THE

JRVEYORS' COMPANION

CONTAINING

A Treatise on Mathematical Instruments,

ETC. ETC.

BY

WILLIAM SCHMOLZ,

Mathematical Instrument Maker.

SAN FRANCISCO:

COMMERCIAL STEAM JOB PRESSES: VALENTINE & CO.

.....

1859.

The California Farm
Suits Constitution
of the United States

THE

SURVEYOR'S AND ENGINEER'S

COMPANION:

BEING

A Concise Treatise on Mathematical Instruments,

CONTAINING

AN IMPROVED METHOD OF TELESCOPIC MEASUREMENTS,

ILLUSTRATED WITH NUMEROUS ENGRAVINGS;

AND INCLUDING

THE MOST IMPORTANT AND USEFUL TABLES AND FORMULAS,

CONSTANTLY USED IN SURVEYING AND ENGINEERING.

BY

WILLIAM SCHMOLZ,

MATHEMATICAL INSTRUMENT MAKER, No. 118 MONTGOMERY STREET.

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PREFACE.

THE frequent inquiries, by Engineers and Surveyors, for a field-book of reliable and useful tables, have induced me to undertake the publication of a work of this nature, which might contain everything that could be required in the execution of a survey. Through the co-operation of DR. R. C. MATTHEWSON, a gentleman of acknowledged mathematical ability — and to whom, indeed, the following work chiefly owes its merit — I am now enabled to present to the profession a compendious and, it is hoped, a highly useful Pocket Companion, in the preparation of which no labor has been spared to make it what it assumes to be. The First Part contains a description of telescopic measurement, with its advantageous application in a rough country; a brief review of mathematical and scientific instruments, together with rules for their adjustment and use, copiously illustrated with fine engravings on wood. In the Second Part may be found all those tables and rules which are continually required in the field, and without which much time would be lost in tedious and difficult calculations.

As the sale of a book of this kind is necessarily limited — the proceeds falling far short of its actual cost — I have resorted to the method of subscriptions, and am happy to state that the members of the profession have most liberally seconded me in my effort. To them I beg leave to tender my sincere thanks.

WILLIAM SCHMOLZ.

CONTENTS.

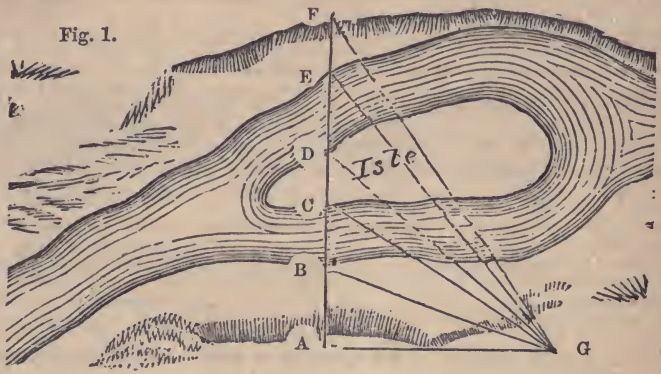
THE SURVEYOR'S AND ENGINEER'S COMPANION.

Telescopic Measurement.

By the ingenious method of telescopic measurement, we may ascertain distances which, from the nature of the ground, cannot be actually measured by the chain, and at the same time, avoid the tedious and detaining process of triangulations.

For example, in Fig. 1, by this method, we can obtain the distances A B, A C, A D, A E, and A F, at once, by mere inspection, without removing the transit from the Station A, on the line; while by the usual method, we would have to measure a base A G, and ascertain the angle F A G, then remove the transit from A to G and ascertain from other angles, viz: A G B, A G C, A G D, A G E, and A G F, besides making the subsequent trigonometrical calculations.

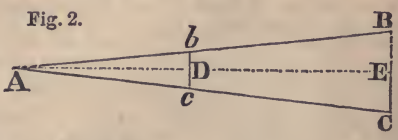
Fig. 1.



The simple contrivance by which this important saving of time and labor is effected, depends upon the following obvious principles:

Let A b c and A B C, Fig. 2, be two similar triangles, of which the parallel sides b c and B C, together with the perpendicular distance A D are known;

Fig. 2.

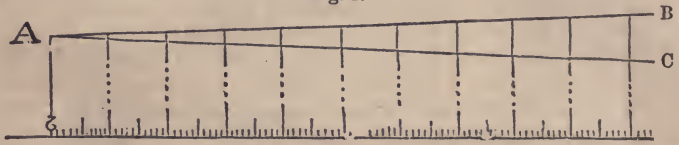


then since $b\,c : B\,C :: A\,D : A\,E = \frac{A\,D \times B\,C}{b\,c}$ the perpendicular distance A E becomes also known. Now in the telescopic instrument, the small triangle A b c, Fig. 2, is fixed, permanently, within the telescope of the transit, the eye of the observer, Fig. 3, coinciding with the vertex A; the distance a a′

Fig. 3.

between the two horizontal and parallel hairs a a' corresponding to the line b c, and the graduated rod B C with its two targets B and C, one of which is fixed and the other moveable, representing the line B C; whence it follows the distance between the eye of the observer and the rod is directly perpendicular to the distance between the targets. If for instance, 7 feet of the rod are intercepted between the targets at a distance of 20 chains, 14 feet will be intercepted at a distance of 40 chains.

Fig. 4.



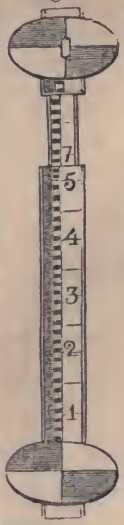
In the method of telescopic measurement, heretofore in use, the hairs were fixed in the telescope at random and the rod graduated afterwards, by trials at ascertained distances. The consequence was, that every instrument required a particular rod adapted only to itself, and when the hairs, by any accident, got out of adjustment, the rod had either to be regraduated or replaced by another. These difficulties have been completely overcome and all objections entirely removed by a recent invention of the author's. The hairs a a' Fig. 5, are attached to the diaphragm of the telescope, in such a manner as to admit, at any time, of the nicest adjustment. By this contrivance, any transit may be adapted to the rods commonly used in leveling, the only improvement required being an additional target for the purpose of assisting the eye in observing long distances.

Fig. 5.

Schmolz's Improved Target Rods.

These rods are constructed so that, when the transit is properly adjusted, the distance can be read off at once, in *chains and links*, without any computation whatever. The instrument is adjusted to read half a foot at the distance of one chain, or 10 feet at the distance of 20 chains, and every half foot is subdivided into 100 equal parts to correspond with the number of links in a chain. This contrivance is admirably adapted to the U. S. Surveys, whether of public lands or private land claims, and the Deputy Surveyors will find it of incalculable advantage especially on the rough portions of their work. It requires only to be tested in order to demonstrate that for facility as well as

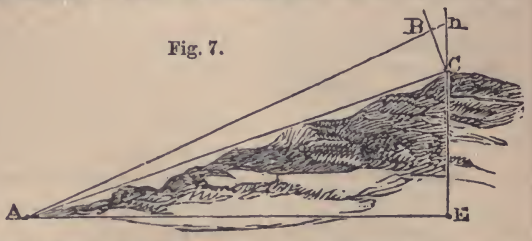
Fig. 6.



accuracy, it is superior, over rough ground, to any other method which can be adopted. The rods are light, durable, and accurately graduated. They are constructed of the very best material, and, for convenience of transportation, are made of two pieces, one of which slides neatly and compactly into the other, as represented in Fig. 6.

The rod is provided with a small telescope fixed permanently at right angles to it, and in ascending or descending, is held, not vertically, but perpendicularly to the distance, as illustrated in Fig. 7, so that the graduations on the rod will always show the true distance from the instrument. The transit used has a vertical arc and this distance must be multiplied by the

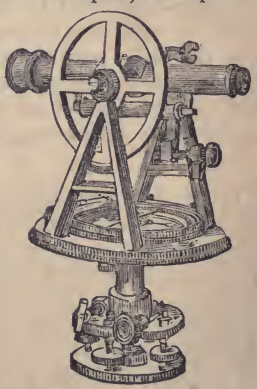
Fig. 7.

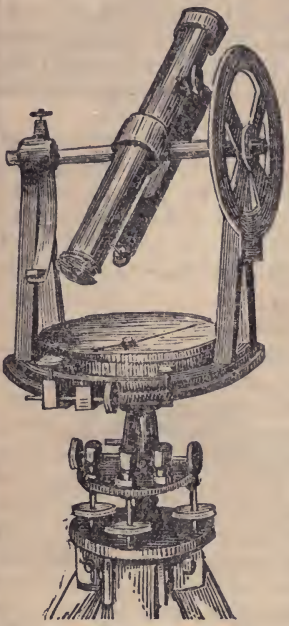


cosine of the angle of elevation or depression, in order to reduce it to the horizontal distance. It will be more convenient, however, to use the Traverse Table in this reduction, for if the observed angle be taken as a course, the horizontal distance will be the corresponding difference of latitude. For example, if the inclined distance be 19·96 chains and the vertical angle 10°, we find the corresponding difference of latitude to be 19·66 chains, which is, therefore, the horizontal distance.

Instruments Imported and Manufactured by W. Schmolz.

TRANSIT INSTRUMENTS, from the best makers in Philadelphia, are kept constantly on hand; but none of them give as much satisfaction as those manufactured by William Schmolz. In these improved instruments the standards are attached to the lower instead of the upper plate, as in the usual method. The great advantage of this construction is, that the *true course* is read off at once, instead of obtaining it by constantly adding or subtracting the variation, thus avoiding a great deal of labor and removing the great liability of committing mistakes by the old method. The plates are clamped together, once for all, by the vernier, to the true variation, so that when the needle points to zero, the telescope moves in the plane of the meridian, and when the transit is





turned around in any other direction, the ends of the needle point to the *true* and not to the *magnetic* course, as in the ordinary Transit. The great advantage of this construction, especially in surveying ranchos, where such a multiplicity of courses is required, must be obvious, at once, to every surveyor. The large number of instruments of this kind recently sold by the manufacturer is enough to prove their superiority.

Adjustments of the Transit.

On a level piece of ground set up the Transit firmly. Bring the two bubbles to the center, by means of the four leveling screws. Then turn the instrument half way around. If the bubbles are still in the center, the spirit levels are in adjustment. If not, raise or lower that spirit level which is out of adjustment, by means of the capstan screws attached to the same, until the bubble is moved to *half* the error. Level the instrument again and repeat the operation. If the adjustment has been accurately done, the bubbles will remain in the center during an entire revolution of the instrument.

Next, measure any distance, (say 5 chains) in a straight line from the instrument and set up a stake with a nail or chain-pin driven into it. Bring the vertical hair of the telescope to it, clamp the instrument, reverse the telescope, and set up another stake in the opposite direction at the same distance and upon it mark the point of sight. Then, loosen the lower clamp screw, turn the instrument half around, again sight on the first point and clamp tightly. Reverse the telescope; if the sight intersects the point in the second stake, the instrument is in adjustment; if not, note the distance that it varies from the second point and move the vertical hair, by means of the attached screws, until the line of sight has moved *one-fourth* of the amount of variation toward the second point; the instrument will then be in adjustment. Several trials will generally be necessary before the adjustment is perfect.

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Dr. R. C. Matthewson's Improved Astronomical Transit,—for which a patent was issued in October, 1858, is one of the most ingenious of modern inventions, and is designed for surveying and engineering purposes. The compass-box and tripod are constructed in any of the usual forms of the ordinary transit. The standards, the horizontal axis, and the vertical arc, are also constructed the same as in the most recent and improved instruments. But instead of attaching the telescope permanently to the horizontal axis, as in the common Transit, it is attached permanently to a vertical axis, which is

fixed at right angles to the horizontal axis, and revolves in it, exactly over the center of the compass-box. Attached to the horizontal axis, and at right angles to the vertical axis, is a graduated equatorial circle, of which the vertical axis is the center. The telescope revolves round this equatorial circle with a vernier, by which the angular motion of the telescope is read off on the graduated circle.

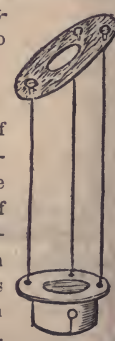
One advantage of this construction over the common Transit is, that oblique angles, as well as horizontal and vertical angles, can be measured. The telescope can thus be moved in the plane of any two objects—the moon and a star, for instance—their angular distance measured, and consequently the longitude of the place ascertained.

Another advantage of this construction is, that by placing the vertical axis parallel to the axis of the earth—which can be done by setting the horizontal axis east and west, and elevating the vertical axis to the latitude of the place—the telescope will revolve in the plane of a parallel of latitude instead of revolving in the arc of a great circle, as in the ordinary Transit, and of course, a true parallel of latitude can be run by back and fore sights, in the same manner that a true meridian is run by the common Transit. The back sights and fore sights will always be mathematically correct, and the deviations, on account of elevations and depressions, can be easily tabulated, and the proper allowance made whenever the boundary monuments are established.

A solar apparatus has been attached to the telescope by the manufacturer, William Schmolz, by which the declination of the magnetic needle can be ascertained during the day; and it can be ascertained during the night by observing the azimuth of Polaris, or any of the circumpolar stars. Hence it appears that on land this instrument embraces all the advantages of the common Transit, Burt's Solar Compass, and Hadley's Sextant, and that without any complicated machinery.

Whoever will take the trouble to study its application and advantages, can with its aid, alone, ascertain his latitude and longitude, calculate the magnetic variation at any hour during the day or night, and run a true parallel of latitude by back and fore sighting.

