4265	0	4265	0	1800
1900	0·0	0·0	0	0·0	0·0	0	0·0	0·00	0·00	0·00	0·00	0	0	0	0	0	0	1900
2000	5·5	33·1	+ 1	8·5	22·5	0	88·0	− 0·96	40·36	41·68	60·73	2534	0	2535	0	2535	0	2000
2100	3·0	51·3	3	6·0	34·1	− 1	57·0	− 2·93	7·72	10·36	48·47	5066	0	5070	−1	5070	−1	2100
2200	1·0	10·7	4	3·5	45·5	1	26·5	− 4·89	48·08	52·01	36·20	799	0	804	1	804	1	2200
2300	5·5	44·2	5	1·0	57·0	2	113·0	− 6·86	15·44	20·63	23·94	3332	0	3338	1	3337	1	2300
2400	4·5	3·8	7	0·0	3·3	2	83·5	− 7·82	55·80	62·23	11·67	5865	0	5872	2	5871	2	2400
2500	2·0	22·6	8	7·5	25·7	2	52·5	− 9·78	23·16	30·83	72·41	1597	0	1605	2	1604	2	2500
2600	6·5	56·5	9	5·0	37·0	3	21·5	−11·75	63·52	72·43	60·14	4130	−1	4138	2	4136	2	2600
2700	4·5	16·6	11	2·5	48·2	3	108·5	−13·71	30·88	41·06	47·88	6662	1	6670	3	6669	2	2700
2800	3·0	35·7	12	1·0	59·5	4	78·5	−14·68	71·24	9·72	35·61	2395	1	2403	3	2402	2	2800
2900	0·5	55·0	+13	9·0	16·6	− 4	48·0	−16·64	38·60	51·40	23·35	4927	−1	4935	−3	4934	−2	2900

TABLE 2 (*concl.*). Additions to L, − ☊, ϖ for the Centuries of the Julian and Gregorian Calendars.

Longitudes	L (Units of 0″.01)	(a)	(b)	− ☊ (Units of 0″.1)	(a)	(b)	ϖ (Units of 1″)	(a)	(b)	Longitudes
Julian										Julian
−2000	167 13023	−52588	−73	598 0798	+5469	+9	194 972	+2694	+5	−2000
−1900	1275 02066	51315	73	1081 5301	5337	9	590 156	2630	5	−1900
−1800	1086 92382	50042	72	268 9673	5206	9	985 276	2566	5	−1800
−1700	898 83972	48767	71	752 3914	5074	9	84 331	2501	5	−1700
−1600	710 76838	47490	70	1235 8022	4942	8	479 322	2437	5	−1600
−1500	522 70983	46211	68	423 1999	4810	8	874 248	2372	5	−1500
−1400	334 66408	44928	65	906 5843	4677	8	1269 110	2307	4	−1400
−1300	146 63119	43640	62	93 9554	4544	8	367 906	2242	4	−1300
−1200	1254 61120	42346	59	577 3132	4410	7	762 637	2176	4	−1200
−1100	1066 60419	41045	56	1060 6575	4276	7	1157 302	2110	4	−1100
−1000	878 61022	39738	52	247 9883	4140	7	255 901	2044	4	−1000
− 900	690 62937	38423	49	731 3056	4004	6	650 433	1977	4	− 900
− 800	502 66170	37101	46	1214 6092	3867	6	1044 898	1910	3	− 800
− 700	314 70727	35773	43	401 8991	3730	5	143 296	1842	3	− 700
− 600	126 76615	34441	41	885 1751	3592	5	537 627	1775	3	− 600
− 500	1234 83837	33104	40	72 4374	3453	5	931 890	1707	3	− 500
− 400	1046 92397	31765	39	555 6858	3314	5	30 084	1638	3	− 400
− 300	859 02298	30424	38	1038 9202	3174	5	424 210	1570	3	− 300
− 200	671 13540	29082	38	226 1407	3035	5	818 268	1502	3	− 200
− 100	483 26124	27739	37	709 3473	2895	5	1212 257	1433	3	− 100
0	295 40052	26395	37	1192 5398	2755	4	310 177	1364	2	0
+ 100	107 55324	25050	36	379 7183	2615	4	704 028	1294	2	+ 100
200	1215 71942	23703	34	862 8828	2474	4	1097 810	1225	2	200
300	1027 89908	22353	32	50 0333	2334	4	195 522	1155	2	300
400	840 09228	20998	29	533 1696	2192	4	589 164	1085	2	400
500	652 29905	19637	26	1016 2917	2050	3	982 737	1015	2	500
600	464 51946	18269	22	203 3997	1908	3	80 239	945	2	600
700	276 75360	16894	18	686 4933	1764	3	473 670	874	2	700
800	89 00152	15511	14	1169 5725	1620	2	867 031	803	1	800
900	1197 26332	14120	10	356 6373	1475	2	1260 319	731	1	900
1000	1009 53906	12722	7	839 6876	1330	2	357 536	659	1	1000
1100	821 82881	11317	5	26 7233	1184	1	750 681	587	1	1100
1200	634 13263	9908	3	509 7444	1037	1	1143 754	514	1	1200
1300	446 45057	8495	2	992 7507	890	1	240 754	441	+1	1300
1400	258 78264	7081	1	179 7423	742	1	633 681	368	0	1400
1500	71 12886	− 5664	− 1	662 7192	+ 594	+1	1026 534	+ 295	0	1500
Gregorian										Gregorian
1500	892 77859	− 5664	− 1	660 8128	+ 594	+1	1022 524	+ 295	0	1500
1600	705 13898	4249	1	1143 7749	446	0	119 304	222	0	1600
1700	470 07849	2833	1	330 5314	297	0	511 610	148	0	1700
1800	235 03216	− 1417	− 1	813 2732	+ 149	0	903 842	+ 74	0	1800
1900	0	0	0	0	0	0	0	0	0	1900
2000	1108 41704	+ 1418	+ 2	482 9026	− 149	0	392 485	− 74	0	2000
2100	873 41325	2840	4	965 5996	299	0	784 494	149	0	2100
2200	638 42370	4265	7	152 2816	449	−1	1176 429	223	0	2200
2300	403 44843	5697	10	634 9486	599	1	272 289	299	0	2300
2400	215 92254	7136	14	1117 7912	751	1	664 475	374	−1	2400
2500	1276 97606	8583	18	304 4279	903	2	1056 184	450	1	2500
2600	1042 04408	10039	22	787 0494	1055	2	151 818	526	1	2600
2700	807 12671	11502	26	1269 6556	1209	2	543 375	602	1	2700
2800	619 65903	12974	29	456 4371	1363	3	935 256	679	1	2800
2900	384 77108	+14462	+32	939 0124	−1518	−3	30 660	− 756	−2	2900

Table 3. Values of the Arguments for the beginnings of the years 1900 to 1950.

Arg.	D	1	2	3	4	5	6	7	8	9	10	Arg.
Period	*d* 29·530588	*c* 141	*c* 156	*c* 116	*c* 124	*c* 128	*c* 132	*c* 100	*c* 50	*c* 42	*c* 80	Period
Addition for Period of D		*c* 11·400	*c* 23·80	*c* 1·06	*c* 27·81	*c* 8·01	*c* 30·81	*c* 9·00	*c* 14·80	*c* 5·64	*c* 20·10	Addition for Period of D
	d	*c*	*c*	*c*	*c*	*c*	*c*	*c*	*c*	*c*	*c*	
1900	14·2404	140·696	132·28	17·14	86·55	89·90	111·64	14·56	27·41	23·20	9·30	1900
1901	24·8733	136·491	105·87	29·86	48·28	58·02	85·36	22·54	5·00	6·88	10·49	1901
1902	5·9757	2·686	103·27	43·63	37·81	34·15	89·90	39·52	47·39	38·21	31·78	1902
1903	16·6086	139·481	76·86	56·35	123·53	2·27	63·62	47·50	24·99	21·89	32·97	1903
1904 *B*	28·2416	135·277	50·46	69·06	85·25	98·39	37·34	55·48	2·58	5·58	34·16	1904 *B*
1905	9·3439	1·471	47·86	82·84	74·78	74·53	41·87	72·45	44·97	36·90	55·45	1905
1906	19·9769	138·266	21·45	95·55	36·51	42·65	15·59	80·43	22·57	20·58	56·64	1906
1907	1·0792	4·461	18·85	109·33	26·04	18·78	20·12	97·41	14·96	9·91	77·93	1907
1908 *B*	12·7122	0·256	148·44	6·04	111·76	114·90	125·85	5·39	42·55	35·59	79·12	1908 *B*
1909	23·3451	137·052	122·04	18·76	73·48	83·02	99·57	13·37	20·15	19·27	0·31	1909
1910	4·4475	3·246	119·43	32·53	63·01	59·15	104·10	30·35	12·54	8·60	21·60	1910
1911	15·0804	140·042	93·03	45·25	24·74	27·28	77·82	38·33	40·13	34·28	22·79	1911
1912 *B*	26·7134	135·837	66·63	57·96	110·46	123·40	51·54	46·31	17·73	17·97	23·98	1912 *B*
1913	7·8157	2·031	64·02	71·74	99·99	99·53	56·07	63·28	10·12	7·29	45·27	1913
1914	18·4486	138·827	37·62	84·45	61·71	67·65	29·80	71·26	37·71	32·97	46·46	1914
1915	29·0816	134·622	11·21	97·17	23·44	35·77	3·52	79·24	15·31	16·66	47·65	1915
1916 *B*	11·1839	0·817	8·61	110·94	12·97	11·90	8·05	96·22	7·70	5·98	68·94	1916 *B*
1917	21·8169	137·612	138·20	7·66	98·69	108·02	113·77	4·20	35·29	31·66	70·13	1917
1918	2·9192	3·807	135·60	21·43	88·22	84·16	118·30	21·18	27·68	20·99	11·42	1918
1919	13·5522	140·602	109·20	34·15	49·94	52·28	92·02	29·16	5·28	4·67	12·61	1919
1920 *B*	25·1851	136·397	82·79	46·86	11·67	20·40	65·75	37·13	32·87	30·35	13·80	1920 *B*
1921	6·2875	2·592	80·19	60·64	1·20	124·53	70·28	54·11	25·26	19·68	35·09	1921
1922	16·9204	139·387	53·78	73·35	86·92	92·65	44·00	62·09	2·86	3·36	36·28	1922
1923	27·5534	135·182	27·38	86·07	48·64	60·77	17·72	70·07	30·45	29·05	37·47	1923
1924 *B*	9·6557	1·377	24·77	99·84	38·17	36·91	22·25	87·05	22·84	18·37	58·76	1924 *B*
1925	20·2887	138·172	154·37	112·56	123·90	5·03	127·97	95·03	0·44	2·05	59·95	1925
1926	1·3910	4·367	151·77	10·33	113·43	109·16	0·51	12·01	42·83	33·38	1·24	1926
1927	12·0240	0·162	125·36	23·05	75·15	77·28	106·23	19·98	20·43	17·06	2·43	1927
1928 *B*	23·6569	136·957	98·96	35·76	36·87	45·40	79·95	27·97	48·02	0·74	3·62	1928 *B*
1929	4·7593	3·152	96·35	49·54	26·40	21·53	84·48	44·94	40·41	32·07	24·91	1929
1930	15·3922	139·947	69·95	62·25	112·13	117·66	58·20	52·92	18·01	15·75	26·10	1930
1931	26·0251	135·742	43·54	74·97	73·85	85·78	31·92	60·90	45·60	41·44	27·29	1931
1932 *B*	8·1275	1·937	40·94	88·74	63·38	61·91	36·45	77·88	37·99	30·76	48·58	1932 *B*
1933	18·7604	138·732	14·54	101·46	25·10	30·03	10·18	85·86	15·59	14·44	49·77	1933
1934	29·3934	134·527	144·13	114·17	110·82	126·15	115·90	93·84	43·18	40·13	50·96	1934
1935	10·4957	0·722	141·53	11·95	100·36	102·28	120·43	10·81	35·57	29·45	72·25	1935
1936 *B*	22·1287	137·517	115·12	24·67	62·08	70·40	94·15	18·79	13·17	13·13	73·44	1936 *B*
1937	3·2310	3·712	112·52	38·44	51·61	46·54	98·68	35·77	5·56	2·46	14·73	1937
1938	13·8640	140·507	86·11	51·16	13·33	14·66	72·40	43·75	33·15	28·14	15·92	1938
1939	24·4969	136·302	59·71	63·87	99·06	110·78	46·13	51·73	10·75	11·83	17·11	1939
1940 *B*	6·5993	2·497	57·11	77·65	88·59	86·91	50·66	68·71	3·14	1·15	38·40	1940 *B*
1941	17·2322	139·292	30·70	90·36	50·31	55·03	24·38	76·69	30·73	26·83	39·59	1941
1942	27·8652	135·087	4·30	103·08	12·03	23·15	130·10	84·67	8·33	10·52	40·78	1942
1943	8·9675	1·282	1·69	0·85	1·56	127·29	2·63	1·64	0·72	41·84	62·07	1943
1944 *B*	20·6005	138·077	131·29	13·57	87·29	95·41	108·35	9·62	28·31	25·52	63·26	1944 *B*
1945	1·7028	4·272	128·68	27·34	76·82	71·54	112·89	26·60	20·71	14·85	4·55	1945
1946	12·3358	0·067	102·28	40·06	38·54	39·66	86·61	34·58	48·30	40·53	5·74	1946
1947	22·9687	136·862	75·88	52·77	0·26	7·78	60·33	42·56	25·89	24·21	6·93	1947
1948 *B*	5·0711	3·057	73·27	66·55	113·79	111·91	64·86	59·54	18·29	13·54	28·22	1948 *B*
1949	15·7040	139·852	46·87	79·26	75·52	80·04	38·58	67·51	45·88	39·22	29·41	1949
1950	26·3369	135·648	20·46	91·98	37·24	48·16	12·30	75·49	23·47	22·91	30·60	1950

TABLE 3 (*cont.*). Values of the Arguments for the beginnings of the years 1900 to 1950.

Arg.	11	12	13	14	15	16	17	18	19	20	21	22	Arg.
Period	c 44	c 24	c 44	c 32	c 28	c 251	c 51	c 38	c 76	c 94	c 56	c 36	Period
Addition for Period of D	c 3·94	c 7·75	c 7·90	c 5·16	c 0·50	c 18·000	c 8·69	c 9·20	c 7·50	c 29·50	c 1·51	c 13·88	Addition for Period of D
	c	c	c	c	c	c	c	c	c	c	c	c	
1900	5·30	23·19	11·71	31·06	7·57	213·372	6·04	36·80	20·39	76·94	23·42	24·07	1900
1901	8·58	20·20	18·50	28·98	13·56	178·373	8·32	33·20	34·38	54·93	41·54	10·62	1901
1902	15·80	0·96	33·19	0·06	20·05	161·375	19·29	0·80	55·88	62·42	5·17	11·05	1902
1903	19·08	21·97	39·98	29·99	26·04	126·377	21·56	35·20	69·87	40·40	23·29	33·60	1903
1904 *B*	22·36	18·98	2·77	27·91	4·03	91·378	23·84	31·60	7·86	18·39	41·41	20·15	1904 *B*
1905	29·58	23·75	17·46	30·99	10·52	74·380	34·81	37·20	29·36	25·88	5·04	20·58	1905
1906	32·86	20·76	24·25	28·92	16·51	39·381	37·09	33·60	43·35	3·87	23·16	7·13	1906
1907	40·07	1·52	38·94	0·00	23·00	22·383	48·06	1·20	64·85	11·35	42·79	7·56	1907
1908 *B*	43·35	22·53	1·72	29·92	1·00	238·384	50·34	35·60	2·84	83·34	4·91	30·11	1908 *B*
1909	2·63	19·54	8·51	27·84	6·99	203·386	1·62	32·00	16·84	61·33	23·03	16·66	1909
1910	9·85	0·30	23·20	30·93	13·48	186·388	12·59	37·60	38·33	68·82	42·66	17·09	1910
1911	13·13	21·31	29·99	28·85	19·47	151·389	14·87	34·00	52·32	46·80	4·78	3·64	1911
1912 *B*	16·41	18·32	36·78	26·77	25·46	116·391	17·15	30·40	66·32	24·79	22·90	26·19	1912 *B*
1913	23·63	23·08	7·47	29·86	3·95	99·393	28·12	36·00	11·81	32·28	42·53	26·62	1913
1914	26·91	20·09	14·26	27·78	9·94	64·394	30·40	32·40	25·81	10·27	4·65	13·17	1914
1915	30·19	17·10	21·05	25·70	15·93	29·396	32·68	28·80	39·80	82·25	22·77	35·72	1915
1916 *B*	37·40	21·87	35·74	28·78	22·42	12·397	43·65	34·40	61·29	89·74	42·40	0·15	1916 *B*
1917	40·68	18·88	42·53	26·71	0·41	228·399	45·93	30·80	75·29	67·73	4·52	22·70	1917
1918	3·90	23·64	13·22	29·79	6·90	211·401	5·90	36·40	20·78	75·22	24·15	23·13	1918
1919	7·18	20·65	20·01	27·71	12·89	176·402	8·18	32·80	34·78	53·20	42·27	9·68	1919
1920 *B*	10·46	17·66	26·80	25·64	18·88	141·404	10·46	29·20	48·77	31·19	4·39	32·23	1920 *B*
1921	17·68	22·42	41·49	28·72	25·37	124·406	21·43	34·80	70·27	38·68	24·02	32·66	1921
1922	20·96	19·43	4·28	26·64	3·36	89·407	23·71	31·20	8·26	16·67	42·14	19·21	1922
1923	24·24	16·44	11·07	24·56	9·35	54·409	25·99	27·60	22·25	88·65	4·26	5·76	1923
1924 *B*	31·46	21·20	25·76	27·65	15·84	37·410	36·96	33·20	43·75	2·14	23·89	6·19	1924 *B*
1925	34·74	18·21	32·55	25·57	21·84	2·412	39·24	29·60	57·74	74·13	42·01	28·74	1925
1926	41·95	22·98	3·24	28·65	0·33	236·414	50·21	35·20	3·24	81·62	5·64	29·16	1926
1927	1·23	19·99	10·03	26·58	6·32	201·415	1·49	31·60	17·23	59·60	23·76	15·71	1927
1928 *B*	4·51	17·00	16·82	24·50	12·31	166·417	3·77	28·00	31·23	37·59	41·88	2·26	1928 *B*
1929	11·73	21·76	31·50	27·58	18·80	149·419	14·74	33·60	52·72	45·08	5·51	2·69	1929
1930	15·01	18·77	38·29	25·50	24·79	114·420	17·02	30·00	66·71	23·07	23·63	25·24	1930
1931	18·29	15·78	1·08	23·43	2·78	79·422	19·30	26·40	4·71	1·05	41·75	11·79	1931
1932 *B*	25·51	20·54	15·77	26·51	9·27	62·423	30·27	32·00	26·20	8·54	5·38	12·22	1932 *B*
1933	28·79	17·55	22·56	24·43	15·26	27·425	32·55	28·40	40·20	80·53	23·50	34·77	1933
1934	32·07	14·56	29·35	22·35	21·25	243·427	34·83	24·80	54·19	58·52	41·62	21·32	1934
1935	39·28	19·32	0·04	25·44	27·74	226·428	45·80	30·40	75·68	66·00	5·25	21·75	1935
1936 *B*	42·56	16·34	6·83	23·36	5·73	191·430	48·08	26·80	13·68	43·99	23·37	8·30	1936 *B*
1937	5·78	21·10	21·52	26·44	12·22	174·432	8·04	32·40	35·17	51·48	43·00	8·73	1937
1938	9·06	18·11	28·31	24·37	18·21	139·433	10·32	28·80	49·17	29·47	5·12	31·28	1938
1939	12·34	15·12	35·10	22·29	24·20	104·435	12·60	25·20	63·16	7·45	23·24	17·83	1939
1940 *B*	19·56	19·88	5·79	25·37	2·69	87·437	23·57	30·80	8·66	14·94	42·87	18·26	1940 *B*
1941	22·84	16·89	12·58	23·29	8·68	52·438	25·85	27·20	22·65	86·93	4·99	4·81	1941
1942	26·12	13·90	19·37	21·22	14·67	17·440	28·13	23·60	36·64	64·92	23·11	27·36	1942
1943	33·34	18·66	34·05	24·30	21·16	0·442	39·10	29·20	58·14	72·40	42·74	27·79	1943
1944 *B*	36·61	15·67	40·85	22·22	27·16	216·443	41·38	25·60	72·13	50·39	4·86	14·34	1944 *B*
1945	43·83	20·43	11·54	25·31	5·65	199·445	1·35	31·20	17·63	57·88	24·49	14·77	1945
1946	3·11	17·45	18·33	23·23	11·64	164·446	3·63	27·60	31·62	35·87	42·61	1·32	1946
1947	6·39	14·46	25·12	21·15	17·63	129·448	5·91	24·00	45·61	13·85	4·73	23·87	1947
1948 *B*	13·61	19·22	39·81	24·23	24·12	112·450	16·88	29·60	67·11	21·34	24·36	24·30	1948 *B*
1949	16·89	16·23	2·60	22·16	2·11	77·451	19·16	26·00	5·10	93·33	42·48	10·85	1949
1950	20·17	13·24	9·39	20·08	8·10	42·453	21·44	22·40	19·10	71·32	4·60	33·40	1950

TABLE 3 (*cont.*). Values of the Arguments for the beginnings of the years 1900 to 1950.

Arg.	23		24		25		26		27		28		29		30		(*a*)	Arg.
Period	*d* 15·0	*c* 464	*d* 14·0	*c* 64	*d* 25·5	*c* 46	*d* 29·5	*c* 86	*d* 34·5	*c* 179	*d* 9·5	*c* 133	*d* 29·0	*c* 109	*d* 27·5	*c* 36		Period
Half day		*c* 599		*c* 167		*c* 189		*c* 142		*c* 258		*c* 178		*c* 207		*c* 330		Half day
	d	*c*	*d*	*c*	*d*	*c*	*d*	*c*	*d*	*c*	*d*	*c*	*d*	*c*	*d*	*c*		
1900	10·5	376·4	2·5	86·1	1·5	94·3	17·0	53·19	30·5	90·3	5·0	66·5	10·5	157·4	22·5	107·596	−44	1900
1901	6·5	22·4	12·5	156·1	8·0	17·3	24·5	15·17	12·0	185·3	4·5	129·5	24·5	91·4	1·5	263·552	44	1901
1902	2·0	267·4	8·5	162·2	14·0	129·3	2·0	33·14	28·5	201·4	4·5	14·5	9·0	123·4	8·5	125·508	44	1902
1903	13·0	377·4	5·0	1·2	20·5	52·3	9·0	137·12	10·5	38·4	4·0	77·6	23·0	57·4	15·0	317·464	44	1903
1904 *B*	10·0	23·4	2·0	7·3	2·0	118·3	17·5	99·10	28·0	54·4	4·5	140·6	8·5	89·5	23·0	179·421	44	1904 *B*
1905	5·5	268·4	12·0	77·3	8·5	41·3	25·0	61·07	9·5	149·4	4·5	25·6	22·5	23·5	2·5	5·377	44	1905
1906	1·0	513·4	8·0	83·4	14·5	153·3	2·5	79·05	26·0	165·4	4·0	88·7	7·0	55·5	9·0	197·333	44	1906
1907	12·5	24·4	4·0	89·4	21·0	76·3	10·0	41·03	8·0	2·5	3·5	151·7	20·5	196·5	16·0	59·290	43	1907
1908 *B*	9·0	269·4	1·0	95·5	2·5	142·3	18·5	3·01	25·5	18·5	4·5	36·7	6·5	21·5	23·5	251·247	43	1908 *B*
1909	4·5	514·4	11·0	165·5	9·0	65·3	25·5	106·98	7·0	113·5	4·0	99·8	20·0	162·6	3·0	77·204	43	1909
1910	0·5	160·4	7·5	4·6	15·0	177·3	3·0	124·96	23·5	129·5	3·5	162·8	4·5	194·6	9·5	269·161	43	1910
1911	11·5	270·4	3·5	10·6	21·5	100·3	10·5	86·94	5·0	224·5	3·5	47·8	18·5	128·6	16·5	131·118	43	1911
1912 *B*	8·0	515·4	0·5	16·7	3·0	166·3	19·0	48·92	22·5	240·5	4·0	110·9	4·0	160·6	24·0	323·075	43	1912 *B*
1913	4·0	161·4	10·5	86·7	9·5	89·3	26·5	10·89	4·5	77·6	3·5	173·9	18·0	94·6	3·5	149·032	43	1913
1914	15·0	271·4	6·5	92·8	16·0	12·2	4·0	28·87	21·0	93·6	3·5	58·9	2·5	126·6	10·5	10·990	43	1914
1915	10·5	516·4	2·5	98·8	22·0	124·2	11·0	132·85	2·5	188·6	3·0	122·0	16·5	60·7	17·0	202·947	42	1915
1916 *B*	7·5	162·3	14·0	1·9	4·0	1·2	19·5	94·83	20·0	204·6	4·0	7·0	2·0	92·7	25·0	64·905	42	1916 *B*
1917	3·0	407·3	10·0	7·9	10·0	113·2	27·0	56·81	2·0	41·6	3·5	70·0	16·0	26·7	4·0	220·863	42	1917
1918	14·0	517·3	6·0	14·0	16·5	36·2	4·5	74·78	18·5	57·6	3·0	133·1	0·5	58·7	11·0	82·821	42	1918
1919	10·0	163·3	2·0	20·0	22·5	148·2	12·0	36·76	0·0	152·7	3·0	18·1	14·0	199·7	17·5	274·779	42	1919
1920 *B*	6·5	408·3	13·0	90·1	4·5	25·2	20·0	140·74	17·5	168·7	3·5	81·1	0·0	24·8	25·5	136·737	42	1920 *B*
1921	2·5	54·3	9·0	96·1	10·5	137·2	27·5	102·72	34·0	184·7	3·0	144·2	13·5	165·8	4·5	292·695	42	1921
1922	13·5	164·3	5·0	102·2	17·0	60·2	5·0	120·69	16·0	21·7	3·0	29·2	27·5	99·8	11·5	154·654	41	1922
1923	9·0	409·3	1·0	108·2	23·0	172·2	12·5	82·67	32·5	37·7	2·5	92·2	12·0	131·8	18·5	16·612	41	1923
1924 *B*	6·0	55·3	12·5	11·3	5·0	49·2	21·0	44·65	15·0	132·8	3·0	155·3	27·0	65·8	26·0	208·571	41	1924 *B*
1925	1·5	300·3	8·5	17·3	11·0	161·2	28·5	6·63	31·5	148·8	3·0	40·3	11·5	97·8	5·5	34·530	41	1925
1926	12·5	410·3	4·5	23·4	17·5	84·2	6·0	24·61	13·0	243·8	2·5	103·3	25·5	31·9	12·0	226·489	41	1926
1927	8·5	56·3	0·5	29·4	24·0	7·2	13·0	128·59	30·0	1·8	2·0	166·4	10·0	63·9	19·0	88·448	41	1927
1928 *B*	5·0	301·3	11·5	99·5	5·5	73·2	21·5	90·57	12·5	96·8	3·0	51·4	24·5	204·9	26·5	280·407	41	1928 *B*
1929	0·5	546·3	7·5	105·5	11·5	185·1	29·0	52·55	29·0	112·8	2·5	114·4	9·5	29·9	6·0	106·366	41	1929
1930	12·0	57·3	3·5	111·6	18·0	108·1	6·5	70·52	10·5	207·9	2·0	177·5	23·0	170·9	12·5	298·326	40	1930
1931	7·5	302·3	14·0	14·6	24·5	31·1	14·0	32·50	27·0	223·9	2·0	62·5	7·5	202·9	19·5	160·286	40	1931
1932 *B*	4·0	547·3	11·0	20·7	6·0	97·1	22·0	136·48	10·0	60·9	2·5	125·5	22·5	137·0	27·5	22·245	40	1932 *B*
1933	0·0	193·3	7·0	26·7	12·5	20·1	0·0	12·46	26·5	76·9	2·5	10·6	7·0	169·0	6·5	178·205	40	1933
1934	11·0	303·3	3·0	32·8	18·5	132·1	7·0	116·44	8·0	171·9	2·0	73·6	21·0	103·0	13·5	40·165	40	1934
1935	6·5	548·2	13·0	102·8	25·0	55·1	14·5	78·42	24·5	187·9	1·5	136·6	5·5	135·0	20·0	232·125	40	1935
1936 *B*	3·5	194·2	10·0	108·9	6·5	121·1	23·0	40·40	7·5	25·0	2·5	21·7	20·5	69·0	0·5	58·085	40	1936 *B*
1937	14·5	304·2	6·0	114·9	13·0	44·1	0·5	58·37	24·0	41·0	2·0	84·7	5·0	101·1	7·0	250·046	40	1937
1938	10·0	549·2	2·0	121·0	19·0	156·1	8·0	20·35	5·5	136·0	1·5	147·7	19·0	35·1	14·0	112·006	39	1938
1939	6·0	195·2	12·5	24·0	0·0	33·1	15·0	124·33	22·0	152·0	1·5	32·8	3·5	67·1	20·5	303·967	39	1939
1940 *B*	2·5	440·2	9·5	30·1	7·0	145·1	23·5	86·31	4·5	247·0	2·0	95·8	18·5	1·1	1·0	129·927	39	1940 *B*
1941	13·5	550·2	5·5	36·1	13·5	68·1	1·0	104·29	21·5	5·0	1·5	158·8	3·0	33·1	7·5	321·888	39	1941
1942	9·5	196·2	1·5	42·2	19·5	180·1	8·5	66·27	3·0	100·0	1·5	43·9	16·5	174·1	14·5	183·849	39	1942
1943	5·0	441·2	11·5	112·2	0·5	57·1	16·0	28·25	19·5	116·1	1·0	106·9	1·0	206·2	21·5	45·810	39	1943
1944 *B*	2·0	87·2	8·5	118·3	7·5	169·1	24·0	132·23	2·0	211·1	1·5	169·9	16·0	140·2	1·5	201·771	39	1944 *B*
1945	13·0	197·2	4·5	124·4	14·0	92·1	2·0	8·21	18·5	227·1	1·5	55·0	0·5	172·2	8·5	63·732	39	1945
1946	8·5	442·2	0·5	130·4	20·5	15·1	9·0	112·19	0·5	64·1	1·0	118·0	14·5	106·2	15·0	255·694	38	1946
1947	4·5	88·2	11·0	33·5	1·0	81·1	16·5	74·17	17·0	80·1	1·0	3·0	28·5	40·2	22·0	117·655	38	1947
1948 *B*	1·0	333·2	8·0	39·5	8·5	4·0	25·0	36·15	34·5	96·1	1·5	66·1	14·0	72·2	2·0	273·617	38	1948 *B*
1949	12·0	443·2	4·0	45·6	14·5	116·0	2·5	54·13	16·0	191·2	1·0	129·1	28·0	6·3	9·0	135·579	38	1949
1950	8·0	89·2	0·0	51·6	21·0	39·0	10·0	16·11	32·5	207·2	1·0	14·1	12·5	38·3	15·5	327·541	−38	1950

TABLE 3 (*cont.*). Values of the Arguments for the beginnings of the years 1900 to 1950.

