

CANADA
DEPARTMENT OF MINES
HON. CHARLES STEWART, MINISTER; CHARLES CAMSELL, DEPUTY MINISTER

NATIONAL MUSEUM OF CANADA
W. H. COLLINS, ACTING DIRECTOR

BULLETIN No. 57

**A Transverse Polyconic Projection for
General Maps of Canada**

BY

C.-O. Senécal
Geological Survey, Canada



OTTAWA
F. A. ACLAND
PRINTER TO THE KING'S MOST EXCELLENT MAJESTY
1929

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A TRANSVERSE POLYCONIC PROJECTION FOR GENERAL MAPS OF CANADA

The ordinary polyconic projection, invented by Professor Ferdinand Hassler, first Superintendent of the United States Coast and Geodetic Survey, owes its popularity in United States and Canada, to the facility of its construction from elaborate tables published by that institution, the United States Geological Survey, the Smithsonian Institution, and others. But it has the grave drawback of introducing on maps, increasing errors in meridional distances as meridians recede from the central meridian. Its use is recommended for maps covering any distance north and south, but limited east and west to such extent that the distortion is at a minimum consistent with the purposes of the maps.

The projection is, therefore, unsuited for a map of the whole of the Dominion of Canada whose great east-west dimension is predominating and whose site is in high latitudes. However, it seems that a polyconic projection in a *transverse* position, as suggested by Charles H. Deetz (U.S.C. and G. Survey Spec. Pub. No. 47), with the poles assumed—for construction only—to be transferred to the equator, and the middle meridian of the country taken as *auxiliary* equator, may be used with advantage for a general map of Canada. On account of the shape of the country, the greatest distortion and largest errors, inherent to the projection, would fall outside its boundaries; the general properties of the polyconic system would be preserved, and, by the fact that angles subtending the developed contact bases of the tangent cones would be smaller than in the ordinary projection, the consequent curve deflexions affecting the length of arcs of parallels of latitude, would also be smaller, and tend to lessen those errors.

The following computation of a *transverse polyconic projection* is, therefore, undertaken in the hope that it may serve a useful purpose, and interest the general map draughtsman to whom this paper is dedicated. Elementary knowledge only of plane and spherical trigonometry is required for the transformation of rectangular co-ordinates and no mathematical discussion of this projection will be entered into.

The problem may be worked out on the hypothesis of a *spherical* earth whose radius would be such that the surface of the map-area would *most nearly* coincide with the corresponding ellipsoidal surface of the earth. The radius of such a sphere is equal to the geometrical mean of the meridian radius of curvature, and the radius of curvature of the normal section of the earth ellipsoid at the latitude of the centre of the area considered:

$$r = \sqrt{\rho_m \rho_n}^1$$

But this applies to relatively small areas only, as errors with contrary signs are introduced in meridional and parallel distances. On a map of the whole of Canada, unless the scale be very small, such errors are inadmissible.

¹ Germain, A.: *Traité des Projections des Cartes Géographiques.*

In order to take into account the flattening of the pole, i.e. to preserve, as far as possible, correct meridional distances between latitudes, and to eliminate extreme errors on maps of moderately small scales, a process may be evolved on the same hypothesis in the assumption of a series of spheres whose radii would gradually increase with the latitudes, so that the least errors would be found in the lengths of corresponding parallels. Such a conventional projection would be the result of a superposition or assemblage of separate projections of zones of different spheres, closely approximating natural surfaces comprised between common axes of rectangular co-ordinates and the parallels of latitude, whereby true distances would be held, at least, on the central meridian.

The meridian of longitude 95 degrees west from Greenwich, is chosen as the central meridian—or *auxiliary* equator—and the intersection of the parallel of latitude 60 degrees with this meridian, as the origin of rectangular co-ordinates. The unit of distances for the computation is the statute mile.

DETERMINATION OF THE RADII OF THE AUXILIARY SPHERES

The radii of the successive spherical zones are determined from the true lengths of meridional arcs measured from the origin of co-ordinates at latitude 60 degrees to the successive intersections of parallels of latitude. These meridional distances may be calculated by the standard formula in geodesy, but a more expeditious method is to compute them from tables given in Special Publication No. 5 of the U.S.C. and G. Survey, thus:

Denoting by $m_1 m_2 m_3 \dots m_n$, the lengths of single degrees of latitude north of latitude 60 degrees; by $m_{-1} m_{-2} m_{-3} \dots m_{-n}$, those south of latitude 60 degrees as found in the tables, and by $M_1 M_2 M_3 \dots$ etc., the meridional distances, we have:

Between lat. 60° and lat. 61°,	(1 degree):	$M_1 = m_1$
“ “	62°, (2 degrees):	$M_2 = m_1 + m_2$
“ “	63°, (3 degrees):	$M_3 = m_1 + m_2 + m_3$
“ “	(60 + n)°, (n degrees):	$M_n = m_1 + m_2 + m_3$ + + m_n

and likewise:

Between lat. 60° and lat. 59°,	(1 degree):	$M_{-1} = m_{-1}$
“ “	58°, (2 degrees):	$M_{-2} = m_{-1} + m_{-2}$
“ “	57°, (3 degrees):	$M_{-3} = m_{-1} + m_{-2} + m_{-3}$
“ “	(60 - n)°, (n degrees):	$M_{-n} = m_{-1} + m_{-2} + m_{-3}$ + + m_{-n}

Denoting by $r_1 r_2 r_3 \dots r_n$ and $r_{-1} r_{-2} r_{-3} \dots r_{-n}$, the radii of spheres corresponding to those meridional arcs, we have

$$\begin{aligned}
 r_1 &= M_1 (360/2\pi) \\
 r_2 &= \frac{M_2 (360/2\pi)}{2} \\
 r_3 &= \frac{M_3 (360/2\pi)}{3} \\
 \vdots & \\
 r_n &= \frac{M_n (360/2\pi)}{n} \\
 r_{-1} &= M_{-1} (360/2\pi)
 \end{aligned}$$

and

$$r_{-2} = \frac{M_{-2} (360/2\pi)}{2}$$

$$r_{-3} = \frac{M_{-3} (360/2\pi)}{3}$$

$$\vdots$$

$$\vdots$$

$$r_{-n} = \frac{M_{-n} (360/2\pi)}{n}$$

or, expressed in logarithms

$$\text{and } \left. \begin{aligned} \log r_n &= \log M_n - \log n + [1.7581226] \\ \log r_{-n} &= \log M_{-n} - \log n + [1.7581226] \end{aligned} \right\} (1)$$

The radius of sphere to be used for the parallel of latitude 60 degrees, is the meridian radius of curvature of the earth ellipsoid at that latitude which is found in the Smithsonian Geographical Tables, but may be calculated by above formula, from the arc of 1 degree between latitude $59^\circ 30'$ and latitude $60^\circ 30'$.

TRANSFORMATION OF RECTANGULAR CO-ORDINATES

This problem is solved as follows:

In Figure 1, let the central meridian of the projection—the axis of

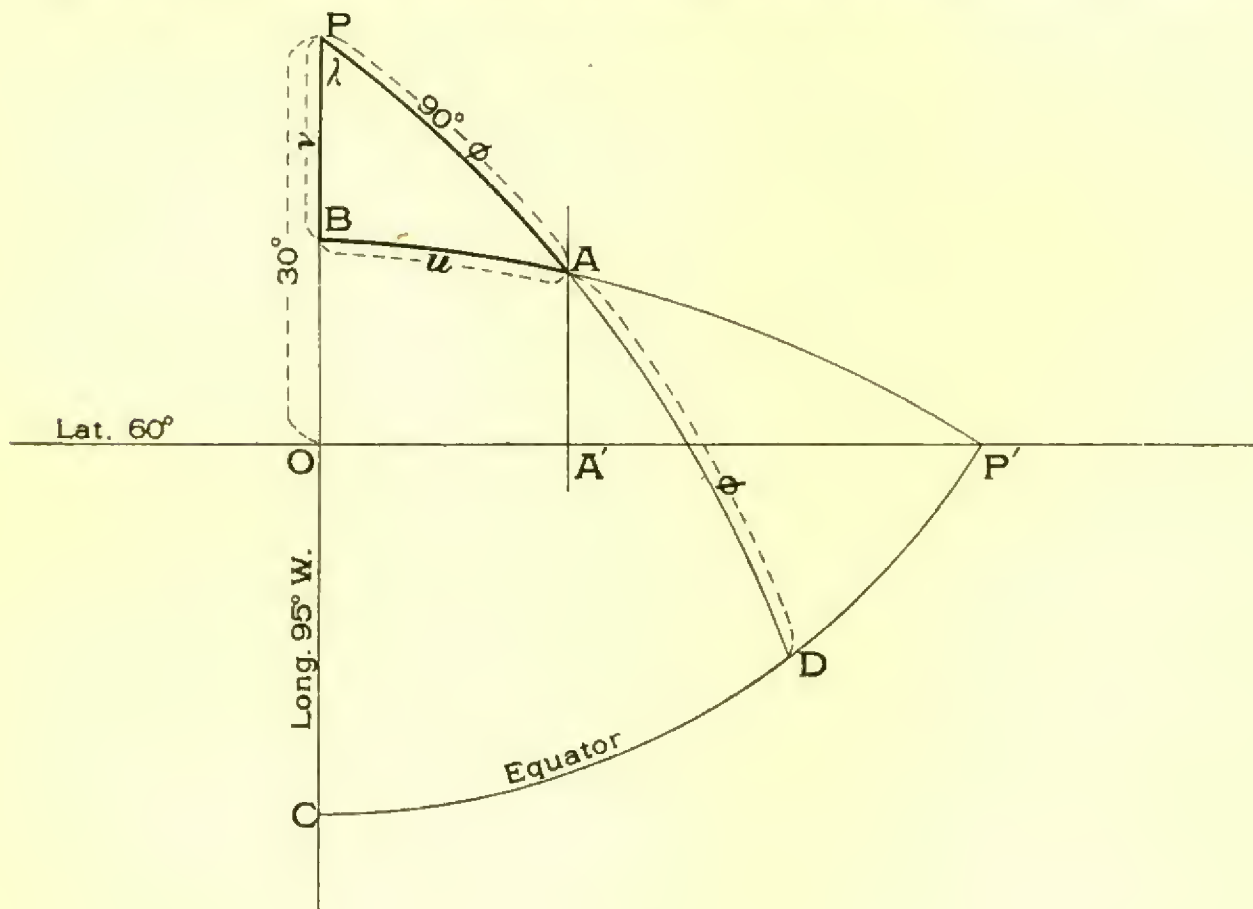


Figure 1.