In doing accurate work, a flag-staff attached to a light tripod with a graduated vertical arc to set the staff in the plane of the parallel of latitude, should be used. The construction of the flag-staff is too simple to require an explanation.



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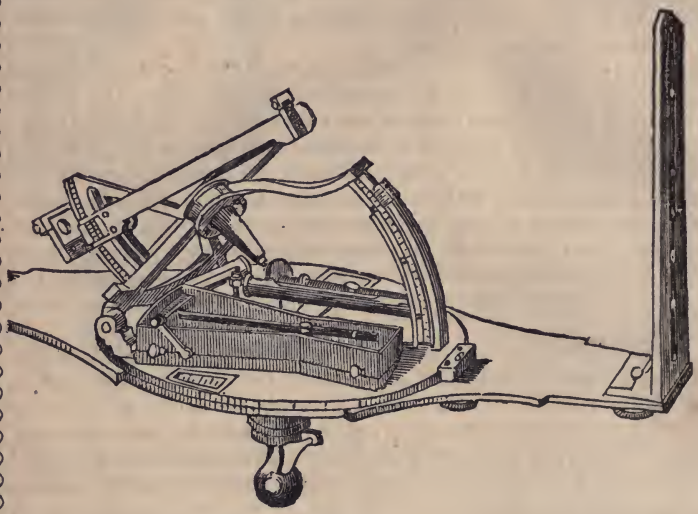
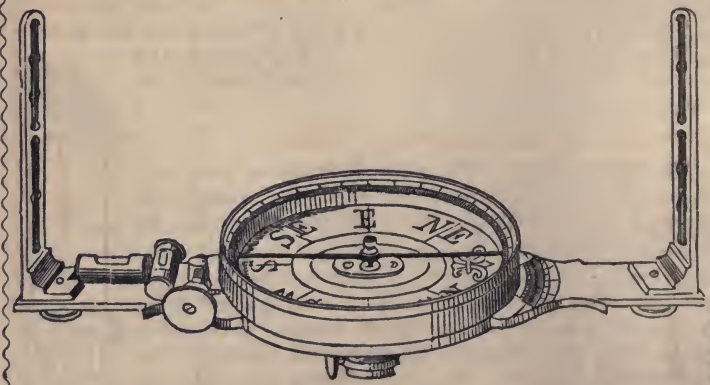
William Schmolz is making Reflectors for the purpose of illuminating the cross-hairs of telescopes, when taking an observation on the North Star, for the purpose of obtaining the variation of the needle. They are made to fit the object-end of the telescope. A lighted candle, or, what is better, a "Bull's-eye" Lantern is held in such a position that its light may fall on the inclined Reflector, (see figure in the margin,) which reflects the rays into the telescope and illuminates the cross-hairs. An aperture is left in the Reflector through which the star can be seen.

BURT'S SOLAR COMPASS,—of the improved style, manufactured by W. J. Young, Philadelphia, is indispensable for accurate surveys in the wilderness. By means of it, can be determined the *latitude of any place, the true meridian and the declination, and hour arc, of any heavenly body within the Zodiac.* It also serves for all the purposes of the common Magnetic Compass. A minute description of the instrument and its adjustment may be found in the "Key to the Solar Compass," published by William A. Burt, Philadelphia.



The CIRCUMFERENTER OR SURVEYORS' COMPASS—as it is usually called, is provided with a *Nonius*, to set off the variation of the needle.



To Find the Variation of the Magnetic Needle.

The most convenient method of determining the true meridian of any place, is by sighting on the North or Pole Star (Polaris) when at its greatest eastern or western elongation.

The following table gives the elongation in common clock time for every tenth day in the year when the star is visible.

Eastern Elongation.				Western Elongation.			
Month.	1st Day.	11th Day.	21st Day.	Month.	1st Day.	11th Day.	21st Day.
	h. m.	h. m.	h. m.		h. m.	h. m.	h. m.
April..	6 31 A.M.	5 52 A.M.	5 13 A.M.	Oct.....	6 21 A.M	5 42 A.M.	5 03 A.M.
May ...	4 33 "	3 54 "	3 14 "	Nov ...	4 20 "	3 40 "	3 01 "
June..	2 31 "	1 52 "	1 13 "	Dec....	2 22 "	1 42 "	1 03 "
July ..	0 33 "	11 50 P.M.	11 11 P.M.	Jan....	0 19 "	11 36 P.M.	10 56 P.M.
Aug...	10 28 P.M.	9 48 "	9 09 "	Feb....	10 13 P.M.	9 34 "	8 55 "
Sept...	8 26 "	7 46 "	7 07 "	Mar ...	8 23 "	7 44 "	7 04 "

Having taken a sight on the star at either elongation, set off an angle equal to the *Azimuth* as given in the following table—to the *left* when the elongation is east, to the *right*, when the elongation is west. The instrument will then sight to the true meridian and the variation can be easily read off.

Azimuths of Polaris.

Year.	L. 30°		L. 32°		L. 34°		L. 36°		L. 38°		L. 40°		L. 42°		L. 44°		L. 46°		L. 48°	
	°	′	°	′	°	′	°	′	°	′	°	′	°	′	°	′	°	′	°	′
1859...	1	40	1	42	1	44	1	47	1	50	1	53	1	56	2	00	2	04	2	09
1860...	1	40	1	41	1	44	1	46	1	49	1	52	1	56	2	00	2	04	2	09
1870...	1	36	1	38	1	40	1	43	1	45	1	48	1	52	1	55	2	00	2	04

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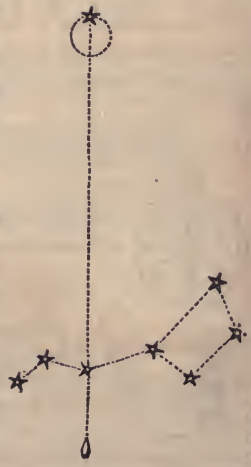
A very close approximation to the true meridian and consequently to the variation, may be obtained by sighting on the Pole Star, at the instant when it is in the same vertical plane with *Alioth*, a star in the tail of the Great Bear, being the next one to the four which form a quadrilateral. (See figure in the margin.)



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Marking Irons—with permanent or shifting plates, in mahogany, ivory or ebony handles. Indispensable to surveyors for properly marking corner-posts and bearing trees.

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The public lands of the United States are divided into squares, whose sides are truly north and south, and east and west. This is effected

by means of meridian lines and parallels of latitude, established six miles apart. The squares thus formed are called townships and each contains 36 square miles, or 23,040 acres, "as near as may be." These are again divided into sections one mile square. Thus every township contains 36 sections of 640 acres each. The sections are subdivided into quarter sections, of 160 acres, and sometimes into half quarter sections, of 80 acres each.

These lines are measured with a CHAIN made of iron or steel wire, and are usually two poles in length. When the ground is tolerably level, a four-pole chain can be used to advantage.

Two Pole Chains (33 feet) with oval rings and 50 links; *Four Pole Chains* (66 feet) with oval rings and 100 links; hundred feet chains, with oval rings and 100 links, made of the very best material, can be found at Wm. Schmolz's establishment.

TABLE FOR RUNNING ON SLOPES.

In the following table the first column shows the angle, the second, the number of links to be added to a chain on the slopes, to make one chain, horizontal measurement.

Angle.	Cor. in links	Angle.	Cor. in links	Angle.	Cor. in links	Angle.	Cor. in links
°		°		°		°	
4	0·24	11	1·88	18	5·14	25	10·54
5	0·38	12	2·24	19	5·76	26	11·26
6	0·55	13	2·63	20	6·42	27	12·24
7	0·76	14	3·06	21	7·11	28	13·37
8	0·98	15	3·53	22	7·85	29	14·34
9	1·24	16	4·02	23	8·64	30	15·47
10	1·55	17	4·56	24	9·47	35	22·07

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VERNIER GLASSES—in strong horn frames.

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PLUMB-BOBS—of different sizes and weights.

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POCKET COMPASSES—useful for travelers through the vast wilderness and dense forest.

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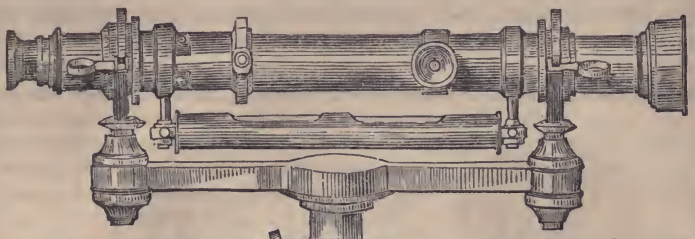
SCHMALKALDER'S OR PRISMATIC COMPASSES.—The use of this little instrument is to measure horizontal angles only, and from its portability, is particularly adapted for military surveys. It is also very useful in filling in the detail of a map where the principal points have been correctly fixed by means of the Transit Instrument.



Y LEVELING INSTRUMENTS—large size—16 inch telescope, with powerful glasses, ground levels, solid tripods, etc., such as are generally used on railroads, canals, etc., from the best makers in Philadelphia, are imported by William Schmolz. Durable instruments of every description, are manufactured at his well known establishment.

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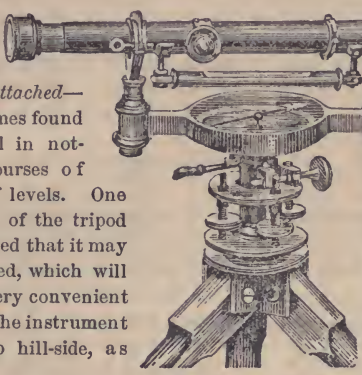
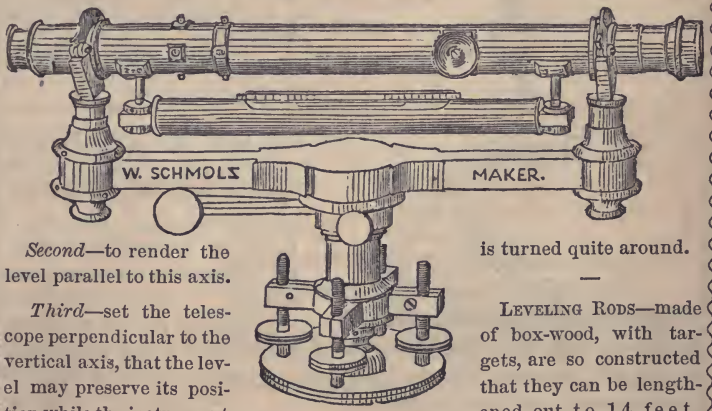
LEVELING INSTRUMENTS *with Compass attached*—are sometimes found very useful in noting the courses of the line of levels. One of the legs of the tripod is so arranged that it may be shortened, which will be found very convenient in setting the instrument on a steep hill-side, as often occurs in mining and ditch work.



Three adjustments are by leveling instruments necessary:

First—place the intersections of the wires in the telescope, so that it shall coincide with the axis of the cylindrical rings on which the telescope turns.



Second—to render the level parallel to this axis.

Third—set the telescope perpendicular to the vertical axis, that the level may preserve its position while the instrument is turned quite around.

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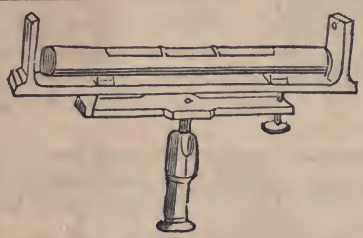
LEVELING RODS—made of box-wood, with targets, are so constructed that they can be lengthened out to 14 feet.

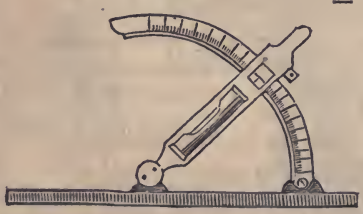
They are graduated to tenths and hundredths of a foot, and by means of an attached vernier, can be read off to thousandths.

Table showing the Difference, in Inches, between the true and apparent Level, for Distances between 1 *and* 100 *Chains.*

Chains	Inches.	Chains	Inches.	Chains	Inches.	Chains	Inches.
1	·001	26	·845	51	3·255	76	7·221
2	·005	27	·911	52	3·380	77	7·412
3	·011	28	·981	53	3·511	78	7·605
4	·020	29	1·051	54	3·645	79	7·802
5	·031	30	1·125	55	3·781	80	8·001
6	·045	31	1·201	56	3·925	81	8·202
7	·061	32	1·280	57	4·061	82	8·406
8	·080	33	1·360	58	4·205	83	8·612
9	·101	34	1·446	59	4·351	84	8·832
10	·125	35	1·531	60	4·500	85	9·042
11	·151	36	1·620	61	4·654	86	9·246
12	·180	37	1·711	62	4·805	87	9·462
13	·211	38	1·805	63	4·968	88	9·681
14	·245	39	1·901	64	5·120	89	9·902
15	·281	40	2·003	65	5·281	90	10·126
16	·320	41	2·101	66	5·443	91	10·351
17	·361	42	2·208	67	5·612	92	10·587
18	·405	43	2·311	68	5·787	93	10·812
19	·451	44	2·420	69	5·955	94	11·046
20	·500	45	2·531	70	6·125	95	11·233
21	·552	46	2·646	71	6·302	96	11·521
22	·605	47	2·761	72	6·480	97	11·763
23	·661	48	2·880	73	6·662	98	12·017
24	·720	49	3·004	74	6·846	99	12·246
25	·781	50	3·125	75	7·032	100	12·502



SMALL LIGHT LEVELS—fitted to a Jacob-staff, working in a ball and socket joint, and furnished with a plain sight in the place of a telescope. These are well adapted to preliminary examinations of ditches, wagon roads, etc., and are, of course, much cheaper than the above-mentioned ones.