Arg.	31 (a)			32		33 (a)			34		35		36		37		38		Arg.
Period	d 14·5	c 156		d 31·5	c 209	d 29·5	c 6		d 205·5	c 11	d 9·5	c 63	d 15·5	c 95	d 10·0	c 67	d 7·0	c 76	Period
Half day		c 294			c 335		c 98			c 14		c 277		c 117		c 396		c 299	Half day
	d	c		d	c	d	c		d	c	d	c	d	c	d	c	d	c	
1900	10·0	183·13	+18	27·5	243·57	28·5	52·64	+6	194·5	10·45	5·0	5·30	0·0	7·7	8·0	250·0	2·0	268·4	1900
1901	6·0	105·31	18	11·0	80·58	9·5	72·70	6	148·0	2·47	4·5	104·31	15·0	23·8	0·0	147·0	3·5	279·3	1901
1902	2·0	27·48	18	26·0	126·59	20·5	0·76	6	101·0	8·50	4·0	203·33	14·0	61·9	2·0	110·9	5·0	290·3	1902
1903	12·5	105·66	18	9·0	298·60	1·5	20·82	6	54·5	0·52	4·0	25·34	13·0	99·9	4·0	74·9	7·0	2·2	1903
1904 *B*	9·5	27·84	18	25·5	9·62	13·0	46·88	6	8·5	6·55	4·5	124·35	13·5	21·0	7·0	38·9	2·0	236·2	1904 *B*
1905	5·0	244·01	18	8·5	181·63	23·5	72·93	6	167·5	9·58	4·0	223·37	12·5	59·1	9·0	2·8	3·5	247·1	1905
1906	1·0	166·19	18	23·5	227·64	4·5	92·99	6	121·0	1·60	4·0	45·38	11·5	97·1	0·5	295·8	5·0	258·1	1906
1907	11·5	244·36	18	7·0	64·65	15·5	21·05	6	74·0	7·63	3·5	144·40	11·0	18·2	2·5	259·8	6·5	269·0	1907
1908 *B*	8·5	166·54	18	23·0	110·66	27·0	47·11	6	28·0	13·65	4·0	243·41	11·0	56·3	5·5	223·7	2·0	204·0	1908 *B*
1909	4·5	88·71	18	6·0	282·67	8·0	67·17	6	187·5	2·68	4·0	65·43	10·0	94·4	7·5	187·7	3·5	214·9	1909
1910	0·5	10·89	18	21·0	328·69	18·5	93·22	6	140·5	8·70	3·5	164·44	9·5	15·4	9·5	151·7	5·0	225·8	1910
1911	11·0	89·06	18	4·5	165·70	0·0	15·28	6	94·0	0·73	3·0	263·45	8·5	53·5	1·5	48·6	6·5	236·8	1911
1912 *B*	8·0	11·24	18	20·5	211·71	11·5	41·34	6	48·0	6·76	4·0	85·47	8·5	91·6	4·5	12·6	2·0	171·7	1912 *B*
1913	3·5	227·41	18	4·0	48·72	22·0	67·40	6	1·0	12·78	3·5	184·48	8·0	12·7	6·0	372·5	3·5	182·7	1913
1914	14·5	11·59	18	19·0	94·73	3·0	87·46	6	160·5	1·81	3·5	6·50	7·0	50·7	8·0	336·5	5·0	193·6	1914
1915	10·0	227·76	18	2·0	266·74	14·0	15·52	6	113·5	7·83	3·0	105·51	6·0	88·8	0·0	233·5	6·5	204·6	1915
1916 *B*	7·0	149·94	18	18·0	312·75	25·5	41·57	6	67·5	13·86	3·5	204·53	6·5	9·9	3·0	197·4	2·0	139·5	1916 *B*
1917	3·0	72·12	18	1·5	149·76	6·5	61·63	6	21·0	5·89	3·5	26·54	5·5	47·9	5·0	161·4	3·5	150·5	1917
1918	13·5	150·29	18	16·5	195·77	17·0	87·69	6	180·0	8·91	3·0	125·55	4·5	86·0	7·0	125·4	5·0	161·4	1918
1919	9·5	72·47	18	0·0	32·78	28·0	15·75	6	133·5	0·94	2·5	224·57	4·0	7·1	9·0	89·3	6·5	172·4	1919
1920 *B*	6·0	288·64	18	16·0	78·79	10·0	35·81	6	87·5	6·96	3·5	46·58	4·0	45·2	1·5	382·3	2·0	107·3	1920 *B*
1921	2·0	210·82	18	31·0	124·80	20·5	61·87	6	40·5	12·99	3·0	145·60	3·0	83·2	3·5	346·3	3·5	118·2	1921
1922	12·5	288·99	18	14·0	296·81	1·5	81·93	6	200·0	2·02	2·5	244·61	2·5	4·3	5·5	310·2	5·0	129·2	1922
1923	8·5	211·17	18	29·5	7·82	12·5	9·98	6	153·0	8·04	2·5	66·63	1·5	42·4	7·5	274·2	6·5	140·1	1923
1924 *B*	5·5	133·34	18	13·5	179·83	24·0	36·04	6	107·5	0·07	3·0	165·64	1·5	80·4	0·5	171·2	2·0	75·1	1924 *B*
1925	1·5	55·52	18	28·5	225·84	5·0	56·10	6	60·5	6·10	2·5	264·66	1·0	1·5	2·5	135·1	3·5	86·0	1925
1926	12·0	133·70	18	12·0	62·85	15·5	82·16	6	13·5	12·12	2·5	86·67	0·0	39·6	4·5	99·1	5·0	97·0	1926
1927	8·0	55·87	18	27·0	108·86	26·5	10·22	6	173·0	1·15	2·0	185·69	15·0	55·7	6·5	63·0	6·5	107·9	1927
1928 *B*	4·5	272·05	18	11·0	280·87	8·5	30·28	6	127·0	7·18	3·0	7·70	15·0	93·7	9·5	27·0	2·0	42·9	1928 *B*
1929	0·5	194·22	18	26·0	326·88	19·0	56·34	6	80·0	13·20	2·5	106·72	14·5	14·8	1·0	320·0	3·5	53·8	1929
1930	11·0	272·40	18	9·5	163·89	0·0	76·40	6	33·5	5·23	2·0	205·73	13·5	52·9	3·0	283·9	5·0	64·8	1930
1931	7·0	194·57	18	24·5	209·90	11·0	4·45	6	192·5	8·26	2·0	27·75	12·5	90·9	5·0	247·9	6·5	75·7	1931
1932 *B*	4·0	116·75	18	9·0	46·91	22·5	30·51	6	147·0	0·29	2·5	126·76	13·0	12·0	8·0	211·9	2·0	10·7	1932 *B*
1933	0·0	38·93	18	24·0	92·92	3·5	50·57	6	100·0	6·31	2·0	225·78	12·0	50·1	0·0	108·8	3·5	21·6	1933
1934	10·5	117·10	18	7·0	264·93	14·0	76·63	6	53·0	12·34	2·0	47·79	11·0	88·2	2·0	72·8	5·0	32·5	1934
1935	6·5	39·28	18	22·0	310·94	25·0	4·69	6	6·5	4·37	1·5	146·81	10·5	9·2	4·0	36·8	6·5	43·5	1935
1936 *B*	3·0	255·45	18	6·5	147·94	7·0	24·75	6	166·5	7·40	2·0	245·82	10·5	47·3	7·0	0·7	1·5	277·4	1936 *B*
1937	14·0	39·63	18	21·5	193·95	17·5	50·80	6	119·5	13·42	2·0	67·84	9·5	85·4	8·5	360·7	3·0	288·4	1937
1938	9·5	255·80	18	5·0	30·96	28·0	76·86	6	73·0	5·45	1·5	166·85	9·0	6·4	0·5	257·7	5·0	0·3	1938
1939	5·5	177·98	18	20·0	76·97	9·0	96·92	6	26·0	11·48	1·0	265·87	8·0	44·5	2·5	221·6	6·5	11·3	1939
1940 *B*	2·5	100·16	18	4·0	248·98	21·0	24·98	6	186·5	0·51	2·0	87·89	8·0	82·6	5·5	185·6	1·5	245·2	1940 *B*
1941	13·0	178·33	18	19·0	294·99	2·0	45·04	6	139·5	6·53	1·5	186·90	7·5	3·7	7·5	149·5	3·0	256·2	1941
1942	9·0	100·51	18	2·5	132·00	12·5	71·10	6	92·5	12·56	1·5	8·92	6·5	41·7	9·5	113·5	4·5	267·1	1942
1943	5·0	22·68	18	17·5	178·00	23·0	97·15	6	46·0	4·59	1·0	107·93	5·5	79·8	1·5	10·5	6·0	278·1	1943
1944 *B*	1·5	238·86	18	2·0	15·01	5·5	19·21	6	0·0	10·62	1·5	206·95	6·0	0·9	4·0	370·4	1·5	213·0	1944 *B*
1945	12·5	23·03	18	17·0	61·02	16·0	45·27	6	159·0	13·65	1·5	28·96	5·0	38·9	6·0	334·4	3·0	224·0	1945
1946	8·0	239·21	18	0·0	233·03	26·5	71·33	6	112·5	5·67	1·0	127·98	4·0	77·0	8·0	298·4	4·5	234·9	1946
1947	4·0	161·39	18	15·0	279·03	7·5	91·39	6	65·5	11·70	0·5	227·00	3·0	115·1	0·0	195·3	6·0	245·9	1947
1948 *B*	1·0	83·56	18	31·0	325·04	19·5	19·45	6	20·0	3·73	1·5	49·01	3·5	36·2	3·0	159·3	1·5	180·8	1948 *B*
1949	11·5	161·74	18	14·5	162·05	0·5	39·51	6	179·0	6·76	1·0	148·03	2·5	74·2	5·0	123·3	3·0	191·8	1949
1950	7·5	83·91	+18	29·5	208·06	11·0	65·57	+6	132·0	12·79	0·5	247·04	1·5	112·3	7·0	87·2	4·5	202·7	1950

TABLE 3 (*cont.*). Values of the Arguments for the beginnings of the years 1900 to 1950.

Arg.	39		40		41		42		43		44		45		46		47		Arg.
Period	d 5.5	c 20	d 13.5	c 66	d 173.0	c 13	d 26.5	c 115	d 9.0	c 41	d 7.0	c 29	d 9.5	c 8	d 6.5	c 47	d 365.0	c 13	Period
Half day		c 31		c 311		c 21		c 152		c 189		c 179		c 133		c 68		c 25	Half day
	d	c	d	c	d	c	d	c	d	c	d	c	d	c	d	c	d	c	
1900	2.5	14.5	4.0	156.84	63.0	3.3	13.0	51.8	1.0	86.9	1.5	124.8	4.0	47.7	6.5	7.5	89.5	13.36	1900
1901	0.5	25.4	1.5	240.83	81.0	19.3	1.5	113.8	1.5	148.0	5.5	77.7	7.0	9.9	1.5	53.6	89.5	0.38	1901
1902	4.5	25.3	13.0	79.82	99.5	14.2	17.0	138.8	2.5	20.1	2.5	1.6	0.0	97.0	4.0	10.6	89.0	12.39	1902
1903	3.0	5.2	10.5	163.81	118.0	9.2	6.0	48.8	3.0	81.2	6.0	133.5	3.0	59.2	6.0	35.7	88.5	24.41	1903
1904 *B*	2.0	16.2	9.0	247.80	137.5	4.1	22.5	73.8	4.5	142.2	4.0	57.4	7.0	21.3	2.5	13.8	89.5	11.43	1904 *B*
1905	0.0	27.1	7.0	20.79	155.5	20.1	11.0	135.7	5.5	14.3	0.5	160.4	0.0	108.5	4.5	38.8	89.0	23.45	1905
1906	4.0	27.0	4.5	104.78	1.0	2.0	0.0	45.7	6.0	75.4	4.5	113.3	3.0	70.7	0.0	16.9	89.0	10.46	1906
1907	2.5	6.9	2.0	188.77	19.0	18.0	15.5	70.7	6.5	136.5	1.5	37.2	6.0	32.8	2.0	42.0	88.5	22.48	1907
1908 *B*	1.5	17.8	0.5	272.75	38.5	12.9	5.0	132.7	8.5	8.6	6.0	169.1	0.0	120.0	5.0	67.0	89.5	9.50	1908 *B*
1909	5.5	17.7	12.0	111.74	57.0	7.9	21.0	5.7	0.0	28.6	3.0	93.0	3.0	82.1	0.5	45.1	89.0	21.52	1909
1910	3.5	28.6	9.5	195.73	75.5	2.9	9.5	67.7	0.5	89.7	0.0	16.9	6.0	44.3	3.0	2.2	89.0	8.54	1910
1911	2.0	8.5	7.0	279.72	93.5	18.8	25.0	92.7	1.0	150.8	3.5	148.8	9.0	6.4	5.0	27.2	88.5	20.55	1911
1912 *B*	1.0	19.4	6.0	52.71	113.0	13.8	15.0	2.7	3.0	22.9	1.5	72.7	3.0	93.6	1.5	5.3	89.5	7.57	1912 *B*
1913	5.0	19.3	3.5	136.70	131.5	8.7	3.5	64.7	3.5	84.0	5.5	25.6	6.0	55.7	3.5	30.4	89.0	19.59	1913
1914	3.0	30.2	1.0	220.69	150.0	3.7	19.0	89.7	4.0	145.0	2.0	128.5	9.0	17.9	5.5	55.4	89.0	6.61	1914
1915	1.5	10.1	12.5	59.68	168.0	19.7	7.5	151.7	5.0	17.1	6.0	81.4	2.0	105.0	1.0	33.5	88.5	18.62	1915
1916 *B*	0.5	21.0	11.0	143.67	14.5	1.6	24.5	24.7	6.5	78.2	4.0	5.3	6.0	67.2	4.0	58.6	89.5	5.64	1916 *B*
1917	4.5	20.9	8.5	227.66	32.5	17.6	13.0	86.7	7.0	139.3	0.5	108.2	9.0	29.3	6.5	15.6	89.0	17.66	1917
1918	3.0	0.8	6.5	0.64	51.0	12.5	1.5	148.7	8.0	11.4	4.5	61.1	2.0	116.5	1.5	61.7	89.0	4.68	1918
1919	1.0	11.7	4.0	84.63	69.5	7.5	17.5	21.6	8.5	72.4	1.0	164.0	5.0	78.6	4.0	18.8	88.5	16.69	1919
1920 *B*	0.0	22.6	2.5	168.62	89.0	2.4	7.0	83.6	1.0	92.5	6.0	116.9	9.0	40.8	0.0	64.9	89.5	3.71	1920 *B*
1921	4.0	22.5	0.0	252.61	107.0	18.4	22.5	108.6	1.5	153.6	3.0	40.8	2.0	127.9	2.5	21.9	89.0	15.73	1921
1922	2.5	2.4	11.5	91.60	125.5	13.3	11.5	18.6	2.5	25.7	6.5	172.8	5.0	90.1	4.5	47.0	89.0	2.75	1922
1923	0.5	13.3	9.0	175.59	144.0	8.3	0.0	80.6	3.0	86.8	3.5	96.7	8.0	52.3	0.0	25.1	88.5	14.77	1923
1924 *B*	5.5	13.2	7.5	259.58	163.5	3.3	16.5	105.6	4.5	147.8	1.5	20.6	2.5	6.4	3.0	50.1	89.5	1.78	1924 *B*
1925	3.5	24.1	5.5	32.57	8.5	6.2	5.5	15.6	5.5	19.9	5.0	152.5	5.0	101.6	5.5	7.2	89.0	13.80	1925
1926	2.0	4.0	3.0	116.56	27.0	1.2	21.0	40.6	6.0	81.0	2.0	76.4	8.0	63.7	0.5	53.3	89.0	0.82	1926
1927	0.0	14.9	0.5	200.55	45.0	17.1	9.5	102.6	6.5	142.1	6.0	29.3	1.5	17.9	3.0	10.3	88.5	12.84	1927
1928 *B*	5.0	14.8	13.0	39.53	64.5	12.1	26.0	127.6	8.5	14.2	3.5	132.2	5.0	113.0	6.0	35.4	89.0	24.85	1928 *B*
1929	3.0	25.7	10.5	123.52	83.0	7.0	15.0	37.6	0.0	34.2	0.5	56.1	8.0	75.2	1.5	13.5	89.0	11.87	1929
1930	1.5	5.6	8.0	207.51	101.5	2.0	3.5	99.6	0.5	95.3	4.5	9.0	1.5	29.3	3.5	38.5	88.5	23.89	1930
1931	5.5	5.5	5.5	291.50	119.5	17.9	19.0	124.5	1.0	156.4	1.0	111.9	4.0	124.5	5.5	63.6	88.5	10.91	1931
1932 *B*	4.5	16.4	4.5	64.49	139.0	12.9	9.0	34.5	3.0	28.5	6.0	64.8	8.0	86.6	2.0	41.7	89.0	22.93	1932 *B*
1933	2.5	27.3	2.0	148.48	157.5	7.9	24.5	59.5	3.5	89.6	2.5	167.7	1.5	40.8	4.0	66.7	89.0	9.94	1933
1934	1.0	7.2	13.0	298.47	2.5	10.8	13.0	121.5	4.0	150.6	6.5	120.6	4.5	2.9	6.5	23.8	88.5	21.96	1934
1935	5.0	7.1	11.0	71.46	21.0	5.8	2.0	31.5	5.0	22.7	3.5	44.5	7.0	98.1	2.0	1.9	88.5	8.98	1935
1936 *B*	4.0	18.1	9.5	155.45	40.5	0.7	18.5	56.5	6.5	83.8	1.0	147.4	1.5	52.2	5.0	27.0	89.0	21.00	1936 *B*
1937	2.0	29.0	7.0	239.44	58.5	16.7	7.0	118.5	7.0	144.9	5.0	100.3	4.5	14.4	0.5	5.0	89.0	8.01	1937
1938	0.5	8.9	5.0	12.42	77.0	11.6	22.5	143.5	8.0	17.0	2.0	24.2	7.0	109.5	2.5	30.1	88.5	20.03	1938
1939	4.5	8.8	2.5	96.41	95.5	6.6	11.5	53.5	8.5	78.0	5.5	156.2	0.5	63.7	4.5	55.2	88.5	7.05	1939
1940 *B*	3.5	19.7	1.0	180.40	115.0	1.5	1.0	115.5	1.0	98.1	3.5	80.1	4.5	25.8	1.0	33.2	89.0	19.07	1940 *B*
1941	1.5	30.6	12.5	19.39	133.0	17.5	16.5	140.5	1.5	159.2	0.5	4.0	7.0	121.0	3.0	58.3	89.0	6.08	1941
1942	0.0	10.5	10.0	103.38	151.5	12.5	5.5	50.5	2.5	31.3	4.0	135.9	0.5	75.2	5.5	15.4	88.5	18.10	1942
1943	4.0	10.4	7.5	187.37	170.0	7.4	21.0	75.4	3.0	92.4	1.0	59.8	3.5	37.3	0.5	61.4	88.5	5.12	1943
1944 *B*	3.0	21.3	6.0	271.36	16.0	10.4	10.5	137.4	4.5	153.4	6.0	12.7	7.0	132.5	4.0	18.5	89.0	17.14	1944 *B*
1945	1.5	1.2	4.0	44.35	34.5	5.3	26.5	10.4	5.5	25.5	2.5	115.6	0.5	86.6	6.0	43.6	89.0	4.16	1945
1946	5.5	1.1	1.5	128.34	53.0	0.3	15.0	72.4	6.0	86.6	6.5	68.5	3.5	48.8	1.5	21.6	88.5	16.17	1946
1947	3.5	12.0	12.5	278.32	71.0	16.2	3.5	134.4	6.5	147.7	3.0	171.4	6.5	10.9	3.5	46.7	88.5	3.19	1947
1948 *B*	2.5	22.9	11.5	51.31	90.5	11.2	20.5	7.4	8.5	19.8	1.0	95.3	0.5	98.1	0.0	24.8	89.0	15.21	1948 *B*
1949	1.0	2.8	9.0	135.30	109.0	6.2	9.0	69.4	0.0	39.9	5.0	48.2	3.5	60.2	2.0	40.8	89.0	2.23	1949
1950	5.0	2.7	6.5	219.29	127.5	1.1	24.5	94.4	0.5	100.9	1.5	151.1	6.5	22.4	4.5	6.9	88.5	14.24	1950

TABLE 3 (*cont.*). Values of the Arguments for the beginnings of the years 1900 to 1950.