ordinates—be represented by the line $C O P$; the rectified arc of great circle $O A' P'$, perpendicular to the central meridian at latitude 60 degrees to be taken as axis of abscissæ with the intersection O , as origin of co-ordinates. The arc $C D P'$ represents the equator, and point P , the pole.

Let A be a point on the earth's surface whose latitude and difference of longitude with the central meridian are respectively ϕ and λ . Through point A , draw an arc of great circle $P' A B$ perpendicular to the central meridian, and an arc of small circle $A A'$, parallel to the central meridian. The arc of great circle $D A P$ perpendicular to the equator represents the meridian of point A .

In the right-angle spherical triangle $A B P$, formed by those arcs of great circle, we have the following relations:

$$\begin{aligned} \sin u &= \sin (90^\circ - \phi) \sin \lambda \\ &= \cos \phi \sin \lambda \end{aligned} \quad (2)$$

$$\begin{aligned} \tan v &= \frac{\cos \lambda}{\cot (90^\circ - \phi)} \\ &= \cos \lambda \tan (90^\circ - \phi) \\ &= \cos \lambda \cot \phi \end{aligned} \quad (3)$$

Now, in a polyconic projection of various points, A , laid in a transverse position, the pole P being transferred to P' on the equator, and the apexes of the tangent cones lying on the axis of abscissæ, the values (2) and (3) may be assumed, for purpose of computation, to be the *auxiliary* latitude and longitude respectively as elements of the formulæ of the regular polyconic development. Thus, we have from Figures 1 and 2:

$$\begin{aligned} r &= \text{radius of spherical zone} \\ l &= r \cot u \\ \left\{ \begin{array}{l} \alpha = (30^\circ - v) \sin u \quad (\text{where } v < 30^\circ) \\ \alpha = (v - 30^\circ) \sin u \quad (\text{where } v > 30^\circ) \end{array} \right. \end{aligned}$$

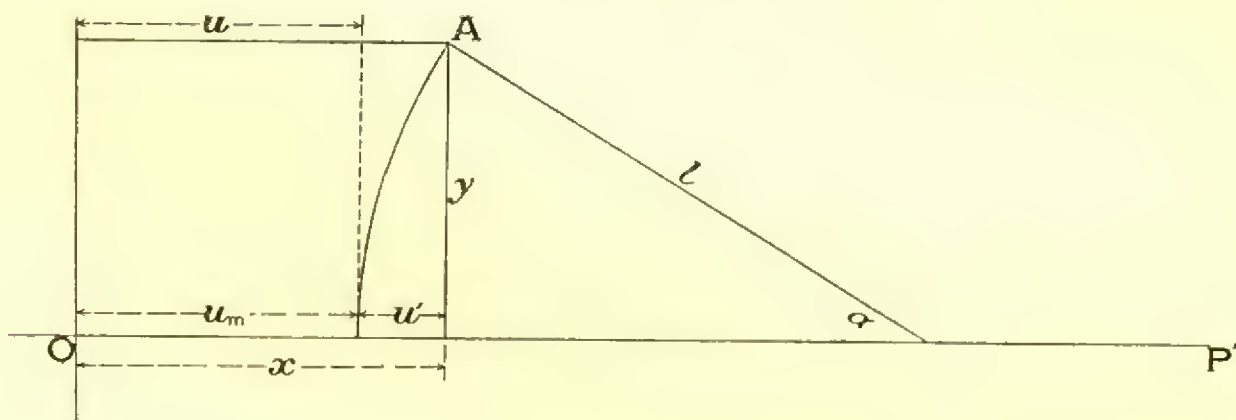


Figure 2.

$$u' = 2l \sin^2 \frac{\alpha}{2}$$

or
$$u' = 2r \cot u \sin^2 \frac{\alpha}{2}$$

The length of arc u in statute miles is given by the formula

$$u_m = 2 \pi r \frac{u}{360}$$

The abscissa is then expressed by

$$x = u_m + u' \quad (4)$$

and the ordinate by

$$y = l \sin \alpha$$

or

$$y = r \cot u \sin \alpha \quad (5)$$

When the projected points are situated to the north of the axis of abscissæ, that is to say, when arc v is smaller than 30 degrees, the colatitude of the origin of co-ordinates, the y values are given the sign +; when the projected points are to the south of the axis of abscissæ where arc v is greater than 30 degrees, the ordinates y are distinguished by the sign -. The ordinates are to be plotted accordingly above or below the axis of abscissæ. The x values are scaled east and west of the central meridian.

Each parallel of latitude is thus separately computed, developed, and projected in the same manner, point by point, the radius of the corresponding spherical zone from formula (1) being used as above explained.

Derived from the above formulæ, the latitude spacings on the different meridians are kept in nearly true distances in the central part of the projection. On the outskirts, the meridians and parallels increase in length, but the greatest distortion falls mostly beyond the limits of the country.

Numerical Example. Suppose $\phi = 65^\circ$ and $\lambda = 40^\circ$, what are the co-ordinates x and y ?

From the table, the meridional distance between latitudes 60° and 65° , is $M_5 = 346.280$ statute miles

$$\log M_5 = 2.5394274$$

$$\log 5 = 0.6989700$$

$$1.8404574$$

$$\text{constant} = 1.7581226$$

$$\log r = 3.5985800$$

$$\log \cos 65^\circ = \bar{1}.6259483$$

$$\log \sin 40^\circ = \bar{1}.8080675$$

$$\log \sin u = \bar{1}.4340158$$

$$u = 15^\circ 45' 45''.72 = 56745'' .72$$

$$\log u \text{ (in seconds)} = 4.7539332$$

$$\log 2\pi = 0.7981799$$

$$\log r = 3.5985800$$

$$9.1506931$$

$$\log \text{circumference (secs)} = 6.1126050$$

$$\log (u \text{ in miles}) = \log u_m = 3.0380881$$

$$u_m = 1091.662 \text{ miles}$$

	$\log \cos 40^\circ = \bar{1}.8842540$
	$\log \cot 65^\circ = \bar{1}.6686725$
	<hr/>
	$\log \tan v = \bar{1}.5529265$
	$v = 19^\circ 39' 26''.48$
$\log (30^\circ - v) = \log 37233''.52$	$= 4.5709341$
$\log \sin u$	$= \bar{1}.4340158$
	<hr/>
$\log \alpha$	$= 4.0049499$
$\alpha = 10114''.62$	$= 2^\circ 48' 34''.62$
$\frac{\alpha}{2}$	$= \bar{1}^\circ 24' 17''.31$
	<hr/>
	$\log \sin \frac{\alpha}{2} = \bar{2}.3894509$
	$\text{“ “} = \bar{2}.3894509$
	$\log 2 = 0.3010300$
	$\log r = 3.5985800$
	$\log \cot u = 0.5493377$
	<hr/>
	$\log u' = 1.2278495$
	$u' = 16.898 \text{ miles}$
	<hr/>
$u_m = 1091.662 \text{ miles}$	$\log \sin \alpha = \bar{2}.6903504$
$u' = 16.898 \text{ “}$	$\log r = 3.5985800$
	<hr/>
$x = 1108.560 \text{ “}$	$\log \cot u = 0.5493377$
	<hr/>
	$\log y = 2.8382681$
	$y = 689.078 \text{ miles}$

USE OF TABLES FOR A TRANSVERSE POLYCONIC PROJECTION FOR GENERAL MAPS OF CANADA

In Table I will be found meridional distances in statute miles of intersections of parallels with the central meridian for every degree from the origin of co-ordinates, and the logarithms of the radii of the corresponding spherical zones.

Tables II and IIa contain the elements for the computation of rectangular co-ordinates of every fifth degree intersection of parallels and meridians.

Tables III, IV, V, and VI give the co-ordinates in inches of 5-degree quadrilaterals for general maps of Canada, on scales of 1 inch to 50, 60, 80, and 100 statute miles, respectively.