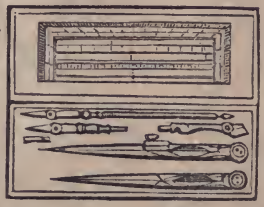
SLOPE LEVELS OR CLINOMETERS—are used in the mines for ascertaining the "dip" of geological formations, and also for measuring the inclination of slopes in excavations and embankments.

Manner of Using.—Place the straight bar upon the slope and revolve the movable limb along the graduated arc until the attached spirit-level indicates that it is vertical. The angle is then shown on the intercepted arc.

ANGLES OF SLOPES IN CUTTINGS OR EMBANKMENTS.

Slopes.	Angles. ° ′
½ to 1	63 26
⅝ to 1	53 8
¾ to 1	45 0
1 to 1	38 40
1¼ to 1	33 41
1½ to 1	26 34
2 to 1	18 26
3 to 1	

Draughting Instruments.



CASES OF DRAUGHTING INSTRUMENTS—of all descriptions and of the best quality—made of German silver—with steel screws and hinges to the pens. For the use of surveyors, engineers, architects, etc.

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FISH-SKIN POCKET CASES—very convenient for field working, containing a pair of six-inch dividers, with pen, pencil, and dotter; a pair of plain dividers, a drawing pen, protractor, parallel ruler, ivory or box-wood scales, etc., in short, all instruments required for plotting in the field.

—

PARALLEL RULERS—nine, twelve, and fifteen, inches long.

—

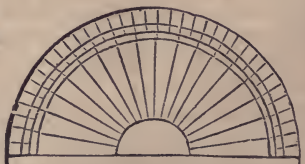
T SQUARES—from 18 to 30 inches long, with swivel joints.

—

BEAM COMPASSES—with adjusting screws.

—

PROPORTIONAL AND PLAIN DIVIDERS, DRAUGHTING PENS, BOW PENS, SQUARES, PENCILS, BRUSHES, ETC. ETC.



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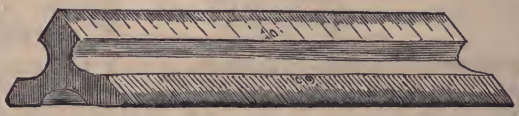
PROTRACTORS—of *horn* or *German silver;* the latter with horn center and movable arm with vernier; also, of *ivory*, six inches long and finely graduated.

—

TRIANGULAR BOX-WOOD SCALES—from 12 to 24 inches long—the six edges are divided into scales



10, 20, 30, 40, 50, and 60 parts, to the inch. Also, *Ivory Scales* for architects, etc. etc.

Telescope.

TERRESTRIAL AND ASTRONOMICAL TELESCOPES.—No invention in the mechanical arts has proved more useful to the successful investigations of astronomical phenomena, and as a consequence, to the purposes of navigation, than that of the

Time.

Astronomers make use of several different kinds of time; an explanation of the nature of which, and of the method of passing from one to another, properly precedes an explanation of the uses of the Ephemeris.

Sideral Time.—Sideral Time is measured by the daily motion of the stars, or, as it is used by astronomers, by the daily motion of that point in the equator from which the true right ascensions of the stars are counted.

A *Sideral Day* is the interval of time between the transit of the vernal equinox over any meridian, and its next succeeding return to the same meridian. It is divided into 24 hours. The sideral hours are counted from 0 to 24, commencing with the instant of the passage of the true vernal equinox over the upper meridian, and ending with its return to the same meridian.

Solar Time.—Solar Time is measured by the daily motion of the sun. A *Solar Day* is the interval of time between two successive transits of the sun over the same meridian; and the hour angle of the sun is called *Solar Time.* This is the most natural and direct measure of time. But the intervals between the successive returns of the sun to the meridian are not exactly equal but depend upon the variable motion of the sun in right ascension.

The want of uniformity in the sun's motion in right ascension arises from two different causes; one, that the sun does not move in the equator, but in the ecliptic; the other, that the sun's motion in the ecliptic is not uniform.

To avoid the irregularity in time caused by the want of uniformity in the sun's motion, a fictitious sun, called a *Mean Sun,* is supposed to move in the equator with a uniform velocity.

Mean Time, which is perfectly equable in its increase, is measured by the motion of this *Mean Sun;* the latter at certain periods agrees with the real sun, then again is in advance of it, and at other times is behind it.

True or *Apparent Time* is measured by the motion of the real sun.

The difference between the *true* and *mean* time is called the *Equation of Time.* By means of it we pass from *true* to *mean* time, or the reverse. Thus if the *true* time be given, the *mean* time corresponding to it will be obtained by adding or subtracting the equation of time, according to the precept at the head of the column in which it is found, on page I of every month of the

Nautical Almanac. If the *mean* time be given, the *true* time is obtained by applying the equation of time as directed by the precept on page II.

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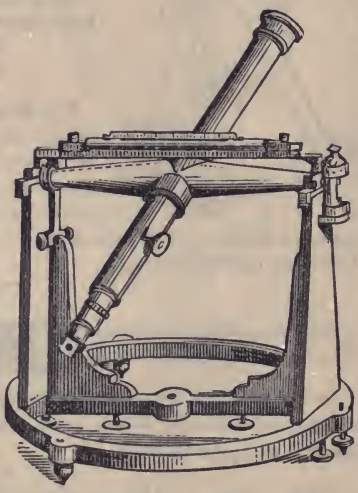


The figure in the margin represents a *Portable Meridian Transit Instrument*, which is used in conjunction with a regulator or chronometer, for observing the passage of the heavenly bodies across the meridian, and determining their difference in right ascension; and also for many other astronomical purposes.

FOR FINDNG THE ERROR OF CLOCK OR CHRONOMETER WITH THE MERIDIAN TRANSIT INSTRUMENT.

The instrument being set in position and well adjusted, note carefully the time when the sun's first limb arrives at each of the perpendicular wires in the telescope; also when the second limb leaves each wire; add up each separately and divide by the number of wires; then add the two proceeds together and divide by 2, which will give the time of the chronometer at apparent noon. Then add or subtract, as the case may be, the equation of time as given in the *Nautical Almanac*, and you obtain the error of clock as regards mean time.

The example below will perhaps be sufficiently explanatory.

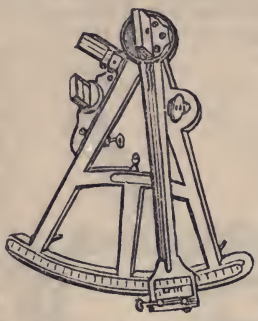
Observation of the Sun's Transit, 1st January, 1859, at San Francisco.

	First limb, m.	s.	Sec. limb, m.	s.
First wire time by Chronometer	5	18·5	7	35·3
Center " "	5	32·8	7	49·6
Third " "	5	47·1	8	3·9
Divide by number of wires.....	3)16	38·4	3)23	28·8
	5	32·8	7	49·6
			5	32·8
			2)13	22·4
Chronometer...			6	41·2
Equation of time...			3	53·49
Fast of mean time.....			2	47·71

Equation of time to be added:

	m.	s.
Apparent noon..	0	00·00
	3	43·84
Increase for lon..		9·65
	3	53·49

A clock keeping mean time ought to indicate 3m, 53·49s, at apparent noon, on the 1st January, 1859, at San Francisco; consequently, the chronometer is too fast as indicated above.



QUADRANTS, SEXTANTS, AND OCTANTS—are principally used by navigators for ascertaining the place of a ship at sea.

They are imported by Wm. Schmolz from the best makers in the east.

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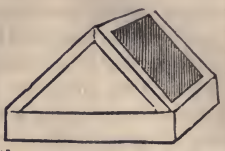

THE ARTIFICIAL HORIZON—is used when observations with the quadrant, sextant, or octant, are made on land, where the natural horizon cannot be seen. Either mercury, oil or molasses, are used as reflectors.

—

SHIP SPY-GLASSES—sometimes called *Day and Night Glasses.* To use them at night the third and fourth lenses must be taken out; objects will appear inverted but quite distinct.

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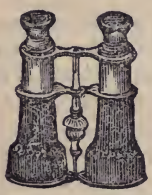

MARINE OPERA GLASSES—with powerful, achromatic lenses, black mounted, and sun-shades attached, are very convenient at sea.

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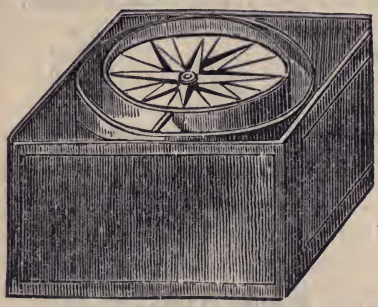


THE MARINER'S COMPASS—used in navigation. Its magnetic needle, formed of a thin plate of steel, about six inches in length and half an inch in width, is delicately balanced on an agate center, resting on a steel-pointed pivot fixed in the base of the instrument. The ends of the needle sweep over a graduated circle of light pasteboard, upon which are marked the Cardinal Points as well as the intermediate divisions into half and quarter points.

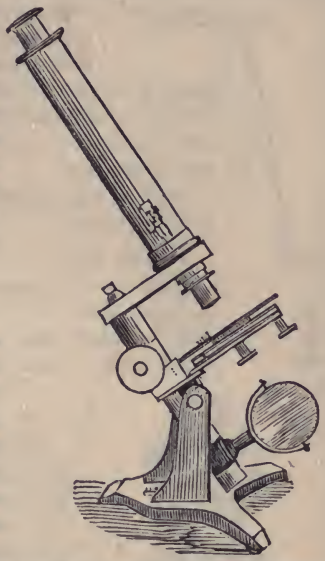
—

MILITARY TELESCOPES—are instruments of superior construction and fold up into a small compass. The lenses are of the first quality and of immense power. Imported by William Schmolz from the best makers.

—

PANORAMA GLASSES—from 3 to 7 inches in diameter, and with a focal distance of 10 to 36 inches.

COMPOUND ACHROMATIC MICROSCOPES.—The most valuable improvement in microscopes, is the introduction of achromatic object-glasses, which not only represent the objects under examination more clearly defined, but also free from all tints and coloring, an important advantage over the common lenses. The only bar to their more general use, is their necessarily high price.



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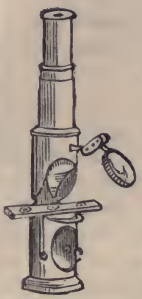

POCKET MICROSCOPE—in a small, convenient form, of considerable magnifying power. Its portability will recommend it to the naturalist, the mineralogist and the botanist. The instrument possesses sufficient power to distinguish animalcule, the crystalization of salts, seed vessels, etc.

REMARKS RESPECTING MICROSCOPES.

High magnifying power is by no means the most necessary quality in a Microscope; it is only applicable to transparent bodies, such as blood, navicula, infusoria, or animalcule.

With high powers, the field of view is very limited—the glass has to be very close to the object, and there is great loss of light.

The low powers are by far the most useful for ordinary objects—the easiest to the eye—give more light, and take in more of the object.

With a power of 500 times, only the one-hundredth of an inch can be seen at a time.

With a power of 40 or 50 times, the field is one-tenth or one-twelfth of an inch.

Only low power, say 40 to 100 times, can be used for opaque bodies—the lower the better.

To examine blood requires 300 to 500 times.

—

POCKET LENSES, INSECT GLASSES, ETC.—are variously mounted, but are commonly in such a form as shown in the margin. The case, which serves at the same time for the handle, is made of black horn or metal.

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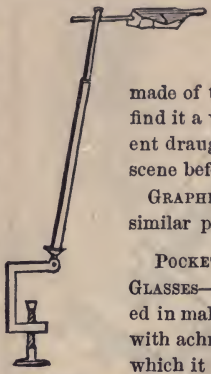
OBJECT GLASSES—for telescopes of surveying instruments, ship's spy-glasses, etc.



CAMERA LUCIDA.—By means of this instrument objects may be represented on a sheet of paper in such a manner that an accurate drawing can be made of the same. The artist in sketching from nature, will find it a valuable and unerring assistant, and even an indifferent draughtsman can by its aid, make a good drawing of the scene before him.

GRAPHIC MIRRORS AND CAMERA OBSCURAS—are intended for similar puposes.

—

POCKET SPY-GLASSES— mounted in mahoghany with achromatic object-glasses. The tube has three slides, by which it can be drawn out to the length of three feet.

—

THE BAROMETER—is an instrument used for measuring the weight of the atmosphere, and was invented by Torricelli, in 1643.

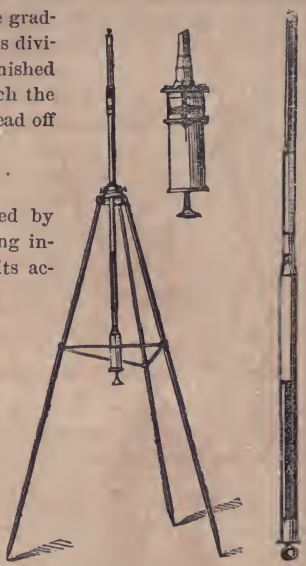
It consists, essentially, of a straight glass tube, about 34 inches in length, hermetically sealed at one end and open at the other. This tube is filled with purified quicksilver, and in this condition its open end is inverted into a cistern of the same material. After several oscillations, the quicksilver in the tube will settle to within about 30 inches of the surface in the cistern at the level of the sea and with slight variations, will remain at that hight. This phenomena is the result of the pressure of the atmosphere upon the external surface of the quicksilver in the cistern.