Arg.	48	49	50	51		52		53		54		55*		56		57		Arg.
Period	c 159	d 13·63	c 101	d 12·5	c 10	d 22·0	c 2	d 35·0	c 32	d 29·5	c 15	d 32·0	c 73	d 10·0	c 21	d 16·0	c 5	Period
Addition for Per. of Vert. Arg.	c 4		c 50	Half day	c 19		c 3		c 39		c 47		c 130		c 80		c 112	Half day
	c	d	c	d	c	d	c	d	c	d	c	d	c	d	c	d	c	
1900	63	3·64	95	0·0	4	4·0	0	23·5	21·8	4·5	31·6	21·5	10·69	6·0	38·3	12·5	47·3	1900
1901	119	0·54	31	7·5	10	12·0	0	34·5	13·8	13·5	39·7	31·0	117·67	6·5	2·3	9·0	44·3	1901
1902	12	11·07	17	2·5	5	19·5	2	10·0	12·8	23·0	0·7	9·0	21·64	6·5	46·4	5·5	41·3	1902
1903	64	7·97	53	10·0	11	5·0	2	21·0	4·8	2·0	40·7	18·5	128·62	7·0	10·4	2·0	38·3	1903
1904 *B*	116	5·87	89	6·0	6	14·0	1	32·5	35·8	12·5	1·8	29·5	105·60	8·0	54·5	15·5	40·3	1904 *B*
1905	13	2·77	25	1·0	2	22·0	0	8·0	34·8	21·5	9·8	7·5	9·58	8·5	18·5	12·0	37·3	1905
1906	65	13·30	11	8·5	7	7·5	0	19·0	26·8	1·0	2·9	17·0	116·56	8·5	62·5	8·5	34·3	1906
1907	117	10·20	47	3·5	3	15·0	2	30·0	18·8	10·0	10·9	27·0	93·54	9·0	26·6	5·0	31·3	1907
1908 *B*	10	8·10	84	12·0	8	2·0	0	6·5	17·8	20·0	19·0	5·5	127·52	0·0	49·6	2·5	28·3	1908 *B*
1909	66	5·00	19	7·0	4	9·5	2	17·5	9·8	29·0	27·0	15·5	104·50	0·5	13·7	15·0	30·3	1909
1910	118	1·89	55	1·5	18	17·5	1	28·5	1·8	8·5	20·0	25·5	81·48	0·5	57·7	11·5	27·3	1910
1911	11	12·43	41	9·5	5	3·0	1	4·0	0·8	17·5	28·1	3·0	115·46	1·0	21·8	8·0	24·3	1911
1912 *B*	63	10·32	78	5·5	0	12·0	0	15·5	31·8	27·5	36·1	14·0	92·44	2·0	65·8	5·5	21·3	1912 *B*
1913	119	7·22	13	0·0	15	19·5	2	26·5	23·8	7·0	29·2	24·0	69·42	2·5	29·8	2·0	18·3	1913
1914	12	4·12	49	8·0	1	5·0	2	2·0	22·8	16·0	37·2	1·5	103·40	2·5	73·9	14·5	20·3	1914
1915	64	1·02	85	2·5	16	13·0	2	13·0	14·8	25·0	45·3	11·5	80·38	3·0	37·9	11·0	17·3	1915
1916 *B*	116	12·55	72	11·5	2	22·0	1	25·0	6·9	5·5	38·3	22·5	57·36	4·5	2·0	8·5	14·3	1916 *B*
1917	13	9·45	7	6·0	17	7·5	1	0·5	5·9	14·5	46·4	0·0	91·33	4·5	46·0	5·0	11·3	1917
1918	65	6·35	43	1·0	12	15·5	0	11·0	36·9	24·0	7·4	10·0	68·31	5·0	10·1	1·5	8·3	1918
1919	117	3·24	79	8·5	18	1·0	0	22·0	28·9	3·5	0·4	20·0	45·29	5·0	54·1	14·0	10·3	1919
1920 *B*	10	1·14	15	4·5	13	9·5	2	34·0	20·9	13·5	8·5	31·0	22·27	6·5	18·1	11·5	7·3	1920 *B*
1921	66	11·67	1	12·5	0	17·5	1	9·5	19·9	22·5	16·5	8·5	56·25	6·5	62·2	8·0	4·3	1921
1922	118	8·57	37	7·0	14	3·0	2	20·5	11·9	2·0	9·6	18·5	33·23	7·0	26·2	4·5	1·3	1922
1923	11	5·47	74	2·0	10	11·0	1	31·5	3·9	11·0	17·6	28·5	10·21	7·0	70·3	0·5	110·3	1923
1924 *B*	63	3·37	9	10·5	15	20·0	0	8·0	2·9	21·0	25·7	7·0	44·19	8·5	34·3	14·5	0·3	1924 *B*
1925	119	0·27	45	5·5	11	5·5	0	18·5	33·9	0·5	18·7	17·0	21·17	8·5	78·4	10·5	109·3	1925
1926	12	10·80	31	0·5	6	13·0	2	29·5	25·9	9·5	26·7	26·5	128·15	9·0	42·4	7·0	106·3	1926
1927	64	7·70	68	8·0	12	21·0	1	5·0	24·9	18·5	34·8	4·5	32·13	9·5	6·4	3·5	103·3	1927
1928 *B*	116	5·60	3	4·0	7	7·5	1	17·0	16·9	28·5	42·8	15·5	9·11	0·5	29·5	1·0	100·3	1928 *B*
1929	13	2·49	39	11·5	13	15·5	1	28·0	8·9	8·0	35·9	25·0	116·09	0·5	73·5	13·5	102·3	1929
1930	65	13·03	25	6·5	8	1·0	1	3·5	7·9	17·0	43·9	3·0	20·07	1·0	37·6	10·0	99·3	1930
1931	117	9·92	62	1·5	4	9·0	0	14·0	38·9	26·5	5·0	12·5	127·05	1·5	1·6	6·5	96·3	1931
1932 *B*	10	7·82	98	10·0	9	17·5	2	26·0	30·9	6·5	45·0	23·5	104·03	2·5	45·6	4·0	93·3	1932 *B*
1933	66	4·72	33	5·0	5	3·0	2	1·5	29·9	16·0	6·0	1·5	8·01	3·0	9·7	0·5	90·3	1933
1934	118	1·62	69	0·0	0	11·0	1	12·5	21·9	25·0	14·1	11·0	114·99	3·0	53·7	13·0	92·3	1934
1935	11	12·15	56	7·5	6	19·0	0	23·5	14·0	4·5	7·1	21·0	91·97	3·5	17·8	9·5	89·3	1935
1936 *B*	67	10·05	92	3·5	1	5·5	1	0·0	13·0	14·5	15·2	32·0	68·95	4·5	61·8	7·0	86·3	1936 *B*
1937	119	6·95	27	11·0	7	13·5	0	11·0	5·0	23·5	23·2	9·5	102·93	5·0	25·9	3·5	83·3	1937
1938	12	3·85	64	6·0	2	21·0	2	21·5	36·0	3·0	16·3	19·5	79·91	5·0	69·9	0·0	80·3	1938
1939	64	0·74	100	0·5	17	6·5	2	32·5	28·0	12·0	24·3	29·5	56·89	5·5	33·9	12·5	82·3	1939
1940 *B*	120	12·28	86	9·5	3	15·5	1	9·0	27·0	22·0	32·3	8·0	90·87	6·5	78·0	10·0	79·3	1940 *B*
1941	13	9·17	21	4·0	18	1·0	1	20·0	19·0	1·5	25·4	18·0	67·85	7·0	42·0	6·5	76·3	1941
1942	65	6·07	58	12·0	4	9·0	0	31·0	11·0	10·5	33·4	28·0	44·83	7·5	6·1	3·0	73·3	1942
1943	117	2·97	94	7·0	0	17·0	0	6·5	10·0	19·5	41·5	5·5	78·81	7·5	50·1	15·5	75·3	1943
1944 *B*	14	0·87	29	2·5	14	3·5	0	18·5	2·0	0·0	34·5	16·5	55·79	9·0	14·2	13·0	72·3	1944 *B*
1945	66	11·40	15	10·5	1	11·0	2	29·0	33·0	9·0	42·6	26·5	32·77	9·0	58·2	9·5	69·3	1945
1946	118	8·30	52	5·0	15	19·0	1	4·5	32·0	18·5	3·6	4·0	66·75	9·5	22·2	6·0	66·3	1946
1947	11	5·20	88	0·0	11	4·5	1	15·5	24·0	27·5	11·7	14·0	43·73	9·5	66·3	2·5	63·3	1947
1948 *B*	67	3·10	23	8·5	16	13·5	0	27·5	16·0	8·0	4·7	25·0	20·71	1·0	9·3	0·0	60·3	1948 *B*
1949	119	0·00	59	3·5	12	21·0	2	3·0	15·0	17·0	12·7	2·5	54·69	1·0	53·4	12·5	62·3	1949
1950	12	10·53	46	11·0	17	7·0	0	14·0	7·0	26·0	20·8	12·5	31·67	1·5	17·4	9·0	59·3	1950

* Add $\frac{1}{100}$ of the value for the year from table, P 29, Sect. VI and subtract 0·10 c.

Table 3 (*cont.*). Values of the Arguments for the beginnings of the years 1900 to 1950.

Arg.	58	59		60		61		62		63	64	65	66	67	68	Arg.
Period	d 2190·5	d 188·0	c 2	d 14·5	c 125	d 27·5	c 43	d 9·5	c 64	d 32·13	c 35	d 26·1	c 45	d 27·6	c 42	Period
Half day			c 5		c 171		c 53		c 205	Addition for Per. of Vert. Arg.	c 6		c 2		c 2	Addition for Per. of Vert. Arg.
	d	d	c	d	c	d	c	d	c	d	c	d	c	d	c	
1900	2100·1	123·0	3·13	7·0	96·2	10·0	16·1	3·0	6	23·21	20	11·1	30	6·2	28	1900
1901	274·6	111·5	4·11	0·5	49·2	12·0	40·1	1·0	34	2·67	19	10·7	13	12·7	12	1901
1902	639·7	100·5	0·08	8·5	127·1	14·5	11·2	8·5	126	14·26	13	10·3	41	19·2	37	1902
1903	1004·7	89·0	1·05	2·0	80·1	16·5	35·3	6·5	154	25·85	7	9·9	24	25·7	21	1903
1904 *B*	1370·7	78·5	2·02	11·0	158·0	20·0	6·4	5·5	182	6·31	7	10·5	7	5·7	7	1904 *B*
1905	1735·8	67·0	3·00	4·5	110·9	22·0	30·5	4·0	5	17·90	1	10·0	35	12·2	33	1905
1906	2100·8	55·5	3·97	13·0	17·9	24·5	1·5	2·0	33	29·49	30	9·6	18	18·7	17	1906
1907	275·3	44·0	4·94	6·0	141·8	26·5	25·6	0·0	61	8·95	29	9·2	2	25·2	0	1907
1908 *B*	641·3	34·0	0·92	0·5	94·8	2·0	6·7	8·5	153	21·54	23	9·8	30	5·1	28	1908 *B*
1909	1006·4	22·5	1·89	9·0	1·7	4·0	30·8	6·5	181	1·00	23	9·4	13	11·6	12	1909
1910	1371·4	11·0	2·86	2·0	125·7	6·5	1·8	5·0	4	12·59	17	9·0	41	18·1	38	1910
1911	1736·4	188·0	0·83	10·5	32·6	8·5	25·9	3·0	32	24·18	11	8·6	24	24·6	22	1911
1912 *B*	2102·4	177·5	1·81	4·5	156·5	11·5	50·0	2·0	60	4·64	11	9·2	7	4·6	7	1912 *B*
1913	277·0	166·0	2·78	13·0	63·5	14·0	21·1	0·0	88	16·23	4	8·8	36	11·1	33	1913
1914	642·0	154·5	3·75	6·5	16·4	16·0	45·2	7·5	180	27·82	33	8·4	19	17·6	17	1914
1915	1007·0	143·0	4·73	14·5	94·4	18·5	16·2	6·0	3	7·28	33	8·0	2	24·1	1	1915
1916 *B*	1373·0	133·0	0·70	9·0	47·3	21·5	40·3	5·0	31	19·87	27	8·6	30	4·0	28	1916 *B*
1917	1738·1	121·5	1·67	2·5	0·3	24·0	11·4	3·0	59	31·46	21	8·2	13	10·5	12	1917
1918	2103·1	110·0	2·65	10·5	78·2	26·0	35·5	1·0	87	10·92	21	7·8	41	17·0	38	1918
1919	277·6	98·5	3·62	4·0	31·1	0·5	16·6	8·5	179	22·51	14	7·4	25	23·6	22	1919
1920 *B*	643·7	88·0	4·59	13·0	109·1	3·5	40·6	8·0	2	2·97	14	8·0	8	3·5	8	1920 *B*
1921	1008·7	77·0	0·57	6·5	62·0	6·0	11·7	6·0	30	14·56	8	7·6	36	10·0	33	1921
1922	1373·7	65·5	1·54	0·0	15·0	8·0	35·8	4·0	58	26·15	2	7·1	19	16·5	17	1922
1923	1738·7	54·0	2·51	8·0	92·9	10·5	6·9	2·0	86	5·61	2	6·7	2	23·0	1	1923
1924 *B*	2104·8	43·5	3·49	2·5	45·9	13·5	31·0	1·0	114	18·20	31	7·3	30	3·0	29	1924 *B*
1925	279·3	32·0	4·46	10·5	123·8	16·0	2·0	9·0	1	29·79	25	6·9	14	9·5	12	1925
1926	644·3	21·0	0·43	4·0	76·8	18·0	26·1	7·0	29	9·25	24	6·5	42	16·0	38	1926
1927	1009·3	9·5	1·41	12·0	154·7	20·0	50·2	5·0	57	20·84	18	6·1	25	22·5	22	1927
1928 *B*	1375·4	187·0	4·38	6·5	107·6	23·5	21·3	4·0	85	1·30	18	6·7	8	2·4	8	1928 *B*
1929	1740·4	176·0	0·35	0·0	60·6	25·5	45·4	2·0	113	12·90	12	6·3	36	8·9	34	1929
1930	2105·4	164·5	1·33	8·0	138·5	0·0	26·4	0·0	141	24·49	6	5·9	19	15·4	17	1930
1931	279·9	153·0	2·30	1·5	91·5	2·0	50·5	8·0	28	3·95	5	5·5	2	21·9	1	1931
1932 *B*	646·0	142·5	3·27	10·5	169·4	5·5	21·6	7·0	55	16·54	34	6·1	31	1·9	29	1932 *B*
1933	1011·0	131·0	4·25	4·0	122·4	7·5	45·7	5·0	83	28·13	28	5·7	14	8·4	13	1933
1934	1376·0	120·0	0·22	12·5	29·3	10·0	16·8	3·0	111	7·59	28	5·3	42	14·9	38	1934
1935	1741·0	108·5	1·19	5·5	153·3	12·0	40·8	1·0	139	19·18	22	4·9	25	21·4	22	1935
1936 *B*	2107·1	98·0	2·17	0·0	106·2	15·5	11·9	0·0	167	31·77	16	5·5	8	1·3	8	1936 *B*
1937	281·6	86·5	3·14	8·5	13·1	17·5	36·0	8·0	54	11·23	15	5·1	36	7·8	34	1937
1938	646·6	75·0	4·11	1·5	137·1	20·0	7·1	6·0	82	22·82	9	4·7	20	14·3	18	1938
1939	1011·6	64·0	0·09	10·0	44·0	22·0	31·2	4·0	110	2·28	9	4·2	3	20·8	1	1939
1940 *B*	1377·7	53·5	1·06	4·0	168·0	25·5	2·2	3·0	138	14·87	3	4·8	31	0·8	29	1940 *B*
1941	1742·7	42·0	2·03	12·5	74·9	27·5	26·3	1·0	166	26·46	32	4·4	14	7·3	13	1941
1942	2107·7	30·5	3·01	6·0	27·9	2·0	7·4	9·0	53	5·92	32	4·0	42	13·8	39	1942
1943	282·3	19·0	3·98	14·0	105·8	4·0	31·5	7·0	81	17·51	25	3·6	25	20·3	23	1943
1944 *B*	648·3	8·5	4·95	8·5	58·8	7·5	2·6	6·0	109	30·10	19	4·2	9	0·2	8	1944 *B*
1945	1013·3	185·5	2·93	2·0	11·7	9·5	26·6	4·0	137	9·56	19	3·8	37	6·7	34	1945
1946	1378·3	174·0	3·90	10·0	89·6	11·5	50·7	2·0	165	21·15	13	3·4	20	13·3	18	1946
1947	1743·4	162·5	4·87	3·5	42·6	14·0	21·8	0·0	193	0·61	13	3·0	3	19·8	2	1947
1948 *B*	2109·4	152·5	0·85	12·5	120·5	17·0	45·9	9·0	80	13·20	7	3·6	31	27·3	27	1948 *B*
1949	283·9	141·0	1·82	6·0	73·5	19·5	17·0	7·0	108	24·79	1	3·2	14	6·2	13	1949
1950	648·9	129·5	2·79	14·0	151·4	21·5	41·0	5·0	136	4·25	0	2·8	43	12·7	39	1950

TABLE 3 (*cont.*). Values of the Arguments for the beginnings of the years 1900 to 1950.

Arg.	69	70	71		72		73		74		75		76		77		78	Arg.
Period	*d* 27·7	*c* 42	*d* 27·5	*c* 24	*d* 31·5	*c* 68	*d* 9·5	*c* 63	*d* 15·0	*c* 55	*d* 12·5	*c* 8	*d* 7·0	*c* 15	*d* 10·0	*c* 11	*d* 117·5	Period
Addition for Per. of Vert. Arg.		*c* 2	Half day	*c* 220		*c* 109		*c* 277		*c* 71		*c* 15		*c* 59		*c* 65		Half day
	d	*c*	*d*	*c*	*d*	*c*	*d*	*c*	*d*	*c*	*d*	*c*	*d*	*c*	*d*	*c*	*d*	
1900	26·1	26	22·5	71·23	4·0	1·00	7·0	228·8	14·5	22·8	3·0	9	4·0	27·2	0·5	32·8	71·5	1900
1901	3·5	12	1·5	175·20	19·0	15·97	7·0	50·8	10·0	51·9	10·5	14	5·5	29·4	2·5	26·9	84·0	1901
1902	8·5	38	8·5	83·17	2·0	71·94	6·5	149·8	6·0	9·9	5·5	10	0·0	16·5	4·5	21·0	96·5	1902
1903	13·6	22	15·0	211·14	17·0	86·91	6·0	248·8	1·5	39·0	0·5	6	1·5	18·7	6·5	15·0	109·0	1903
1904 *B*	19·6	6	23·0	119·11	1·5	33·88	7·0	70·8	13·5	52·0	9·0	11	4·0	20·9	9·5	9·1	4·5	1904 *B*
1905	24·7	32	2·5	3·08	16·5	48·85	6·5	169·9	9·5	10·1	4·0	7	5·5	23·0	1·0	57·2	17·0	1905
1906	2·0	18	9·0	131·05	31·5	63·82	6·0	268·9	5·0	39·1	11·5	12	0·0	10·2	3·0	51·3	29·5	1906
1907	7·1	2	16·0	39·02	15·0	10·79	6·0	90·9	0·5	68·1	6·5	8	1·5	12·3	5·0	45·4	42·0	1907
1908 *B*	13·1	28	23·5	167·00	31·0	25·76	6·5	189·9	13·0	10·2	2·5	4	4·0	14·5	8·0	39·5	55·0	1908 *B*
1909	18·2	11	3·0	50·97	14·0	81·73	6·5	11·9	8·5	39·2	10·0	9	5·5	16·7	0·0	22·6	67·5	1909
1910	23·2	37	9·5	178·94	29·0	96·70	6·0	110·9	4·0	68·2	5·0	5	0·0	3·8	2·0	16·6	80·0	1910
1911	0·6	23	16·5	86·91	12·5	43·67	5·5	210·0	0·0	26·3	0·0	2	1·5	6·0	4·0	10·7	92·5	1911
1912 *B*	6·6	7	24·0	214·88	28·5	58·63	6·5	32·0	12·0	39·3	8·5	6	4·0	8·1	7·0	4·8	105·5	1912 *B*
1913	11·6	33	3·5	98·85	12·0	5·60	6·0	131·0	7·5	68·3	3·5	2	5·5	10·3	8·5	63·9	0·5	1913
1914	16·7	17	10·5	6·83	27·0	20·57	5·5	230·0	3·5	26·4	11·0	7	7·0	12·5	0·5	47·0	13·0	1914
1915	21·7	1	17·0	134·80	10·0	76·54	5·5	52·0	14·5	39·4	6·0	3	1·0	58·6	2·5	41·1	25·5	1915
1916 *B*	0·1	29	25·0	42·77	26·0	91·51	6·0	151·0	11·0	68·5	2·0	0	4·0	1·8	5·5	35·2	38·5	1916 *B*
1917	5·2	13	4·0	146·74	9·5	38·48	5·5	250·0	7·0	26·5	9·5	4	5·5	3·9	7·5	29·2	51·0	1917
1918	10·2	38	11·0	54·71	24·5	53·45	5·5	72·1	2·5	55·5	4·5	0	7·0	6·1	9·5	23·3	63·5	1918
1919	15·2	22	17·5	182·69	8·0	0·42	5·0	171·1	13·5	68·6	12·0	5	1·0	52·3	1·5	6·4	76·0	1919
1920 *B*	21·3	6	25·5	90·66	24·0	15·39	5·5	270·1	10·5	26·6	8·0	1	3·5	54·4	4·5	0·5	89·0	1920 *B*
1921	26·3	32	4·5	194·63	7·0	71·36	5·5	92·1	6·0	55·7	2·5	13	5·0	56·6	6·0	59·6	101·5	1921
1922	3·7	18	11·5	102·60	22·0	86·33	5·0	191·1	2·0	13·7	10·5	2	6·5	58·7	8·0	53·7	114·0	1922
1923	8·7	2	18·5	10·58	5·5	33·30	5·0	13·1	13·0	26·7	5·0	13	1·0	45·9	0·0	36·8	9·0	1923
1924 *B*	14·8	28	26·0	138·55	21·5	48·26	5·5	112·1	9·5	55·8	1·0	10	3·5	48·1	3·0	30·8	22·0	1924 *B*
1925	19·8	12	5·5	22·52	4·5	104·23	5·0	211·2	5·5	13·8	8·5	14	5·0	50·2	5·0	24·9	34·5	1925
1926	24·9	38	12·0	150·50	20·0	10·20	5·0	33·2	1·0	42·8	3·5	11	6·5	52·4	7·0	19·0	47·0	1926
1927	2·2	23	19·0	58·47	3·0	66·17	4·5	132·2	12·0	55·9	11·5	0	1·0	39·6	9·0	13·1	59·5	1927
1928 *B*	8·3	7	26·5	186·44	19·0	81·14	5·0	231·2	9·0	13·9	7·0	11	3·5	41·7	1·5	61·2	72·5	1928 *B*
1929	13·3	33	6·0	70·41	2·5	28·11	5·0	53·2	4·5	43·0	2·0	8	5·0	43·9	3·5	55·3	85·0	1929
1930	18·4	17	12·5	198·39	17·5	43·08	4·5	152·2	0·5	1·0	9·5	12	6·5	46·0	5·5	49·4	97·5	1930
1931	23·4	1	19·5	106·36	0·5	99·05	4·0	251·2	11·5	14·0	4·5	9	1·0	33·2	7·5	43·4	110·0	1931
1932 *B*	1·8	29	27·5	14·33	17·0	5·02	5·0	73·3	8·0	43·1	0·5	5	3·5	35·4	0·5	26·5	5·5	1932 *B*
1933	6·8	13	6·5	118·30	0·0	60·98	4·5	172·3	4·0	1·1	8·0	9	5·0	37·5	2·5	20·6	18·0	1933
1934	11·9	39	13·5	26·28	15·0	75·95	4·0	271·3	15·0	14·2	3·0	6	6·5	39·7	4·5	14·7	30·5	1934
1935	17·0	23	20·0	154·25	30·0	90·92	4·0	93·3	10·5	43·2	10·5	10	1·0	26·8	6·5	8·8	43·0	1935
1936 *B*	23·0	6	0·5	38·22	14·5	37·89	4·5	192·3	7·5	1·2	6·5	7	3·5	29·0	9·5	2·9	56·0	1936 *B*
1937	0·3	34	7·0	166·20	29·5	52·86	4·5	14·3	3·0	30·3	1·5	3	5·0	31·2	1·0	51·0	68·5	1937
1938	5·4	18	14·0	74·17	12·5	108·83	4·0	113·4	14·0	43·3	9·0	7	6·5	33·3	3·0	45·0	81·0	1938
1939	10·4	2	20·5	202·14	28·0	14·80	3·5	212·4	10·0	1·4	4·0	4	1·0	20·5	5·0	39·1	93·5	1939
1940 *B*	16·5	28	1·0	86·12	12·0	70·76	4·5	34·4	6·5	30·4	0·0	0	3·5	22·6	8·0	33·2	107·0	1940 *B*
1941	21·5	12	7·5	214·09	27·0	85·73	4·0	133·4	2·0	59·4	7·5	5	5·0	24·8	0·0	16·3	1·5	1941
1942	26·6	38	14·5	122·06	10·5	32·70	3·5	232·4	13·5	1·5	2·5	1	6·5	27·0	2·0	10·4	14·0	1942
1943	4·0	24	21·5	30·04	25·5	47·67	3·5	54·4	9·0	30·5	10·0	5	1·0	14·1	4·0	4·5	26·5	1943
1944 *B*	10·0	8	1·5	134·01	9·5	103·64	4·0	153·4	5·5	59·6	6·0	2	3·5	16·3	6·5	63·6	40·0	1944 *B*
1945	15·0	33	8·5	41·99	25·0	9·60	3·5	252·5	1·5	17·6	0·5	13	5·0	18·4	8·5	57·6	52·0	1945
1946	20·1	17	15·0	169·96	8·0	65·57	3·5	74·5	12·5	30·6	8·5	3	6·5	20·6	0·5	40·7	64·5	1946
1947	25·1	1	22·0	77·94	23·0	80·54	3·0	173·5	8·0	59·7	3·0	14	1·0	7·8	2·5	34·8	77·0	1947
1948 *B*	3·5	29	2·0	181·91	7·5	27·51	3·5	272·5	5·0	17·7	12·0	4	3·5	9·9	5·5	28·9	90·5	1948 *B*
1949	8·5	13	9·0	89·89	22·5	42·48	3·5	94·5	0·5	46·7	7·0	0	5·0	12·1	7·5	23·0	102·5	1949
1950	13·6	39	15·5	217·86	5·5	98·44	3·0	193·5	11·5	59·8	1·5	11	6·5	14·3	9·5	17·1	115·0	1950

TABLE 3 (*cont.*). Values of the Arguments and of L, − ☊, ϖ for the beginnings of the years 1900 to 1950.