DIRECTIONS FOR PLOTTING THE PROJECTION

(See Figure 3)

In the middle of a sheet of paper of determined size according to the scale of the map, draw a vertical line to represent the central meridian of the projection—longitude 95 degrees west—and the axis of ordinates. Midway on this median line, mark the intersection of the parallel of 60 degrees and, through this point as origin of co-ordinates, draw a perpendicular across the sheet to represent the axis of abscissæ. From the origin, scale in the usual manner, the co-ordinates x and y of the intersections of meridians and parallels taken from the tables: abscissæ are plotted on both sides of the central meridian, and the ordinates above or below the axis of abscissæ according to the sign + or - preceding the y values. The plotted intersections are then joined by suitable curves representing meridians and parallels. Should a network of 1-degree quadrilaterals be desired, graticulation may be completed by subdividing the 5-degree quadrilaterals by means of the scale or proportional divider. The parallels should be subdivided in equal parts, and the meridians in the ratio of meridional distances given in Table I.

Table I

Latitude	Number of degrees in arc= n	Meridional distance = M_{-n} or M_n	Log radius of spherical zone= $\log r$	r in statute miles
		Miles		
60° to 40°.....	20	-1,382.282	3.5976892	3,959.945
60° to 41°.....	19	-1,313.282	3.5977263	3,960.284
60° to 42°.....	18	-1,244.270	3.5977646	3,960.633
60° to 43°.....	17	-1,175.246	3.5978023	3,960.977
60° to 44°.....	16	-1,106.210	3.5978400	3,961.321
60° to 45°.....	15	-1,037.162	3.5978777	3,961.665
60° to 46°.....	14	- 968.102	3.5979152	3,962.006
60° to 47°.....	13	- 899.029	3.5979525	3,962.346
60° to 48°.....	12	- 829.944	3.5979901	3,962.690
60° to 49°.....	11	- 760.847	3.5980272	3,963.028
60° to 50°.....	10	- 691.738	3.5980642	3,963.366
60° to 51°.....	9	- 622.617	3.5981012	3,962.704
60° to 52°.....	8	- 553.484	3.5981377	3,964.037
60° to 53°.....	7	- 484.339	3.5981740	3,964.368
60° to 54°.....	6	- 415.182	3.5982099	3,964.695
60° to 55°.....	5	- 346.018	3.5982450	3,965.016
60° to 56°.....	4	- 276.833	3.5982802	3,965.337
60° to 57°.....	3	- 207.642	3.5983165	3,965.669
60° to 58°.....	2	- 138.439	3.5983511	3,965.985
60° to 59°.....	1	- 69.225	3.5983856	3,966.300
60° to 60°.....	0	0.000	3.5984195	3,966.615 ¹
60° to 61°.....	1	+ 69.236	3.5984546	3,966.930
60° to 62°.....	2	+ 138.482	3.5984859	3,967.218
60° to 63°.....	3	+ 207.738	3.5985173	3,967.504
60° to 64°.....	4	+ 277.004	3.5985486	3,967.789
60° to 65°.....	5	+ 346.280	3.5985800	3,968.075
60° to 66°.....	6	+ 415.566	3.5986114	3,968.363
60° to 67°.....	7	+ 484.861	3.5986430	3,968.648
60° to 68°.....	8	+ 554.165	3.5986716	3,968.913
60° to 69°.....	9	+ 623.477	3.5987004	3,969.176
60° to 70°.....	10	+ 692.797	3.5987286	3,969.434
60° to 71°.....	11	+ 762.125	3.5987562	3,969.686
60° to 72°.....	12	+ 831.461	3.5987831	3,969.932

¹ This value of r is the length of the meridian radius of curvature of the earth at latitude 60 degrees converted into miles from the Smithsonian Geographical Tables.

Table I—Continued

Latitude	Number of degrees in arc = n	Meridional distance = M_{-n} or M_n	Log radius of spherical zone = log r	r in statute miles
		Miles		Miles
60° to 73°.....	13	+ 900.805	3.5988101	3,970.179
60° to 74°.....	14	+ 970.156	3.5988365	3,970.420
60° to 75°.....	15	+1,039.513	3.5988616	3,970.650
60° to 76°.....	16	+1,108.876	3.5988854	3,970.867
60° to 77°.....	17	+1,178.245	3.5989092	3,971.085
60° to 78°.....	18	+1,247.620	3.5989323	3,971.295
60° to 79°.....	19	+1,317.000	3.5989547	3,971.501
60° to 80°.....	20	+1,386.384	3.5989762	3,971.697
60° to 81°.....	21	+1,455.772	3.5989969	3,971.886
60° to 82°.....	22	+1,525.164	3.5990163	3,972.065
60° to 85°.....	25	+1,733.357	3.5990306	3,972.195
60° to 90°.....	30	+2,080.378	3.5991436	3,973.229

Table II

LATITUDE 40°

λ	sin u = cos φ sin λ			tan v = cot φ cos λ			α = { $\frac{v-30^\circ}{30^\circ-v}$ } sin u			Sign
	log sin u	u		log tan v	v		log α (seconds)	α		
°		°	' "		°	' "		°	' "	
5	2̄.8245500	3	49 41.56	0.0745307	49	53 32.65	3.6795398	1	19 41.23	—
10	1̄.1239242	7	38 39.37	0.0695380	49	34 03.16	3.9717630	2	36 10.50	—
15	1̄.2972502	11	26 08.27	0.0611303	49	01 09.00	4.1327442	3	46 15.13	—
20	1̄.4183057	15	11 20.13	0.0491723	48	14 12.13	4.2355545	4	46 41.03	—
25	1̄.5102023	18	53 22.29	0.0334622	47	12 18.46	4.3021627	5	34 12.23	—
30	1̄.5832240	22	31 15.65	0.0137171	45	54 16.87	4.3410516	6	05 30.65	—
35	1̄.6428453	26	03 52.74	1̄.9895510	44	18 38.90	4.3548119	6	17 16.64	—
40	1̄.6923215	29	29 55.35	1̄.9604405	42	23 38.72	4.3418386	6	06 10.43	—

LATITUDE 45°

°		°	' "		°	' "		°	' "	
5	2̄.7897810	3	31 59.83	1̄.9983442	44	53 26.80	3.5190009	0	55 03.70	—
10	1̄.0891552	7	03 10.87	1̄.9933515	44	33 41.23	3.8086644	1	47 16.69	—
15	1̄.2624812	10	32 43.04	1̄.9849438	44	00 25.30	3.9651297	2	33 48.47	—
20	1̄.3835367	13	59 43.61	1̄.9729858	43	13 09.05	4.0610437	3	11 49.17	—
25	1̄.4754333	17	23 15.78	1̄.9572757	42	11 10.54	4.1176063	3	38 30.11	—
30	1̄.5484550	20	42 17.32	1̄.9375306	40	53 36.21	4.1419206	3	51 05.02	—
35	1̄.6080763	23	55 38.86	1̄.9133645	39	19 21.68	4.1339200	3	46 51.93	—
40	1̄.6575525	27	02 02.47	1̄.8842540	37	27 13.39	4.0862281	3	23 16.30	—
45	1̄.6989700	30	00 00.00	1̄.8494850	35	15 51.81	3.9766207	2	37 55.91	—

LATITUDE 50°

°		°	' "		°	' "		°	' "	
5	2̄.7483635	3	12 41.43	1̄.9221577	39	53 32.90	3.2999709	0	33 15.13	—
10	1̄.0477377	6	24 31.12	1̄.9171650	39	34 07.28	3.5848926	1	04 04.97	—
15	1̄.2210637	9	34 35.68	1̄.9087573	39	01 30.17	3.7328156	1	30 05.25	—
20	1̄.3421192	12	42 00.02	1̄.8967993	38	15 20.26	3.8151718	1	48 53.89	—
25	1̄.4340158	15	45 45.72	1̄.8810892	37	15 08.47	3.8507972	1	58 12.45	—
30	1̄.5070375	18	44 50.05	1̄.8613441	36	00 18.76	3.8418683	1	55 48.13	—
35	1̄.5666588	21	38 04.97	1̄.8371780	34	30 09.69	3.7764335	1	39 36.31	—
40	1̄.6161350	24	24 16.18	1̄.8080675	32	43 56.67	3.6089831	1	07 44.27	—
45	1̄.6575525	27	02 02.47	1̄.9732985	30	40 55.40	3.0476748	0	18 36.03	—
50	1̄.6923215	29	29 55.35	1̄.7318810	28	20 26.77	3.4685308	0	49 01.24	+

Table II—Continued

LATITUDE 55°

λ	sin u = cos φ sin λ			tan v = cot φ cos λ			α = $\begin{cases} v-30^\circ \\ 30^\circ-v \end{cases}$ sin u			Sign
	log sin u	u		log tan v	v		log α (seconds)	α		
°		°	' "		°	' "		°	' "	
5	2̄.6988873	2	51 55.57	1̄.8435710	34	53 50.76	2.9451583	0	14 41.37	—
10	2̄.9982615	5	42 58.19	1̄.8385783	34	35 20.31	3.2162797	0	27 25.43	—
15	1̄.1715875	8	32 14.13	1̄.8301706	34	04 20.64	3.3377405	0	36 16.41	—
20	1̄.2926430	11	18 48.08	1̄.8182126	33	20 38.80	3.3732262	0	39 21.71	—
25	1̄.3845393	14	01 42.47	1̄.8025025	32	23 57.68	3.3209364	0	34 53.80	—
30	1̄.4575613	16	39 56.77	1̄.7827574	31	13 57.07	3.1046576	0	21 12.50	—
35	1̄.5171826	19	12 26.93	1̄.7585913	29	50 15.25	2.2841528	0	03 12.38	+
40	1̄.5666588	21	38 04.97	1̄.7294808	28	12 31.21	3.3761374	0	39 37.59	+
45	1̄.6080763	23	55 38.86	1̄.6947118	26	20 27.60	3.7277412	1	29 02.46	+
50	1̄.6428453	26	03 52.74	1̄.6532943	24	13 54.42	3.9601894	2	32 04.09	+
55	1̄.6719558	28	01 27.55	1̄.6038181	21	52 53.43	4.1377337	3	48 52.00	+
60	1̄.6961219	29	47 02.42	1̄.5441968	19	17 43.23	4.2819972	5	19 02.44	+