Barometers whose tubes have large diameters are preferable, as in them the motion of the fluid is more free, its friction against the sides of the tube being nearly inappreciable. Tubes of small diameters require correction for *capillarity*, or the depression of the quicksilver, caused by its adhesion to the sides of the tube.

—

THE CISTERN MOUNTAIN BAROMETER.—A very important property of this instrument is that of determining hights, for which purpose it is inferior to no other; hence, it is not only very useful to surveyors, but also highly interesting

to philosophers, scientific men, etc. The graduated scale ranges from 15 to 31 inches, is divided into twentieths of an inch, and furnished with a sliding vernier, by means of which the five hundredth part of an inch can be read off with ease.



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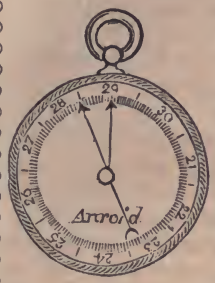
ANEROID BAROMETER—recently invented by M. Vidi, of Paris, is used like the foregoing instrument, for ascertaining elevations; its action depends on the pressure of the atmosphere upon an elastic, metallic box, from which the air has been exhausted, and the box is then hermetically sealed. The contraction or expansion of this box is communicated to an index-hand which sweeps around a graduated dial-plate, the graduations corresponding to the divisions on the Mountain Barometer.



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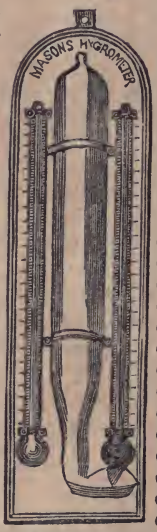
RAIN GAUGE.—This instrument consists of a glass tube about three feet in length, and is graduated to the one thousandth part of an inch.

—

WATCHMAKER'S GLASSES—of various powers.

—

MASON'S HYGROMETER, or DRY AND WET BULB THERMOMETER—has been universally adopted in meteorological observations, for finding the *dew and vapor point* in the atmosphere.



The silk which covers the wet bulb and thread which conveys the water to it, requires renewal about every month, and the fountain to be filled, when requisite, with distilled water, or water that has been boiled and allowed to cool, by immersing it in a basin of the water till the aperture, *only*, is just upon the surface, and the water will flow in. If the Hygrometer is placed out of doors in frosty weather, the fountain had better be removed, or the freezing of water within it may break it; in this case, a thin coating of ice may soon be formed on the wet bulb, which will last a considerable time and may be renewed when requisite.

TABLES FOR THE USE OF DR. MASON'S HYGROMETER.

Table of Degrees.

Mason's Hygrometer.	Degrees + Excess X 2 = Absolute Dryness.		Leslie's Hygrometer compared with Mason's.
Degrees of Dryness Observed.	Excess of Dryness to be Added.	Absolute Dryness Existing.	
0	0·0	0·0	0
0·5	0·083	1·166	3
1	0·166	2·332	6
1·5	0·2495	3·499	9
2	0·333	4·666	12
2·5	0·4165	5·833	15
3	0·300	7·0	18
3·5	0·483	8·166	21
4	0·666	9·332	24
4·5	0·7495	10·499	27
5	0.833	11·666	30
5·5	0.9165	12·833	33
6	1·000	14·0	36
6·5	1·083	15·166	39
7	1·166	16·332	42
7·5	1·2495	17·499	45
8	1 333	18·666	48
8·5	1·4165	19·833	51
9	1·500	21·0	54
9·5	1·583	21·166	57
10	1·666	23·332	60
10·5	1·7495	24·499	63
11	1·833	25·666	66
11·5	1·9165	26·833	69
12	2·000	28·0	72
12·5	2·083	29·166	75
13	2·166	30·332	78
13·5	2·2495	31·499	81
14	2·333	32·666	84
14·5	2·4165	33·833	87
15	2·500	35·0	90
15·5	2·583	36·166	93
16	2·666	37·332	96
16·5	2·7495	38·499	99
17	2·833	39·666	102
17·5	2·9165	40·833	105
18	3·000	42·0	108
18·5	3·083	43·166	111
19	3·166	44·332	114
19·5	3·2495	45·499	117
20	3·333	46·666	120
20·5	3·4165	47·833	123
21	3·500	49·0	126
21·5	3·583	50·166	129
22	3 666	51·332	132
22·5	3·7495	52·499	135

The comparison of Dr. Mason's with the Dew Point Hygrometer, (Professor Daniel's Hygrometer is registered by the third column,) and of Sir John Leslie's, will be seen in the same line of the first, third, and fourth columns of the table.

By the Table of Degrees is shown, *without calculation*, the absolute dryness of the atmosphere, in degrees of Fahrenheit's Thermometer.

Observe the number of degrees the two thermometers differ, which are here called "Degrees of Dryness Observed," and found in the first column of the table.

The second column merely contains the figures which have been added to the degrees of dryness in the first, and multiplied by two, to obtain the answer put down in the third column.

Example.—Temperature of the air 57, wet bulb 54 = 3° of dryness observed; then add 0·5 excess of dryness = 3·5, and multiply by 2, which will give 7° of absolute dryness existing.

To Find the Dew-Point.

Rule.—Subtract the absolute dryness from the temperature of the air.

Example.—57 — 7 = 50, dew-point.

Table of Quantity.

Showing the Weight, in Grains, of a Cubic Foot of Vapor, at Different Temperatures, from 0 to 95° Fahrenheit.

Temp.	Weight.	Temp.	Weight.	Temp.	Weight.	Temp.	Weight.
°	grs.	°	grs.	°	grs.	°	grs.
0	0·856	24	1·961	48	4·279	72	8·924
1	0·992	25	2·028	49	4·407	73	9·190
2	0·928	26	2·096	50	4·535	74	9·484
3	0·963	27	2·163	51	4·684	75	9·780
4	0·999	28	2·229	52	4·832	76	10·107
5	1·034	29	2·295	53	5·003	77	10·387
6	1·069	30	2·361	54	5·173	78	10·699
7	1·104	31	2·451	55	5·342	79	11·016
8	1·139	32	2·539	56	5·511	80	11·333
9	1·173	33	2·630	57	5·679	81	11·665
10	1·208	34	2·717	58	5·868	82	12·005
11	1·254	35	2·805	59	6·046	83	12·354
12	1·308	36	2·892	60	6·222	84	12 713
13	1·359	37	2·979	61	6·399	85	13·081
14	1·405	38	3·066	62	6·575	86	13·458
15	1 451	39	3·153	63	6·794	87	13·877
16	1·497	40	3·239	64	7·013	88	14·230
17	1·541	41	3·371	65	7·230	89	14·613
18	1·586	42	3·502	66	7·447	90	15·005
19	1·631	43	3·633	67	7·662	91	15·432
20	1·688	44	3·763	68	7 899	92	15·786
21	1·757	45	3 893	69	8·135	93	16·186
22	1 825	46	4·022	70	8·392	94	16·593
23	1·893	47	4 151	71	8·658	95	17 009

To Find the Weight of Moisture in a Cubic Foot of Air at any Time.

Rule.—Divide the *weight in grains*, found opposite the *temperature*, corresponding to the dew-point at the time, in the Table of Quantity, by the correction found opposite to the *difference of temperature*, in Table of Corrections, corresponding to the absolute dryness existing at the time.

If the air be *very dry*, the difference between the two thermometers will be great; if moist, less in proportion, and when *fully saturated*, both will be alike. For general purposes, it is only necessary to place the instrument in

a retired part of the room, away from the fire, and not exposed to the open doors or passages; but for nice experiments, the observation should *always* be made in the open air and in the *shade*, taking especial care that the instrument be not influenced by the radiation of any heated bodies, nor any currents of air; the dew-point is then found by the Rule given on another page, and corresponds exactly with the Dew-Point Hygrometer, an instrument described in "Jameson's Journal," July, 1835, and modified by Dr. Mason.

Should the wind be strong upon the instrument, the "Degrees of Dryness Observed," multiplied by 2, gives the "Absolute Dryness," (the "Excess of Dryness" being omitted in the calculation,) because a strong current of air makes the instrument indicate the *Excess of Dryness*, which is necessary to be added, in a calm atmosphere.

If the absolute dryness of an apartment be required, the instrument must be placed in the shade and the dew-point found, which subtracted from the temperature of the apartment, will give its absolute dryness. The reason is obvious, and arises from this law, namely, that air has its dryness doubled for every increase of temperature corresponding to 21° of Fahrenheit's thermometer, and in proportion, for all intermediate temperatures.

Table of Corrections

To be used when the Term of Deposition, or Dew-Point, differs from the Temperature of the Air in the Shade.

Diff. of Temp.	Correction.	Diff of. Temp.	Correction.	Diff. of Temp	Correction.	Diff. of Temp.	Correction.
0	0·0000	13	1·0271	26	1·0542	39	1·0813
1	1·0020	14	1·0291	27	1·0562	40	1·0834
2	1·0041	15	1·0312	28	1·0583	41	1·0854
3	1·0062	16	1·0333	29	1·0604	42	1·0875
4	1·0083	17	1·0354	30	1·0625	43	1·0896
5	1·0104	18	1·0375	31	1·0646	44	1·0917
6	1·0125	19	1·0396	32	1·0667	45	1·0937
7	1·0146	20	1·0417	33	1·0687	46	1·0958
8	1·0167	21	1·0437	34	1·0708	47	1·0979
9	1·0187	22	1·0458	35	1·0729	48	1·1000
10	1·0208	23	1·0479	36	1·0750	49	1·1021
11	1·0229	24	1·0500	37	1·0771	50	1·1042
12	1·0250	25	1·0521	38	1·0792	51	1·1062

N. B.—The principles of these calculations will be found in Professor Daniel's Meteorological Essays, in Mr. Anderson's Essay on Hygrometry, in the Edinburgh Encyclopedia, Vol. xi., and in the Edinburgh Journal of Science, Vol. vii., p. 47, in an excellent article on the Dew-Point Hygrometer, by Mr. Foggo, from which the Table of Corrections has been partly subtracted. The Table of Quantity, by weight, has been taken from Professor Daniel's work on Meteorology, to which the reader is referred for further particulars.

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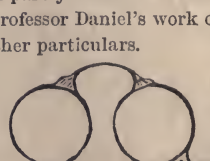
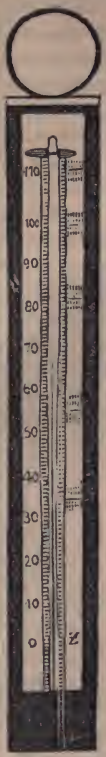


Eye Glasses—are made in a variety of elegant forms, with frames of either black horn, blue steel, silver, or gold, connected with springs in such a manner as to fasten well to the nose.



THERMOMETERS.—On metallic scales from 6 to 12 inches long.

On wooden scales, for dairies.

Entirely of glass, for chemical experiments.

For brewers, *a new article.*

With two scales, Fahrenheit and Reaumer.

Pocket, in cases, for travelers.

Self-registering, showing the extreme heat or cold, during the night time.

In meteorological observations, it is of great importance to ascertain the limits of the range of the thermometer in a given period of time, as during a day or night, while the observer is absent.

—

HYDROMETERS—are used in the manufacture of acids, alkalies, oils, sugars, beer, etc., in ascertaining their weight or specific gravity.

They also serve as tests of the quality of spirits, vinegar, milk, etc.

—

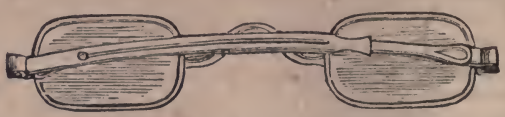
U. S. CUSTOM-HOUSE HYDROMETER—for testing spirits, with attached thermometer and Correction Table, for temperature.

TABLE,

Showing the Comparative Scales of Trallé and Baumé, with the Specific Gravities and Proof, at the Temperature of Sixty Degrees.

Trallé's Scale.	Baumé's Scale.	Specific Gravity.	Proof.	
100	45	796	100	
95	40	815	90	
90	36	833	80	
85	33	848	70	
80	31	863	60	Per centage over proof.
75	28	876	50	
70	26	889	40	
65	24	901	30	
60	23	912	20	
55	21	923	10	
50	19	933	0	Proof.
45	18	942	10	
40	17	951	20	
35	16	958	30	
30	15	964	40	
25	14	970	50	Under proof.
20	13	976	60	
15	12	982	70	
10	12	988	80	
5	11	994	90	
0	10	1000	100	

Per Centage of pure Alcohol.



SPECTACLES.—Those who have occasion to use Spectacles, should by all means, attend to the selection of them in person. By trying them on and at the same time availing themselves of the suggestions of an optician, they will not fail to select those most suitable to their eyesight.

Oculists recommend, that so soon as the slightest failing in the eyesight becomes apparent to a person, spectacles should be resorted to, as serious injury is often the result of delay, in consequence of the severe strain upon the optical nerve.

The best form for the lenses, is the double-convex or double-concave. Wm. Schmolz has an unlimited assortment of well-ground and highly polished glasses, and an equally large number of frames to put them in. Also, Pebbles, Miniscus, etc.