Arg.	l'	79	80	81	82	83	84	L (*a*)	− ☊ (*a*)	ϖ	Arg.
Period	*d* 365·26	*c* 73	*c* 73	*c* 73	*d* 6800	*d* 6800	*d* 6800	1296 00000	1296 0000	1296 000	Period
Addition for Period of l'		*c* 45·66	*c* 66·85	*c* 34·19				(units of 0″·01)	(units of 0″·1)	(units of 1″)	
	d	*c*	*c*	*c*	*d*	*d*	*d*				
1900	−1·55	49·48	45·20	33·80	3604	408	5492	933 75827 0	363 5021 0	1203 585	1900
1901	−1·81	22·15	39·04	67·98	3969	773	5857	103 54362 0	433 0835 0	53 970	1901
1902	−2·07	67·81	32·89	29·17	4335	1138	6222	569 32896 0	502 6650 0	200 355	1902
1903	−2·32	40·47	26·74	63·36	4700	1503	6588	1035 11431 0	572 2464 0	346 740	1903
1904 *B*	−1·58	13·14	20·58	24·54	5066	1869	154	252 33468 +1	642 0185 0	493 526	1904 *B*
1905	−1·84	58·80	14·43	58·73	5431	2234	519	718 12003 1	711 5999 0	639 911	1905
1906	−2·10	31·46	8·28	19·92	5796	2600	884	1183 90538 1	781 1814 0	786 296	1906
1907	−2·36	4·13	2·12	54·11	6161	2965	1249	353 69073 1	850 7628 0	932 680	1907
1908 *B*	−1·62	49·79	68·97	15·29	6527	3331	1615	866 91111 1	920 5349 0	1079 466	1908 *B*
1909	−1·88	22·46	62·82	49·48	92	3696	1980	36 69647 1	990 1163 0	1225 851	1909
1910	−2·14	68·12	56·66	10·67	457	4061	2345	502 48182 1	1059 6977 0	76 236	1910
1911	−2·40	40·78	50·51	44·86	822	4426	2711	968 26718 2	1129 2791 0	222 621	1911
1912 *B*	−1·66	13·45	44·35	6·04	1188	4792	3077	185 48757 2	1199 0512 0	369 407	1912 *B*
1913	−1·92	59·11	38·20	40·23	1553	5157	3442	651 27293 2	1268 6326 0	515 792	1913
1914	−2·18	31·77	32·05	1·42	1919	5522	3807	1117 05829 2	42 2140 0	662 177	1914
1915	−2·44	4·44	25·89	35·61	2284	5888	4172	286 84365 2	111 7955 0	808 562	1915
1916 *B*	−1·70	50·10	19·74	69·79	2650	6254	4538	800 06405 2	181 5675 0	955 347	1916 *B*
1917	−1·96	22·76	13·59	30·98	3015	6619	4903	1265 84941 2	251 1489 0	1101 732	1917
1918	−2·22	68·43	7·43	65·17	3380	184	5268	435 63478 3	320 7304 0	1248 117	1918
1919	−2·48	41·09	1·28	26·36	3745	549	5634	901 42015 3	390 3118 0	98 502	1919
1920 *B*	−1·74	13·75	68·13	60·54	4111	915	6000	118 64055 3	460 0838 0	245 288	1920 *B*
1921	−2·00	59·42	61·97	21·73	4476	1280	6365	584 42592 3	529 6652 0	391 673	1921
1922	−2·26	32·08	55·82	55·92	4841	1645	6730	1050 21129 3	599 2466 0	538 057	1922
1923	−2·52	4·74	49·66	17·10	5206	2010	295	219 99666 3	668 8280 0	684 442	1923
1924 *B*	−1·78	50·41	43·51	51·29	5572	2376	661	733 21707 3	738 6001 0	831 228	1924 *B*
1925	−2·04	23·07	37·36	12·48	5937	2742	1026	1199 00245 4	808 1815 0	977 613	1925
1926	−2·30	68·74	31·20	46·67	6303	3107	1391	368 78782 4	877 7629 0	1123 998	1926
1927	−2·56	41·40	25·05	7·85	6668	3472	1756	834 57320 4	947 3443 0	1270 382	1927
1928 *B*	−1·82	14·06	18·90	42·04	234	3838	2122	51 79361 4	1017 1163 0	121 168	1928 *B*
1929	−2·08	59·73	12·74	3·23	599	4203	2487	517 57900 4	1086 6977 0	267 553	1929
1930	−2·34	32·39	6·59	37·42	964	4568	2852	983 36438 4	1156 2791 0	413 938	1930
1931	−2·59	5·05	0·44	71·60	1329	4933	3218	153 14977 4	1225 8605 0	560 322	1931
1932 *B*	−1·85	50·72	67·28	32·79	1695	5299	3584	666 37018 5	1295 6325 0	707 108	1932 *B*
1933	−2·11	23·38	61·13	66·98	2060	5664	3949	1132 15557 5	69 2139 −1	853 493	1933
1934	−2·37	69·04	54·97	28·17	2425	6030	4314	301 94096 5	138 7953 1	999 878	1934
1935	−2·63	41·71	48·82	62·35	2790	6395	4679	767 72635 5	208 3767 1	1146 262	1935
1936 *B*	−1·89	14·37	42·67	23·54	3156	6761	5045	1280 94677 5	278 1487 1	1293 048	1936 *B*
1937	−2·15	60·04	36·51	57·73	3521	326	5410	450 73217 5	347 7301 1	143 433	1937
1938	−2·41	32·70	30·36	18·91	3887	691	5775	916 51756 5	417 3115 1	289 817	1938
1939	−2·67	5·36	24·21	53·10	4252	1056	6141	86 30296 6	486 8929 1	436 202	1939
1940 *B*	−1·93	51·03	18·05	14·29	4618	1422	6507	599 52339 6	556 6649 1	582 988	1940 *B*
1941	−2·19	23·69	11·90	48·48	4983	1787	72	1065 30879 6	626 2463 1	729 372	1941
1942	−2·45	69·35	5·75	9·66	5348	2152	437	235 09419 6	695 8277 1	875 757	1942
1943	−2·71	42·02	72·59	43·85	5713	2518	802	700 87959 6	765 4091 1	1022 142	1943
1944 *B*	−1·97	14·68	66·44	5·04	6079	2884	1168	1214 10002 6	835 1811 1	1168 927	1944 *B*
1945	−2·23	60·34	60·28	39·23	6444	3249	1533	383 88543 6	904 7625 1	19 312	1945
1946	−2·49	33·01	54·13	0·41	9	3614	1898	849 67084 7	974 3438 1	165 696	1946
1947	−2·75	5·67	47·98	34·60	375	3979	2263	19 45624 7	1043 9252 1	312 081	1947
1948 *B*	−2·01	51·34	41·82	68·79	741	4345	2629	532 67668 7	1113 6972 1	458 867	1948 *B*
1949	−2·27	24·00	35·67	29·98	1106	4710	2994	998 46209 7	1183 2786 1	605 251	1949
1950	−2·53	69·66	29·52	64·16	1471	5075	3359	168 24750 +7	1252 8599 −1	751 636	1950

TABLE 3 (*cont.*). Values of the Arguments for the beginnings of the years 1950 to 2000.

Arg.	D	1	2	3	4	5	6	7	8	9	10	Arg.
Period	d 29·530588	c 141	c 156	c 116	c 124	c 128	c 132	c 100	c 50	c 42	c 80	Period
Addition for Period of D		c 11·400	c 23·80	c 1·06	c 27·81	c 8·01	c 30·81	c 9·00	c 14·80	c 5·64	c 20·10	Addition for Period of D
	d	c	c	c	c	c	c	c	c	c	c	
1950	26·3369	135·648	20·46	91·98	37·24	48·16	12·30	75·49	23·47	22·91	30·60	1950
1951	7·4393	1·842	17·86	105·75	26·77	24·29	16·84	92·47	15·87	12·23	51·89	1951
1952 *B*	19·0722	138·637	147·45	2·47	112·49	120·41	122·56	0·45	43·46	37·91	53·08	1952 *B*
1953	0·1746	4·832	144·85	16·24	102·03	96·54	127·09	17·43	35·85	27·24	74·37	1953
1954	10·8075	0·627	118·45	28·96	63·75	64·66	100·81	25·41	13·45	10·92	75·56	1954
1955	21·4405	137·423	92·04	41·67	25·47	32·79	74·53	33·39	41·04	36·60	76·75	1955
1956 *B*	3·5428	3·617	89·44	55·45	15·00	8·92	79·06	50·36	33·43	25·93	18·04	1956 *B*
1957	14·1758	140·413	63·03	68·16	100·72	105·04	52·79	58·34	11·03	9·61	19·23	1957
1958	24·8087	136·208	36·63	80·88	62·45	73·16	26·51	66·32	38·62	35·30	20·42	1958
1959	5·9111	2·402	34·02	94·65	51·98	49·29	31·04	83·30	31·01	24·62	41·71	1959
1960 *B*	17·5440	139·198	7·62	107·37	13·70	17·41	4·76	91·28	8·61	8·30	42·90	1960 *B*
1961	28·1770	134·993	137·22	4·08	99·42	113·54	110·48	99·26	36·20	33·99	44·09	1961
1962	9·2793	1·188	134·61	17·86	88·95	89·67	115·01	16·24	28·59	23·31	65·38	1962
1963	19·9123	137·983	108·21	30·57	50·68	57·79	88·74	24·22	6·19	6·99	66·57	1963
1964 *B*	2·0146	4·178	105·60	44·35	40·21	33·92	93·27	41·19	48·58	38·32	7·86	1964 *B*
1965	12·6476	140·973	79·20	57·06	1·93	2·04	66·99	49·17	26·17	22·00	9·05	1965
1966	23·2805	136·768	52·80	69·78	87·65	98·16	40·71	57·15	3·77	5·68	10·24	1966
1967	4·3829	2·963	50·19	83·55	77·18	74·30	45·24	74·13	46·16	37·01	31·53	1967
1968 *B*	16·0158	139·758	23·79	96·27	38·91	42·42	18·96	82·11	23·75	20·69	32·72	1968 *B*
1969	26·6487	135·553	153·38	108·98	0·63	10·54	124·69	90·09	1·35	4·38	33·91	1969
1970	7·7511	1·748	150·78	6·76	114·16	114·67	129·22	7·07	43·74	35·70	55·20	1970
1971	18·3840	138·543	124·37	19·47	75·88	82·79	102·94	15·05	21·33	19·38	56·39	1971
1972 *B*	0·4864	4·738	121·77	33·25	65·42	58·92	107·47	32·02	13·73	8·71	77·68	1972 *B*
1973	11·1193	0·533	95·37	45·96	27·14	27·05	81·19	40·00	41·32	34·39	78·87	1973
1974	21·7523	137·328	68·96	58·68	112·86	123·17	54·91	47·98	18·91	18·07	0·06	1974
1975	2·8546	3·523	66·36	72·45	102·39	99·30	59·45	64·96	11·31	7·40	21·35	1975
1976 *B*	14·4876	140·318	39·95	85·17	64·11	67·42	33·17	72·94	38·90	33·08	22·54	1976 *B*
1977	25·1205	136·113	13·55	97·88	25·84	35·54	6·89	80·92	16·49	16·77	23·73	1977
1978	6·2229	2·308	10·94	111·66	15·37	11·67	11·42	97·89	8·89	6·09	45·02	1978
1979	16·8558	139·103	140·54	8·37	101·09	107·80	117·14	5·87	36·48	31·77	46·21	1979
1980 *B*	28·4888	134·898	114·14	21·09	62·81	75·92	90·86	13·85	14·07	15·46	47·40	1980 *B*
1981	9·5911	1·093	111·53	34·86	52·35	52·05	95·40	30·83	6·47	4·78	68·69	1981
1982	20·2241	137·888	85·13	47·58	14·07	20·17	69·12	38·81	34·06	30·46	69·88	1982
1983	1·3264	4·083	82·52	61·35	3·60	124·30	73·65	55·79	26·45	19·79	11·17	1983
1984 *B*	12·9594	140·878	56·12	74·07	89·32	92·42	47·37	63·77	4·05	3·47	12·36	1984 *B*
1985	23·5923	136·673	29·71	86·79	51·04	60·55	21·09	71·75	31·64	29·16	13·55	1985
1986	4·6947	2·868	27·11	100·56	40·58	36·68	25·62	88·72	24·03	18·48	34·84	1986
1987	15·3276	139·663	0·71	113·28	2·30	4·80	131·35	96·70	1·63	2·16	36·03	1987
1988 *B*	26·9606	135·458	130·30	9·99	88·02	100·92	105·07	4·68	29·22	27·85	37·22	1988 *B*
1989	8·0629	1·653	127·70	23·77	77·55	77·05	109·60	21·66	21·61	17·17	58·51	1989
1990	18·6959	138·448	101·29	36·48	39·27	45·17	83·32	29·64	49·21	0·85	59·70	1990
1991	29·3288	134·243	74·89	49·20	1·00	13·30	57·04	37·62	26·80	26·54	60·89	1991
1992 *B*	11·4312	0·438	72·28	62·97	114·53	117·43	61·57	54·60	19·19	15·86	2·18	1992 *B*
1993	22·0641	137·233	45·88	75·69	76·25	85·55	35·30	62·58	46·79	41·55	3·37	1993
1994	3·1665	3·428	43·28	89·46	65·78	61·68	39·83	79·55	39·18	30·87	24·66	1994
1995	13·7994	140·223	16·87	102·18	27·51	29·80	13·55	87·53	16·77	14·55	25·85	1995
1996 *B*	25·4324	136·018	146·47	114·89	113·23	125·92	119·27	95·51	44·37	40·24	27·04	1996 *B*
1997	6·5347	2·213	143·86	12·67	102·76	102·06	123·80	12·49	36·76	29·56	48·33	1997
1998	17·1677	139·008	117·46	25·38	64·48	70·18	97·52	20·47	14·35	13·24	49·52	1998
1999	27·8006	134·804	91·06	38·10	26·20	38·30	71·25	28·45	41·95	38·93	50·71	1999
2000 *B*	9·9030	0·998	88·45	51·87	15·74	14·43	75·78	45·42	34·34	28·25	72·00	2000 *B*

TABLE 3 (*cont.*). Values of the Arguments for the beginnings of the years 1950 to 2000.

Arg.	11	12	13	14	15	16	17	18	19	20	21	22	Arg.
Period	c 44	c 24	c 44	c 32	c 28	c 251	c 51	c 38	c 76	c 94	c 56	c 36	Period
Addition for Period of D	c 3·94	c 7·75	c 7·90	c 5·16	c 0·50	c 18·000	c 8·69	c 9·20	c 7·50	c 29·50	c 1·51	c 13·88	Addition for Period of D
	c	c	c	c	c	c	c	c	c	c	c	c	
1950	20·17	13·24	9·39	20·08	8·10	42·453	21·44	22·40	19·10	71·32	4·60	33·40	1950
1951	27·39	18·00	24·07	23·16	14·59	25·455	32·41	28·00	40·59	78·80	24·23	33·83	1951
1952 *B*	30·67	15·01	30·86	21·09	20·58	241·456	34·69	24·40	54·59	56·79	42·35	20·38	1952 *B*
1953	37·89	19·77	1·55	24·17	27·07	224·458	45·66	30·00	0·08	64·28	5·98	20·81	1953
1954	41·16	16·78	8·34	22·09	5·06	189·460	47·94	26·40	14·07	42·27	24·10	7·36	1954
1955	0·44	13·79	15·13	20·01	11·05	154·461	50·22	22·80	28·07	20·25	42·22	29·91	1955
1956 *B*	7·66	18·56	29·82	23·10	17·54	137·463	10·19	28·40	49·56	27·74	5·85	30·34	1956 *B*
1957	10·94	15·57	36·61	21·02	23·53	102·465	12·47	24·80	63·56	5·73	23·97	16·89	1957
1958	14·22	12·58	43·40	18·94	1·52	67·466	14·75	21·20	1·55	77·72	42·09	3·44	1958
1959	21·44	17·34	14·09	22·03	8·01	50·468	25·72	26·80	23·04	85·20	5·72	3·87	1959
1960 *B*	24·72	14·35	20·88	19·95	14·00	15·470	28·00	23·20	37·04	63·19	23·84	26·42	1960 *B*
1961	28·00	11·36	27·67	17·87	20·00	231·471	30·28	19·60	51·03	41·18	41·96	12·97	1961
1962	35·22	16·12	42·36	20·95	26·49	214·473	41·25	25·20	72·53	48·67	5·59	13·40	1962
1963	38·49	13·13	5·15	18·88	4·48	179·475	43·53	21·60	10·52	26·65	23·71	35·95	1963
1964 *B*	1·71	17·89	19·84	21·96	10·97	162·477	3·50	27·20	32·02	34·14	43·34	0·38	1964 *B*
1965	4·99	14·90	26·63	19·88	16·96	127·478	5·78	23·60	46·01	12·13	5·46	22·93	1965
1966	8·27	11·92	33·42	17·81	22·95	92·480	8·06	20·00	60·00	84·12	23·58	9·48	1966
1967	15·49	16·68	4·11	20·89	1·44	75·482	19·02	25·60	5·50	91·60	43·21	9·91	1967
1968 *B*	18·77	13·69	10·90	18·81	7·43	40·483	21·31	22·00	19·49	69·59	5·33	32·46	1968 *B*
1969	22·05	10·70	17·69	16·73	13·42	5·485	23·59	18·40	33·49	47·58	23·45	19·01	1969
1970	29·27	15·46	32·38	19·82	19·91	239·487	34·56	24·00	54·98	55·07	43·08	19·44	1970
1971	32·55	12·47	39·17	17·74	25·90	204·488	36·83	20·40	68·97	33·05	5·20	5·99	1971
1972 *B*	39·76	17·23	9·85	20·82	4·39	187·490	47·80	26·00	14·47	40·54	24·83	6·42	1972 *B*
1973	43·04	14·24	16·64	18·75	10·38	152·492	50·08	22·40	28·46	18·53	42·95	28·97	1973
1974	2·32	11·25	23·43	16·67	16·37	117·493	1·36	18·80	42·46	90·52	5·07	15·52	1974
1975	9·54	16·02	38·12	19·75	22·86	100·495	12·33	24·40	63·95	4·00	24·70	15·95	1975
1976 *B*	12·82	13·03	0·91	17·67	0·85	65·497	14·61	20·80	1·95	75·99	42·82	2·50	1976 *B*
1977	16·10	10·04	7·70	15·60	6·84	30·499	16·89	17·20	15·94	53·98	4·94	25·05	1977
1978	23·32	14·80	22·39	18·68	13·33	13·500	27·86	22·80	37·43	61·47	24·57	25·48	1978
1979	26·60	11·81	29·18	16·60	19·32	229·502	30·14	19·20	51·43	39·45	42·69	12·03	1979
1980 *B*	29·88	8·82	35·97	14·53	25·31	194·504	32·42	15·60	65·42	17·44	4·81	34·58	1980 *B*
1981	37·10	13·58	6·66	17·61	3·80	177·505	43·39	21·20	10·92	24·93	24·44	35·01	1981
1982	40·37	10·59	13·45	15·53	9·80	142·507	45·67	17·60	24·91	2·92	42·56	21·56	1982
1983	3·59	15·35	28·14	18·61	16·29	125·509	5·64	23·20	46·40	10·40	6·19	21·99	1983
1984 *B*	6·87	12·36	34·93	16·54	22·28	90·511	7·92	19·60	60·40	82·39	24·31	8·54	1984 *B*
1985	10·15	9·37	41·72	14·46	0·27	55·512	10·20	16·00	74·39	60·38	42·43	31·09	1985
1986	17·37	14·14	12·41	17·54	6·76	38·514	21·17	21·60	19·89	67·87	6·06	31·52	1986
1987	20·65	11·15	19·20	15·47	12·75	3·516	23·45	18·00	33·88	45·86	24·18	18·07	1987
1988 *B*	23·93	8·16	25·99	13·39	18·74	219·517	25·73	14·40	47·88	23·84	42·30	4·62	1988 *B*
1989	31·15	12·92	40·68	16·47	25·23	202·519	36·70	20·00	69·37	31·33	5·93	5·05	1989
1990	34·43	9·93	3·47	14·39	3·22	167·521	38·98	16·40	7·36	9·32	24·05	27·60	1990
1991	37·70	6·94	10·26	12·32	9·21	132·523	41·26	12·81	21·36	81·31	42·17	14·15	1991
1992 *B*	0·92	11·70	24·95	15·40	15·70	115·524	1·23	18·41	42·85	88·79	5·80	14·58	1992 *B*
1993	4·20	8·71	31·74	13·32	21·69	80·526	3·51	14·81	56·85	66·78	23·92	1·13	1993
1994	11·42	13·47	2·42	16·41	0·18	63·528	14·48	20·41	2·34	74·27	43·55	1·55	1994
1995	14·70	10·49	9·21	14·33	6·17	28·530	16·76	16·81	16·33	52·26	5·67	24·10	1995
1996 *B*	17·98	7·50	16·00	12·25	12·16	244·531	19·04	13·21	30·33	30·24	23·79	10·65	1996 *B*
1997	25·20	12·26	30·69	15·33	18·65	227·533	30·01	18·81	51·82	37·73	43·42	11·08	1997
1998	28·48	9·27	37·48	13·26	24·64	192·535	32·29	15·21	65·82	15·72	5·54	33·63	1998
1999	31·76	6·28	0·27	11·18	2·63	157·536	34·57	11·61	3·81	87·71	23·66	20·18	1999
2000 *B*	38·97	11·04	14·96	14·26	9·12	140·538	45·54	17·21	25·30	1·19	43·29	20·61	2000 *B*

TABLE P 12 (*concl.*). Vert. Arg. l'. Hor. Arg. 81.

Arg. d	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	Arg. d
0	7	7	7	7	8	8	8	8	8	8	9	9	9	10	9	9	9	9	0
10	8	8	8	8	8	8	8	8	8	9	9	9	9	9	9	9	9	8	10
20	8	8	8	8	8	8	8	8	8	8	9	9	8	8	8	8	8	8	20
30	9	9	9	9	9	9	8	8	8	8	8	8	8	8	7	7	7	7	30
40	9	9	9	9	9	9	9	8	8	8	8	7	7	7	7	6	6	7	40
50	10	10	9	9	9	9	8	8	8	8	7	7	6	6	6	6	6	6	50
60	10	10	10	9	9	9	8	8	8	7	7	6	6	5	5	5	5	6	60
70	10	10	10	9	9	9	8	8	7	7	6	5	5	5	5	5	5	6	70
80	11	10	10	9	9	8	8	7	7	6	5	5	4	4	4	4	5	5	80
90	11	10	10	9	9	8	8	7	6	5	5	4	4	4	4	4	4	5	90
100	11	10	10	9.	8	8	7	6	6	5	4	4	3	3	3	4	5	6	100
110	10	10	9	9	8	8	7	6	5	4	4	3	3	3	3	4	5	6	110
120	10	10	9	8	8	7	6	5	5	4	3	3	2	2	3	4	5	6	120
130	10	10	9	8	8	7	6	5	4	3	3	2	2	2	3	4	5	6	130
140	10	9	9	8	7	6	5	4	3	3	2	2	2	2	3	4	5	6	140
150	10	9	8	8	7	6	5	4	3	2	2	1	2	2	3	4	5	7	150
160	9	9	8	7	6	5	5	4	3	2	1	1	2	2	3	4	6	7	160
170	9	8	8	7	6	5	4	3	2	2	1	1	2	2	3	5	6	7	170
180	9	8	7	7	6	5	4	3	2	1	1	1	2	3	4	5	6	8	180
190	8	8	7	6	5	4	3	2	2	1	1	1	2	3	4	5	7	8	190
200	8	7	7	6	5	4	3	2	2	1	1	1	2	3	4	6	7	8	200
210	8	7	6	6	5	4	3	2	2	1	1	2	2	3	5	6	7	9	210
220	7	7	6	5	4	3	3	2	2	1	1	2	3	4	5	6	8	9	220
230	7	6	6	5	4	3	3	2	2	2	2	2	3	4	5	7	8	10	230
240	7	6	5	5	4	3	3	2	2	2	2	2	3	4	6	7	9	10	240
250	6	6	5	4	4	3	3	2	2	2	2	3	4	5	6	8	9	11	250
260	6	5	5	4	4	3	3	2	2	2	3	3	4	5	7	8	9	11	260
270	6	5	5	4	4	3	3	3	2	2	3	3	4	6	7	9	10	11	270
280	6	5	5	4	4	3	3	3	3	3	3	4	5	6	7	9	10	12	280
290	6	5	5	4	4	4	3	3	3	3	4	4	5	6	8	9	11	12	290
300	5	5	5	4	4	4	4	4	4	4	4	5	6	7	8	10	11	12	300
310	5	5	5	5	5	4	4	4	4	4	5	5	6	7	9	10	11	13	310
320	5	5	5	5	5	5	5	5	5	5	5	6	7	8	9	10	12	13	320
330	6	6	6	5	5	5	5	5	5	5	5	6	7	8	9	11	12	13	330
340	6	6	6	6	6	6	6	5	5	5	6	6	7	9	10	11	12	13	340
350	6	6	6	6	6	6	6	6	6	6	6	7	8	9	10	11	12	12	350
360	7	7	7	7	7	7	6	6	6	6	6	7	8	9	10	11	12	12	360
370	7	7	7	7	7	7	7	6	6	6	7	7	8	9	10	11	11	12	370

Arg. d	54	55	56	57	58	59	60	61	62	63	64	65	66	67	68	69	70	71	72	Arg. d
0	9	9	9	9	9	9	9	8	8	8	7	7	7	6	6	7	7	7	7	0
10	8	8	8	8	9	9	8	8	8	8	7	7	7	7	7	7	7	8	8	10
20	8	8	8	8	8	8	8	8	8	8	7	7	7	7	7	7	8	8	8	20
30	7	7	8	8	8	9	9	8	8	8	8	7	7	7	8	8	8	8	9	30
40	7	7	8	8	8	9	9	9	8	8	8	8	8	8	8	8	9	9	9	40
50	7	7	8	8	9	9	9	9	8	8	8	8	8	8	9	9	9	10	9	50
60	6	7	8	8	9	9	9	9	9	8	8	8	8	9	9	9	10	10	10	60
70	6	7	8	9	9	9	9	9	9	9	9	9	9	9	10	10	10	10	10	70
80	6	7	8	9	9	10	10	9	9	9	9	9	9	10	10	10	10	10	10	80
90	6	7	8	9	10	10	10	10	10	9	9	10	10	10	10	10	11	10	10	90
100	7	8	9	9	10	10	10	10	10	10	10	10	10	11	11	11	11	11	10	100
110	7	8	9	10	10	10	10	10	10	10	10	10	11	11	11	11	11	10	10	110
120	7	8	9	10	10	11	11	11	11	11	11	11	11	11	11	11	11	10	10	120
130	7	8	9	10	11	11	11	11	11	11	11	11	11	11	11	11	11	10	10	130
140	7	8	10	11	11	11	11	11	11	11	11	11	11	11	11	11	11	10	10	140
150	8	9	10	11	11	12	12	12	12	12	12	12	12	11	11	11	11	10	10	150
160	9	10	11	11	12	12	12	12	12	12	12	12	12	11	11	11	10	10	9	160
170	9	10	11	12	12	12	12	12	12	12	12	12	12	11	11	11	10	10	9	170
180	9	10	11	12	12	13	13	13	13	12	12	12	12	11	11	10	10	10	9	180
190	9	11	12	12	13	13	13	13	13	13	12	12	12	11	11	10	10	9	9	190
200	10	11	12	13	13	13	13	13	13	13	12	12	12	11	11	10	10	9	8	200
210	10	11	12	13	13	14	14	13	13	13	12	12	11	11	10	10	9	9	8	210
220	11	12	13	13	14	14	14	13	13	13	12	12	11	11	10	10	9	8	8	220
230	11	12	13	14	14	14	14	14	13	13	12	11	11	10	10	9	9	8	8	230
240	11	13	13	14	14	14	14	14	13	12	12	11	10	10	9	9	8	8	7	240
250	12	13	14	14	14	14	14	13	13	12	11	11	10	10	9	9	8	7	7	250
260	12	13	14	14	14	14	14	13	13	12	11	10	10	9	9	8	8	7	7	260
270	13	13	14	14	14	14	14	13	12	11	11	10	9	9	8	8	7	7	6	270
280	13	14	14	15	14	14	13	13	12	11	10	10	9	9	8	7	7	6	6	280
290	13	14	14	14	14	14	13	12	11	11	10	9	9	8	8	7	7	6	6	290
300	13	14	14	14	14	13	13	12	11	10	9	9	8	8	7	7	6	6	5	300
310	13	14	14	14	13	13	12	11	11	10	9	8	8	7	7	6	6	6	5	310
320	13	14	14	14	13	12	12	11	10	9	9	8	8	7	7	6	6	6	5	320
330	13	14	13	13	12	12	11	10	9	9	8	8	7	7	6	6	6	5	5	330
340	13	13	13	12	12	11	10	10	9	8	8	7	7	7	6	6	6	6	6	340
350	13	13	12	12	11	10	10	9	9	8	7	7	7	6	6	6	6	6	6	350
360	12	12	12	11	11	10	9	9	8	8	7	7	7	6	6	6	6	6	6	360
370	12	11	11	10	10	9	9	8	8	7	7	7	7	6	6	6	6	6	7	370

TABLE P 13. (Factor of Table 31, Sect. III.) Vert. Arg. l'. Hor. Arg. 79.