LATITUDE 60°

°		°	' "		°	' "		°	' "	
5	2̄.6392660	2	29 51.43	1̄.7597836	29	54 19.82	1.1709748	0	00 14.82	+
10	2̄.9386402	4	58 51.33	1̄.7547909	29	37 17.96	2.0728301	0	01 58.26	+
15	1̄.1119662	7	26 07.70	1̄.7463832	29	08 50.75	2.5989985	0	06 37.19	+
20	1̄.2330217	9	50 47.59	1̄.7344252	28	28 52.47	2.9708129	0	15 35.00	+
25	1̄.3249183	12	11 56.69	1̄.7187151	27	37 16.07	3.2575909	0	30 09.63	+
30	1̄.3979400	14	28 39.04	1̄.6989700	26	33 54.19	3.4901627	0	51 31.45	+
35	1̄.4575613	16	39 56.77	1̄.6748039	25	18 40.42	3.6849230	1	20 40.86	+
40	1̄.5070375	18	44 50.05	1̄.6456934	23	51 31.16	3.8516034	1	58 25.64	+
45	1̄.5484550	20	42 17.32	1̄.6109244	22	12 27.56	3.9964256	2	45 18.03	+
50	1̄.5832240	22	31 15.65	1̄.5695069	20	21 38.08	4.1235776	3	41 31.61	+
55	1̄.6123345	24	10 41.28	1̄.5200307	18	19 21.08	4.2359319	4	46 55.99	+
60	1̄.6365006	25	39 32.06	1̄.4604094	16	06 07.61	4.3357518	6	01 04.65	+
65	1̄.6562457	26	56 46.38	1̄.3873877	13	42 43.82	4.4244113	7	22 51.21	+
70	1̄.6719558	28	01 27.55	1̄.2954911	11	10 12.84	4.5031032	8	50 49.54	+
75	1̄.6839138	28	52 44.74	1̄.1744356	8	29 55.61	4.5726794	10	23 03.45	+

LATITUDE 65°

°		°	' "		°	' "		°	' "	
5	2̄.5662443	2	06 37.45	1̄.6670167	24	54 59.15	2.8287156	0	11 14.09	+
10	2̄.8656185	4	12 30.75	1̄.6620240	24	39 56.51	3.1489989	0	23 29.28	+
15	1̄.0389445	6	16 46.81	1̄.6536163	24	14 51.67	3.3550896	0	37 45.11	+
20	1̄.1600000	8	18 39.14	1̄.6416583	23	39 44.46	3.5182309	0	54 57.85	+
25	1̄.2518966	10	17 18.91	1̄.6259482	22	54 35.30	3.6588572	1	15 58.87	+
30	1̄.3249183	12	11 56.69	1̄.6062031	21	59 25.95	3.7848240	1	41 32.90	+
35	1̄.3845396	14	01 42.47	1̄.5820370	20	54 20.51	3.8996115	2	12 16.18	+
40	1̄.4340158	15	45 45.72	1̄.5529265	19	39 26.48	4.0049499	2	48 34.62	+
45	1̄.4754333	17	23 15.78	1̄.5181575	18	14 56.05	4.1018143	3	30 41.96	+
50	1̄.5102023	18	53 22.29	1̄.4767400	16	41 07.47	4.1908328	4	18 37.90	+
55	1̄.5393128	20	15 12.74	1̄.4272638	14	58 26.44	4.2724584	5	12 06.58	+
60	1̄.5634789	21	28 08.49	1̄.3676425	13	07 27.37	4.3470440	6	10 35.35	+
65	1̄.5832240	22	31 15.65	1̄.2946208	11	08 54.34	4.4148677	7	13 13.67	+
70	1̄.5989341	23	23 56.22	1̄.2027242	9	03 41.74	4.4761803	8	18 55.07	+
75	1̄.6108921	24	05 34.58	1̄.0816687	6	52 54.13	4.5311505	9	26 14.29	+
80	1̄.6192998	24	35 41.17	2̄.9083427	4	37 45.62	4.5799341	10	33 33.18	+

Table II—Continued

LATITUDE 70°

λ	sin u = cos φ sin λ			tan v = cot φ cos λ			α = $\begin{cases} v-30^\circ \\ 30^\circ-v \end{cases}$ sin u			Sign
	log sin u	u		log tan v	v		log α (seconds)	α		
°		°	' "		°	' "		°	' "	
5	2̄.4743477	1	42 29.46	1̄.5594101	19	55 47.71	3.0336832	0	18 00.64	+
10	2̄.7737219	3	24 17.52	1̄.5544174	19	43 11.11	3.3420279	0	36 38.00	+
15	2̄.9470479	5	04 42.76	1̄.5460097	19	22 12.21	3.5298813	0	56 27.52	+
20	1̄.0681034	6	43 03.77	1̄.5340517	18	52 54.20	3.6704433	1	18 02.13	+
25	1̄.1600000	8	18 39.14	1̄.5183416	18	15 22.05	3.7861142	1	41 51.03	+
30	1̄.2330217	9	50 47.59	1̄.4985965	17	29 42.87	3.8863995	2	08 18.38	+
35	1̄.2926430	11	18 48.08	1̄.4744304	16	36 06.45	3.9759923	2	37 42.20	+
40	1̄.3421192	12	42 00.02	1̄.4453199	15	34 45.83	4.0574051	3	10 13.14	+
45	1̄.3835367	13	59 43.61	1̄.4105509	14	25 57.80	4.1320518	3	45 53.50	+
50	1̄.4183057	15	11 20.13	1̄.3691334	13	10 04.19	4.2007484	4	24 36.26	+
55	1̄.4474162	16	16 12.51	1̄.3196572	11	47 31.12	4.2639814	5	06 04.60	+
60	1̄.4715823	17	13 45.83	1̄.2600359	10	18 50.78	4.3220399	5	49 51.33	+
65	1̄.4913274	18	03 27.94	1̄.1870142	8	44 41.02	4.3750966	6	35 19.01	+
70	1̄.5070375	18	44 50.05	1̄.0951176	7	05 45.50	4.4232519	7	21 40.37	+
75	1̄.5189955	19	17 27.59	2̄.9740621	5	22 53.48	4.4665592	8	07 59.20	+

LATITUDE 75°

°		°	' "		°	' "		°	' "	
5	2̄.3532922	1	17 33.23	1̄.4263967	14	56 43.74	3.0872615	0	20 22.54	+
10	2̄.6526664	2	34 33.38	1̄.4214040	14	46 55.80	3.3913217	0	41 02.19	+
15	2̄.8259924	3	50 27.47	1̄.4129963	14	30 38.95	3.5723234	1	02 15.28	+
20	2̄.9470479	5	04 42.76	1̄.4010383	14	07 57.81	3.7038528	1	24 16.53	+
25	1̄.0389445	6	16 46.81	1̄.3853282	13	38 59.05	3.8087719	1	47 18.31	+
30	1̄.1119662	7	26 07.70	1̄.3655831	13	03 51.61	3.8970715	2	11 29.90	+
35	1̄.1715875	8	32 14.12	1̄.3414170	12	22 46.58	3.9739057	2	36 56.85	+
40	1̄.2210637	9	34 35.68	1̄.3123065	11	35 58.46	4.0421964	3	03 40.32	+
45	1̄.2624812	10	32 43.04	1̄.2775375	10	43 42.90	4.1037036	3	31 37.07	+
50	1̄.2972502	11	26 08.27	1̄.2361200	9	46 20.76	4.1594963	4	00 37.63	+
55	1̄.3263607	12	14 25.05	1̄.1866448	8	44 14.66	4.2102794	4	30 28.54	+
60	1̄.3505268	12	57 09.13	1̄.1270225	7	37 50.67	4.2564809	5	00 50.57	+
65	1̄.3702719	13	33 58.53	1̄.0540008	6	27 38.39	4.2983686	5	31 17.81	+
70	1̄.3859820	14	04 35.13	2̄.9621042	5	14 10.29	4.3361020	6	01 22.13	+