—

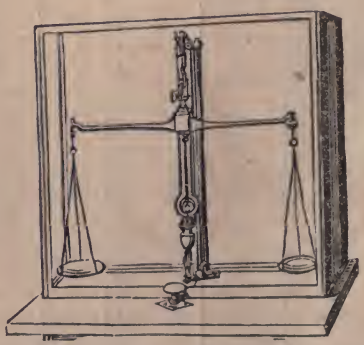
DOUBLE-EYE SPECTACLES—are necessary to persons suffering with weak eyes, and are also a great relief to the eyes, when riding in the wind and dust. The glasses are large, shaded either blue, gray, or green, and mounted in fine steel, by which they are firmly clamped to the head.

—

GOGGLES—with white glasses and protecting gauze frames, are also very desirable in the dust and wind. Those with colored glasses, are a complete protection to the eye against dust, sunlight, and cold winds.

—

GOLD ASSAYING SCALES—in the most approved style and so delicately balanced as to be affected by the *thousandth part of a grain.*

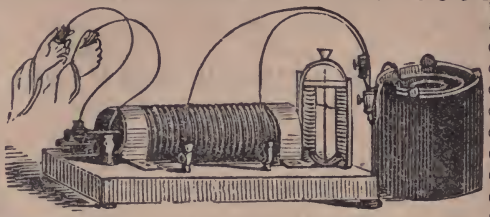


—

GOLD ASSAYING WEIGHTS—divided into tenths, hundredths, and thousandths, corresponding with the assay weights of the U. S. Branch Mint.

—

GOLD DUST COUNTER SCALES—assorted sizes, with weights from 10 to 200 ounces.



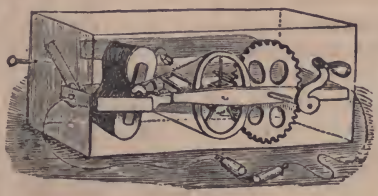
ELECTRO-MAGNETIC MACHINES—are now used with astonishing success in all cases of nervous diseases, such as Neuralgia, Paralysis, Rheumatism, Sick and Nervous Headaches,

Dyspepsia, Bronchitis, Loss of Voice, Scrofula, Curvature of the Spine, Toothache, Deafness, etc.

—

GALVANIC BATTERIES—are constructed of various forms but consist, essentially, of two different metals, which are placed in some dilute acid which acts on but one of the metals. The galvanic current is conducted by wires fastened to the metals.

—



MAGNETO-ELECTRIC MACHINES—for medical purposes, are the most perfect, convenient, and portable instruments of the kind, as no acid is used with them, and, consequently they are always ready for use. They are imported by Wm Schmolz from the best makers.

—

TERRESTIAL AND ASTRONOMICAL GLOBES—are used for the purpose of conveying to the youthful mind his first ideas of the figure and movements of the planet we inhabit; to explain the meaning of latitude and longitude, and to show the relative position of different places with respect to each other, as well as to the sun during the change of seasons. They are often used in solving, mechanically, many problems in astronomy relative to the hour of day at different places; the times of the rising and setting of the sun; the limits of the visibility of eclipses, etc., etc.

Rules for Solving all Cases of Plane Trigonometry.

Case 1.

Given all the Angles and One Side, to find the other Side.

Rule.—As sine of the angle opposite the given side, is to sine of the angle opposite the required side, so is the given side to the required side.

Case 2.

Given two Sides and an Angle opposite one of them, to find the other Angles and Side.

Rule.—As the side opposite the given angle, is to the other given side, so is sine of the angle opposite the former, to sine of the angle opposite the latter.

Case 3.

Given Two Sides and the included Angle, to find the other Angles and Side.

Rule.—Subtract the given angle from 180° and the remainder will be the sum of the two unknown angles; then say, as the sum of the two given sides is to their difference, so is tangent of half sum of unknown angles, to tangent of half their difference. Add this half difference of the unknown angles to their half sum for the angle opposite the greater side, and subtract it from the half sum for the angle opposite the less side.

Case 4.

Given the Three Sides to find the Angles.

Rule.—Upon the longest side let fall a perpendicular from the opposite angle. This perpendicular will divide the base into two segments and the triangle into two right-angled triangles; then say, as the given base is to the sum of the two other sides, so is the difference of those sides, to the difference of the segments of the base. To half the base add half the difference of the segments for the greater segment, and subtract it from half the base for the less side; then proceed as in Case 2.

Rule 2.—Add together the arith. comp. of the logarithms of the two sides, containing the required angle the log. of the half sum of the three sides and the log. of the difference of the half sum and the side opposite the required angle. The half the sum of these four logarithms will be the logarithmic cosine of half the required angle.

A NEW SET

OF

PRACTICAL TABLES,

USEFUL IN

Surveying and Engineering;

CONTAINING

EASY AND ACCURATE METHODS FOR FINDING THE VARIATION OF THE MAGNETIC NEEDLE AT ANY HOUR OF THE NIGHT, LATITUDES AND LONGITUDES OF PLACES FROM THEIR DIFFERENCE OF LATITUDE AND DEPARTURE, THE CONVERGENCIES OF THE MERIDIANS, THE DIVERGENCIES OF THE PARALLELS OF LATITUDE AND PRIME VERTICALS, ALTITUDES BY THE BAROMETER, ATMOSPHERIC REFRACTION, ETC.

TOGETHER WITH

AN IMPROVED METHOD OF TABLING,

WHICH FACILITATES

The Computation of Areas and the Projection of Maps.

BY

R. C. MATTHEWSON,

U. S. Deputy Surveyor.

SAN FRANCISCO:

PUBLISHED BY WILLIAM SCHMOLZ,

MATHEMATICAL INSTRUMENT MAKER.

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1859.

PREFACE.

Every practical Surveyor must be aware that, for operations in the field, a set of Pocket Tables, of convenient size, combining the greatest accuracy with the utmost brevity, has been hitherto a desideratum. The object of the following Tables is to supply this deficiency, and it is hoped that they will answer, to some extent at least, the purpose for which they are intended. It is not expected that they are free from imperfections, or that they do not admit of improvements; but for accuracy, brevity, and perspicuity combined, it is confidently believed they are superior to any Tables, of a similar character, now extant. How far this opinion is correct must be left for others to determine.

Some of the Tables are entirely original, and others, it is supposed, are more systematically and conveniently arranged than they will be found in any other work. The Table for finding the Variation of the Magnetic Needle, at any hour of the night, and that for finding the Divergency of the Parallel of Latitude and Prime Vertical, are examples of the former, while the Table for ascertaining Altitudes by the Barometer, and that for computing the amount of Atmospheric Refraction, are examples of the latter. The first two of these Tables are not to be found in any known Treatise on Surveying, and the last two have Formulas placed at their bottom, in which every step of the calculation is clearly indicated, and the necessity of constantly referring to the Examples altogether avoided.

With the exception of the Tables for converting Sideral Time into Mean Solar Time as well as into Arc, and the reverse, which are introduced merely for facilitating the reductions, and that for finding the Hight of the Barometer corresponding to the Temperature of Boiling Water, which is acknowledged to the proper source, all the Tables in this collection have been computed anew, from the most recent authorities and the most reliable data. The Lengths of the Degrees of Latitude and Longitude are given in chains, instead of yards or feet, with the view of better adapting them to the United States system of Land Surveys.

These Tables were commenced some months since at the request of Mr. Wm. Schmolz, the publisher. They have been calculated and prepared for the press with the assistance of Messrs. W. J. Lewis and G. F. Allardt, to the former of whom, in particular, much credit is due for many valuable suggestions, and all the credit for the two last Approximate Rules given at the end of the Explanations. The calculations have been made with great care, every precaution has been taken to avoid typographical errors by comparing the revised sheets with the original computations or the best authorities, and it is firmly believed that the Rules and Tables will give results accurate to the nearest minute in angular, and to the nearest link in linear measure.

San Francisco, July 6, 1859.

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TABLES.

EXPLANATION AND USE OF THE TABLES.

Tables I and II.

Table I gives the length of a degree of latitude, in chains, for every minute of latitude between 29 and 49 degrees, calculated by the Formula $Dm = 5523{\cdot}8724 - 27{\cdot}7425 \cos 2\,l + {\cdot}0592 \cos 4\,l$, in which *Dm* represents a degree of the meridian, and *l*, the middle latitude.

Table II gives the length of a degree of longitude, in chains, for every minute of latitude between 29 and 49 degrees, calculated by the Formula $Dp = 5537{\cdot}7439 \cos l - 4{\cdot}6337 \cos 3\,l + {\cdot}0058 \cos 5\,l$, in which *Dp* represents a degree of the parallel, and *l*, the latitude.

These tables are useful for converting linear into angular, and angular into linear measure, as well as for determining the convergencies and divergencies of the meridians, on the spheroidal surface of the earth.

PROBLEMS AND EXAMPLES.

1. *Given the latitudes of any two places on the same meridian, to find the distance between them.*

Rule.—Find, from Table I, the length of a degree of the meridian at each latitude, and take half their sum for the mean length of a degree. Then say, as 60 minutes is to the difference of latitude, so is the mean length of a degree to the distance required.

The latitude of the Monte Diablo Base Line, is 37° 53′ 5″, and that of the 1st Standard North, 38° 19′ 11″; what is the meridional distance between them?

chains. chains.
As 60′ : 26′ 6″ : : 5517·205 : 2400, the distance required.

2. *Given the distance between any two places on the same meridian, and the latitude of one of them, to find their difference of latitude.*

Rule.—Find, from Table I, the length of a degree of the meridian, in the given latitude, and also in that differing from it, by the meridional distance, converted into arc at the rate of 52 seconds per mile, and take half their sum for the mean length of a degree. Then say, as the mean length of a degree is to the meridional distance, so is 60 minutes to the difference of latitude required.

The latitude of the Monte Diablo Base Line, is 37° 53′ 5″; what is the latitude of the 1st Standard North, the meridional distance being 30 miles?

chains. chains.
As 5517·205 : 2400 : : 60′ : 26′ 6″, the difference of latitude required.

3. *Given the longitudes of any two places, on the same parallel, in a given latitude, to find the distance between them.*

Rule.—Find, from Table II, the length of a degree of longitude in the

given latitude; and say, as 60 minutes is to the difference of longitude, so is the length of the degree of longitude to the distance required.

The longitude of the Monte Diablo Meridian is 121° 54′ 1″, and that of Range 1 East, 121° 21′ 5″; what is the distance between them, on the Base Line, in latitude 37° 53′ 5″?

chains. chains.
As 60′ : 32′ 56″ : : 4372·51 : 2400, the distance required.

4. *Given the distance between any two places on the same parallel, in a given latitude, to find their difference of longitude.*

RULE.—Find from Table II, the length of degree of longitude in the given latitude; and say, as the length of the degree of longitude is to the given distance, so is 60 minutes to the difference of longitude.

The longitude of the Monte Diablo Meridian, is 121° 54′ 1″; what is the difference of longitude to Range 5 East, the distance on the Base Line, in latitude 37° 53′ 5″, being 30 miles?

chains. chains.
As 4372·51 : 2400 : : 60′ : 32′ 56″, the difference of longitude required.

5. *Given the distance between two meridians, on any parallel, in a given latitude, to find the convergency of the meridians for any distance north of that parallel.*

RULE.—Find the length of a degree of longitude, at each latitude, by the foregoing rules; and say, as the *greater* of the two lengths is to their difference, so is the given distance to the *convergency* required.

The distance between Ranges 1 and 2 on the 1st Standard North, is 6 miles, what is the convergency of the two range lines at the 2d Standard North, the meridional distance being 30 miles?

chains. chains. chains. chains.
As 4346·66 : 26·07 : : 480 : 2·88, the convergency required.

6. *Given the distance between two meridians, on any parallel, in a given latitude, to find the divergency of the meridians for any distance south of that parallel.*

RULE.—Find the length of a degree of longitude, at each latitude, by the foregoing rules; and say, as the *less* of the two lengths is to their difference, so is the given distance to the *divergency* required.

The distance between Ranges 1 and 2, on the 1st Standard South, is 6 miles; what is the divergency of the two range lines at the 2d Standard South, the meridional distance being 24 miles?

chains. chains. chains. chains.
As 4393·00 : 20·34 : : 480 : 2·22, the divergency required.

Tables III and IV.

Table III gives equivalents of degrees, minutes, and seconds of arc, in hours, minutes, and seconds of sideral time, calculated by the Formula, 360° = 24h, or 15° = 1h.

Table IV gives equivalents of hours, minutes, and seconds, of sideral time, in degrees, minutes, and seconds of arc, calculated by the Formula, 24h = 360°, or 1h = 15°.

These tables are useful in facilitating the conversion of arc into sideral time, or of sideral time into arc.

PROBLEMS AND EXAMPLES.

1. *Given any number of degrees, minutes, and seconds of arc, to find the corresponding hours, minutes, and seconds of time.*

RULE.—Find, from Table III, the intervals of time corresponding to the degrees, minutes, and seconds, separately, and add them together; the result will be the time required.

The apparent Right Ascension of Polaris, January 1, 1860, is 16° 59′ 54″ in arc; what is it in sideral time?

1h 4m –|– 3m 56s –|– 3·60s = 1h 7m 59·60s,* the sideral time required.

The longitude of San Francisco is 122° 23′ 10″ in arc; what is it in sideral time?

8h 8m –|– 1m 32s –|– 0·67s = 8h 9m 32·67s, the sideral time required.