Arg. d	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	Arg. d
0	132	129	116	100	88	90	99	114	129	140	146	150	155	160	162	160	154	147	0
10	129	116	101	93	95	107	121	135	144	148	154	158	161	161	159	151	143	135	10
20	115	102	97	102	114	128	140	148	153	156	161	163	163	158	149	140	130	123	20
30	105	102	108	122	136	146	152	158	160	162	164	162	156	146	135	126	118	110	30
40	107	116	130	143	152	156	160	162	164	164	161	153	144	131	121	113	105	98	40
50	122	137	149	156	161	164	165	165	164	161	151	141	128	117	109	101	92	86	50
60	143	155	162	165	165	168	168	164	157	148	137	124	114	104	96	88	82	78	60
70	161	166	168	170	169	168	165	156	146	134	121	110	100	90	83	77	72	70	70
80	170	173	171	170	168	164	155	144	131	118	108	98	87	78	72	68	66	66	80
90	175	174	172	169	165	153	143	130	117	104	94	84	76	69	65	62	63	63	90
100	177	173	170	163	152	141	127	115	104	92	81	72	66	62	61	60	61	62	100
110	175	170	162	152	138	126	112	102	90	80	72	64	59	58	58	59	61	62	110
120	171	161	150	137	125	112	100	89	78	69	63	57	55	54	57	60	62	64	120
130	161	151	137	125	112	99	88	78	70	61	56	54	53	54	57	60	64	68	130
140	150	136	124	111	99	88	78	70	62	58	54	52	53	55	59	64	68	71	140
150	139	125	112	99	89	79	71	62	58	53	50	51	55	57	63	68	71	73	150
160	124	112	100	90	80	72	64	58	53	51	51	52	57	62	67	71	72	73	160
170	112	102	91	81	73	65	59	54	52	51	51	56	61	67	71	72	73	72	170
180	102	93	84	75	67	60	55	51	50	51	55	60	64	69	73	74	72	70	180
190	94	84	77	69	62	56	53	50	50	54	57	64	68	72	74	73	69	65	190
200	87	78	71	62	57	52	51	50	53	57	61	66	70	73	72	70	66	62	200
210	80	73	63	58	53	51	50	52	55	58	64	68	69	71	70	67	64	62	210
220	73	65	58	54	52	51	52	54	57	61	65	68	69	69	66	64	63	61	220
230	66	60	55	52	51	50	51	54	58	62	66	67	68	66	65	65	63	62	230
240	60	56	52	50	50	50	52	56	59	63	64	66	66	66	66	65	65	64	240
250	56	52	51	48	48	50	53	57	60	62	64	65	66	66	67	67	67	69	250
260	52	50	48	47	48	50	54	57	60	62	65	67	68	70	70	69	72	77	260
270	50	47	45	46	49	52	55	57	60	64	67	70	72	72	73	76	80	86	270
280	46	46	45	47	49	52	54	58	63	68	71	73	75	76	80	84	91	100	280
290	44	44	46	46	50	52	56	62	67	73	76	78	80	84	89	95	103	111	290
300	43	44	46	48	51	56	61	68	73	78	81	84	88	94	101	108	115	124	300
310	43	44	46	50	54	61	69	76	80	84	89	94	99	107	113	120	128	139	310
320	44	44	48	55	62	70	77	82	87	93	99	106	112	119	125	132	142	151	320
330	45	49	55	63	71	79	85	92	98	104	110	118	123	130	137	146	154	161	330
340	50	56	64	72	80	88	96	102	109	117	124	130	134	142	150	157	161	162	340
350	58	65	75	83	90	99	106	114	122	129	134	139	146	153	161	162	162	158	350
360	68	78	85	94	101	110	119	128	134	139	144	150	155	161	163	161	156	150	360
370	80	87	96	106	115	124	133	141	145	149	154	158	164	162	159	152	146	140	370

Arg. d	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	Arg. d
0	138	132	127	122	116	108	101	94	86	81	71	61	52	45	40	39	37	37	0
10	128	122	115	108	103	97	92	86	78	68	60	51	45	40	38	38	36	36	10
20	116	110	103	98	93	88	83	77	68	60	51	44	40	38	36	34	34	36	20
30	104	98	93	89	84	81	76	66	60	52	44	41	38	36	34	34	37	40	30
40	92	88	83	81	78	72	66	60	53	47	43	38	36	36	36	36	40	44	40
50	81	78	77	75	71	65	60	55	49	44	41	38	35	36	37	40	44	49	50
60	74	73	72	69	66	61	56	52	48	43	40	38	37	38	41	45	50	55	60
70	70	69	67	66	61	57	54	50	46	42	40	39	39	42	45	50	56	63	70
80	66	66	64	62	60	58	54	49	45	40	40	41	42	45	50	56	63	73	80
90	64	64	62	62	60	58	53	48	44	41	41	43	47	51	57	64	74	83	90
100	63	64	64	62	60	56	52	48	44	43	45	46	51	58	66	75	84	93	100
110	64	66	65	64	60	56	50	47	44	45	46	51	58	66	75	84	92	102	110
120	67	68	67	63	58	54	49	47	46	48	52	58	66	75	84	94	103	111	120
130	70	69	65	62	58	53	50	47	51	53	58	65	75	83	92	103	112	122	130
140	71	69	65	60	55	51	50	50	53	58	65	74	82	92	101	111	122	133	140
150	70	68	64	58	54	51	51	52	58	64	72	81	91	101	111	123	134	144	150
160	70	66	60	56	52	52	55	57	63	70	80	90	100	109	121	133	144	156	160
170	68	64	57	54	53	54	58	63	69	78	88	98	108	121	132	143	154	166	170
180	64	59	55	54	54	57	63	69	76	86	97	108	120	132	143	155	165	174	180
190	60	58	55	56	59	61	68	76	86	95	107	119	131	142	156	165	174	178	190
200	60	57	56	58	62	68	75	84	95	105	118	130	142	155	164	173	176	180	200
210	60	58	59	61	68	76	84	94	107	117	130	142	156	164	172	176	179	177	210
220	61	61	64	69	76	84	94	106	118	130	144	156	165	171	174	178	178	174	220
230	62	64	68	76	85	96	106	118	131	145	155	164	170	174	175	175	173	166	230
240	66	70	77	86	96	107	119	131	145	156	165	168	172	173	173	171	165	154	240
250	73	81	88	98	109	120	133	146	157	165	168	170	171	170	168	162	150	136	250
260	83	91	101	111	122	135	147	158	166	167	168	168	168	166	158	146	130	117	260
270	95	103	114	125	138	149	160	164	167	167	166	165	162	155	140	125	114	109	270
280	107	116	127	140	150	160	164	166	166	164	162	158	149	135	121	110	108	112	280
290	120	130	143	152	162	164	164	164	161	158	153	144	129	114	108	106	115	123	290
300	134	145	156	162	164	164	161	159	155	148	137	122	110	104	106	117	126	126	300
310	148	158	162	164	162	159	156	152	142	130	116	104	100	106	119	130	132	116	310
320	159	163	162	159	157	153	147	138	123	108	98	97	106	120	131	129	117	96	320
330	163	162	158	153	148	142	131	117	102	92	92	104	121	132	131	116	96	78	330
340	160	155	150	144	137	125	110	95	88	91	105	122	132	130	116	96	80	76	340
350	152	147	141	132	119	103	88	83	89	105	123	133	130	114	96	82	81	90	350
360	143	136	128	112	96	83	79	87	105	123	133	129	115	97	86	86	98	112	360
370	132	121	106	90	77	75	86	104	123	132	129	114	98	90	94	105	120	133	370

TABLE P 13 (*concl.*). Vert. Arg. *l′*. Hor. Arg. 79.

Arg. *d*	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	Arg. *d*
0	37	38	40	42	44	46	49	54	59	68	77	85	93	103	112	121	130	137	0
10	37	40	43	46	48	50	55	62	71	80	88	97	106	116	126	135	141	146	10
20	40	44	46	48	53	58	65	74	82	90	100	110	120	130	139	146	150	154	20
30	44	46	50	54	60	68	76	84	93	103	114	123	135	144	151	155	158	160	30
40	48	52	57	63	70	80	88	96	106	116	127	139	147	154	158	162	164	166	40
50	53	59	66	74	82	90	100	108	119	130	142	152	157	161	166	166	168	164	50
60	61	68	77	85	93	102	112	121	133	145	154	160	165	168	170	168	164	157	60
70	71	79	88	96	104	114	125	136	148	156	163	168	171	173	170	164	156	144	70
80	81	90	98	107	116	126	138	149	160	166	172	172	174	171	165	155	143	133	80
90	92	101	108	118	129	141	152	160	168	174	175	175	171	164	155	142	129	116	90
100	102	110	119	130	142	154	162	169	174	177	177	172	165	154	140	127	113	99	100
110	110	120	132	144	154	163	171	176	179	177	174	165	154	140	126	113	101	80	110
120	122	133	144	155	164	172	176	180	179	174	165	154	140	124	110	94	79	65	120
130	133	145	154	165	173	178	182	178	175	166	154	140	125	109	92	76	63	55	130
140	144	155	165	174	179	182	180	175	167	155	140	124	108	92	76	63	55	54	140
150	155	166	173	180	181	181	177	167	156	140	124	106	89	75	64	57	56	58	150
160	166	174	180	182	181	177	169	158	142	125	107	89	76	65	61	60	60	62	160
170	174	179	181	181	178	169	157	144	126	108	90	78	70	64	63	63	61	61	170
180	179	181	181	178	170	159	144	126	108	91	80	73	70	68	64	60	58	58	180
190	180	182	177	172	159	144	126	108	92	83	76	74	72	66	60	55	54	59	190
200	179	178	171	160	144	125	109	95	86	82	81	75	68	60	53	51	57	70	200
210	176	170	159	144	126	109	98	91	86	84	79	69	59	50	50	56	69	86	210
220	169	158	142	125	110	99	94	92	89	82	70	59	50	49	57	71	86	102	220
230	156	141	123	110	102	100	98	95	87	71	58	47	49	59	73	89	104	118	230
240	138	122	111	104	104	104	99	87	72	57	48	50	60	76	91	106	119	131	240
250	120	110	106	107	109	103	91	72	56	49	52	64	78	95	109	120	133	144	250
260	109	109	113	113	107	92	74	58	49	54	68	83	98	111	123	134	145	156	260
270	111	117	119	110	94	73	56	53	58	72	88	103	115	126	136	147	156	163	270
280	120	122	112	95	73	58	53	63	77	93	108	118	129	138	149	158	162	166	280
290	125	114	96	74	59	58	66	82	99	113	122	131	141	151	158	163	164	162	290
300	116	95	74	61	62	72	88	104	117	127	135	143	152	158	162	162	160	157	300
310	95	73	63	66	78	95	111	121	131	138	148	155	160	162	159	157	153	151	310
320	76	66	71	86	101	116	126	135	142	150	157	161	162	157	154	149	147	143	320
330	71	77	91	107	121	132	139	145	153	159	160	160	155	151	145	142	139	131	330
340	84	99	114	127	135	142	150	156	160	162	158	153	148	142	138	134	127	118	340
350	105	122	132	140	146	152	159	161	162	157	150	144	138	134	130	122	114	108	350
360	127	137	144	150	155	160	162	161	154	148	139	134	128	123	118	109	102	95	360
370	141	148	152	158	160	163	159	152	145	135	129	124	118	111	104	99	92	86	370

Arg. *d*	54	55	56	57	58	59	60	61	62	63	64	65	66	67	68	69	70	71	72	Arg. *d*
0	142	145	152	157	162	162	160	155	149	142	135	125	112	94	82	76	84	101	121	0
10	150	155	158	163	162	158	152	145	139	130	120	104	88	76	72	82	102	120	130	10
20	158	161	164	162	157	149	142	135	125	114	98	82	71	74	82	102	120	130	127	20
30	164	165	160	155	147	138	130	120	107	91	76	65	68	84	102	120	128	125	114	30
40	164	160	153	143	134	124	115	101	85	71	62	66	81	102	117	126	122	113	106	40
50	159	151	139	130	120	109	95	78	65	59	64	81	101	116	124	119	113	109	112	50
60	147	136	126	115	103	88	74	61	57	64	81	100	114	119	116	112	111	117	129	60
70	133	122	111	97	83	67	57	54	64	80	98	111	116	114	111	113	121	136	150	70
80	119	107	92	78	64	54	54	63	80	94	108	112	111	111	116	126	141	155	166	80
90	103	89	74	60	51	52	63	78	93	104	107	108	110	117	130	146	160	169	176	90
100	84	69	57	50	53	63	77	90	98	102	104	110	119	134	150	164	172	176	178	100
110	66	54	50	53	63	75	87	94	96	101	109	120	137	153	166	176	179	180	178	110
120	54	50	54	63	73	83	90	93	98	108	122	138	155	168	176	180	182	181	176	120
130	52	55	62	71	79	84	87	95	107	122	139	155	170	178	182	184	181	177	172	130
140	57	62	68	74	79	84	92	105	121	139	156	170	178	183	184	182	178	171	161	140
150	62	67	70	74	79	89	104	121	140	155	169	179	184	186	183	180	172	162	148	150
160	63	66	69	76	87	102	119	138	155	169	179	184	185	183	180	171	161	149	136	160
170	61	65	73	86	102	119	137	154	167	176	183	185	183	179	170	160	149	137	125	170
180	62	71	85	102	119	136	152	165	175	182	184	182	177	170	160	149	137	126	114	180
190	69	84	101	118	135	150	163	174	181	183	182	177	170	160	148	137	125	114	103	190
200	84	101	118	133	148	162	172	179	182	181	175	169	159	148	138	126	113	104	96	200
210	102	117	132	147	160	170	178	180	180	174	167	159	148	137	125	114	105	96	88	210
220	117	132	146	158	169	174	179	178	173	167	158	148	137	124	113	105	96	88	80	220
230	130	145	158	167	173	176	175	172	166	156	149	136	123	113	104	96	88	81	72	230
240	144	156	166	172	174	173	170	164	155	147	135	123	112	103	96	88	81	74	66	240
250	156	165	170	172	170	168	162	156	146	134	122	110	102	94	88	80	72	66	60	250
260	164	168	169	168	166	160	153	144	132	120	110	101	92	86	79	71	64	60	56	260
270	168	167	166	162	158	153	141	131	118	108	100	90	85	77	69	62	58	54	52	270
280	164	164	160	156	148	140	129	117	106	97	88	82	73	66	61	56	53	50	48	280
290	160	157	153	147	138	126	115	104	96	87	79	70	63	58	54	52	50	48	45	290
300	154	150	145	136	123	112	104	92	85	76	58	62	57	53	50	48	46	44	44	300
310	147	140	132	120	110	100	91	81	72	63	56	52	51	49	48	45	43	42	43	310
320	136	127	118	108	98	88	79	68	60	54	50	47	47	45	44	42	42	43	43	320
330	123	113	105	94	86	76	67	58	51	49	44	44	44	42	42	41	42	43	44	330
340	110	101	92	84	74	64	55	48	44	43	42	41	40	40	40	42	44	44	45	340
350	98	90	82	72	62	54	46	42	40	40	40	39	40	40	43	43	45	46	51	350
360	88	79	70	61	52	45	41	41	38	37	37	39	40	43	44	45	48	53	59	360
370	78	69	58	51	44	40	37	37	36	36	37	40	43	45	46	50	55	62	70	370

TABLE P 14. (Factor of Table 31, Sect. III.) Vert. Arg. l'. Hor. Arg. 80.

Arg. *d*	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	Arg. *d*
0	59	63	67	70	72	72	72	69	66	62	57	52	47	44	42	40	41	44	0
10	64	68	71	72	73	72	70	67	63	59	54	51	47	46	45	46	50	56	10
20	69	71	73	73	72	71	68	64	61	57	54	52	50	49	52	56	62	70	20
30	71	73	74	74	72	70	67	64	61	57	56	55	56	58	62	68	76	85	30
40	74	75	75	74	72	69	66	64	62	60	60	61	64	68	75	82	92	103	40
50	76	76	76	75	73	70	68	67	66	66	67	70	74	80	88	98	107	118	50
60	79	78	78	76	75	74	72	72	71	74	76	81	87	94	102	112	122	133	60
70	82	82	81	80	79	78	78	78	80	82	86	92	98	107	115	125	135	145	70
80	86	86	84	84	83	83	84	86	88	92	97	104	110	118	128	137	146	154	80
90	92	90	90	89	89	89	91	93	96	101	106	113	120	129	138	146	154	162	90
100	96	95	95	95	96	97	98	101	104	110	116	123	130	138	146	153	160	165	100
110	101	101	100	100	102	103	105	108	113	118	124	131	139	146	152	158	162	166	110
120	106	105	106	106	106	108	111	115	121	126	132	139	145	152	157	160	163	164	120
130	110	110	110	110	111	114	117	122	126	132	138	144	150	155	159	161	161	160	130
140	113	112	112	113	116	119	123	128	133	138	144	149	154	157	159	159	158	156	140
150	114	115	116	118	120	125	129	133	138	144	149	152	156	157	158	156	153	149	150
160	117	118	119	122	125	130	134	139	144	148	153	155	156	156	154	151	145	140	160
170	119	121	124	127	130	135	140	145	149	152	155	156	154	152	149	143	137	128	170
180	122	125	129	133	137	142	146	150	152	154	155	154	151	146	141	134	126	116	180
190	126	130	134	138	142	146	150	154	155	154	152	149	144	138	131	122	113	104	190
200	132	136	140	144	146	152	154	155	154	152	148	142	135	128	119	109	99	90	200
210	137	142	146	149	153	154	154	154	150	145	139	132	124	114	105	95	86	78	210
220	144	146	150	153	155	153	152	148	143	136	129	120	111	100	91	82	74	66	220
230	149	151	153	154	152	150	146	140	133	124	116	106	96	86	78	70	62	58	230
240	151	152	152	151	148	142	136	128	120	110	101	90	82	73	66	60	55	52	240
250	151	150	148	144	139	131	124	114	105	95	86	77	68	62	57	52	50	49	250
260	147	144	140	134	126	117	109	99	90	80	71	64	58	53	50	49	48	50	260
270	140	135	128	120	111	102	92	84	75	66	60	55	51	48	48	49	50	52	270
280	128	121	113	105	95	86	77	69	62	56	51	49	47	48	49	51	54	57	280
290	114	106	97	88	79	72	63	58	52	48	47	46	47	50	52	55	58	61	290
300	98	90	81	72	65	58	53	49	46	46	46	48	50	53	57	61	64	65	300
310	82	74	66	60	53	49	46	44	44	46	48	51	54	59	62	65	68	68	310
320	67	60	54	49	45	43	42	43	45	48	52	56	61	64	67	69	69	68	320
330	54	49	45	42	40	40	42	45	49	53	58	62	66	69	70	70	69	66	330
340	44	42	40	39	40	42	45	50	54	59	63	66	70	71	72	70	67	63	340
350	39	38	38	39	41	46	50	55	59	64	68	70	72	72	70	67	64	59	350
360	36	37	39	42	46	51	56	60	64	68	71	73	72	71	68	64	60	54	360
370	36	39	42	47	51	56	61	66	69	71	73	73	71	68	65	61	56	51	370

Arg. *d*	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	Arg. *d*
0	50	57	66	78	92	105	118	132	145	156	166	175	180	184	185	184	181	177	0
10	63	73	85	98	110	124	138	150	160	170	178	183	186	187	184	182	177	170	10
20	80	91	104	117	130	142	154	165	173	181	185	188	187	185	181	176	168	161	20
30	97	109	122	134	146	158	168	176	182	186	188	187	185	180	174	166	159	151	30
40	115	127	139	150	161	170	177	182	186	186	186	182	177	171	164	155	147	139	40
50	130	141	152	162	170	176	182	185	186	183	180	174	168	161	153	145	136	129	50
60	144	154	162	171	176	180	183	183	181	177	172	164	157	149	141	132	124	117	60
70	154	163	170	175	178	181	180	178	174	167	160	153	144	136	128	120	112	107	70
80	162	168	173	176	177	176	174	169	163	156	149	140	131	123	116	108	102	97	80
90	167	171	174	175	174	170	166	159	152	144	139	126	118	111	103	97	92	88	90
100	169	170	170	170	166	160	155	147	140	130	122	114	106	100	94	89	84	80	100
110	167	167	165	162	157	150	143	135	126	118	110	102	96	89	84	81	77	74	110
120	164	161	158	153	146	138	130	122	113	105	98	91	84	80	77	74	71	69	120
130	158	155	149	142	134	126	118	109	101	93	87	81	77	73	70	68	66	65	130
140	151	145	138	130	122	113	105	97	89	83	77	73	70	67	64	64	63	62	140
150	142	135	127	118	110	101	93	85	78	74	69	66	64	61	60	60	60	59	150
160	132	123	114	106	98	89	80	75	70	66	63	60	59	58	58	58	58	56	160
170	120	111	102	93	85	78	71	67	63	60	58	57	56	56	56	56	55	54	170
180	107	98	90	81	74	68	63	59	58	56	55	54	54	54	54	54	52	51	180
190	94	85	77	71	65	60	57	55	54	53	53	54	54	53	52	52	50	48	190
200	82	74	68	60	57	55	53	52	52	52	53	53	53	52	51	49	48	44	200
210	70	63	58	55	53	52	51	51	52	52	53	53	52	50	48	46	42	38	210
220	60	56	52	52	49	51	52	52	52	53	52	52	50	48	44	41	37	32	220
230	54	51	50	50	51	52	52	52	54	54	52	50	47	44	40	35	31	27	230
240	50	50	50	51	52	53	54	54	55	53	50	47	43	38	34	30	26	23	240
250	50	50	52	53	54	56	57	55	53	51	46	42	38	34	28	24	22	20	250
260	51	53	55	57	58	58	57	54	51	46	42	38	32	27	23	20	19	21	260
270	54	57	59	60	60	58	56	52	47	42	37	32	26	22	20	19	21	24	270
280	59	61	61	61	60	57	52	48	43	37	31	26	22	19	19	22	25	30	280
290	63	64	63	61	58	54	49	43	36	32	26	22	20	20	22	26	33	42	290
300	66	64	63	60	55	49	43	37	31	27	23	21	22	24	29	36	46	57	300
310	66	64	61	56	50	43	38	32	27	24	22	23	27	33	40	50	62	74	310
320	66	62	56	50	44	38	33	29	25	25	25	30	36	44	55	67	80	94	320
330	63	57	51	44	39	34	30	28	28	29	34	40	50	60	73	86	101	115	330
340	58	52	46	40	36	33	31	31	34	38	45	55	66	80	93	107	122	135	340
350	54	48	43	38	36	34	35	38	44	51	61	72	85	100	114	128	141	153	350
360	49	45	41	39	38	40	43	49	57	67	79	92	106	121	134	147	157	168	360
370	48	44	42	43	45	49	54	63	74	85	99	113	126	140	151	162	171	178	370

TABLE P 14 (*concl.*). Vert. Arg. *l′*. Hor. Arg. 80.

Arg. *d*	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	Arg. *d*
0	170	164	157	150	142	137	131	126	121	119	116	114	111	110	108	105	102	98	0
10	163	154	148	141	135	129	123	119	115	112	109	107	105	102	99	96	93	87	10
20	153	146	139	132	126	120	115	112	108	105	102	100	97	95	91	88	83	78	20
30	143	136	128	122	117	112	108	104	102	98	95	92	90	87	83	78	73	68	30
40	132	125	118	113	108	104	100	97	95	91	88	86	82	79	74	69	64	59	40
50	121	115	109	103	100	96	93	90	87	84	82	79	75	70	66	62	57	52	50
60	111	104	100	96	92	90	86	84	81	78	76	72	68	64	60	55	50	46	60
70	101	96	92	88	86	83	80	78	76	72	69	66	62	58	54	50	46	42	70
80	92	88	85	82	80	77	75	72	70	68	64	59	57	53	49	44	41	38	80
90	84	81	78	76	75	72	71	68	66	63	59	56	52	49	45	41	39	37	90
100	78	75	74	72	69	68	66	64	61	58	54	51	48	44	42	39	37	36	100
110	72	70	68	67	66	64	62	60	57	54	51	47	44	41	39	37	36	36	110
120	67	66	65	63	62	61	58	56	52	49	46	43	40	39	37	36	36	37	120
130	64	63	62	60	60	57	54	51	48	45	43	40	38	36	36	36	38	40	130
140	60	60	59	57	55	53	50	47	44	42	38	37	36	35	36	38	41	44	140
150	58	58	56	54	51	49	46	43	40	38	36	35	35	36	38	41	45	51	150
160	55	54	52	50	47	44	41	38	36	34	34	34	35	38	42	47	52	59	160
170	52	51	48	46	42	40	36	34	33	33	33	34	38	42	47	54	60	69	170
180	50	47	44	40	37	35	32	31	31	32	34	38	42	48	55	64	72	80	180
190	45	42	38	35	32	31	29	30	30	33	37	44	50	58	65	75	84	94	190
200	40	36	32	31	28	28	28	30	33	38	43	51	59	68	77	88	98	106	200
210	34	31	28	26	26	26	28	32	38	44	53	61	71	81	92	101	111	118	210
220	30	26	24	24	25	27	32	38	47	54	64	74	85	95	105	114	122	130	220
230	24	23	23	24	27	32	39	47	57	66	78	88	99	109	118	126	133	138	230
240	21	22	24	27	33	39	49	59	70	81	92	103	114	122	130	136	142	144	240
250	21	23	27	33	42	51	62	73	86	97	108	118	127	135	141	145	147	148	250
260	23	28	35	43	54	65	77	90	101	112	123	132	139	145	148	150	151	150	260
270	29	36	45	57	68	81	94	106	117	128	137	144	149	152	153	154	152	150	270
280	39	49	60	73	86	98	111	123	133	142	148	153	156	156	156	154	152	148	280
290	53	64	78	91	104	117	128	139	146	154	158	159	160	159	157	154	150	146	290
300	69	82	96	110	122	134	145	153	158	162	164	163	162	159	156	152	146	143	300
310	88	102	116	129	140	150	157	163	166	168	167	165	162	158	153	148	142	139	310
320	109	123	135	146	155	162	168	171	171	170	168	164	159	154	148	143	138	136	320
330	128	141	152	160	168	172	175	175	174	170	166	161	155	149	143	138	134	130	330
340	147	158	166	172	177	178	178	176	172	167	162	156	150	143	138	133	130	126	340
350	163	171	176	180	182	181	178	173	168	162	156	148	143	138	132	128	124	122	350
360	175	180	183	184	183	179	175	168	162	155	148	141	135	130	126	122	118	117	360
370	184	186	186	184	180	174	168	161	154	146	140	133	128	123	118	116	113	110	370

Arg. *d*	54	55	56	57	58	59	60	61	62	63	64	65	66	67	68	69	70	71	72	Arg. *d*
0	93	89	83	76	69	63	57	51	46	41	39	37	36	36	38	41	45	50	54	0
10	82	78	71	64	59	53	47	43	39	36	35	35	36	38	42	46	50	55	60	10
20	72	66	60	54	49	44	40	37	35	33	34	36	38	42	46	51	55	60	65	20
30	62	57	51	46	42	38	36	34	34	34	35	39	42	47	51	56	60	65	68	30
40	54	48	44	40	36	34	33	33	34	36	39	42	48	52	57	62	66	70	72	40
50	47	42	40	37	34	34	34	35	37	39	43	48	52	57	62	66	69	73	75	50
60	42	38	36	34	34	34	36	37	40	44	48	53	58	62	66	70	74	76	78	60
70	39	36	35	35	35	36	38	41	44	49	53	59	63	68	72	76	78	80	81	70
80	36	35	35	35	36	38	42	46	50	55	60	65	70	74	77	81	83	85	86	80
90	35	35	35	37	38	41	46	51	56	61	66	70	76	81	85	88	89	90	91	90
100	36	36	37	40	44	48	53	58	63	68	74	78	84	88	91	92	94	96	96	100
110	37	38	42	45	50	54	60	66	71	77	82	87	91	95	98	100	101	101	101	110
120	40	43	46	51	56	62	68	74	80	86	91	96	100	103	105	106	106	106	106	120
130	44	48	52	59	64	71	78	84	89	96	100	104	108	110	111	112	112	111	110	130
140	49	54	61	67	74	81	88	94	100	106	110	112	115	116	116	116	116	115	113	140
150	57	63	70	78	84	92	98	106	110	114	118	119	120	121	121	120	118	117	115	150
160	66	74	81	89	96	103	110	115	119	122	124	124	125	125	123	121	120	118	117	160
170	77	86	93	101	108	114	120	123	126	128	129	128	127	126	123	121	120	119	119	170
180	89	98	105	112	119	124	127	130	132	132	131	130	127	125	124	122	121	120	121	180
190	102	110	117	122	128	131	133	134	134	134	132	129	126	126	123	122	122	122	124	190
200	114	121	127	131	135	137	138	136	135	133	130	128	126	124	124	124	124	125	129	200
210	126	130	135	138	140	140	139	136	134	132	129	127	125	124	125	126	127	130	134	210
220	134	138	141	141	141	140	137	134	133	130	128	127	126	125	127	130	132	136	140	220
230	142	143	144	143	141	138	136	133	130	129	128	126	127	128	131	134	137	141	145	230
240	146	146	144	142	139	136	134	131	129	128	128	129	130	132	135	139	142	146	149	240
250	148	146	144	140	138	134	132	130	129	129	129	132	134	136	140	144	146	148	150	250
260	148	145	142	138	135	132	131	130	129	130	132	135	137	140	143	146	148	149	149	260
270	146	143	139	136	134	131	130	130	130	132	134	137	140	142	145	146	147	145	143	270
280	144	140	137	134	132	130	130	131	132	134	137	139	141	142	143	143	141	138	134	280
290	142	138	135	132	131	131	131	132	134	136	137	139	140	140	138	136	133	128	121	290
300	139	135	133	131	130	130	132	132	134	135	136	136	135	133	130	126	121	114	107	300
310	136	132	130	129	130	130	131	132	132	132	132	130	128	124	119	113	107	99	91	310
320	132	130	129	128	128	128	128	128	127	126	124	121	117	112	105	99	92	84	75	320
330	129	127	126	125	124	124	124	122	120	118	114	110	104	99	91	84	76	68	61	330
340	125	123	122	121	120	119	117	116	112	108	103	97	91	84	77	68	62	56	49	340
350	120	119	118	116	114	112	109	106	101	96	90	84	77	70	63	56	50	45	41	350
360	115	113	111	109	106	104	100	95	89	84	77	71	64	58	51	46	42	38	37	360
370	108	107	104	101	97	93	89	84	78	71	66	59	52	47	42	38	36	36	35	370

Table P 15. (Factor of Table 31, Sect. III.) Vert. Arg. l'. Hor. Arg. 81.