LATITUDE 80°

°		°	' "		°	' "		°	' "	
5	2̄.1799662	0	52 01.82	1̄.2446630	9	57 45.76	3.0381076	0	18 11.71	+
10	2̄.4793404	1	43 40.59	1̄.2396703	9	51 03.89	3.3398947	0	36 27.23	+
15	2̄.6526664	2	34 33.38	1̄.2312626	9	39 56.87	3.5171961	0	54 50.00	+
20	2̄.7737219	3	24 17.52	1̄.2193046	9	24 28.96	3.6437220	1	13 22.73	+
25	2̄.8656185	4	12 30.75	1̄.2035945	9	04 46.08	3.7424894	1	32 07.00	+
30	2̄.9386402	4	58 51.33	1̄.1838494	8	40 55.93	3.8236850	1	51 03.23	+
35	2̄.9982615	5	42 58.19	1̄.1596833	8	13 07.98	3.8926441	2	10 09.88	+
40	1̄.0477377	6	24 31.12	1̄.1305728	7	41 33.47	3.9524886	2	29 23.73	+
45	1̄.0891552	7	03 10.87	1̄.0958038	7	06 25.48	4.0051590	2	48 39.50	+
50	1̄.1239242	7	38 39.37	1̄.0543863	6	27 58.88	4.0519159	3	07 49.77	+
55	1̄.1530347	8	10 39.83	1̄.0049101	5	46 30.32	4.0935994	3	26 45.07	+
60	1̄.1772008	8	38 56.99	2̄.9452888	5	02 18.13	4.1307761	3	45 13.76	+

Table IIa

LATITUDE 40°

λ	$\log \sin \alpha$	$\log (2 \sin^2 \frac{\alpha}{2})$	$\log (r \cot u)$	u_m	u'	x	y
°				Miles	Miles	Miles	Miles
5	2.3650756	4.4291778	4.7721699	264.583	15.898	280.482	-1,371.657
10	2.6571883	3.0135706	4.4698885	528.326	30.441	558.767	-1,339.913
15	2.8180053	3.3354502	4.2917307	790.363	42.382	832.745	-1,287.467
20	2.9206261	3.5409802	4.1639411	1,049.768	50.690	1,100.458	-1,214.973
25	2.9870525	3.6740938	4.0634444	1,305.532	54.644	1,360.176	-1,123.302
30	1.0258074	3.7526318	3.9800146	1,557.368	54.031	1,611.399	-1,013.493
35	1.0395144	3.7793078	3.9082645	1,801.435	48.705	1,850.140	- 886.704
40	1.0265917	3.7533860	3.8450701	2,038.777	39.669	2,078.446	- 744.152

LATITUDE 45°

				Miles	Miles	Miles	Miles
5	2.2045569	4.1081093	4.8072705	244.306	8.229	252.535	-1,027.608
10	2.4941670	4.6874096	4.5054240	487.676	15.589	503.265	- 999.059
15	2.6505596	3.0003056	4.3279990	729.145	21.296	750.441	- 951.828
20	2.7463935	3.1920942	4.2012537	967.703	24.737	992.440	- 886.436
25	2.8028887	3.3051862	4.1021314	1,202.258	25.545	1,227.803	- 803.563
30	2.8271682	3.3537985	4.0204268	1,431.615	23.672	1,455.287	- 704.036
35	2.8191793	3.3378009	3.9507760	1,654.443	19.434	1,673.877	- 588.783
40	2.7715499	3.2424492	3.8900747	1,869.242	13.568	1,882.810	- 458.801
45	2.6620425	3.0232851	3.8364383	2,074.323	7.240	2,081.563	- 315.123

LATITUDE 50°

				Miles	Miles	Miles	Miles
5	3.9855393	5.6700542	4.8490239	222.152	3.305	225.457	- 683.224
10	2.2704427	4.2398908	4.5476046	443.310	6.131	449.441	- 657.730
15	2.4183410	4.5357248	4.3709058	662.448	8.066	670.514	- 615.526
20	2.5006741	4.7004256	4.2451877	878.315	8.822	887.137	- 557.009
25	2.5362855	4.7715683	4.1474019	1,090.366	8.298	1,098.664	- 482.711
30	2.5273606	4.7538132	4.0673518	1,296.817	6.625	1,303.442	- 393.289
35	2.4619472	4.6229542	3.9996797	1,496.555	4.194	1,500.749	- 289.486
40	2.2945293	4.2880706	3.9412814	1,688.190	1.696	1,689.886	- 172.112
45	3.7332486	5.1654636	3.8902612	1,870.045	0.114	1,870.159	- 42.025
50	2.1540906	4.0071733	3.8454451	2,040.537	0.712	2,041.249	+ 99.893

LATITUDE 55°

				Miles	Miles	Miles	Miles
5	3.6307318	6.9604252	4.8988151	198.296	0.723	199.019	- 338.491
10	3.9018497	5.5026708	4.5978188	395.573	1.260	396.834	- 315.987
15	2.0233075	5.7455930	4.4218185	590.804	1.470	592.274	- 278.693
20	2.0587920	5.8165645	4.2970801	782.916	1.299	784.215	- 226.920
25	2.0065026	5.7119864	4.2005557	970.806	0.818	971.624	- 161.086
30	3.7902298	5.2794338	4.1220465	1,153.314	0.252	1,153.566	- 81.710
35	4.9697333	7.6383434	4.0561878	1,329.208	0.005	1,329.213	+ 10.615
40	2.0617022	5.8223924	3.9998605	1,497.178	0.664	1,497.842	+ 115.229
45	2.4132676	4.5255780	3.9511433	1,655.842	2.997	1,658.839	+ 231.425
50	2.6456230	4.9904280	3.9088203	1,803.762	7.930	1,811.692	+ 358.462
55	2.8229878	3.3454270	3.8721260	1,939.355	16.503	1,955.858	+ 495.580
60	2.9669486	3.6338026	3.8405949	2,061.131	29.812	2,090.943	+ 642.012

Table IIa—Continued

LATITUDE 60°

λ	$\log \sin \alpha$	$\log (2 \sin^2 \frac{\alpha}{2})$	$\log (r \cot u)$	u_m	u'	x	y
°				Miles	Miles	Miles	Miles
5	$\bar{5}$.8562727	$\bar{9}$.4099292	4.9587418	172.911	0.000	172.911	+ 6.532
10	$\bar{4}$.7583731	$\bar{7}$.2155216	4.6581364	344.832	0.007	344.839	+ 26.092
15	$\bar{3}$.2845727	$\bar{6}$.2678948	4.4827861	514.773	0.056	514.829	+ 58.527
20	$\bar{3}$.6563850	$\bar{5}$.0117417	4.3589528	681.681	0.235	681.916	+ 103.595
25	$\bar{3}$.9431603	$\bar{5}$.5852918	4.2635772	844.548	0.706	845.254	+ 160.967
30	$\bar{2}$.1757208	$\bar{4}$.0504360	4.1864652	1,002.284	1.725	1,004.009	+ 230.243
35	$\bar{2}$.3704575	$\bar{4}$.4399448	4.1222210	1,153.787	3.649	1,157.436	+ 310.941
40	$\bar{2}$.5370922	$\bar{4}$.7732832	4.0677071	1,297.879	6.934	1,304.813	+ 402.531
45	$\bar{2}$.6818329	$\bar{3}$.0628868	4.0209686	1,433.402	12.130	1,445.532	+ 504.431
50	$\bar{2}$.8083518	$\bar{3}$.3171246	3.9807448	1,559.139	19.628	1,578.767	+ 616.023
55	$\bar{2}$.9210027	$\bar{3}$.5417310	3.9462137	1,673.785	30.757	1,704.542	+ 736.574
60	$\bar{1}$.0205277	$\bar{3}$.7412254	3.9168306	1,776.399	45.505	1,821.904	+ 865.682
65	$\bar{1}$.1087844	$\bar{3}$.9183418	3.8922621	1,865.497	64.655	1,930.152	+1,002.413
70	$\bar{1}$.1869509	$\bar{2}$.0754630	3.8723005	1,940.135	88.667	2,028.802	+1,146.175
75	$\bar{1}$.2558741	$\bar{2}$.2142895	3.8568317	1,999.357	117.793	2,117.150	+1,296.301

LATITUDE 65°

λ	$\log \sin \alpha$	$\log (2 \sin^2 \frac{\alpha}{2})$	$\log (r \cot u)$	u_m	u'	x	y
°				Miles	Miles	Miles	Miles
5	$\bar{3}$.5142920	$\bar{6}$.7275550	5.0321440	146.158	0.575	146.733	+ 351.914
10	$\bar{3}$.8345688	$\bar{5}$.3681124	4.7317898	291.582	1.259	292.841	+ 368.433
15	$\bar{2}$.0406554	$\bar{5}$.7802938	4.5570222	434.905	2.174	437.079	+ 395.984
20	$\bar{2}$.2037872	$\bar{4}$.1066000	4.4339953	575.578	3.553	579.131	+ 434.193
25	$\bar{2}$.3443967	$\bar{4}$.3878165	4.3396436	712.546	5.339	717.885	+ 483.104
30	$\bar{2}$.4703358	$\bar{4}$.6397362	4.2637427	844.859	8.007	852.866	+ 542.099
35	$\bar{2}$.5850792	$\bar{4}$.8692891	4.2008907	971.555	11.754	983.309	+ 610.900
40	$\bar{2}$.6903504	$\bar{3}$.0799318	4.1479177	1,091.662	16.899	1,108.561	+ 689.078
45	$\bar{2}$.7871173	$\bar{3}$.2736126	4.1028337	1,204.204	23.793	1,227.997	+ 776.160
50	$\bar{2}$.8759980	$\bar{3}$.4515808	4.0643352	1,308.213	32.803	1,341.016	+ 871.632
55	$\bar{2}$.9574355	$\bar{3}$.6147383	4.0315658	1,402.679	44.290	1,446.969	+ 974.993
60	$\bar{1}$.0317775	$\bar{3}$.7637870	4.0038714	1,486.858	58.568	1,545.426	+1,085.548
65	$\bar{1}$.0992923	$\bar{3}$.8992968	3.9809053	1,559.715	75.893	1,635.608	+1,202.812
70	$\bar{1}$.1602295	$\bar{2}$.0232227	3.9623761	1,620.514	96.738	1,717.252	+1,326.189
75	$\bar{1}$.2147598	$\bar{2}$.1314384	3.9481037	1,668.581	120.098	1,788.679	+1,455.002
80	$\bar{1}$.2630479	$\bar{2}$.2287587	3.9379751	1,702.943	146.803	1,849.746	+1,588.631