2. *Given any number of hours, minutes, and seconds, of time, to find the corresponding degrees, minutes, and seconds of arc.*

RULE.—Find, from Table IV, the degrees, minutes, and seconds, corresponding to the intervals of time, separately, and add them together; the result will be the arc required.

The apparent Right Ascension of Polaris, January 1, 1860, is 1h 7m 59·60s, in sideral time; what is it in arc?

15° –|– 1° 45′ –|– 14′ 45″ –|– 9″ = 16° 59′ 54″, the arc required.

The longitude of San Francisco, is 8h 9m 32·67s, in sideral time; what is it in arc?

120° –|– 2° 15′ –|– 8′ –|– 10″ = 122° 23′ 10″, the arc required.

Tables V and VI.

Table V gives mean solar time in equivalent intervals of sideral time, calculated by the Formula, 24h mean time = 24h 3m 56·555s sideral time, or 1h mean time = 1h –|– 9·8565s sideral time.

Table VI gives sideral time in equivalent intervals of mean solar time, calculated by the Formula, 24h sideral time = 23h 56m 4·091s mean time, or 1h sideral time = 1h — 9·8296s mean time.

These tables are useful, not only for converting intervals of solar into equivalent intervals of sideral time, and intervals of sideral into equivalent intervals of solar time; but also for converting any given instant of solar, to its corresponding sideral, or of sideral, to its corresponding solar time.

SIDERAL TIME AT MEAN NOON, is the angular distance of the first point of Aries from the mean Sun when on the meridian, or at mean noon; and is the time indicated by an accurate sideral clock, when the mean time clock indicates 0h 0m 0s. It *increases* 3m 56·556s† per day, and is given for every day

* The quantities throughout these examples are carried out, for exercise, to the decimal of a second, as given in the *Nautical Almanac;* but in practice, it will be unnecessary to carry them beyond the nearest minute, or the nearest second, at the utmost.

† This differs from 3m 56·555s, because it is affected by the equation of the equinoxes, and is not, *strictly*, a uniformly increasing quantity. It is the *apparent* and not the *mean* sideral time at mean noon, and should be so designated in astronomical works.

in the year, on page II of each month, in the English *Nautical Almanac*, for the meridian of Greenwich, whence it can be calculated for any other meridian, by *adding* for the difference of longitude when *west*, or *subtracting* when *east*, 9·8565s per hour, which can be done by Table V.

MEAN TIME AT SIDERAL NOON, is the angular distance of the mean Sun from the first point of Aries when on the meridian, or at sideral noon, and is the time indicated by an accurate mean time clock, when the sideral clock indicates 0h 0m 0s. It *decreases* 3m 55·910s* per day, and is given for every day in the year, on page XX of each month, in the English *Nautical Almanac*, for the meridian of Greenwich, whence it can be calculated for any other meridian, by *subtracting* for the difference of longitude, when *west*, or *adding*, when *east*, 9·8296s per hour, which can be done by Table VI.

If the sideral time at mean noon, on any day, be subtracted from 24h, the remainder, converted into its solar equivalent, will be the mean time at sideral noon, or if the mean time at sideral noon, converted into its sideral equivalent, be subtracted from 24h, the remainder will be the sideral time, at mean noon, on the same day. In like manner, if to the sideral time on the *preceding* mean noon, at any place, be added any given interval of mean time, converted into its sideral equivalent, the result will be the corresponding sideral time; or if to the mean time, on the *preceding* sideral noon, be added any given interval of sideral time, converted into its solar equivalent, the result will be the corresponding mean time.

PROBLEMS AND EXAMPLES.

1. *Given any interval of solar time, to find its equivalent in sideral time.*

RULE.—Find, from Table V, the sideral equivalents corresponding to the given hours, minutes, and seconds, separately, and add them together; the sum will be the sideral interval required.

What is the sideral interval equivalent to 16h 12m 45·86s, mean time?

16h 2m 37·70s –|– 12m 1·97s –|– 45·12s –|– ·87s = 16h 15m 25·66s, sid. time req'd

2. *Given any interval of sideral time, to find its equivalent in solar time.*

RULE.—Find, from Table VI, the solar equivalents corresponding to the given hours, minutes, and seconds, separately, and add them together; the sum will be the solar interval required.

What is the solar interval equivalent to 16h 15m 25·66s sideral time?

15h 57m 22·73s –|– 14m 57·54s –|– 24·93s –|– ·66s = 16h 12m 45·86s, mean t. req

3. *Given the sideral time at mean noon, on any day, to find it on any subsequent day.*

RULE.—To the given sideral time, add 3m 56·556s for every succeeding day, diminishing the sum by 24 hours, when the former exceeds the latter, and the result will be the sideral time required.

* This differs from 3m 55·909s for the reasons given in the last note. These distinctions are of importance, because they enable us, by making a *memorandum* of the quantities, for any day of the year, to obtain them for any other day, without reference to the *Nautical Almanac*.

The sideral time, at Greenwich mean noon, March 23, 1859, is 0h 1m 46·91s; what is it October 9, 1859?

	h.	m.	s.
Sideral time given, March 23	0	1	46·91
3m 56·556s X 200 days	13	8	31·20
Sideral time required, October 9	13	10	18·11*

The sideral time, at Greenwich mean noon, January 1, 1860, is 18h 41m 28·87s; what is it January 1, 1861?

	h.	m.	s.
Sideral time given	18	41	28·87
3m 56·556s X 366 days	24	2	59·50
Sideral time required, subtracting 24h	18	44	28·37

4. *Given the mean time at sideral noon, on any day, to find it on any subsequent day.*

RULE.—From the given mean time, subtract 3m 55·910s for every succeeding day, increasing the former by 23h 56m 4·09s, when the latter exceeds it, and the result will be the mean time required.

The mean time, at Greenwich sideral noon, March 23, 1859, is 23h 54m 17·48s; what is it October 9, 1859?

	h.	m.	s.
Mean time given, March 23	23	54	17·48
3m 55·910s X 200 days	13	6	22·00
Mean time required, October 9	10	47	55·48*

The mean time, at Greenwich sideral noon, January 1, 1860, is 5h 17m 38·95s; what is it January 1, 1861?

	h.	m.	s.
Mean time given, adding 23h 56m 4·09s	29	13	43·04
3m 55·910s X 366 days	23	59	3·06
Mean time required	5	14	39·98

5. *Given the sideral time at Greenwich, to find the corresponding sideral time at any other place.*

RULE.—*Increase* or *diminish* the given sideral time by the acceleration of sideral on solar time, taken from Table V, for the difference of longitude, according as it is *west* or *east*.

What is the sideral time, at mean noon, in San Francisco, on January 1, 1860?

	h.	m.	s.
Sideral time at Greenwich, mean noon, Jan. 1	18	41	28·87
Acceleration of sideral on solar time, for 8h 9m 33s	0	1	20·42
Sideral time required, Jan. 1	18	42	49·29

6. *Given the mean time, at Greenwich, to find the corresponding mean time at any other place.*

RULE.—*Diminish* or *increase* the given mean time by the retardation of solar on sideral time, taken from Table VI, for the difference of longitude, according as it is *west* or *east*.

What is the mean time, at sideral noon, in San Francisco, on January 1, 1860?

* Each of these quantities differs from that given in the *Nautical Almanac* only by the *hundredth* part of a second.

	h.	m.	s.
Mean time at Greenwich, sideral noon, Jan. 1.....	5	17	38·95
Retardation of solar on sideral time, for 8h 9m 33s.....	0	1	20·20
Mean time required, Jan. 1.....	5	16	18·75

7. *Given the mean time at any place, to find the corresponding sideral time.*

RULE.—To the sideral time at the *preceding* mean noon, add the sideral equivalent of the given mean time; the sum will be the sideral time required.*

On January 1, 1860, when it is 1h 20m 30·45s mean time at San Francisco, what is the sideral time?

	h.	m.	s.
Sid. time at S. Francisco preceding mean noon, Jan. 1..	18	42	49·29
Sideral equivalent of the given mean time.....	1	20	43·68
Sideral time required, Jan. 1.....	20	3	32·97

On January 1, 1860, when it is 22h 33m 44·55s, mean time at San Francisco, what is the sideral time?

	h.	m.	s.
Sid. time at S. Francisco preceding mean noon, Jan. 1..	18	42	49·29
Sideral equivalent of given mean time.....	22	37	26·93
Sideral time required, Jan 2.....	17	20	16·22

8. *Given the sideral time at any place, to find the corresponding mean time.*

RULE.—To the mean time at the preceding sideral noon, add the solar equivalent of the given sideral time; the sum will be the solar time required.†

When it is January 1, 1860, 20h 3m 32·97s sideral time at San Francisco, what is the mean time?

	h.	m.	s.
Mean time at S. Francisco preceding sid. noon, Dec. 31..	5	20	14·66
Mean equivalent of given sideral time.....	19	59	15·79
Mean time required, Jan. 1.....	1	20	30·45

When it is January 2, 1860, 17h 20m 16·22s sideral time at San Francisco, what is the mean time?

	h.	m.	s.
Mean time at S. Francisco preceding sid. noon, Jan. 1..	5	16	18·75
Mean equivalent of given sideral time.....	17	17	25·80
Mean time required, Jan. 1.....	22	33	44·55

Table VII.

This table is useful for ascertaining the variation of the magnetic needle by the Pole Star, *at any hour of the night*, instead of waiting for the time of

* The 5th and 7th reductions may be made, at once, in *west* longitude, as follows: From the sideral interval corresponding to the sum of the longitude and the given mean time, subtract the longitude, and add the remainder to the sideral time at the *Greenwich* preceding mean noon; the result will be the sideral time at *the place of observation.*

† The 6th and 8th reductions may be made, at once, in *west* longitude, as follows: From the mean interval corresponding to the sum of the longitude and the given sideral time, subtract the longitude, and add the remainder to the mean time at the *Greenwich* preceding sideral noon; the result will be the mean time at *the place of observation.*

greatest elongation, as must be done by the ordinary methods; and may be calculated by Spherical Trigonometry, or, more expeditiously, by the following Formulas: Let l represent the latitude of the place of observation, h the sideral hour angle of the star from its upper meridian passage, p its polar distance, and z its azimuth. Put $\sin x = \sin h \sin p$, and $\tan y = \cos h \tan p$. Then $\tan z = \tan x \sec (l \pm y)$, the positive sign being used when the star is above, and the negative when it is below the Pole.

The azimuths* of the star are given in the table, for every second degree of latitude, from 28 to 48 degrees, at variable intervals of sideral time, corresponding nearly to a uniform increase of azimuth, the successive differences being about 2 minutes, so that the intermediate minutes can be easily interpolated, and the *course* obtained *at least* with as much accuracy as it can be read, by the needle, from any portable transit instrument. The table is calculated for the mean polar distance of the star in the year 1860, and as its declination is *increasing* at the rate of about 19″ annually, the azimuths will *diminish* about 4′ in 10 years, and should, therefore, be re-calculated at intervals of about 3 years, or what would be still preferable, given annually, in some of the Nautical Almanacs.

In taking the observation, the transit must be well adjusted and properly set, with its two plates clamped together at zero; the star must then be bisected by the vertical hair of the telescope, and the *time* of observation as well as the *bearing* of the needle, *noted down*. The time should be taken by a good watch, well regulated, especially when the star is near the meridian, and converted from civil to astronomical time, the former being always reckoned 12 hours in *advance* of the latter. With these data and the Apparent Right Ascension of Polaris, or *the sideral time of its culmination*, which is given for every day in the year, on pages 366–8, of the English *Nautical Almanac*, for the meridian of Greenwich, and may be taken without any sensible error for any other meridian, the sideral time of the star from the meridian of any place can be ascertained, and the corresponding azimuth found in the table. Then the *sum* of the bearing of the needle and the azimuth of the star, when they are both east or both west, or their *difference*, when one is east and the other west, will be the variation.

PROBLEMS AND EXAMPLES.

1. *Given the civil time of day, to find the corresponding astronomical time.*

Rule.—In the forenoon of the civil day, increase the hour of the day by 12 and diminish the day of the month by unity; in the afternoon the hour of the day and the day of the month are the same as in the civil reckoning.

When it is 35m past 3 o'clock A. M. January 2, civil time, what is the astronomical time?

	d.	h.	m.
Civil time	Jan. 2	3	35
Correction	— 1	+12	
Astronomical time required	Jan. 1	15	35

* The azimuth at the time of greatest elongation, is found by the proportion: As cos latitude : radius : : sin polar distance : sin azimuth; and does not differ, sensibly, in any of the latitudes in the table, from the azimuth at 6 sideral hours from the meridian.

2. *Given the astronomical time of day, to find the corresponding civil time.*

RULE.—In the last 12 hours of the astronomical day, diminish the hour of the day by 12 and increase the day of the month by unity; in the first 12 hours, the hour of the day and day of the month are the same as in the astronomical reckoning.

When it is 15h 35m on January 1, astronomical time, what is the civil time?

	d.	h.	m.
Astronomical time	Jan. 1	15	35
Correction	-|- 1	—12	
Civil time	2	3	35

3. *Given the sideral time of day, to find the mean time of Polaris from the meridian.*

RULE.—To the mean time at sideral noon, on the given day, add the mean interval corresponding to the sum of the given sideral time and the Right Ascension of the star.