Arg. *d*	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	Arg. *d*
0	15	15	15	14	14	14	15	16	18	21	24	29	34	38	42	47	50	51	0
10	15	15	15	16	16	16	17	18	21	24	28	32	37	42	46	49	51	52	10
20	16	16	16	16	17	18	20	21	24	28	31	36	40	44	48	51	52	53	20
30	16	17	18	18	19	20	22	24	27	30	33	38	42	46	50	53	53	52	30
40	18	18	20	21	21	23	24	28	29	32	36	40	44	49	51	52	53	52	40
50	18	20	21	23	24	26	28	29	32	34	38	42	46	50	52	53	53	51	50
60	20	22	24	25	27	28	30	31	34	37	40	44	48	50	52	53	52	49	60
70	23	25	27	27	29	30	32	34	36	39	42	45	50	51	52	52	51	48	70
80	25	27	28	30	31	32	33	35	38	40	44	47	49	51	51	51	48	44	80
90	28	29	31	32	33	34	36	38	38	42	45	47	49	51	51	49	45	41	90
100	30	32	33	34	35	35	36	38	40	42	44	48	49	50	49	46	42	37	100
110	32	34	35	36	36	37	38	39	41	44	45	48	49	48	46	44	39	34	110
120	34	36	36	38	37	38	39	40	41	43	46	47	47	47	44	40	36	30	120
130	36	38	38	38	38	39	39	41	42	43	45	47	46	44	42	37	32	26	130
140	38	40	40	40	39	39	40	40	42	43	44	44	44	42	38	34	28	22	140
150	39	40	40	40	40	39	39	40	42	43	43	44	42	39	35	30	25	20	150
160	41	42	41	40	40	40	40	41	41	42	42	41	39	36	32	26	21	16	160
170	43	42	42	41	40	39	39	41	40	41	40	38	37	33	28	23	18	14	170
180	43	43	41	40	40	39	40	40	40	39	38	36	33	29	24	20	15	12	180
190	44	43	42	40	39	39	38	38	38	38	36	34	30	26	20	17	13	11	190
200	44	43	42	40	39	37	38	38	37	36	34	30	26	22	18	14	12	10	200
210	44	42	41	40	38	37	36	36	35	33	31	27	23	19	15	12	10	10	210
220	44	42	41	38	37	36	35	34	33	30	27	24	20	16	12	10	10	11	220
230	44	42	39	37	35	35	34	33	30	27	24	20	16	14	10	10	10	12	230
240	42	41	38	36	34	33	32	29	27	24	20	18	14	11	10	10	11	14	240
250	42	38	36	34	34	31	30	27	25	21	18	14	12	10	10	10	14	17	250
260	40	37	35	32	31	29	26	24	22	18	14	12	9	9	10	12	16	20	260
270	37	36	33	31	29	27	24	21	18	15	12	9	9	9	12	14	19	24	270
280	36	33	31	30	27	24	22	18	15	12	10	8	8	10	13	18	22	27	280
290	34	31	29	26	24	21	19	16	13	9	9	8	9	12	16	21	26	31	290
300	32	29	27	24	21	18	15	12	11	8	8	8	12	15	20	25	30	34	300
310	29	26	24	22	19	16	14	10	9	8	8	10	13	18	23	28	33	38	310
320	27	24	22	19	17	14	12	10	8	8	9	12	16	22	27	32	38	41	320
330	24	22	20	17	14	12	10	8	8	9	11	15	20	26	32	37	42	44	330
340	22	20	18	16	12	11	10	8	9	10	14	18	24	30	36	40	44	47	340
350	20	18	16	14	12	10	9	10	11	13	17	22	28	34	40	44	48	49	350
360	18	16	15	13	11	10	10	11	13	16	20	26	33	38	43	47	50	50	360
370	18	16	14	13	12	11	11	13	16	20	25	31	36	42	47	49	52	52	370

Arg. *d*	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	Arg. *d*
0	52	51	50	47	44	42	38	35	32	29	27	26	24	22	21	20	18	16	0
10	52	51	48	45	43	38	35	31	29	26	24	22	21	20	20	19	17	16	10
20	52	50	47	43	39	34	30	27	25	23	21	20	19	18	18	17	16	15	20
30	52	49	45	40	36	32	28	24	22	20	19	19	18	18	18	17	16	15	30
40	50	47	42	38	32	28	24	22	19	18	17	17	17	18	17	17	16	16	40
50	48	44	39	33	29	25	21	18	17	16	16	16	17	17	17	17	17	17	50
60	46	40	35	30	26	21	18	16	14	15	16	16	17	18	18	18	18	18	60
70	42	37	32	26	21	17	16	14	13	14	15	16	17	18	19	20	19	21	70
80	39	33	28	23	18	15	13	12	13	14	15	16	18	19	20	21	22	22	80
90	35	30	24	20	15	14	12	12	13	14	16	18	19	20	21	22	24	25	90
100	32	26	20	16	12	11	11	11	13	14	17	18	21	22	22	25	26	26	100
110	28	22	17	13	12	10	10	12	14	16	18	20	22	24	25	26	28	30	110
120	24	18	14	12	10	10	11	12	16	17	19	22	24	26	26	28	30	32	120
130	21	16	12	10	9	10	12	14	16	19	22	24	26	28	29	31	32	34	130
140	18	13	11	10	10	10	13	16	18	21	23	26	27	29	31	33	35	37	140
150	15	12	10	10	10	12	15	18	20	22	25	27	29	30	33	34	37	39	150
160	13	10	9	10	12	14	17	20	22	25	27	28	30	33	35	37	39	41	160
170	11	10	10	11	13	16	19	21	24	27	28	30	32	35	37	39	41	42	170
180	10	10	11	12	15	19	22	24	26	28	30	32	34	36	39	40	43	43	180
190	10	10	12	15	18	21	24	26	28	30	32	34	36	38	40	41	43	44	190
200	10	12	14	17	20	23	25	28	29	32	33	35	38	40	42	44	45	44	200
210	12	14	17	20	23	26	28	30	31	33	35	37	40	41	44	45	45	45	210
220	12	16	19	22	25	27	29	31	33	34	36	38	41	43	44	45	46	44	220
230	15	18	22	26	28	30	32	32	34	36	38	40	42	44	46	46	45	43	230
240	18	22	25	28	30	32	33	34	36	37	39	41	43	45	46	46	44	42	240
250	20	24	29	32	32	34	35	36	37	38	40	43	44	45	46	45	44	41	250
260	24	28	31	34	35	35	37	37	38	40	42	44	45	46	46	43	42	40	260
270	28	31	34	36	38	37	38	39	39	41	42	44	45	45	44	43	40	38	270
280	30	35	37	38	39	40	39	39	40	42	44	44	45	44	43	41	38	35	280
290	35	37	40	40	40	40	40	40	41	42	43	43	43	42	42	39	36	33	290
300	38	40	42	42	42	40	40	41	42	42	43	43	43	42	39	36	33	30	300
310	41	43	44	43	42	42	42	42	42	42	42	42	41	40	37	34	31	28	310
320	44	45	45	44	43	42	42	42	41	41	41	41	40	37	34	31	28	26	320
330	46	46	46	45	44	42	42	41	40	40	40	39	37	34	31	29	26	23	330
340	48	47	46	45	44	42	41	39	38	39	38	36	34	32	29	26	24	22	340
350	50	48	47	45	42	41	39	38	37	36	35	34	31	28	26	24	21	19	350
360	50	50	47	44	42	39	38	36	36	34	32	31	28	26	24	22	19	18	360
370	50	48	46	43	40	37	36	34	32	32	30	28	26	24	22	19	18	17	370

TABLE P 15 (*concl.*). Vert. Arg. l'. Hor. Arg. 81.

Arg.	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	Arg.
d																			*d*
0	14	13	12	10	11	11	14	18	22	28	33	40	44	48	50	51	50	49	0
10	14	13	12	12	13	14	17	22	27	32	38	44	48	51	52	52	51	48	10
20	14	13	13	14	14	17	20	25	31	37	42	46	49	52	53	52	50	48	20
30	14	15	14	16	17	20	24	29	34	39	45	49	51	53	53	52	49	45	30
40	16	16	17	18	20	23	28	32	38	43	48	51	52	53	53	51	48	43	40
50	17	18	19	21	23	27	32	36	41	46	49	52	53	53	52	49	45	41	50
60	19	21	21	24	28	31	35	41	44	48	50	53	53	52	50	47	43	39	60
70	21	22	24	28	30	34	38	42	46	49	52	52	52	51	48	45	41	36	70
80	23	26	27	30	34	37	40	44	47	50	52	52	51	49	46	42	38	33	80
90	26	28	30	33	37	40	42	45	48	50	51	51	49	46	43	40	35	30	90
100	29	31	34	36	38	41	44	46	48	50	50	49	47	44	42	37	32	26	100
110	32	34	36	39	41	42	44	47	48	49	48	47	46	42	38	34	29	24	110
120	34	36	38	40	42	44	46	46	47	47	47	45	43	40	35	31	26	21	120
130	36	38	40	41	43	44	45	46	46	46	45	43	40	36	33	27	23	18	130
140	38	40	41	42	43	44	44	44	44	44	43	41	38	34	30	25	20	16	140
150	40	41	42	43	44	44	44	42	42	42	41	38	36	32	26	23	18	14	150
160	42	42	43	43	44	42	42	42	42	41	39	36	32	29	24	20	16	12	160
170	43	44	43	43	42	41	40	40	40	38	36	34	30	26	22	18	14	10	170
180	44	43	42	42	40	40	40	38	38	37	34	32	28	23	19	15	12	10	180
190	45	43	42	40	40	38	38	37	36	34	32	30	26	21	17	13	10	9	190
200	44	42	41	39	38	38	36	36	34	33	31	27	23	19	15	12	9	8	200
210	44	41	40	38	37	36	34	34	32	31	28	25	21	16	13	10	8	8	210
220	42	40	39	37	35	34	33	33	31	29	26	23	18	14	11	9	8	8	220
230	41	39	37	35	34	33	32	30	30	27	23	19	16	12	9	8	8	8	230
240	40	38	35	33	32	31	30	29	27	24	22	18	13	10	8	7	8	10	240
250	38	36	33	31	30	30	28	26	24	22	19	16	12	9	7	7	8	12	250
260	36	34	32	30	28	28	26	25	23	20	16	13	10	8	7	8	10	13	260
270	34	32	29	28	27	26	25	23	20	18	14	12	9	7	7	9	12	15	270
280	32	30	27	26	26	24	23	21	18	16	13	10	8	7	8	10	13	17	280
290	30	27	26	24	23	22	20	19	16	14	11	9	7	8	10	12	16	21	290
300	27	24	24	23	22	21	19	17	15	12	10	9	8	9	10	14	19	23	300
310	26	23	22	21	20	20	17	16	13	12	10	8	9	10	13	17	22	26	310
320	23	22	20	20	18	17	16	14	12	10	10	9	11	13	16	20	25	30	320
330	21	20	18	18	17	16	14	14	12	11	10	10	12	15	19	23	28	33	330
340	19	18	18	16	16	16	14	12	12	12	11	12	15	18	22	27	32	36	340
350	18	17	16	15	15	15	14	13	12	12	13	15	18	21	25	30	35	39	350
360	17	16	15	15	15	15	14	14	13	14	15	17	20	24	29	33	38	42	360
370	16	15	15	15	14	16	15	15	15	16	18	20	24	27	31	36	41	45	370

Arg.	54	55	56	57	58	59	60	61	62	63	64	65	66	67	68	69	70	71	72	Arg.
d																				*d*
0	46	44	41	39	37	36	35	33	31	30	28	25	23	21	20	17	16	16	16	0
10	45	42	39	37	35	33	31	30	28	27	25	22	21	19	17	16	15	15	15	10
20	44	40	37	34	32	30	29	27	26	24	23	21	19	17	16	15	15	15	15	20
30	42	38	36	32	30	28	26	25	24	22	20	19	18	17	15	15	15	15	16	30
40	40	36	33	30	27	25	24	23	22	20	19	18	16	16	15	15	14	15	16	40
50	37	34	30	27	24	23	21	20	20	18	18	17	16	16	15	15	15	16	18	50
60	34	30	26	24	22	20	19	19	18	17	17	16	16	15	15	15	16	18	19	60
70	31	28	24	21	19	18	18	18	17	17	16	15	15	15	15	16	17	18	20	70
80	28	24	20	19	18	16	16	16	16	17	16	16	16	16	16	18	19	20	23	80
90	25	22	19	16	16	15	16	16	16	16	16	16	16	16	18	19	20	23	25	90
100	22	19	16	14	15	14	15	16	16	17	16	16	17	18	19	20	22	25	27	100
110	20	16	14	13	13	14	14	16	17	17	17	17	18	19	20	22	24	27	30	110
120	18	14	13	12	12	14	15	17	17	18	18	19	19	20	22	24	27	29	32	120
130	15	12	12	12	12	14	16	17	18	18	19	19	20	22	24	26	28	32	34	130
140	13	11	10	12	13	15	16	18	19	19	20	20	21	23	26	28	31	33	36	140
150	12	11	10	11	14	16	17	18	20	20	21	22	23	25	27	29	33	35	38	150
160	10	10	10	12	14	17	18	20	21	21	22	23	25	26	29	32	35	37	40	160
170	9	10	11	13	15	18	20	21	22	22	24	24	25	28	32	35	37	39	42	170
180	9	10	11	14	17	20	21	22	23	24	25	26	28	30	34	36	40	41	43	180
190	9	10	12	15	18	20	22	23	24	25	26	28	31	32	36	38	41	43	44	190
200	9	12	13	17	20	22	24	24	26	26	28	29	32	34	38	40	43	44	45	200
210	9	11	15	18	21	23	25	26	27	28	29	31	34	36	39	42	45	45	44	210
220	10	13	17	20	23	25	27	28	28	30	31	33	36	38	42	43	46	46	45	220
230	12	15	18	21	25	27	28	30	30	31	32	35	38	41	44	46	46	46	45	230
240	13	16	20	24	26	29	30	31	32	33	35	38	40	42	44	46	46	46	44	240
250	15	18	22	26	28	30	32	33	34	35	37	40	42	44	46	46	46	45	43	250
260	16	21	25	28	31	32	34	35	36	38	39	42	44	45	46	46	46	44	42	260
270	19	23	28	30	33	35	36	37	38	40	41	43	44	46	46	45	44	43	40	270
280	22	27	30	33	36	38	38	39	40	42	43	44	45	46	45	45	43	40	38	280
290	25	29	33	36	38	39	40	41	42	43	45	45	46	45	44	43	41	39	36	290
300	28	32	36	38	40	41	42	43	44	45	45	45	44	44	43	40	38	36	33	300
310	31	35	38	40	43	43	44	45	45	46	44	45	44	42	40	38	36	34	31	310
320	34	38	42	43	44	46	46	46	45	45	44	44	42	40	38	36	33	31	28	320
330	38	40	44	46	47	48	47	47	46	45	43	41	40	37	34	32	30	29	26	330
340	41	44	46	48	49	49	48	47	45	44	42	39	37	34	32	30	28	26	24	340
350	43	46	48	49	49	50	48	46	44	43	39	36	33	31	29	27	25	24	22	350
360	46	48	50	51	50	49	47	45	42	39	35	33	30	28	26	25	22	22	20	360
370	48	50	52	52	50	49	46	43	39	36	32	29	27	25	22	23	21	20	19	370

TABLE P 16. (Addition to Arg. 32.) Vert. Arg. l'. Hor. Arg. 79.

Arg. *d*	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	Arg. *d*
0	117	102	89	79	73	71	71	73	78	84	93	103	116	129	141	151	157	160	0
10	90	78	69	65	64	65	68	72	78	86	95	107	118	130	139	145	148	146	10
20	69	62	59	59	62	65	70	75	82	91	101	111	121	129	135	137	136	130	20
30	59	58	60	63	67	72	78	84	91	100	109	117	124	129	131	130	124	115	30
40	62	65	69	74	79	85	91	97	104	111	118	124	128	130	128	122	113	102	40
50	73	79	86	92	97	103	109	114	120	125	129	132	133	131	125	116	105	92	50
60	92	99	106	112	118	123	127	131	134	137	138	138	136	130	121	110	97	85	60
70	113	121	127	133	137	140	142	144	145	145	144	141	135	126	115	103	90	79	70
80	130	140	145	149	151	152	152	151	150	147	143	137	129	118	106	94	83	74	80
90	147	154	157	158	158	156	153	150	147	142	135	127	116	105	94	83	75	70	90
100	157	160	161	159	156	152	147	142	136	128	120	110	99	88	78	71	66	65	100
110	158	159	156	152	146	139	132	125	118	109	99	89	79	70	63	58	58	62	110
120	154	151	145	138	130	121	113	105	96	86	76	67	59	52	49	49	53	61	120
130	145	139	130	121	111	101	92	82	73	64	55	47	42	39	39	43	52	64	130
140	134	124	113	102	91	81	71	62	53	45	39	34	32	32	37	46	58	73	140
150	122	110	98	86	74	64	55	47	40	34	30	29	30	35	44	56	72	89	150
160	112	99	85	73	62	53	45	39	34	32	31	33	38	47	59	75	92	110	160
170	104	89	76	65	55	48	43	39	37	37	40	46	55	67	82	99	117	134	170
180	96	82	70	61	54	49	47	46	47	51	57	66	78	93	109	127	144	159	180
190	88	76	67	60	56	55	55	58	62	69	78	90	104	121	138	154	169	181	190
200	81	71	65	62	62	63	67	72	80	89	101	115	130	147	163	177	189	197	200
210	72	66	64	65	67	72	79	87	97	108	122	137	152	168	181	193	200	204	210
220	63	61	63	67	73	81	90	100	112	125	139	153	168	181	192	199	202	201	220
230	54	57	62	70	79	89	100	111	124	137	151	164	176	186	193	195	194	189	230
240	48	55	64	74	85	97	108	120	133	145	157	169	177	183	185	184	178	170	240
250	46	56	68	80	92	104	116	128	139	150	160	168	173	174	172	166	158	147	250
260	50	63	76	90	102	114	125	135	145	153	159	163	164	162	156	146	135	122	260
270	61	76	90	104	115	125	135	143	150	155	158	158	155	148	139	127	114	102	270
280	80	96	109	121	131	139	146	152	155	157	156	152	145	136	124	111	98	87	280
290	106	120	132	142	149	155	159	161	161	159	155	147	137	126	112	100	88	80	290
300	134	146	156	162	167	169	169	168	165	160	152	142	130	117	105	93	85	80	300
310	161	171	177	180	181	180	177	173	166	158	148	136	124	111	100	91	86	85	310
320	184	190	192	192	189	185	179	172	163	153	141	129	116	106	97	92	91	93	320
330	199	201	199	195	189	182	173	164	154	142	130	118	108	100	94	93	96	103	330
340	204	201	195	188	179	170	160	150	138	127	116	106	98	93	91	94	101	112	340
350	198	191	183	172	162	151	142	129	118	108	99	91	87	85	88	95	106	119	350
360	183	173	162	150	139	128	117	107	97	88	81	77	76	79	86	97	110	125	360
370	163	150	138	126	114	103	93	85	77	71	67	66	69	76	87	100	115	129	370

Arg. *d*	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	Arg. *d*
0	158	153	144	133	120	107	95	84	75	66	59	52	50	49	52	58	69	83	0
10	140	131	120	107	94	82	71	62	55	49	46	43	43	47	53	64	78	95	10
20	121	109	96	83	71	61	52	46	42	39	39	40	45	52	62	76	92	110	20
30	103	90	77	65	54	47	42	39	38	39	42	47	55	65	78	94	111	129	30
40	89	76	63	53	46	42	40	41	44	48	55	63	74	86	101	117	134	150	40
50	79	67	57	50	47	46	48	53	59	67	76	87	99	113	128	144	159	172	50
60	73	63	57	54	55	58	64	72	81	91	102	114	128	142	156	170	182	191	60
70	70	64	62	63	68	75	84	95	106	117	130	143	156	169	182	192	200	203	70
80	69	67	69	75	83	94	106	118	130	143	155	167	179	190	200	206	209	208	80
90	69	71	78	87	99	112	125	138	151	163	175	185	195	203	209	211	209	202	90
100	68	76	86	99	113	127	141	154	166	177	187	195	202	206	207	205	197	186	100
110	69	81	94	109	125	139	153	164	175	183	191	196	199	199	196	189	178	163	110
120	72	87	103	119	134	148	160	170	177	183	187	189	188	185	177	166	152	136	120
130	79	95	113	128	143	154	164	171	176	179	179	177	173	166	155	141	125	107	130
140	90	108	124	139	151	160	166	170	172	171	168	163	155	145	131	116	99	83	140
150	106	123	138	150	159	165	168	168	167	163	158	149	139	126	111	95	80	66	150
160	127	142	154	163	168	170	170	167	162	156	148	137	125	111	96	82	68	57	160
170	149	161	170	175	176	175	171	166	158	150	140	128	115	101	88	75	64	57	170
180	171	180	184	185	183	178	172	164	155	145	134	122	109	97	85	75	68	65	180
190	189	193	194	191	185	178	169	160	150	139	129	118	106	96	87	80	77	78	190
200	201	200	197	191	182	173	163	154	144	134	124	114	105	97	91	88	89	94	200
210	203	199	192	183	173	163	153	144	135	126	118	111	104	99	96	97	102	110	210
220	196	189	179	169	158	148	139	131	124	117	111	106	102	100	101	105	113	123	220
230	181	171	159	148	138	129	122	116	111	107	103	100	99	101	105	112	121	132	230
240	159	147	136	125	117	110	106	102	99	97	96	96	98	102	108	117	127	137	240
250	134	122	111	103	97	92	91	90	90	90	92	94	98	104	112	121	130	138	250
260	110	99	91	85	82	81	82	83	85	88	92	96	102	108	116	124	132	137	260
270	90	82	77	74	75	77	80	84	88	93	98	103	109	116	123	129	133	134	270
280	79	73	71	72	76	81	86	92	98	104	109	115	120	126	131	134	134	129	280
290	75	73	75	79	85	93	100	107	114	120	125	130	134	138	140	138	133	122	290
300	78	80	86	93	102	111	120	127	133	138	143	146	149	149	146	139	127	112	300
310	87	93	102	112	123	133	141	148	153	157	160	161	160	156	147	134	119	103	310
320	100	109	120	132	144	153	160	166	170	172	172	169	163	154	140	125	109	94	320
330	113	125	138	150	161	169	175	178	180	179	175	168	157	143	127	111	98	88	330
340	125	138	151	163	172	178	182	183	181	176	167	155	140	124	110	97	88	83	340
350	133	147	159	169	176	180	181	178	172	161	148	132	117	103	92	84	80	80	350
360	139	152	162	170	174	174	171	163	152	137	121	106	93	83	77	74	74	77	360
370	143	153	162	166	166	162	153	141	125	109	94	82	73	68	67	68	71	76	370

TABLE 4 (*cont.*). Additions to L, − ☊ for the days of the year.