LATITUDE 70°

λ	$\log \sin \alpha$	$\log (2 \sin^2 \frac{\alpha}{2})$	$\log (r \cot u)$	u_m	u'	x	y
°				Miles	Miles	Miles	Miles
5	$\bar{3}$.7192439	$\bar{5}$.1374804	5.1241932	118.342	1.827	120.169	+ 697.328
10	$\bar{2}$.0275943	$\bar{5}$.7541710	4.8242405	235.888	3.788	239.676	+ 710.943
15	$\bar{2}$.2154372	$\bar{4}$.1298736	4.6499730	351.840	6.024	357.864	+ 733.517
20	$\bar{2}$.3559811	$\bar{4}$.4109881	4.5276333	465.401	8.682	474.083	+ 764.917
25	$\bar{2}$.4716257	$\bar{4}$.6423168	4.4341439	575.775	11.925	587.700	+ 804.951
30	$\bar{2}$.5718734	$\bar{4}$.8428681	4.3592619	682.166	15.927	698.093	+ 853.366
35	$\bar{2}$.6614055	$\bar{3}$.0220277	4.2975637	783.786	20.873	804.659	+ 909.851
40	$\bar{2}$.7427584	$\bar{3}$.1848191	4.2458521	879.853	26.957	906.810	+ 974.115
45	$\bar{2}$.8173138	$\bar{3}$.3340664	4.2021046	969.602	34.369	1,003.971	+1,045.727
50	$\bar{2}$.8858942	$\bar{3}$.4714018	4.1649805	1,052.282	43.289	1,095.571	+1,124.280
55	$\bar{2}$.9489824	$\bar{3}$.5977958	4.1335617	1,127.191	53.871	1,181.062	+1,209.328
60	$\bar{1}$.0068649	$\bar{3}$.7138247	4.1072072	1,193.647	66.227	1,259.874	+1,300.386
65	$\bar{1}$.0597138	$\bar{3}$.8198341	4.0854649	1,251.036	80.409	1,331.445	+1,396.943
70	$\bar{1}$.1076313	$\bar{3}$.9160261	4.0680162	1,298.803	96.292	1,395.095	+1,498.468
75	$\bar{1}$.1506746	$\bar{2}$.0025087	4.0546275	1,336.475	114.060	1,450.535	+1,604.361

Table IIa—Continued

LATITUDE 75°

λ	$\log \sin \alpha$	$\log (2 \sin^2 \frac{\alpha}{2})$	$\log (r \cot u)$	u_m	u'	x	y
°				Miles	Miles	Miles	Miles
5	$\bar{3}.7728354$	$\bar{5}.2446443$	5.2454674	89.576	3.091	92.667	+ 1,043.044
10	$\bar{2}.0768861$	$\bar{5}.8527576$	4.9957582	178.515	6.288	184.803	+ 1,053.524
15	$\bar{2}.2578742$	$\bar{4}.2147542$	4.7718938	266.182	9.697	275.880	+ 1,070.947
20	$\bar{2}.3893839$	$\bar{4}.4778032$	4.6501060	351.148	13.425	364.573	+ 1,095.191
25	$\bar{2}.4942762$	$\bar{4}.6876282$	4.5573038	435.187	17.577	452.764	+ 1,126.108
30	$\bar{2}.5825405$	$\bar{4}.8642118$	4.4832282	515.285	22.256	537.541	+ 1,163.506
35	$\bar{2}.6593297$	$\bar{3}.0178556$	4.4224351	591.640	27.560	619.200	+ 1,207.160
40	$\bar{2}.7275511$	$\bar{3}.1544052$	4.3717032	663.666	33.582	697.248	+ 1,256.765
45	$\bar{2}.7890041$	$\bar{3}.2773896$	4.3289829	730.798	40.399	771.197	+ 1,312.130
50	$\bar{2}.8447161$	$\bar{3}.3889353$	4.2929031	792.500	48.067	840.567	+ 1,372.837
55	$\bar{2}.8954061$	$\bar{3}.4904548$	4.2625144	848.264	56.620	904.884	+ 1,438.535
60	$\bar{2}.9415113$	$\bar{3}.5828244$	4.2371417	897.623	66.064	963.687	+ 1,508.874
65	$\bar{2}.9832710$	$\bar{3}.6665207$	4.2163004	940.154	76.352	1,016.506	+ 1,583.330
70	$\bar{1}.0208767$	$\bar{3}.7419236$	4.1996289	975.510	87.408	1,062.918	+ 1,661.520

LATITUDE 80°

°				Miles	Miles	Miles	Miles
5	$\bar{3}.7236801$	$\bar{5}.1459351$	5.4189626	60.113	3.672	63.785	+ 1,388.810
10	$\bar{2}.0254612$	$\bar{5}.7499045$	5.1194425	119.777	7.402	127.179	+ 1,396.059
15	$\bar{2}.2027523$	$\bar{4}.1045024$	4.9458728	178.561	11.230	189.791	+ 1,408.073
20	$\bar{2}.3292640$	$\bar{4}.3575473$	4.8244881	236.023	15.206	251.229	+ 1,424.781
25	$\bar{2}.4280124$	$\bar{4}.5550805$	4.7321860	291.733	19.376	311.109	+ 1,446.100
30	$\bar{2}.5091841$	$\bar{4}.7174516$	4.6586931	345.274	23.776	369.050	+ 1,471.896
35	$\bar{2}.5781154$	$\bar{4}.8553566$	4.5985500	396.240	28.439	424.679	+ 1,501.985
40	$\bar{2}.6379269$	$\bar{4}.9750288$	4.5485166	444.242	33.485	477.727	+ 1,536.185
45	$\bar{2}.6905597$	$\bar{3}.0803505$	4.5065225	488.910	38.625	527.535	+ 1,574.280
50	$\bar{2}.7372738$	$\bar{3}.1738418$	4.4711755	529.894	44.159	574.053	+ 1,616.029
55	$\bar{2}.7789123$	$\bar{3}.2571873$	4.4415031	566.868	49.968	616.836	+ 1,661.175
60	$\bar{2}.8160403$	$\bar{3}.3315168$	4.4168086	599.553	56.018	655.571	+ 1,709.420

Table III. Co-ordinates for a Transverse Polyconic Projection of Map of Canada

(Scale, 1 inch to 50 statute miles)

Longitude from central meridian	Latitude 40°		Latitude 45°		Latitude 50°	
	x	y	x	y	x	y
°	Inches	Inches	Inches	Inches	Inches	Inches
0.....	0.000	-27.646	0.000	-20.743	0.000	-13.835
5.....	5.610	-27.433	5.051	-20.552	4.509	-13.664
10.....	11.175	-26.798	10.065	-19.981	8.988	-13.155
15.....	16.655	-25.749	15.009	-19.037	13.410	-12.311
20.....	22.009	-24.299	19.849	-17.729	17.743	-11.140
25.....	27.203	-22.466	24.556	-16.071	21.973	-9.654
30.....	32.228	-20.270	29.106	-14.081	26.069	-7.866
35.....	37.003	-17.734	33.478	-11.757	30.015	-5.790
40.....	41.569	-14.883	37.656	-9.176	33.798	-3.442
45.....			41.631	-6.302	37.403	-0.840
50.....					40.825	+ 1.998

Table III. Co-ordinates for a Transverse Polyconic Projection of Map of Canada—Continued

(Scale, 1 inch to 50 statute miles)

Longitude from central meridian	Latitude 55°		Latitude 60°		Latitude 65°	
	<i>x</i>	<i>y</i>	<i>x</i>	<i>y</i>	<i>x</i>	<i>y</i>
	Inches	Inches	Inches	Inches	Inches	Inches
0.....	0.000	— 6.920	0.000	0.000	0.000	+ 6.926
5.....	3.980	— 6.790	3.458	+ 0.131	2.935	+ 7.038
10.....	7.937	— 6.320	6.897	+ 0.522	5.857	+ 7.369
15.....	11.845	— 5.574	10.297	+ 1.170	8.742	+ 7.920
20.....	15.684	— 4.538	13.638	+ 2.072	11.583	+ 8.684
25.....	19.432	— 3.222	16.905	+ 3.219	14.358	+ 9.662
30.....	23.071	— 1.634	20.080	+ 4.605	17.057	+10.842
35.....	26.584	+ 0.212	23.149	+ 6.219	19.666	+12.218
40.....	29.957	+ 2.304	26.096	+ 8.051	22.171	+13.782
45.....	33.177	+ 4.628	28.911	+10.089	24.560	+15.523
50.....	36.234	+ 7.169	31.575	+12.320	26.820	+17.433
55.....	39.117	+ 9.912	34.091	+14.731	28.939	+19.500
60.....	41.819	+12.840	36.438	+17.313	30.909	+21.711
65.....			38.603	+20.048	32.712	+24.056
70.....			40.576	+22.924	34.345	+26.524
75.....			42.343	+25.926	35.774	+29.100
80.....					36.995	+31.773