What is the mean time of the upper transit of Polaris, at San Francisco, January 1, 1860?

	h.	m.	s.
Mean time at sideral noon, Jan. 1	5	16	18·75
Mean equivalent of S. T. -|- R. A	1	7	48·49
Mean time of transit required	6	24	7·24

What is the mean time of the lower transit of Polaris, at San Francisco, January 1, 1860?

	h.	m.	s.
Mean time at sideral noon, Jan. 1	5	16	18·75
Mean equivalent of S. T. -|- R. A	13	5	50·54
Mean time of transit required	18	22	9·29

4. *Given the mean time of day, to find the sideral time of Polaris from the meridian.**

RULE.—To the sideral time at mean noon, on the given day, add the sideral interval corresponding to the given mean time, diminished by the Right Ascension of the star; and the result will be the sideral time required.

What is the sideral time of Polaris from the meridian of San Francisco, January 1, 1860, at 9h 45m 15s, A. M. civil time?

	h.	m.	s.
Sideral time at mean noon, Dec. 31	18	38	52·73
Sideral equivalent of M. T. — R. A	20	40	49·96
Sideral time required	15	19	42·69

What is the sideral time of Polaris from the meridian of San Francisco, January 1, 1860, at 9h 30m 30s P. M. civil time?

	h.	m.	s.
Sideral time at mean noon, Jan. 1	18	42	49·29
Sideral equivalent of M. T. — R. A	8	24	4·66
Sideral time required	3	6	53·95

* The sideral time from the meridian at the greatest elongation, is found by the proportion: As radius : tangent latitude : : tangent polar distance : cosine hour angle, and is, in this latitude, about 4 minutes less than 6 sideral hours.

5. *Given the mean time of observation and the bearing of the needle, to find the variation.*

RULE.—Find in one of the right or left hand columns of the table, the sideral time of the star from the meridian at the mean time of observation, and opposite to it, under the latitude of the place, will be found the azimuth, east or west, as indicated at the head of the column; then the *sum* of the bearing of the needle and the azimuth, when they are both east or both west, or their *difference*, when one is east and the other west, will be the variation.

At San Francisco on May 7, 1859, at 9h 16m P. M., the bearing of the needle was N. 16° 15′ E. when the vertical hair of the transit instrument was on the North Star. Required the variation.

	h.	m.	s.
Sideral time at mean noon	2	59	12
Sideral equivalent of M. T. — R. A.	8	9	48
Sideral time of star from meridian	11	9	0

Bearing of the needle	N.	16° 15′	E.
Azimuth from table		24	W.
Variation		15 51	E.

If the mean, instead of the apparent Right Ascension of Polaris,* converted once for all, from sideral into its equivalent interval in solar time, be used, and a *memorandum* of it taken, the *Nautical Almanac* may be dispensed with altogether in the field, and the operation somewhat simplified by adopting the following:

RULE.—Increase the time of day, shown by the watch, commencing, successively, at 4, 10, 16, and 22 hours, by 1, 2, 3, or 4 minutes, respectively; from this subtract the mean time at the preceding sideral noon, and the mean equivalent of the Right Ascension, and opposite to the remainder the azimuth will be found in the table.

Tables VIII and IX.

Table VIII is used for determining the difference of altitude between any two places, by means of the barometer, and is calculated by the Formula of La Place, as modified by later writers, in accordance with the results of more accurate observations. The original Formula, with the view of simplifying the operation, is separated into four distinct parts, which are given in so many simple Formulas at the bottom of the table. The successive steps of the computation, are as follows:

* The mean Right Ascension of Polaris, for the year 1860, is 1h 8m 2·61s, the mean solar equivalent of which is 1h 7m 51·46s, or 1h 8m, taking it to the nearest minute. It increases at the rate of about 19s annually, or a little less than a minute in three years. The apparent Right Ascension diminishes, annually, from the 1st of the year until about the 3d of April, when it becomes a minimum; it then increases until about the 18th of October, when it becomes a maximum; and then diminishes until the end of the year. It never varies from the mean Right Ascension more than about one minute, a quantity which can hardly affect the accuracy of any bearing taken by the magnetic needle.

1. Observe the hights H and H′ of the barometers at the lower and upper stations, find the numbers N and N′ corresponding to them, from the first page of the table, subtract the latter from the former, and the difference will be the first approximate altitude, D.

2. Observe the hights T and T′ of the attached thermometers* at the lower and upper stations, subtract the latter from the former, multiply the difference by 2·3409, and *diminish* or *increase* the approximate altitude D by the product, according as it is *positive* or *negative;*† the result will be the second approximate altitude, C.

3. Observe the hights t and t′ of the detached thermometers at the lower and upper stations, subtract 64° from their sum, multiply the difference by the nine hundredth part of C, and *increase* or *diminish* the approximate altitude C by the product, according as it is *positive* or *negative;* the result will be the third approximate altitude, B.

4. Opposite the approximate altitude B, in the right or left hand column of the last page of the table, and respectively, under the latitude, elevation, and hight of the barometer at the lower station, find the numbers L, E, and S; add E and S to the approximate altitude B, and *increase* or *diminish* the sum by L, according as the latitude is *less* or *greater* than 45°; and the result will be the true difference of altitude between the two stations.

EXAMPLES.

Find the altitude of the mountain of Guanaxuato, in Mexico, in latitude 21° N, from the following observations made by Baron Humboldt:

	L. Sta. on bank of sea.	U. Sta. on Guanaxuato.
Barometer	H = 30·046 inches	H′ = 23·660 inches.
Attached thermometer	T = 77·5°	T′ = 70·3°
Detached thermometer	t = 77·5°	t′ = 70·3°

Formula 1 gives for H = 30·046 inches ..... N = 27649·7 feet.
" " H′ = 23·660 " ..... N′ = 21406·9 "

First approximate altitude ..... 6242·8 "

Formula 2 gives 2·3409 (77·5 — 70·3) = 2·3409 × 7·2 ... = — 16·9 "

Second approximate altitude ..... 6225·9 "

Form. 3 gives $\frac{6225 \cdot 9}{900}$ (77·5 + 70·3 — 64) = 6·918 × 83·8 = + 579·7 "

Third approximate altitude ..... 6805·6 "

Formula 4 gives 13·3 + 19·3 + 0 ..... = 32·6 "

True altitude required ..... 6838·2 "

When Gay Lussac made his celebrated balloon ascent in 1805, the following observations were made, from which it is required to find the elevation of the balloon above Paris in latitude 49°.

	L. Sta. at Paris.	U. Sta. at baloon.
Barometer	H = 30·145 inches	H′ = 12·945 inches.
Attached thermometer	T = 87·44°	T′ = 14·9°
Detached thermometer	t = 87·44°	t′ = 14·9°

* The thermometer referred to, in every instance, in these tables, is Fahrenheit's.

† This correction is generally negative, because the temperature at the lower generally exceeds that at the upper station.

Formula 1 gives for H = 30·145 inches	N = 27735·6 feet.	
" " H′ = 12·945 "	N′ = 5650·4 "	
First approximate altitude	22085·2 "	
Form. 2 gives 2·3409 (87·44 — 14·9) = 2·3409 X 72·54..	= — 169·9 "	
Second approximate altitude	21915·3 "	
Fm. 3 gives $\frac{21915·3}{900}$ (87·44 -|- 14·9—64)=24·35 X 38·34	= -|- 933·6 "	
Third approximate altitude	22848·9 "	
Formula 4 gives — 8·2 -|- 82·1 -|- 0	= -|- 73·9 "	
Elevation required	22922·8 "	

Table IX is designed for dispensing with the barometer, in the observations necessary for determining the altitude from the foregoing table, by substituting the temperature of boiling water in its place, and is copied from the recent admirable Treatise on Practical Astronomy, by Professor Loomis.

Table X.

This table is used in ascertaining the amount of atmospheric refraction, for all altitudes, from the horizon to the zenith, according to Bessel's Formula, which is considered more accurate than any other. The requisite data are the apparent altitude and the hight of the barometer as well as that of the attached and detached thermometers, at the time of observation, from which the true refraction is obtained as follows:

Find, from the table, the mean refraction corresponding to the apparent altitude; the factor B, corresponding to the hight of the barometer; and the factors T and T′, corresponding to the hights of the attached and detached thermometers, respectively. Multiply these four numbers together, and the product will be the true refraction.

EXAMPLES.

Near Oroville, Dec. 26, 1857, the apparent meridian altitude of Polaris was observed to be 41° 1′ 40″, the barometer indicating 29·8 inches, the attached thermometer, 46°, and the detached thermometer, 44°; what is the refraction?

The table gives M X B X T X T′ = 66·236″ X 1·007 X ·999 X 1·009 = 67·23″ = 1′ 7·2″, the refraction.

The observed apparent altitude of a star was 3° 44′ 40″, the barometer indicated 30·162 inches, the attached and detached thermometers, 52·2° and 46·6°, respectively. Required the refraction.

The table gives M X B X T X T′ = 732·967″ X 1·019 X ·998 X 1·004 = 748·36″ = 12′ 28·4″, the refraction.

Table XI.

This table gives the divergency of the Parallel of Latitude from the Prime Vertical,* or perpendicular to the meridian, on the spheroidal surface of the

* The length of a degree of the Prime Vertical may be calculated by the Formula $Dv = 5551·6748 - 18·6536 \cos^2 l + ·0940 \cos^4 l$; in which *Dv* represents a degree of the Prime Vertical, in chains, and *l* the latitude.

earth, at every second degree of latitude, from 28 to 48 degrees, for any number of miles from 1 to 36; and is useful in running a parallel of latitude by fore and back sighting.

EXAMPLE.

If a line commenced on the parallel of 37° north latitude, be extended east or west, 27½ miles, by fore and back sighting, what distance will its terminus be south of that parallel?

chains.

The table gives for 27 miles in latitude 37°.. 5·52
" " 28 " " .. 5·94

The mean of which is..... 5·73 the dist'ce required.

Tables XII and XIII.

These tables show the relations of different standard lineal and superficial measures, and are useful in facilitating the reductions from one denomination to another. They are familiar to every person and require no explanation.

APPROXIMATE RULES CONVENIENT IN PRACTICE.

I. For Correcting Random Lines.*

1. *Given the error of latitude or departure for any distance, to find the error of the course.*

Rule.—Three-sevenths of the error of latitude or departure, *per mile*, in *links*, will be the error of the course, in *minutes*.

EXAMPLE.

What is the error of the course for an error of 210 links of latitude or departure, in 6 miles?

Here the error, per mile, is 35 links, three-sevenths of which is 15′, the error required.

2. *Given the error of the course, to find the corresponding error of latitude or departure for any distance.*

Rule.—Seven-thirds of the error of the course, in *minutes*, will be the error of latitude or departure, *per mile*, in *links*.

EXAMPLE.

What is the error of latitude or departure, in 6 miles, for an error of 15′ in the course?

Here seven-thirds of 15 is 35 links, the error per mile, or 210 links in 6 miles, the error required.

II. For Running a Parallel of Latitude.†

Given the distance run, east or west, on a great circle, to find the divergency from the parallel of latitude.

Rule.—Multiply the square of the distance in *miles*, by the natural tangent of the latitude, and the product will be the divergency, in *links*.

* This approximation is true to the *nearest minute* for all angles up to 3°; and to the *nearest quarter of a degree* for all angles up to 11¼°.

† This approximation may be considered practically correct for any distance not exceeding 30 miles.

EXAMPLE.

After running 6 miles, east or west, on the arc of a great circle, from latitude 38°, what will be the meridional distance south of the parallel?

Here we have $\cdot 781 \times 6^2 = 28$ links, the divergency required.

III. For Finding the Diameter of a Tree.

Rule.—Annex a cipher to the number of *links* around the tree, and one-fourth of the result will be the diameter, in *inches*.

EXAMPLE.

What is the diameter of a tree whose circumference is 16 links?

Here we have $\frac{1}{4}$ of $160 = 40$ inches, the diameter required.

TRIGONOMETRICAL SERIES.

$$\text{Sin } A = A - \frac{A^3}{2\cdot3} + \frac{A^5}{2\,3\cdot4\cdot5} - \frac{A^7}{2\cdot3\cdot4\cdot5\cdot6\cdot7} + \text{etc.}$$

$$\text{Cos } A = 1 - \frac{A^2}{2} + \frac{A^4}{2\cdot3\cdot4} - \frac{A^6}{2\cdot3\cdot4\cdot5\cdot6} + \text{etc.}$$

$$\text{Tan } A = A + \frac{A^3}{3} + \frac{2A^5}{3\cdot5} + \frac{17A^7}{3^2\cdot5\cdot7} + \text{etc.}$$

$$\text{Cot } A = \frac{1}{A} - \frac{A}{3} - \frac{A^3}{3^2\cdot5} - \frac{2A^5}{3^3\,5\cdot7} - \text{etc.}$$

$$\text{Arc } A = \sin A + \frac{\sin^3 A}{2\cdot3} + \frac{3\sin^5 A}{2\cdot4\cdot5} + \frac{3\cdot5\sin^7 A}{2\cdot4\cdot6\cdot7} + \text{etc.}$$

$$\text{Arc } A = \tan A - \frac{1}{3}\tan^3 A + \frac{1}{5}\tan^5 A - \frac{1}{7}\tan^7 A + \text{etc.}$$

Tables A and B.