Day	L	− ☊	Day	L	− ☊	Day	L	− ☊	Day	L	− ☊
120·0	508 20340	22 8761	**150·0**	635 25425	28 5951	**180·0**	762 30510	34 3141	**210·0**	889 35595	40 0332
·5	531 92091	22 9714	·5	658 97176	28 6904	·5	786 02261	34 4095	·5	913 07346	40 1285
121·0	555 63843	23 0667	**151·0**	682 68928	28 7857	**181·0**	809 74013	34 5048	**211·0**	936 79098	40 2238
·5	579 35594	23 1620	·5	706 40679	28 8811	·5	833 45764	34 6001	·5	960 50849	40 3191
122·0	603 07346	23 2574	**152·0**	730 12431	28 9764	**182·0**	857 17516	34 6954	**212·0**	984 22601	40 4144
·5	626 79097	23 3527	·5	753 84182	29 0717	·5	880 89267	34 7907	·5	1007 94352	40 5097
123·0	650 50849	23 4480	**153·0**	777 55934	29 1670	**183·0**	904 61019	34 8860	**213·0**	1031 66104	40 6051
·5	674 22600	23 5433	·5	801 27685	29 2623	·5	928 32770	34 9814	·5	1055 37855	40 7004
124·0	697 94351	23 6386	**154·0**	824 99436	29 3576	**184·0**	952 04521	35 0767	**214·0**	1079 09606	40 7957
·5	721 66103	23 7339	·5	848 71188	29 4530	·5	975 76273	35 1720	·5	1102 81358	40 8910
125·0	745 37854	23 8293	**155·0**	872 42939	29 5483	**185·0**	999 48024	35 2673	**215·0**	1126 53109	40 9863
·5	769 09606	23 9246	·5	896 14691	29 6436	·5	1023 19776	35 3626	·5	1150 24861	41 0816
126·0	792 81357	24 0199	**156·0**	919 86442	29 7389	**186·0**	1046 91527	35 4579	**216·0**	1173 96612	41 1770
·5	816 53108	24 1152	·5	943 58193	29 8342	·5	1070 63278	35 5533	·5	1197 68363	41 2723
127·0	840 24860	24 2105	**157·0**	967 29945	29 9296	**187·0**	1094 35030	35 6486	**217·0**	1221 40115	41 3676
·5	863 96611	24 3058	·5	991 01696	30 0249	·5	1118 06781	35 7439	·5	1245 11866	41 4629
128·0	887 68363	24 4012	**158·0**	1014 73448	30 1202	**188·0**	1141 78533	35 8392	**218·0**	1268 83618	41 5582
·5	911 40114	24 4965	·5	1038 45199	30 2155	·5	1165 50284	35 9345	·5	1292 55369	41 6535
129·0	935 11866	24 5918	**159·0**	1062 16951	30 3108	**189·0**	1189 22036	36 0298	**219·0**	20 27121	41 7489
·5	958 83617	24 6871	·5	1085 88702	30 4061	·5	1212 93787	36 1252	·5	43 98872	41 8442
130·0	982 55368	24 7824	**160·0**	1109 60453	30 5015	**190·0**	1236 65538	36 2205	**220·0**	67 70623	41 9395
·5	1006 27120	24 8777	·5	1133 32205	30 5968	·5	1260 37290	36 3158	·5	91 42375	42 0348
131·0	1029 98871	24 9731	**161·0**	1157 03956	30 6921	**191·0**	1284 09041	36 4111	**221·0**	115 14126	42 1301
·5	1053 70623	25 0684	·5	1180 75708	30 7874	·5	11 80793	36 5064	·5	138 85878	42 2255
132·0	1077 42374	25 1637	**162·0**	1204 47459	30 8827	**192·0**	35 52544	36 6017	**222·0**	162 57629	42 3208
·5	1101 14125	25 2590	·5	1228 19210	30 9780	·5	59 24295	36 6971	·5	186 29380	42 4161
133·0	1124 85877	25 3543	**163·0**	1251 90962	31 0734	**193·0**	82 96047	36 7924	**223·0**	210 01132	42 5114
·5	1148 57628	25 4497	·5	1275 62713	31 1687	·5	106 67798	36 8877	·5	233 72883	42 6067
134·0	1172 29380	25 5450	**164·0**	3 34465	31 2640	**194·0**	130 39550	36 9830	**224·0**	257 44635	42 7020
·5	1196 01131	25 6403	·5	27 06216	31 3593	·5	154 11301	37 0783	·5	281 16386	42 7974
135·0	1219 72883	25 7356	**165·0**	50 77968	31 4546	**195·0**	177 83053	37 1736	**225·0**	304 88138	42 8927
·5	1243 44634	25 8309	·5	74 49719	31 5499	·5	201 54804	37 2690	·5	328 59889	42 9880
136·0	1267 16385	25 9262	**166·0**	98 21470	31 6453	**196·0**	225 26555	37 3643	**226·0**	352 31640	43 0833
·5	1290 88137	26 0216	·5	121 93222	31 7406	·5	248 98307	37 4596	·5	376 03392	43 1786
137·0	18 59888	26 1169	**167·0**	145 64973	31 8359	**197·0**	272 70058	37 5549	**227·0**	399 75143	43 2739
·5	42 31640	26 2122	·5	169 36725	31 9312	·5	296 41810	37 6502	·5	423 46895	43 3693
138·0	66 03391	26 3075	**168·0**	193 08476	32 0265	**198·0**	320 13561	37 7455	**228·0**	447 18646	43 4646
·5	89 75142	26 4028	·5	216 80227	32 1218	·5	343 85312	37 8409	·5	470 90397	43 5599
139·0	113 46894	26 4981	**169·0**	240 51979	32 2172	**199·0**	367 57064	37 9362	**229·0**	494 62149	43 6552
·5	137 18645	26 5935	·5	264 23730	32 3125	·5	391 28815	38 0315	·5	518 33900	43 7505
140·0	160 90397	26 6888	**170·0**	287 95482	32 4078	**200·0**	415 00567	38 1268	**230·0**	542 05652	43 8458
·5	184 62148	26 7841	·5	311 67233	32 5031	·5	438 72318	38 2221	·5	565 77403	43 9412
141·0	208 33900	26 8794	**171·0**	335 38985	32 5984	**201·0**	462 44070	38 3175	**231·0**	589 49155	44 0365
·5	232 05651	26 9747	·5	359 10736	32 6937	·5	486 15821	38 4128	·5	613 20906	44 1318
142·0	255 77402	27 0700	**172·0**	382 82487	32 7891	**202·0**	509 87572	38 5081	**232·0**	636 92657	44 2271
·5	279 49154	27 1654	·5	406 54239	32 8844	·5	533 59324	38 6034	·5	660 64409	44 3224
143·0	303 20905	27 2607	**173·0**	430 25990	32 9797	**203·0**	557 31075	38 6987	**233·0**	684 36160	44 4177
·5	326 92657	27 3560	·5	453 97742	33 0750	·5	581 02827	38 7940	·5	708 07912	44 5131
144·0	350 64408	27 4513	**174·0**	477 69493	33 1703	**204·0**	604 74578	38 8894	**234·0**	731 79663	44 6084
·5	374 36159	27 5466	·5	501 41244	33 2656	·5	628 46329	38 9847	·5	755 51414	44 7037
145·0	398 07911	27 6419	**175·0**	525 12996	33 3610	**205·0**	652 18081	39 0800	**235·0**	779 23166	44 7990
·5	421 79662	27 7373	·5	548 84747	33 4563	·5	675 89832	39 1753	·5	802 94917	44 8943
146·0	445 51414	27 8326	**176·0**	572 56499	33 5516	**206·0**	699 61584	39 2706	**236·0**	826 66669	44 9896
·5	469 23165	27 9279	·5	596 28250	33 6469	·5	723 33335	39 3659	·5	850 38420	45 0850
147·0	492 94917	28 0232	**177·0**	620 00002	33 7422	**207·0**	747 05087	39 4613	**237·0**	874 10172	45 1803
·5	516 66668	28 1185	·5	643 71753	33 8376	·5	770 76838	39 5566	·5	897 81923	45 2756
148·0	540 38419	28 2138	**178·0**	667 43504	33 9329	**208·0**	794 48589	39 6519	**238·0**	921 53674	45 3709
·5	564 10171	28 3092	·5	691 15256	34 0282	·5	818 20341	39 7472	·5	945 25426	45 4662
149·0	587 81922	28 4045	**179·0**	714 87007	34 1235	**209·0**	841 92092	39 8425	**239·0**	968 97177	45 5615
·5	611 53674	28 4998	·5	738 58759	34 2188	·5	865 63844	39 9378	·5	992 68929	45 6569

Table 4 (*cont.*). Additions to L, − ☊ for the days of the year.

Day	L	− ☊	Day	L	− ☊	Day	L	− ☊	Day	L	− ☊
240·0	1016 40680	45 7522	270·0	1143 45765	51 4712	300·0	1270 50850	57 1902	330·0	101 55935	62 9092
·5	1040 12431	45 8475	·5	1167 17516	51 5665	·5	1294 22601	57 2855	·5	125 27687	63 0046
241·0	1063 84183	45 9428	271·0	1190 89268	51 6618	301·0	21 94353	57 3809	331·0	148 99438	63 0999
·5	1087 55934	46 0381	·5	1214 61019	51 7572	·5	45 66104	57 4762	·5	172 71189	63 1952
242·0	1111 27686	46 1334	272·0	1238 32771	51 8525	302·0	69 37856	57 5715	332·0	196 42941	63 2905
·5	1134 99437	46 2288	·5	1262 04522	51 9478	·5	93 09607	57 6668	·5	220 14692	63 3858
243·0	1158 71189	46 3241	273·0	1285 76274	52 0431	303·0	116 81359	57 7621	333·0	243 86444	63 4812
·5	1182 42940	46 4194	·5	13 48025	52 1384	·5	140 53110	57 8574	·5	267 58195	63 5765
244·0	1206 14691	46 5147	274·0	37 19776	52 2337	304·0	164 24861	57 9528	334·0	291 29946	63 6718
·5	1229 86443	46 6100	·5	60 91528	52 3291	·5	187 96613	58 0481	·5	315 01698	63 7671
245·0	1253 58194	46 7054	275·0	84 63279	52 4244	305·0	211 68364	58 1434	335·0	338 73449	63 8624
·5	1277 29946	46 8007	·5	108 35031	52 5197	·5	235 40116	58 2387	·5	362 45201	63 9577
246·0	5 01697	46 8960	276·0	132 06782	52 6150	306·0	259 11867	58 3340	336·0	386 16952	64 0531
·5	28 73448	46 9913	·5	155 78533	52 7103	·5	282 83618	58 4293	·5	409 88704	64 1484
247·0	52 45200	47 0866	277·0	179 50285	52 8056	307·0	306 55370	58 5247	337·0	433 60455	64 2437
·5	76 16951	47 1819	·5	203 22036	52 9010	·5	330 27121	58 6200	·5	457 32206	64 3390
248·0	99 88703	47 2773	278·0	226 93788	52 9963	308·0	353 98873	58 7153	338·0	481 03958	64 4343
·5	123 60454	47 3726	·5	250 65539	53 0916	·5	377 70624	58 8106	·5	504 75709	64 5296
249·0	147 32206	47 4679	279·0	274 37291	53 1869	309·0	401 42376	58 9059	339·0	528 47461	64 6250
·5	171 03957	47 5632	·5	298 09042	53 2822	·5	425 14127	59 0013	·5	552 19212	64 7203
250·0	194 75708	47 6585	280·0	321 80793	53 3775	310·0	448 85878	59 0966	340·0	575 90963	64 8156
·5	218 47460	47 7538	·5	345 52545	53 4729	·5	472 57630	59 1919	·5	599 62715	64 9109
251·0	242 19211	47 8492	281·0	369 24296	53 5682	311·0	496 29381	59 2872	341·0	623 34466	65 0062
·5	265 90963	47 9445	·5	392 96048	53 6635	·5	520 01133	59 3825	·5	647 06218	65 1015
252·0	289 62714	48 0398	282·0	416 67799	53 7588	312·0	543 72884	59 4778	342·0	670 77969	65 1969
·5	313 34465	48 1351	·5	440 39550	53 8541	·5	567 44636	59 5732	·5	694 49721	65 2922
253·0	337 06217	48 2304	283·0	464 11302	53 9494	313·0	591 16387	59 6685	343·0	718 21472	65 3875
·5	360 77968	48 3257	·5	487 83053	54 0448	·5	614 88138	59 7638	·5	741 93223	65 4828
254·0	384 49720	48 4211	284·0	511 54805	54 1401	314·0	638 59890	59 8591	344·0	765 64975	65 5781
·5	408 21471	48 5164	·5	535 26556	54 2354	·5	662 31641	59 9544	·5	789 36726	65 6734
255·0	431 93223	48 6117	285·0	558 98308	54 3307	315·0	686 03393	60 0497	345·0	813 08478	65 7688
·5	455 64974	48 7070	·5	582 70059	54 4260	·5	709 75144	60 1451	·5	836 80229	65 8641
256·0	479 36725	48 8023	286·0	606 41810	54 5213	316·0	733 46895	60 2404	346·0	860 51980	65 9594
·5	503 08477	48 8976	·5	630 13562	54 6167	·5	757 18647	60 3357	·5	884 23732	66 0547
257·0	526 80228	48 9930	287·0	653 85313	54 7120	317·0	780 90398	60 4310	347·0	907 95483	66 1500
·5	550 51980	49 0883	·5	677 57065	54 8073	·5	804 62150	60 5263	·5	931 67235	66 2453
258·0	574 23731	49 1836	288·0	701 28816	54 9026	318·0	828 33901	60 6216	348·0	955 38986	66 3407
·5	597 95482	49 2789	·5	725 00567	54 9979	·5	852 05653	60 7170	·5	979 10738	66 4360
259·0	621 67234	49 3742	289·0	748 72319	55 0933	319·0	875 77404	60 8123	349·0	1002 82489	66 5313
·5	645 38985	49 4695	·5	772 44070	55 1886	·5	899 49155	60 9076	·5	1026 54240	66 6266
260·0	669 10737	49 5649	290·0	796 15822	55 2839	320·0	923 20907	61 0029	350·0	1050 25992	66 7219
·5	692 82488	49 6602	·5	819 87573	55 3792	·5	946 92658	61 0982	·5	1073 97743	66 8172
261·0	716 54240	49 7555	291·0	843 59325	55 4745	321·0	970 64410	61 1935	351·0	1097 69495	66 9126
·5	740 25991	49 8508	·5	867 31076	55 5698	·5	994 36161	61 2889	·5	1121 41246	67 0079
262·0	763 97742	49 9461	292·0	891 02827	55 6652	322·0	1018 07912	61 3842	352·0	1145 12997	67 1032
·5	787 69494	50 0414	·5	914 74579	55 7605	·5	1041 79664	61 4795	·5	1168 84749	67 1985
263·0	811 41245	50 1368	293·0	938 46330	55 8558	323·0	1065 51415	61 5748	353·0	1192 56500	67 2938
·5	835 12997	50 2321	·5	962 18082	55 9511	·5	1089 23167	61 6701	·5	1216 28252	67 3892
264·0	858 84748	50 3274	294·0	985 89833	56 0464	324·0	1112 94918	61 7654	354·0	1240 00003	67 4845
·5	882 56499	50 4227	·5	1009 61584	56 1417	·5	1136 66670	61 8608	·5	1263 71755	67 5798
265·0	906 28251	50 5180	295·0	1033 33336	56 2371	325·0	1160 38421	61 9561	355·0	1287 43506	67 6751
·5	930 00002	50 6134	·5	1057 05087	56 3324	·5	1184 10172	62 0514	·5	15 15257	67 7704
266·0	953 71754	50 7087	296·0	1080 76839	56 4277	326·0	1207 81924	62 1467	356·0	38 87009	67 8657
·5	977 43505	50 8040	·5	1104 48590	56 5230	·5	1231 53675	62 2420	·5	62 58760	67 9611
267·0	1001 15257	50 8993	297·0	1128 20342	56 6183	327·0	1255 25427	62 3373	357·0	86 30512	68 0564
·5	1024 87008	50 9946	·5	1151 92093	56 7136	·5	1278 97178	62 4327	·5	110 02263	68 1517
268·0	1048 58759	51 0899	298·0	1175 63844	56 8090	328·0	6 68929	62 5280	358·0	133 74014	68 2470
·5	1072 30511	51 1853	·5	1199 35596	56 9043	·5	30 40681	62 6233	·5	157 45766	68 3423
269·0	1096 02262	51 2806	299·0	1223 07347	56 9996	329·0	54 12432	62 7186	359·0	181 17517	68 4376
·5	1119 74014	51 3759	·5	1246 79099	57 0949	·5	77 84184	62 8139	·5	204 89269	68 5330

TABLE 4 (*cont.*). Additions to L, $-\Omega$, ϖ and to the Arguments for the days of the year.

Day	L	$-\Omega$
360·0	228 61020	68 6283
·5	252 32772	68 7236
361·0	276 04523	68 8189
·5	299 76274	68 9142
362·0	323 48026	69 0095
·5	347 19777	69 1049
363·0	370 91529	69 2002
·5	394 63280	69 2955
364·0	418 35031	69 3908
·5	442 06783	69 4861
365·0	465 78534	69 5814
·5	489 50286	69 6768
366·0	513 22037	69 7721

Day	ϖ	Day	ϖ	Day	ϖ
0	0	130	52 137	260	104 274
10	4 011	140	56 148	270	108 285
20	8 021	150	60 158	280	112 295
30	12 032	160	64 169	290	116 306
40	16 042	170	68 179	300	120 316
50	20 053	180	72 190	310	124 327
60	24 063	190	76 200	320	128 338
70	28 074	200	80 211	330	132 348
80	32 084	210	84 221	340	136 359
90	36 095	220	88 232	350	140 369
100	40 105	230	92 243	360	144 380
110	44 116	240	96 253	370	148 390
120	48 127	250	100 264		

Arg.	D	1	2	3	4	5	6	7	8	9	10	Arg.
d	*d*	*c*	*c*	*c*	*c*	*c*	*c*	*c*	*c*	*c*	*c*	*d*
0	0·0000	0·000	0·00	0·00	0·00	0·00	0·00	0·00	0·00	0·00	0·00	0
30	0·4694	11·400	23·80	1·06	27·81	8·01	30·81	9·00	14·80	5·64	20·10	30
60	0·9388	22·799	47·60	2·12	55·62	16·02	61·62	18·00	29·60	11·28	40·20	60
90	1·4082	34·199	71·40	3·18	83·43	24·03	92·43	26·99	44·40	16·92	60·30	90
120	1·8776	45·598	95·20	4·24	111·24	32·04	123·24	35·99	9·20	22·56	0·40	120
150	2·3471	56·998	119·00	5·30	15·05	40·05	22·05	44·99	24·00	28·20	20·50	150
180	2·8165	68·398	142·80	6·36	42·86	48·06	52·86	53·99	38·80	33·84	40·59	180
210	3·2859	79·797	10·60	7·42	70·67	56·07	83·67	62·99	3·60	39·48	60·69	210
240	3·7553	91·197	34·40	8·48	98·48	64·08	114·48	71·99	18·40	3·12	0·79	240
270	4·2247	102·596	58·20	9·54	2·29	72·09	13·29	80·98	33·20	8·76	20·89	270
300	4·6941	113·996	82·00	10·60	30·10	80·10	44·10	89·98	47·99	14·40	40·99	300
330	5·1635	125·396	105·80	11·66	57·91	88·11	74·91	98·98	12·79	20·04	61·09	330
360	5·6329	136·795	129·60	12·72	85·72	96·12	105·72	7·98	27·59	25·68	1·19	360

Arg.	11	12	13	14	15	16	17	18	19	20	21	22	Arg.
d	*c*	*c*	*c*	*c*	*c*	*c*	*c*	*c*	*c*	*c*	*c*	*c*	*d*
0	0·00	0·00	0·00	0·00	0·00	0·000	0·00	0·00	0·00	0·00	0·00	0·00	0
30	3·94	7·75	7·90	5·16	0·50	18·000	8·69	9·20	7·50	29·50	1·51	13·88	30
60	7·88	15·50	15·80	10·32	1·00	36·000	17·38	18·40	15·00	59·00	3·02	27·76	60
90	11·82	23·25	23·70	15·48	1·50	54·000	26·07	27·60	22·50	88·50	4·53	5·64	90
120	15·76	7·00	31·60	20·64	2·00	72·001	34·76	36·80	30·00	24·00	6·04	19·52	120
150	19·70	14·75	39·50	25·80	2·50	90·001	43·45	8·00	37·50	53·49	7·55	33·40	150
180	23·64	22·51	3·39	30·96	3·00	108·001	1·14	17·20	45·00	82·99	9·06	11·28	180
210	27·58	6·26	11·29	4·12	3·49	126·001	9·83	26·40	52·50	18·49	10·57	25·15	210
240	31·52	14·01	19·19	9·28	3·99	144·001	18·52	35·60	60·00	47·99	12·08	3·03	240
270	35·46	21·76	27·09	14·44	4·49	162·001	27·21	6·80	67·50	77·49	13·59	16·91	270
300	39·40	5·51	34·99	19·60	4·99	180·001	35·90	16·00	75·00	12·99	15·10	30·79	300
330	43·34	13·26	42·89	24·76	5·49	198·001	44·59	25·20	6·49	42·49	16·61	8·67	330
360	3·28	21·01	6·79	29·92	5·99	216·002	2·28	34·40	13·99	71·99	18·12	22·55	360

Table 4 (*cont.*). Additions to the Arguments for the days of the year.

Arg.	23		24		25		26		27		28		29		30		31		Arg.
d	d	c	d	c	d	c	d	c	d	c	d	c	d	c	d	c	d	c	d
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
10	10·0	0	10·0	0	10·0	0	10·0	0	10·0	0	0·0	45	10·0	0	10·0	0	10·0	0	10
20	4·5	135	5·5	103	20·0	0	20·0	0	20·0	0	0·0	90	20·0	0	20·0	0	5·0	138	20
30	14·5	135	1·5	39	4·0	143	0·0	56	30·0	0	0·0	135	0·5	98	2·0	294	0·0	276	30
40	9·0	270	11·5	39	14·0	143	10·0	56	5·0	79	0·5	2	10·5	98	12·0	294	10·0	276	40
50	3·5	405	7·0	142	24·0	143	20·0	56	15·0	79	0·5	47	20·5	98	22·0	294	5·5	120	50
60	13·5	405	3·0	78	8·5	97	0·0	112	25·0	79	0·5	92	1·0	196	4·5	258	0·5	258	60
70	8·0	540	13·0	78	18·5	97	10·0	112	0·0	158	0·5	137	11·0	196	14·5	258	10·5	258	70
80	3·0	76	9·0	14	3·0	51	20·0	112	10·0	158	1·0	4	21·0	196	24·5	258	6·0	102	80
90	13·0	76	4·5	117	13·0	51	0·5	26	20·0	158	1·0	49	2·0	87	7·0	222	1·0	240	90
100	7·5	211	0·5	53	23·0	51	10·5	26	30·0	158	1·0	94	12·0	87	17·0	222	11·0	240	100
110	2·0	346	10·5	53	7·5	5	20·5	26	5·0	237	1·0	139	22·0	87	27·0	222	6·5	84	110
120	12·0	346	6·0	156	17·5	5	0·5	82	15·0	237	1·5	6	2·5	185	9·5	186	1·5	222	120
130	6·5	481	2·0	92	1·5	148	10·5	82	25·0	237	1·5	51	12·5	185	19·5	186	11·5	222	130
140	1·5	17	12·0	92	11·5	148	20·5	82	0·5	58	1·5	96	22·5	185	2·0	150	7·0	66	140
150	11·5	17	8·0	28	21·5	148	0·5	138	10·5	58	1·5	141	3·5	76	12·0	150	2·0	204	150
160	6·0	152	3·5	131	6·0	102	10·5	138	20·5	58	2·0	8	13·5	76	22·0	150	12·0	204	160
170	0·5	287	13·5	131	16·0	102	20·5	138	30·5	58	2·0	53	23·5	76	4·5	114	7·5	48	170
180	10·5	287	9·5	67	0·5	56	1·0	52	5·5	137	2·0	98	4·0	174	14·5	114	2·5	186	180
190	5·0	422	5·5	3	10·5	56	11·0	52	15·5	137	2·0	143	14·0	174	24·5	114	12·5	186	190
200	15·0	422	1·0	106	20·5	56	21·0	52	25·5	137	2·5	10	24·0	174	7·0	78	8·0	30	200
210	9·5	557	11·0	106	5·0	10	1·0	108	0·5	216	2·5	55	5·0	65	17·0	78	3·0	168	210
220	4·5	93	7·0	42	15·0	10	11·0	108	10·5	216	2·5	100	15·0	65	27·0	78	13·0	168	220
230	14·5	93	2·5	145	25·0	10	21·0	108	20·5	216	2·5	145	25·0	65	9·5	42	8·5	12	230
240	9·0	228	12·5	145	9·0	153	1·5	22	30·5	216	3·0	12	5·5	163	19·5	42	3·5	150	240
250	3·5	363	8·5	81	19·0	153	11·5	22	6·0	37	3·0	57	15·5	163	2·0	6	13·5	150	250
260	13·5	363	4·5	17	3·5	107	21·5	22	16·0	37	3·0	102	25·5	163	12·0	6	8·5	288	260
270	8·0	498	0·0	120	13·5	107	1·5	78	26·0	37	3·0	147	6·5	54	22·0	6	4·0	132	270
280	3·0	34	10·0	120	23·5	107	11·5	78	1·0	116	3·5	14	16·5	54	4·0	300	14·0	132	280
290	13·0	34	6·0	56	8·0	61	21·5	78	11·0	116	3·5	59	26·5	54	14·0	300	9·0	270	290
300	7·5	169	1·5	159	18·0	61	1·5	134	21·0	116	3·5	104	7·0	152	24·0	300	4·5	114	300
310	2·0	304	11·5	159	2·5	15	11·5	134	31·0	116	3·5	149	17·0	152	6·5	264	14·5	114	310
320	12·0	304	7·5	95	12·5	15	21·5	134	6·0	195	4·0	16	27·0	152	16·5	264	9·5	252	320
330	6·5	439	3·5	31	22·5	15	2·0	48	16·0	195	4·0	61	8·0	43	26·5	264	5·0	96	330
340	1·0	574	13·5	31	6·5	158	12·0	48	26·0	195	4·0	106	18·0	43	9·0	228	0·0	234	340
350	11·0	574	9·0	134	16·5	158	22·0	48	1·5	16	4·0	151	28·0	43	19·0	228	10·0	234	350
360	6·0	110	5·0	70	1·0	112	2·0	104	11·5	16	4·5	18	8·5	141	1·5	192	5·5	78	360

Arg.	32		33		34		35		36		37		38		39		40		Arg.
d	d	c	d	c	d	c	d	c	d	c	d	c	d	c	d	c	d	c	d
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
10	10·0	0	10·0	0	10·0	0	0·0	214	10·0	0	10·0	0	2·5	223	4·0	11	10·0	0	10
20	20·0	0	20·0	0	20·0	0	0·5	151	4·0	22	9·5	329	5·5	147	2·5	2	6·0	245	20
30	30·0	0	0·0	92	30·0	0	1·0	88	14·0	22	9·5	262	1·0	294	0·5	24	2·5	179	30
40	8·0	126	10·0	92	40·0	0	1·5	25	8·0	44	9·5	195	4·0	218	5·0	4	12·5	179	40
50	18·0	126	20·0	92	50·0	0	1·5	239	2·0	66	9·5	128	0·0	66	3·0	26	9·0	113	50
60	28·0	126	0·5	86	60·0	0	2·0	176	12·0	66	9·5	61	2·5	289	1·5	17	5·5	47	60
70	6·0	252	10·5	86	70·0	0	2·5	113	6·0	88	9·0	390	5·5	213	0·0	8	1·5	292	70
80	16·0	252	20·5	86	80·0	0	3·0	50	0·0	110	9·0	323	1·5	61	4·0	19	11·5	292	80
90	26·0	252	1·0	80	90·0	0	3·0	264	10·0	110	9·0	256	4·0	284	2·5	10	8·0	226	90
100	4·5	43	11·0	80	100·0	0	3·5	201	4·5	15	9·0	189	0·0	132	1·0	1	4·5	160	100
110	14·5	43	21·0	80	110·0	0	4·0	138	14·5	15	9·0	122	3·0	56	5·0	12	1·0	94	110
120	24·5	43	1·5	74	120·0	0	4·5	75	8·5	37	9·0	55	5·5	279	3·5	3	11·0	94	120
130	2·5	169	11·5	74	130·0	0	5·0	12	2·5	59	8·5	384	1·5	127	1·5	25	7·5	28	130
140	12·5	169	21·5	74	140·0	0	5·0	226	12·5	59	8·5	317	4·5	51	0·0	16	3·5	273	140
150	22·5	169	2·0	68	150·0	0	5·5	163	6·5	81	8·5	250	0·0	198	4·0	27	0·0	207	150
160	0·5	295	12·0	68	160·0	0	6·0	100	0·5	103	8·5	183	3·0	122	2·5	18	10·0	207	160
170	10·5	295	22·0	68	170·0	0	6·5	37	10·5	103	8·5	116	6·0	46	1·0	9	6·5	141	170
180	20·5	295	2·5	62	180·0	0	6·5	251	5·0	8	8·5	49	1·5	193	5·0	20	3·0	75	180
190	30·5	295	12·5	62	190·0	0	7·0	188	15·0	8	8·0	378	4·5	117	3·5	11	13·0	75	190
200	9·0	86	22·5	62	200·0	0	7·5	125	9·0	30	8·0	311	0·0	264	2·0	2	9·5	9	200
210	19·0	86	3·0	56	4·0	3	8·0	62	3·0	52	8·0	244	3·0	188	0·0	24	5·5	254	210
220	29·0	86	13·0	56	14·0	3	8·0	276	13·0	52	8·0	177	6·0	112	4·5	4	2·0	188	220
230	7·0	212	23·0	56	24·0	3	8·5	213	7·0	74	8·0	110	1·5	259	2·5	26	12·0	188	230
240	17·0	212	3·5	50	34·0	3	9·0	150	1·0	96	8·0	43	4·5	183	1·0	17	8·5	122	240
250	27·0	212	13·5	50	44·0	3	0·0	24	11·0	96	7·5	372	0·5	31	5·0	28	5·0	56	250
260	5·5	3	23·5	50	54·0	3	0·0	238	5·5	1	7·5	305	3·0	254	3·5	19	1·0	301	260
270	15·5	3	4·0	44	64·0	3	0·5	175	15·5	1	7·5	238	6·0	178	2·0	10	11·0	301	270
280	25·5	3	14·0	44	74·0	3	1·0	112	9·5	23	7·5	171	2·0	26	0·5	1	7·5	235	280
290	3·5	129	24·0	44	84·0	3	1·5	49	3·5	45	7·5	104	4·5	249	4·5	12	4·0	169	290
300	13·5	129	4·5	38	94·0	3	1·5	263	13·5	45	7·5	37	0·5	97	3·0	3	0·5	103	300
310	23·5	129	14·5	38	104·0	3	2·0	200	7·5	67	7·0	366	3·5	21	1·0	25	10·5	103	310
320	1·5	255	24·5	38	114·0	3	2·5	137	1·5	89	7·0	299	6·0	244	5·5	5	7·0	37	320
330	11·5	255	5·0	32	124·0	3	3·0	74	11·5	89	7·0	232	2·0	92	3·5	27	3·0	282	330
340	21·5	255	15·0	32	134·0	3	3·5	11	5·5	111	7·0	165	5·0	16	2·0	18	13·0	282	340
350	0·0	46	25·0	32	144·0	3	3·5	225	0·0	16	7·0	98	0·5	163	0·5	9	9·5	216	350
360	10·0	46	5·5	26	154·0	3	4·0	162	10·0	16	7·0	31	3·5	87	4·5	20	6·0	150	360

TABLE 4 (*cont.*). Additions to the Arguments for the days of the year.