Longitude from central meridian	Latitude 70°		Latitude 75°		Latitude 80°	
	<i>x</i>	<i>y</i>	<i>x</i>	<i>y</i>	<i>x</i>	<i>y</i>
	Inches	Inches	Inches	Inches	Inches	Inches
0.....	0.000	+13.856	0.000	+20.790	0.000	+27.728
5.....	2.403	+13.947	1.853	+20.861	1.276	+27.776
10.....	4.793	+14.219	3.696	+21.070	2.544	+27.921
15.....	7.157	+14.670	5.518	+21.419	3.796	+28.161
20.....	9.482	+15.298	7.291	+21.904	5.025	+28.496
25.....	11.754	+16.099	9.055	+22.522	6.222	+28.922
30.....	13.962	+17.067	10.751	+23.270	7.381	+29.438
35.....	16.093	+18.177	12.384	+24.143	8.494	+30.040
40.....	18.136	+19.482	13.945	+25.135	9.555	+30.724
45.....	20.079	+20.915	15.424	+26.243	10.551	+31.486
50.....	21.911	+22.486	16.811	+27.457	11.481	+32.321
55.....	23.621	+24.187	18.100	+28.771	12.337	+33.224
60.....	25.197	+26.008	19.274	+30.178	13.111	+34.188
65.....	26.629	+27.939	20.330	+31.667		
70.....	27.902	+29.969	21.258	+33.230		
75.....	29.011	+32.087				

Table IV. Co-ordinates for a Transverse Polyconic Projection of Map of Canada

(Scale, 1 inch to 60 statute miles)

Longitude from central meridian	Latitude 40°		Latitude 45°		Latitude 50°	
	<i>x</i>	<i>y</i>	<i>x</i>	<i>y</i>	<i>x</i>	<i>y</i>
°	Inches	Inches	Inches	Inches	Inches	Inches
0.....	0·000	-23·038	0·000	-17·286	0·000	-11·529
5.....	4·675	-22·861	4·209	-17·127	3·758	-11·387
10.....	9·313	-22·332	8·388	-16·651	7·491	-10·962
15.....	13·879	-21·458	12·507	-15·864	11·175	-10·259
20.....	18·341	-20·250	16·541	-14·774	14·786	- 9·283
25.....	22·670	-18·722	20·463	-13·393	18·311	- 8·045
30.....	26·857	-16·892	24·255	-11·734	21·724	- 6·555
35.....	30·836	-14·778	27·898	- 9·813	25·012	- 4·825
40.....	34·641	-12·403	31·380	- 7·647	28·165	- 2·869
45.....			34·673	- 5·252	31·169	- 0·700
50.....					34·021	+ 1·665
Longitude from central meridian	Latitude 55°		Latitude 60°		Latitude 65°	
	<i>x</i>	<i>y</i>	<i>x</i>	<i>y</i>	<i>x</i>	<i>y</i>
°	Inches	Inches	Inches	Inches	Inches	Inches
0.....	0·000	- 5·767	0·000	0·000	0·000	+ 5·771
5.....	3·317	- 5·642	2·882	+ 0·109	2·446	+ 5·865
10.....	6·614	- 5·266	5·747	+ 0·435	4·881	+ 6·141
15.....	9·705	- 4·645	8·581	+ 0·976	7·285	+ 6·600
20.....	13·070	- 3·782	11·365	+ 1·727	9·652	+ 7·237
25.....	16·194	- 2·685	14·088	+ 2·682	11·965	+ 8·052
30.....	19·226	- 1·362	16·733	+ 3·837	14·214	+ 9·035
35.....	22·154	+ 0·177	19·291	+ 5·182	16·388	+10·182
40.....	24·964	+ 1·920	21·747	+ 6·709	18·093	+11·485
45.....	27·647	+ 3·857	24·092	+ 8·407	20·467	+12·936
50.....	30·195	+ 5·974	26·313	+10·267	22·350	+14·527
55.....	32·598	+ 8·260	28·409	+12·276	24·116	+16·250
60.....	34·849	+10·700	30·365	+14·418	25·757	+18·092
65.....			32·169	+16·707	27·260	+20·047
70.....			33·813	+19·105	28·621	+22·103
75.....			35·286	+21·605	29·811	+24·250
80.....					30·829	+26·477
Longitude from central meridian	Latitude 70°		Latitude 75°		Latitude 80°	
	<i>x</i>	<i>y</i>	<i>x</i>	<i>y</i>	<i>x</i>	<i>y</i>
°	Inches	Inches	Inches	Inches	Inches	Inches
0.....	0·000	+11·547	0·000	+17·325	0·000	+23·106
5.....	2·003	+11·622	1·544	+17·384	1·063	+23·147
10.....	3·995	+11·849	3·080	+17·559	2·120	+23·268
15.....	5·964	+12·225	4·598	+17·849	3·163	+23·468
20.....	7·901	+12·749	6·076	+18·253	4·187	+23·746
25.....	9·795	+13·416	7·546	+18·768	5·185	+24·102
30.....	11·635	+14·223	8·959	+19·392	6·151	+24·532
35.....	13·411	+15·164	10·320	+20·119	7·078	+25·033
40.....	15·113	+16·235	11·621	+20·946	7·962	+25·603
45.....	16·733	+17·429	12·853	+21·869	8·792	+26·238
50.....	18·260	+18·738	14·009	+22·881	9·568	+26·934
55.....	19·684	+20·155	15·081	+23·976	10·281	+27·686
60.....	20·998	+21·673	16·061	+25·148	10·926	+28·490
65.....	22·191	+23·282	16·942	+26·389		
70.....	23·251	+24·974	17·715	+27·692		
75.....	24·176	+26·739				

Table V. Co-ordinates for a Transverse Polyconic Projection for Map of Canada

(Scale, 1 inch to 80 statute miles)

Longitude from central meridian	Latitude 40°		Latitude 45°		Latitude 50°	
	<i>x</i>	<i>y</i>	<i>x</i>	<i>y</i>	<i>x</i>	<i>y</i>
°	Inches	Inches	Inches	Inches	Inches	Inches
0.....	0.000	-17.279	0.000	-12.965	0.000	-8.647
5.....	3.506	-17.146	3.157	-12.845	2.818	-8.540
10.....	6.985	-16.749	6.291	-12.488	5.618	-8.222
15.....	10.409	-16.093	9.381	-11.898	8.381	-7.694
20.....	13.756	-15.187	12.405	-11.081	11.089	-6.963
25.....	17.002	-14.041	15.347	-10.045	13.733	-6.034
30.....	20.142	-12.669	18.191	- 8.800	16.293	-4.916
35.....	23.127	-11.084	20.923	- 7.360	18.759	-3.619
40.....	25.981	- 9.302	23.535	- 5.735	21.124	-2.151
45.....			26.020	- 3.939	23.377	-0.503
50.....					25.516	+1.249
Longitude from central meridian	Latitude 55°		Latitude 60°		Latitude 65°	
	<i>x</i>	<i>y</i>	<i>x</i>	<i>y</i>	<i>x</i>	<i>y</i>
°	Inches	Inches	Inches	Inches	Inches	Inches
0.....	0.000	-4.327	0.000	0.000	0.000	+ 4.329
5.....	2.488	-4.231	2.161	+ 0.082	1.834	+ 4.399
10.....	4.960	-3.950	4.310	+ 0.326	3.661	+ 4.605
15.....	7.403	-3.484	6.435	+ 0.732	5.463	+ 4.950
20.....	9.803	-2.836	8.524	+ 1.295	7.239	+ 5.427
25.....	12.145	-2.014	10.566	+ 2.011	8.974	+ 6.039
30.....	14.420	-1.021	12.550	+ 2.878	10.661	+ 6.776
35.....	16.615	+0.133	14.468	+ 3.886	12.291	+ 7.636
40.....	18.723	+1.440	16.310	+ 5.032	13.857	+ 8.614
45.....	20.735	+2.893	18.069	+ 6.305	15.350	+ 9.702
50.....	22.646	+4.481	19.735	+ 7.700	16.763	+10.895
55.....	24.448	+6.195	21.307	+ 9.207	18.087	+12.187
60.....	26.137	+8.025	22.774	+10.821	19.318	+13.569
65.....			24.127	+12.530	20.445	+15.035
70.....			25.360	+14.327	21.466	+16.577
75.....			26.464	+16.204	22.358	+18.188
80.....					23.122	+19.858
Longitude from central meridian	Latitude 70°		Latitude 75°		Latitude 80°	
	<i>x</i>	<i>y</i>	<i>x</i>	<i>y</i>	<i>x</i>	<i>y</i>
°	Inches	Inches	Inches	Inches	Inches	Inches
0.....	0.000	+ 8.660	0.000	+12.994	0.000	+17.330
5.....	1.502	+ 8.717	1.158	+13.038	0.797	+17.360
10.....	2.986	+ 8.887	2.310	+13.169	1.590	+17.451
15.....	4.473	+ 9.169	3.448	+13.357	2.372	+17.601
20.....	5.826	+ 9.561	4.557	+13.690	3.140	+17.810
25.....	7.346	+10.062	5.660	+14.076	3.889	+18.076
30.....	8.726	+10.667	6.719	+14.544	4.613	+18.399
35.....	10.058	+11.373	7.740	+15.090	5.308	+18.775
40.....	11.335	+12.176	8.716	+15.710	5.972	+19.202
45.....	12.550	+13.072	9.640	+16.402	6.594	+19.679
50.....	13.965	+14.054	10.507	+17.160	7.176	+20.200
55.....	14.763	+15.117	11.311	+17.982	7.710	+20.765
60.....	15.748	+16.255	12.046	+18.861	8.195	+21.368
65.....	16.643	+17.462	12.706	+19.792		
70.....	17.438	+18.731	13.286	+20.769		
75.....	18.132	+20.055				