Arg.	41		42		43		44		45		46		47		30 48		49 50		Arg.
d	*d*	*c*	*d*	*c*	*d*	*c*	*d*	*c*	*d*	*c*	*d*	*c*	*d*	*c*	*d*	*c*	*d*	*c*	*d*
0	0·0	0	0·0	0	0·0	0	0·0	0	0·0	0	0·0	0	0·0	0	0·00	0	0·00	0	0
10	10·0	0	10·0	0	0·5	148	2·5	150	0·0	125	3·0	21	10·0	0	10·00	0	10·00	0	10
20	20·0	0	20·0	0	1·5	107	5·5	121	0·5	117	6·0	42	20·0	0	20·00	0	6·37	50	20
30	30·0	0	3·0	37	2·5	66	1·5	63	1·0	109	2·5	16	30·0	0	2·45	4	2·73	100	30
40	40·0	0	13·0	37	3·5	25	4·5	34	1·5	101	5·5	37	40·0	0	12·45	4	12·73	100	40
50	50·0	0	23·0	37	4·0	173	0·0	155	2·0	93	2·0	11	50·0	0	22·45	4	9·10	49	50
60	60·0	0	6·0	74	5·0	132	3·0	126	2·5	85	5·0	32	60·0	0	4·89	8	5·47	99	60
70	70·0	0	16·0	74	6·0	91	6·0	97	3·0	77	1·5	6	70·0	0	14·89	8	1·83	48	70
80	80·0	0	26·0	74	7·0	50	2·0	39	3·5	69	4·5	27	80·0	0	24·89	8	11·83	48	80
90	90·0	0	9·0	111	8·0	9	5·0	10	4·0	61	1·0	1	90·0	0	7·34	12	8·20	98	90
100	100·0	0	19·0	111	8·5	157	0·5	131	4·5	53	4·0	22	100·0	0	17·34	12	4·56	47	100
110	110·0	0	2·0	148	0·5	75	3·5	102	5·0	45	0·0	64	110·0	0	27·34	12	0·93	97	110
120	120·0	0	12·0	148	1·5	34	6·5	73	5·5	37	3·5	17	120·0	0	9·79	16	10·93	97	120
130	130·0	0	22·0	148	2·0	182	2·5	15	6·0	29	6·5	38	130·0	0	19·79	16	7·30	46	130
140	140·0	0	5·5	33	3·0	141	5·0	165	6·5	21	3·0	12	140·0	0	2·23	20	3·66	96	140
150	150·0	0	15·5	33	4·0	100	1·0	107	7·0	13	6·0	33	150·0	0	12·23	20	0·03	45	150
160	160·0	0	25·5	33	5·0	59	4·0	78	7·5	5	2·5	7	160·0	0	22·23	20	10·03	45	160
170	170·0	0	8·5	70	6·0	18	0·0	20	7·5	130	5·5	28	170·0	0	4·68	24	6·40	95	170
180	6·5	8	18·5	70	6·5	166	2·5	170	8·0	122	2·0	2	180·0	0	14·68	24	2·76	44	180
190	16·5	8	1·5	107	7·5	125	5·5	141	8·5	114	5·0	23	190·0	0	24·68	24	12·76	44	190
200	26·5	8	11·5	107	8·5	84	1·5	83	9·0	106	1·0	65	200·0	0	7·13	28	9·13	94	200
210	36·5	8	21·5	107	0·5	2	4·5	54	0·0	90	4·5	18	210·0	0	17·13	28	5·50	43	210
220	46·5	8	4·5	144	1·0	150	0·0	175	0·5	82	0·5	60	220·0	0	27·13	28	1·86	93	220
230	56·5	8	14·5	144	2·0	109	3·0	146	1·0	74	4·0	13	230·0	0	9·57	32	11·86	93	230
240	66·5	8	24·5	144	3·0	68	6·0	117	1·5	66	0·0	55	240·0	0	19·57	32	8·23	42	240
250	76·5	8	8·0	29	4·0	27	2·0	59	2·0	58	3·5	8	250·0	0	2·02	36	4·59	92	250
260	86·5	8	18·0	29	4·5	175	5·0	30	2·5	50	6·5	29	260·0	0	12·02	36	0·96	41	260
270	96·5	8	1·0	66	5·5	134	0·5	151	3·0	42	3·0	3	270·0	0	22·02	36	10·96	41	270
280	106·5	8	11·0	66	6·5	93	3·5	122	3·5	34	6·0	24	280·0	0	4·47	40	7·33	91	280
290	116·5	8	21·0	66	7·5	52	6·5	93	4·0	26	2·0	66	290·0	0	14·47	40	3·69	40	290
300	126·5	8	4·0	103	8·5	11	2·5	35	4·5	18	5·5	19	300·0	0	24·47	40	0·06	90	300
310	136·5	8	14·0	103	0·0	118	5·5	6	5·0	10	1·5	61	310·0	0	6·91	44	10·06	90	310
320	146·5	8	24·0	103	1·0	77	1·0	127	5·5	2	5·0	14	320·0	0	16·91	44	6·43	39	320
330	156·5	8	7·0	140	2·0	36	4·0	98	5·5	127	1·0	56	330·0	0	26·91	44	2·79	89	330
340	166·5	8	17·0	140	2·5	184	0·0	40	6·0	119	4·5	9	340·0	0	9·36	48	12·79	89	340
350	3·0	16	0·5	25	3·5	143	3·0	11	6·5	111	0·5	51	350·0	0	19·36	48	9·16	38	350
360	13·0	16	10·5	25	4·5	102	5·5	161	7·0	103	4·0	4	360·0	0	1·80	52	5·53	88	360

Arg.	51		52		53		54		55		56		57		58	59		Arg.
d	*d*	*c*	*d*	*c*	*d*	*c*	*d*	*c*	*d*	*c*	*d*	*c*	*d*	*c*	*d*	*d*	*c*	*d*
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
10	10·0	0	10·0	0	10·0	0	10·0	0	10·0	0	10·0	0	10·0	0	10·0	10·0	0	10
20	7·0	9	20·0	0	20·0	0	20·0	0	20·0	0	9·5	59	3·5	107	20·0	20·0	0	20
30	4·0	18	7·5	1	30·0	0	0·0	32	30·0	0	9·5	38	13·5	107	30·0	30·0	0	30
40	1·5	8	17·5	1	4·5	7	10·0	32	7·5	57	9·5	17	7·5	102	40·0	40·0	0	40
50	11·5	8	5·0	2	14·5	7	20·0	32	17·5	57	9·0	76	1·5	97	50·0	50·0	0	50
60	8·5	17	15·0	2	24·5	7	0·5	17	27·5	57	9·0	55	11·5	97	60·0	60·0	0	60
70	6·0	7	3·0	0	34·5	7	10·5	17	5·0	114	9·0	34	5·5	92	70·0	70·0	0	70
80	3·0	16	13·0	0	9·0	14	20·5	17	15·0	114	9·0	13	15·5	92	80·0	80·0	0	80
90	0·5	6	0·5	1	19·0	14	1·0	2	25·0	114	8·5	72	9·5	87	90·0	90·0	0	90
100	10·5	6	10·5	1	29·0	14	11·0	2	3·0	41	8·5	51	3·5	82	100·0	100·0	0	100
110	7·5	15	20·5	1	3·5	21	21·0	2	13·0	41	8·5	30	13·5	82	110·0	110·0	0	110
120	5·0	5	8·0	2	13·5	21	1·0	34	23·0	41	8·5	9	7·5	77	120·0	120·0	0	120
130	2·0	14	18·0	2	23·5	21	11·0	34	0·5	98	8·0	68	1·5	72	130·0	130·0	0	130
140	12·0	14	6·0	0	33·5	21	21·0	34	10·5	98	8·0	47	11·5	72	140·0	140·0	0	140
150	9·5	4	16·0	0	8·0	28	1·5	19	20·5	98	8·0	26	5·5	67	150·0	150·0	0	150
160	6·5	13	3·5	1	18·0	28	11·5	19	30·5	98	8·0	5	15·5	67	160·0	160·0	0	160
170	4·0	3	13·5	1	28·0	28	21·5	19	8·5	25	7·5	64	9·5	62	170·0	170·0	0	170
180	1·0	12	1·0	2	2·5	35	2·0	4	18·5	25	7·5	43	3·5	57	180·0	180·0	0	180
190	11·0	12	11·0	2	12·5	35	12·0	4	28·5	25	7·5	22	13·5	57	190·0	1·5	3	190
200	8·5	2	21·0	2	22·5	35	22·0	4	6·0	82	7·5	1	7·5	52	200·0	11·5	3	200
210	5·5	11	9·0	0	32·5	35	2·0	36	16·0	82	7·0	60	1·5	47	210·0	21·5	3	210
220	3·0	1	19·0	0	7·5	3	12·0	36	26·0	82	7·0	39	11·5	47	220·0	31·5	3	220
230	0·0	10	6·5	1	17·5	3	22·0	36	4·0	9	7·0	18	5·5	42	230·0	41·5	3	230
240	10·0	10	16·5	1	27·5	3	2·5	21	14·0	9	6·5	77	15·5	42	240·0	51·5	3	240
250	7·5	0	4·0	2	2·0	10	12·5	21	24·0	9	6·5	56	9·5	37	250·0	61·5	3	250
260	4·5	9	14·0	2	12·0	10	22·5	21	1·5	66	6·5	35	3·5	32	260·0	71·5	3	260
270	1·5	18	2·0	0	22·0	10	3·0	6	11·5	66	6·5	14	13·5	32	270·0	81·5	3	270
280	11·5	18	12·0	0	32·0	10	13·0	6	21·5	66	6·0	73	7·5	27	280·0	91·5	3	280
290	9·0	8	22·0	0	6·5	17	23·0	6	31·5	66	6·0	52	1·5	22	290·0	101·5	3	290
300	6·0	17	9·5	1	16·5	17	3·0	38	9·0	123	6·0	31	11·5	22	300·0	111·5	3	300
310	3·5	7	19·5	1	26·5	17	13·0	38	19·0	123	6·0	10	5·5	17	310·0	121·5	3	310
320	0·5	16	7·0	2	1·0	24	23·0	38	29·0	123	5·5	69	15·5	17	320·0	131·5	3	320
330	10·5	16	17·0	2	11·0	24	3·5	23	7·0	50	5·5	48	9·5	12	330·0	141·5	3	330
340	8·0	6	5·0	0	21·0	24	13·5	23	17·0	50	5·5	27	3·5	7	340·0	151·5	3	340
350	5·0	15	15·0	0	31·0	24	23·5	23	27·0	50	5·5	6	13·5	7	350·0	161·5	3	350
360	2·5	5	2·5	1	5·5	31	4·0	8	4·5	107	5·0	65	7·5	2	360·0	171·5	3	360

TABLE 4 (*concl.*). Additions to the Arguments for the days of the year.

Arg.	60		61		62		63 64		65 66		67 68		69 70		71		Arg.
d	d	c	d	c	d	c	d	c	d	c	d	c	d	c	d	c	d
0	0·0	0	0·0	0	0·0	0	0·00	0	0·0	0	0·0	0	0·0	0	0·0	0	0
10	10·0	0	10·0	0	0·0	141	10·00	0	10·0	0	10·0	0	10·0	0	10·0	0	10
20	5·0	46	20·0	0	0·5	77	20·00	0	20·0	0	20·0	0	20·0	0	20·0	0	20
30	0·0	92	2·0	10	1·0	13	30·00	0	3·9	2	2·4	2	2·3	2	2·0	196	30
40	10·0	92	12·0	10	1·0	154	7·87	6	13·9	2	12·4	2	12·3	2	12·0	196	40
50	5·0	138	22·0	10	1·5	90	17·87	6	23·9	2	22·4	2	22·3	2	22·0	196	50
60	0·5	13	4·0	20	2·0	26	27·87	6	7·8	4	4·9	4	4·6	4	4·5	172	60
70	10·5	13	14·0	20	2·0	167	5·74	12	17·8	4	14·9	4	14·6	4	14·5	172	70
80	5·5	59	24·0	20	2·5	103	15·74	12	1·7	6	24·9	4	24·6	4	24·5	172	80
90	0·5	105	6·0	30	3·0	39	25·74	12	11·7	6	7·3	6	6·9	6	7·0	148	90
100	10·5	105	16·0	30	3·0	180	3·62	18	21·7	6	17·3	6	16·9	6	17·0	148	100
110	5·5	151	26·0	30	3·5	116	13·62	18	5·6	8	27·3	6	26·9	6	27·0	148	110
120	1·0	26	8·0	40	4·0	52	23·62	18	15·6	8	9·8	8	9·2	8	9·5	124	120
130	11·0	26	18·0	40	4·0	193	1·49	24	25·6	8	19·8	8	19·2	8	19·5	124	130
140	6·0	72	0·0	50	4·5	129	11·49	24	9·5	10	2·2	10	1·5	10	2·0	100	140
150	1·0	118	10·0	50	5·0	65	21·49	24	19·5	10	12·2	10	11·5	10	12·0	100	150
160	11·0	118	20·0	50	5·5	1	31·49	24	3·4	12	22·2	10	21·5	10	22·0	100	160
170	6·0	164	2·5	7	5·5	142	9·36	30	13·4	12	4·6	12	3·9	12	4·5	76	170
180	1·5	39	12·5	7	6·0	78	19·36	30	23·4	12	14·6	12	13·9	12	14·5	76	180
190	11·5	39	22·5	7	6·5	14	29·36	30	7·3	14	24·6	12	23·9	12	24·5	76	190
200	6·5	85	4·5	17	6·5	155	7·23	1	17·3	14	7·1	14	6·2	14	7·0	52	200
210	1·5	131	14·5	17	7·0	91	17·23	1	1·2	16	17·1	14	16·2	14	17·0	52	210
220	11·5	131	24·5	17	7·5	27	27·23	1	11·2	16	27·1	14	26·2	14	27·0	52	220
230	7·0	6	6·5	27	7·5	168	5·10	7	21·2	16	9·5	16	8·5	16	9·5	28	230
240	2·0	52	16·5	27	8·0	104	15·10	7	5·1	18	19·5	16	18·5	16	19·5	28	240
250	12·0	52	26·5	27	8·5	40	25·10	7	15·1	18	1·9	18	0·8	18	2·0	4	250
260	7·0	98	8·5	37	8·5	181	2·98	13	25·1	18	11·9	18	10·8	18	12·0	4	260
270	2·0	144	18·5	37	9·0	117	12·98	13	9·0	20	21·9	18	20·8	18	22·0	4	270
280	12·0	144	0·5	47	9·5	53	22·98	13	19·0	20	4·4	20	3·1	20	4·0	200	280
290	7·5	19	10·5	47	0·0	130	0·85	19	2·9	22	14·4	20	13·1	20	14·0	200	290
300	2·5	65	20·5	47	0·5	66	10·85	19	12·9	22	24·4	20	23·1	20	24·0	200	300
310	12·5	65	3·0	4	1·0	2	20·85	19	22·9	22	6·8	22	5·4	22	6·5	176	310
320	7·5	111	13·0	4	1·0	143	30·85	19	6·8	24	16·8	22	15·4	22	16·5	176	320
330	2·5	157	23·0	4	1·5	79	8·72	25	16·8	24	26·8	22	25·4	22	26·5	176	330
340	12·5	157	5·0	14	2·0	15	18·72	25	0·7	26	9·3	24	7·7	24	9·0	152	340
350	8·0	32	15·0	14	2·0	156	28·72	25	10·7	26	19·3	24	17·7	24	19·0	152	350
360	3·0	78	25·0	14	2·5	92	6·59	31	20·7	26	1·7	26	0·0	26	1·5	128	360

Arg.	72		73		74		75		76		77		78	Arg.
d	d	c	d	c	d	c	d	c	d	c	d	c	d	d
0	0·0	0	0·0	0	0·0	0	0·0	0	0·0	0	0·0	0	0·0	0
10	10·0	0	0·0	214	10·0	0	10·0	0	2·5	44	10·0	0	10·0	10
20	20·0	0	0·5	151	4·5	16	7·0	7	5·5	29	9·5	54	20·0	20
30	30·0	0	1·0	88	14·5	16	4·0	14	1·0	58	9·5	43	30·0	30
40	8·0	41	1·5	25	9·0	32	1·5	6	4·0	43	9·5	32	40·0	40
50	18·0	41	1·5	239	3·5	48	11·5	6	0·0	13	9·5	21	50·0	50
60	28·0	41	2·0	176	13·5	48	8·5	13	2·5	57	9·5	10	60·0	60
70	6·0	82	2·5	113	8·0	64	6·0	5	5·5	42	9·0	64	70·0	70
80	16·0	82	3·0	50	3·0	9	3·0	12	1·5	12	9·0	53	80·0	80
90	26·0	82	3·0	264	13·0	9	0·5	4	4·0	56	9·0	42	90·0	90
100	4·5	14	3·5	201	7·5	25	10·5	4	0·0	26	9·0	31	100·0	100
110	14·5	14	4·0	138	2·0	41	7·5	11	3·0	11	9·0	20	110·0	110
120	24·5	14	4·5	75	12·0	41	5·0	3	5·5	55	9·0	9	2·5	120
130	2·5	55	5·0	12	6·5	57	2·0	10	1·5	25	8·5	63	12·5	130
140	12·5	55	5·0	226	1·5	2	12·0	10	4·5	10	8·5	52	22·5	140
150	22·5	55	5·5	163	11·5	2	9·5	2	0·0	39	8·5	41	32·5	150
160	0·5	96	6·0	100	6·0	18	6·5	9	3·0	24	8·5	30	42·5	160
170	10·5	96	6·5	37	0·5	34	4·0	1	6·0	9	8·5	19	52·5	170
180	20·5	96	6·5	251	10·5	34	1·0	8	1·5	38	8·5	8	62·5	180
190	30·5	96	7·0	188	5·0	50	11·0	8	4·5	23	8·0	62	72·5	190
200	9·0	28	7·5	125	15·0	50	8·5	0	0·0	52	8·0	51	82·5	200
210	19·0	28	8·0	62	9·5	66	5·5	7	3·0	37	8·0	40	92·5	210
220	29·0	28	8·0	276	4·5	11	2·5	14	6·0	22	8·0	29	102·5	220
230	7·0	69	8·5	213	14·5	11	0·0	6	1·5	51	8·0	18	112·5	230
240	17·0	69	9·0	150	9·0	27	10·0	6	4·5	36	8·0	7	5·0	240
250	27·0	69	0·0	24	3·5	43	7·0	13	0·5	6	7·5	61	15·0	250
260	5·5	1	0·0	238	13·5	43	4·5	5	3·0	50	7·5	50	25·0	260
270	15·5	1	0·5	175	8·0	59	1·5	12	6·0	35	7·5	39	35·0	270
280	25·5	1	1·0	112	3·0	4	11·5	12	2·0	5	7·5	28	45·0	280
290	3·5	42	1·5	49	13·0	4	9·0	4	4·5	49	7·5	17	55·0	290
300	13·5	42	1·5	263	7·5	20	6·0	11	0·5	19	7·5	6	65·0	300
310	23·5	42	2·0	200	2·0	36	3·5	3	3·5	4	7·0	60	75·0	310
320	1·5	83	2·5	137	12·0	36	0·5	10	6·0	48	7·0	49	85·0	320
330	11·5	83	3·0	74	6·5	52	10·5	10	2·0	18	7·0	38	95·0	330
340	21·5	83	3·5	11	1·0	68	8·0	2	5·0	3	7·0	27	105·0	340
350	0·0	15	3·5	225	11·0	68	5·0	9	0·5	32	7·0	16	115·0	350
360	10·0	15	4·0	162	6·0	13	2·5	1	3·5	17	7·0	5	7·5	360

TABLE 5. Conversion of seconds of arc into degrees and minutes.

Deg.	Seconds	Deg.	Seconds	Deg.	Seconds	Deg.	Seconds	Deg.	Seconds	Deg.	Seconds	Min.	Seconds
0	00	60	216000	120	432000	180	648000	240	864000	300	1080000	0	00
1	3600	61	219600	121	435600	181	651600	241	867600	301	1083600	1	60
2	7200	62	223200	122	439200	182	655200	242	871200	302	1087200	2	120
3	10800	63	226800	123	442800	183	658800	243	874800	303	1090800	3	180
4	14400	64	230400	124	446400	184	662400	244	878400	304	1094400	4	240
5	18000	65	234000	125	450000	185	666000	245	882000	305	1098000	5	300
6	21600	66	237600	126	453600	186	669600	246	885600	306	1101600	6	360
7	25200	67	241200	127	457200	187	673200	247	889200	307	1105200	7	420
8	28800	68	244800	128	460800	188	676800	248	892800	308	1108800	8	480
9	32400	69	248400	129	464400	189	680400	249	896400	309	1112400	9	540
10	36000	70	252000	130	468000	190	684000	250	900000	310	1116000	10	600
11	39600	71	255600	131	471600	191	687600	251	903600	311	1119600	11	660
12	43200	72	259200	132	475200	192	691200	252	907200	312	1123200	12	720
13	46800	73	262800	133	478800	193	694800	253	910800	313	1126800	13	780
14	50400	74	266400	134	482400	194	698400	254	914400	314	1130400	14	840
15	54000	75	270000	135	486000	195	702000	255	918000	315	1134000	15	900
16	57600	76	273600	136	489600	196	705600	256	921600	316	1137600	16	960
17	61200	77	277200	137	493200	197	709200	257	925200	317	1141200	17	1020
18	64800	78	280800	138	496800	198	712800	258	928800	318	1144800	18	1080
19	68400	79	284400	139	500400	199	716400	259	932400	319	1148400	19	1140
20	72000	80	288000	140	504000	200	720000	260	936000	320	1152000	20	1200
21	75600	81	291600	141	507600	201	723600	261	939600	321	1155600	21	1260
22	79200	82	295200	142	511200	202	727200	262	943200	322	1159200	22	1320
23	82800	83	298800	143	514800	203	730800	263	946800	323	1162800	23	1380
24	86400	84	302400	144	518400	204	734400	264	950400	324	1166400	24	1440
25	90000	85	306000	145	522000	205	738000	265	954000	325	1170000	25	1500
26	93600	86	309600	146	525600	206	741600	266	957600	326	1173600	26	1560
27	97200	87	313200	147	529200	207	745200	267	961200	327	1177200	27	1620
28	100800	88	316800	148	532800	208	748800	268	964800	328	1180800	28	1680
29	104400	89	320400	149	536400	209	752400	269	968400	329	1184400	29	1740
30	108000	90	324000	150	540000	210	756000	270	972000	330	1188000	30	1800
31	111600	91	327600	151	543600	211	759600	271	975600	331	1191600	31	1860
32	115200	92	331200	152	547200	212	763200	272	979200	332	1195200	32	1920
33	118800	93	334800	153	550800	213	766800	273	982800	333	1198800	33	1980
34	122400	94	338400	154	554400	214	770400	274	986400	334	1202400	34	2040
35	126000	95	342000	155	558000	215	774000	275	990000	335	1206000	35	2100
36	129600	96	345600	156	561600	216	777600	276	993600	336	1209600	36	2160
37	133200	97	349200	157	565200	217	781200	277	997200	337	1213200	37	2220
38	136800	98	352800	158	568800	218	784800	278	1000800	338	1216800	38	2280
39	140400	99	356400	159	572400	219	788400	279	1004400	339	1220400	39	2340
40	144000	100	360000	160	576000	220	792000	280	1008000	340	1224000	40	2400
41	147600	101	363600	161	579600	221	795600	281	1011600	341	1227600	41	2460
42	151200	102	367200	162	583200	222	799200	282	1015200	342	1231200	42	2520
43	154800	103	370800	163	586800	223	802800	283	1018800	343	1234800	43	2580
44	158400	104	374400	164	590400	224	806400	284	1022400	344	1238400	44	2640
45	162000	105	378000	165	594000	225	810000	285	1026000	345	1242000	45	2700
46	165600	106	381600	166	597600	226	813600	286	1029600	346	1245600	46	2760
47	169200	107	385200	167	601200	227	817200	287	1033200	347	1249200	47	2820
48	172800	108	388800	168	604800	228	820800	288	1036800	348	1252800	48	2880
49	176400	109	392400	169	608400	229	824400	289	1040400	349	1256400	49	2940
50	180000	110	396000	170	612000	230	828000	290	1044000	350	1260000	50	3000
51	183600	111	399600	171	615600	231	831600	291	1047600	351	1263600	51	3060
52	187200	112	403200	172	619200	232	835200	292	1051200	352	1267200	52	3120
53	190800	113	406800	173	622800	233	838800	293	1054800	353	1270800	53	3180
54	194400	114	410400	174	626400	234	842400	294	1058400	354	1274400	54	3240
55	198000	115	414000	175	630000	235	846000	295	1062000	355	1278000	55	3300
56	201600	116	417600	176	633600	236	849600	296	1065600	356	1281600	56	3360
57	205200	117	421200	177	637200	237	853200	297	1069200	357	1285200	57	3420
58	208800	118	424800	178	640800	238	856800	298	1072800	358	1288800	58	3480
59	212400	119	428400	179	644400	239	860400	299	1076400	359	1292400	59	3540
60	216000	120	432000	180	648000	240	864000	300	1080000	360	1296000	60	3600