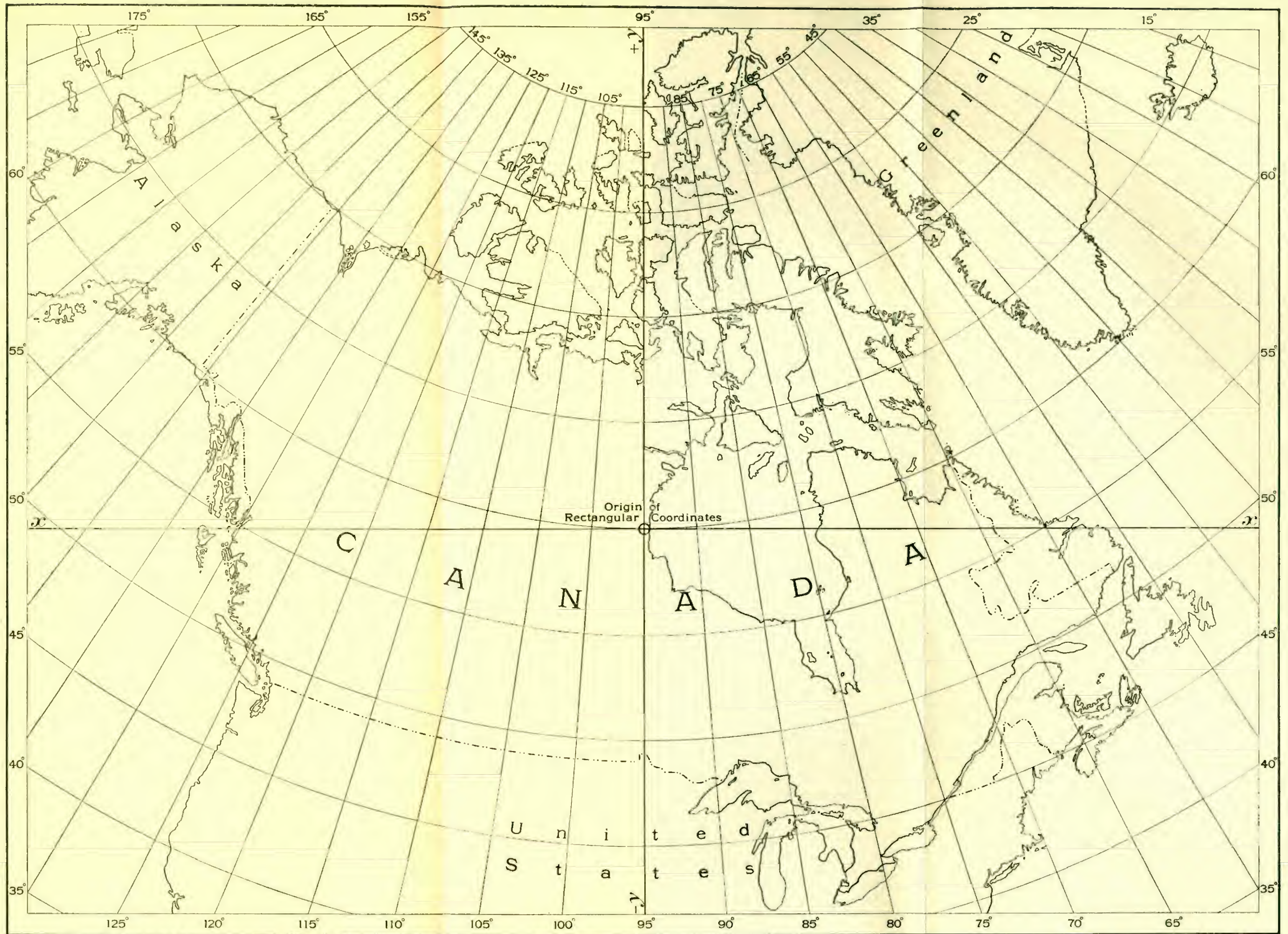
Table VI. Co-ordinates for a Transverse Polyconic Projection of Map of Canada

(Scale, 1 inch to 100 statute miles)

Longitude from central meridian	Latitude 40°		Latitude 45°		Latitude 50°	
	<i>x</i>	<i>y</i>	<i>x</i>	<i>y</i>	<i>x</i>	<i>y</i>
	Inches	Inches	Inches	Inches	Inches	Inches
0.....	0.000	-13.823	0.000	-10.372	0.000	- 6.917
5.....	2.805	-13.717	2.525	-10.276	2.255	- 6.832
10.....	5.588	-13.399	5.033	- 9.991	4.494	- 6.577
15.....	8.327	-12.875	7.504	- 9.518	6.705	- 6.155
20.....	11.005	-12.150	9.924	- 8.864	8.871	- 5.570
25.....	13.602	-11.233	12.278	- 8.036	10.987	- 4.827
30.....	16.114	-10.135	14.553	- 7.040	13.034	- 3.933
35.....	18.501	- 8.867	16.739	- 5.888	15.007	- 2.895
40.....	20.784	- 7.442	18.828	- 4.588	16.899	- 1.721
45.....			20.816	- 3.151	18.702	- 0.420
50.....					20.412	+ 0.999

Longitude from central meridian	Latitude 55°		Latitude 60°		Latitude 65°	
	<i>x</i>	<i>y</i>	<i>x</i>	<i>y</i>	<i>x</i>	<i>y</i>
	Inches	Inches	Inches	Inches	Inches	Inches
0.....	0.000	- 3.460	0.000	0.000	0.000	+ 3.463
5.....	1.990	- 3.385	1.729	+ 0.065	1.467	+ 3.519
10.....	3.968	- 3.160	3.448	+ 0.261	2.928	+ 3.684
15.....	5.923	- 2.787	5.148	+ 0.585	4.371	+ 3.960
20.....	7.842	- 2.269	6.819	+ 1.036	5.791	+ 4.342
25.....	9.716	- 1.611	8.453	+ 1.610	7.179	+ 4.831
30.....	11.536	- 0.817	10.040	+ 2.302	8.529	+ 5.421
35.....	13.292	+ 0.106	11.574	+ 3.109	9.833	+ 6.109
40.....	14.978	+ 1.152	13.048	+ 4.025	11.086	+ 6.891
45.....	16.588	+ 2.314	14.455	+ 5.044	12.280	+ 7.762
50.....	18.117	+ 3.585	15.788	+ 6.160	13.410	+ 8.716
55.....	19.559	+ 4.956	17.045	+ 7.366	14.470	+ 9.750
60.....	20.909	+ 6.420	18.219	+ 8.657	15.454	+10.855
65.....			19.302	+10.024	16.356	+12.028
70.....			20.288	+11.462	17.173	+13.262
75.....			21.172	+12.963	17.887	+14.550
80.....					18.497	+15.886

Longitude from central meridian	Latitude 70°		Latitude 75°		Latitude 80°	
	<i>x</i>	<i>y</i>	<i>x</i>	<i>y</i>	<i>x</i>	<i>y</i>
	Inches	Inches	Inches	Inches	Inches	Inches
0.....	0.000	+ 6.928	0.000	+10.395	0.000	+13.864
5.....	1.202	+ 6.973	0.927	+10.430	0.638	+13.888
10.....	2.397	+ 7.109	1.848	+10.535	1.272	+13.961
15.....	3.579	+ 7.335	2.759	+10.709	1.898	+14.081
20.....	4.741	+ 7.649	3.646	+10.952	2.512	+14.248
25.....	5.877	+ 8.050	4.528	+11.261	3.111	+14.461
30.....	6.981	+ 8.534	5.375	+11.635	3.691	+14.719
35.....	8.047	+ 9.099	6.192	+12.072	4.247	+15.020
40.....	9.068	+ 9.741	6.972	+12.568	4.777	+15.362
45.....	10.040	+10.457	7.712	+13.121	5.275	+15.743
50.....	10.956	+11.243	8.406	+13.728	5.741	+16.160
55.....	11.811	+12.093	9.049	+14.385	6.168	+16.612
60.....	12.599	+13.004	9.637	+15.089	6.556	+17.094
65.....	13.314	+13.969	10.165	+15.833		
70.....	13.950	+14.985	10.629	+16.615		
75.....	14.505	+16.044				



To accompany Museum Bulletin by C.-O. Senécal.

Geological Survey, Canada.

Figure 3.
 Transverse Polyconic Projection for map of Canada