Table A is an improved method of tabling the computation of areas. It requires 16 columns of the proper width, the first nine of which contain the numbers, courses, distances, northings, southings, eastings, westings, latitude corrections, and departure corrections, in the same order as the usual method. The 10th and 13th columns contain the corrected departures and corrected latitudes, with their proper *signs*, that is, the eastings and westings, as well as the northings and southings, must have *contrary* signs, it being wholly immaterial which of the courses are marked *positive*, provided those running in an *opposite* direction are marked *negative*. The 11th and 12th columns contain the departure ordinates and latitude ordinates, or the rectangular distances of each successive station from the meridian and parallel passing through the initial point of the survey. The 14th column contains the double meridian distances, or the sums of the two rectangular distances of the extremities of each successive course from the meridian passing through the origin. The 15th and 16th columns contain the + areas and — areas, or the double areas of the successive trapeziums into which the tract is divided, which are bounded, respectively, by the principal meridian, the successive courses, and their corresponding departure ordinates.

The numbers, courses, and distances, are marked, run, and measured in the

field. The northings, southings, eastings, and westings, are obtained from the courses and distances, by the Traverse Table. The latitude and departure corrections, are obtained by distributing the errors in latitude and departure, in proportion to the corresponding distances, or in any other proportion which will be more likely to insure greater accuracy. The corrected departures and latitudes are obtained from the northings, southings, eastings, and westings, by the proper application of their respective corrections. The first departure ordinate and latitude ordinate are the same as their corresponding departure and latitude, and each succeeding ordinate is found from that immediately preceding it, by *adding* or *subtracting* its corresponding departure or latitude, according as the signs are *alike* or *unlike*. The first double meridian distance is the same as its corresponding departure ordinate, and each succeeding double meridian distance is found from the preceding departure ordinate by *adding* or *subtracting* its corresponding departure ordinate, according as the signs are *alike* or *unlike*. The areas are obtained by multiplying each double meridian distance by its corresponding latitude and are +|+ or —, according as the signs are *alike* or *unlike*. Finally, the area of the survey is obtained by taking half the difference of the total positive and negative areas.

The advantages of this method are obvious. The columns which are constantly used together, or of which one is derived from the other, are, for convenience of reference as well as calculation, placed in juxtaposition. For instance, the departure and latitude ordinates, from which the survey is plotted are placed along side each other, while they are, at the same time, along side their corresponding departures and latitudes, from which they are deduced. In the same manner, the double meridian distances and their corresponding latitudes, from which the areas are computed, are also placed along side each other, and the confusion incident to looking continually from one side of the page to the other, is thus avoided. The tabling may be commenced from any station of the survey, at pleasure, if the courses are taken around, in regular succession, to the place of beginning.

The following tests of the accuracy of the calculations are very important, and a knowledge of them may save considerable time and trouble. The difference between the sum of the eastings and that of the westings, at every step of the calculation, must differ from the corresponding departure ordinate by the amount of the departure corrections, up to that point. In like manner, the difference between the sum of the northings and that of the southings, at every stage of the computation, must differ from the corresponding latitude ordinate, by the amount of the latitude corrections up to that point. The total amount of the latitude and departure corrections must be respectively equal to the errors in latitude and departure, and each of the last ordinates must always be *nothing*. The only portions of the work which do not check themselves, are the double meridian distances* and the areas, and these should, therefore, be reviewed; or, which would be preferable, calculated separately, by two persons.

Table B shows the relative positions of the principal lines of the United States Surveys, in California, and is useful for obtaining, approximately, the latitudes and longitudes of places in their vicinity.

* The algebraic sum of the double meridian distances must always be twice that of the departure ordinates.

A. *Tabling of the Survey of the Rancho "Cañada de Herrera," situated in Marin County, California.*

No.	Course.	Dist.	N.	S.	E.	W.	L. C.	D. C.	Dep.	D. O.	L. O.	Lat.	D. M. D.	-/- Area.	— Area.
1	N 11¼ E	78·90	77·38	..	15·40	..	23	11	— 15 51	— 15·51	77·15	77·15	— 15·51		1196·5965
2	N 33 W	110·00	92·26	..	..	59·91	32	15	59·76	44·25	169·09	91·94	28·74	2642·3556	...
3	N 47¼ W	155·40	105·48	..	..	114·11	46	21	113 90	158·15	274·11	105·02	202·40	21.56·0480	....
4	S 64 W	75·20	..	32·97	..	67·59	22	10	67·49	225·64	240·92	— 33·19	383·79	...	12737·9901
5	S 5 W	9·00	..	8·97	..	0·78	3	1	0·77	226·41	231·92	— 9·00	452·05	...	4068·4500
6	S 56½ W	27·90	..	15·40	..	23·26	8	4	23·22	249·63	216·44	— 15·48	476·04	...	7369·0992
7	S 9 W	41·60	..	41·09	..	6·50	12	6	6·44	256·07	175·23	— 41·21	505·70	...	20839·8970
8	S 45½ W	49·50	..	34·69	..	35·31	14	7	35·24	291·31	140·40	— 34·83	547·38	...	19065·2454
9	S 10¼ W	53·10	..	52·25	..	9·45	16	7	9·38	300·69	87·99	— 52·41	592·00	...	31026·7200
10	S 14 E	124·60	..	120·90	30·15	..	37	17	— 30·32	270·37	— 33·28	—121·27	571·06	...	69252·4462
11	N 83½ E	239·70	28·16	..	238·05	..	70	33	—238·38	31·99	— 5·82	27·46	302·36	8302·8056	...
12	N 79½ E	32·50	5 92	..	31·95	..	10	4	— 31·99	0·00	0·00	5·82	31·99	186·1818	...
		997·40	309·20	306·27	315·55	316·91	293	136						32387·3910	165556·4444
			306·27			315·55									32387·3910
			2·93			1·36									20) 133169·0534
						Area, 6658·45 acres.									6658·45267

B. *Position of the Principal Lines of the United States Surveys in the State of California.*

Surveys North of the Monte Diablo Base Line.

Parallel.	Latitude.			Dist.	Lon.pr.			R'nge	Conver.
	°	′	″	miles.	°	′	″		chains.
Monte Diablo Base Line....	37	53	5	0	0	6	35·2		0·00
I Standard North.....	38	19	11	30	0	6	37·5		2·84
II " "	38	45	16	60	0	6	39·9		2·88
III " "	39	11	22	90	0	6	42·4		2·93
IV " "	39	37	28	120	0	6	44·9		2·97
V " "	40	3	33	150	0	6	47·5		3·02
VI " "	40	29	39	180	0	6	50·1		3·06
VII " "	40	55	44	210	0	6	52·8		3·11
VIII " "	41	21	49	240	0	6	55·5		3·16
IX " "	41	47	54	270	0	6	58·3		3·21
Oregon Boundary.....	42	0	0	284	0	6	59·6		1·51

Surveys South of the Monte Diablo Base Line.

Parallel.	Latitude.			Dist.	Lon.pr.			R'nge	Diverg.
	°	′	″	miles.	°	′	″		chains.
Monte Diablo Base Line.....	37	53	5	0	0	6	35·2		0·00
I Standard South.....	37	32	12	24	0	6	33·4		2·25
II " "	37	11	19	48	0	6	31·6		2·22
III " "	36	50	26	72	0	6	29·8		2·19
IV " "	36	29	32	96	0	6	28·0		2·17
V " "	36	8	39	120	0	6	26·3		2·14
VI " "	35	47	46	144	0	6	24·6		2·11
VII " "	35	26	53	168	0	6	22·9		2·09
VIII " "	35	5	59	192	0	6	21·3		2·06
IX " "	34	45	6	216	0	6	19·7		2·03
X " "	34	24	13	240	0	6	18·1		2·00

Length of a Degree of Latitude.

′	29°	30°	31°	32°	33°	34°	35°	36°	37°	38°	′
	chains.	chains.	chains.	chains.	chains.	chains.	chains	chains.	chains.	chains.	
0	5509·15	5509·94	5510.82	5511·67	5512·55	5513·44	5514·34	5515·25	5516·18	5517·11	0
1	09·16	09·99	10·83	11·69	12·56	13·45	14·35	15·27	16·19	17·13	1
2	09·17	10·00	10·84	11·70	12·58	13·47	14·37	15·28	16·21	17·14	2
3	09·19	10·01	10·86	11·72	12·59	13·48	14·38	15·30	16·22	17·16	3
4	09·20	10·03	10·87	11·73	12·61	13·50	14·40	15·31	16·24	17·17	4
5	09·21	10·04	10·89	11·75	12·62	13·51	14·42	15·33	16·25	17·19	5
6	09·23	10·06	10·90	11·76	12·64	13·53	14·43	15·34	16·27	17·20	6
7	09·24	10·07	10·91	11·78	12·65	13·54	14·45	15·36	16·28	17·22	7
8	09·25	10·08	10·93	11·79	12·67	13·56	14·46	15·38	16·30	17·23	8
9	09·27	10·10	10·94	11·81	12·68	13·57	14·48	15·39	16·32	17·25	9
10	09·28	10·11	10·96	11·82	12·70	13·59	14·49	15·41	16·33	17·27	10
11	09·30	10·13	10·97	11·83	12·71	13·60	14·51	15·42	16·35	17·28	11
12	09·31	10·14	10·99	11·85	12·73	13·62	14·52	15·44	16·36	17·30	12
13	09·32	10·15	11·00	11·86	12·74	13·63	14·54	15·45	16·38	17·31	13
14	09·34	10·17	11·01	11·88	12·76	13·65	14·55	15·47	16·39	17·33	14
15	09·35	10·18	11·03	11·89	12·77	13·66	14·57	15·48	16·41	17·34	15
16	09·36	10·19	11·04	11·91	12·79	13·68	14·58	15·50	16·42	17·36	16
17	09·38	10·21	11·06	11·92	12·80	13·69	14·60	15·51	16·44	17·38	17
18	09·39	10·22	11 07	11·94	12·81	13·71	14·61	15·53	16·46	17·39	18
19	09·41	10·24	11·09	11·95	12·83	13·72	14·63	15·54	16·47	17·41	19
20	09·42	10·25	11·10	11·96	12·84	13·74	14·64	15·56	16·49	17·42	20
21	09·43	10·26	11·11	11·98	12·86	13·75	14·66	15·57	16·50	17·44	21
22	09·45	10·28	11·13	11·99	12·87	13·77	14·67	15·59	16·52	17·45	22
23	09·46	10·29	11·14	12·01	12·89	13·78	14·69	15·61	16·53	17·47	23
24	09·47	10·31	11·16	12·02	12·90	13·80	14·70	15·62	16·55	17·49	24
25	09·49	10 32	11·17	12·04	12·92	13·81	14·72	15·64	16·56	17·50	25
26	09·50	10·33	11·19	12·05	12·93	13·83	14·73	15·65	16·58	17·52	26
27	09·51	10·35	11·20	12·07	12·95	13·84	14·75	15·67	16·60	17·53	27
28	09·53	10·36	11·21	12·08	12·96	13·86	14·76	15·68	16·61	17·55	28
29	09·54	10·38	11·23	12·10	12·98	13·87	14·78	15·70	16·63	17·56	29
30	09·56	10·39	11·24	12·11	12·99	13·89	14·79	15·71	16·64	17·58	30
31	09·57	10·41	11·26	12·12	13·01	13·90	14·81	15·73	16·66	17·60	31
32	09·58	10·42	11·27	12·14	13·02	13·92	14·82	15·74	16·67	17·61	32
33	09·60	10·44	11·29	12·15	13·04	13·93	14·84	15·76	16·69	17·63	33
34	09·61	10 45	11·30	12·17	13·05	13·95	14·86	15·77	16·70	17·64	34
35	09·63	10·46	11·31	12·18	13·07	13·96	14·87	15·79	16·72	17·66	35
36	09·64	10·48	11·33	12·20	13·08	13·98	14·89	15·81	16·74	17·67	36
37	09·65	10·49	11·34	12·21	13·10	13·99	14·90	15·82	16·75	17·69	37
38	09·67	10·50	11·36	12·22	13·11	14·01	14·92	15·84	16·77	17·71	38
39	09·68	10·52	11·37	12·24	13·13	14·02	14·93	15·85	16·78	17·72	39
40	09·69	10·53	11·39	12·26	13·14	14·04	14·95	15·87	16·80	17·74	40
41	09·71	10·55	11·40	12·27	13·16	14·05	14·96	15·88	16·81	17·75	41
42	09·72	10·56	11·42	12·29	13·17	14·07	14·98	15·90	16·83	17·77	42
43	09·74	10·57	11·43	12·30	13·18	14·08	14·99	15·91	16·84	17·78	43
44	09·75	10·59	11·44	12·31	13·20	14·10	15·01	15·93	16·86	17·80	44
45	09·76	10·60	11·46	12·33	13·21	14·11	15·02	15·94	16·88	17·82	45
46	09·78	10·62	11·47	12·34	13·23	14·13	15·04	15·96	16·89	17·83	46
47	09·79	10·63	11·49	12·36	13·24	14·14	15·05	15·98	16·91	17·85	47
48	09·80	10·65	11·50	12·37	13·26	14·16	15·07	15·99	16·92	17·86	48
49	09·82	10·66	11·52	12·39	13·27	14 17	15·08	16·01	16·94	17·88	49
50	09·83	10·67	11·53	12·40	13·29	14·19	15·10	16·02	16·95	17·89	50
51	09·85	10·69	11·54	12·42	13·30	14·20	15·11	16·04	16·97	17·91	51
52	09·86	10·70	11·56	12·43	13·32	14·22	15·13	16·05	16·98	17·93	52
53	09·87	10·72	11·57	12·45	13·33	14·23	15·15	16·07	17·00	17·94	53
54	09·89	10·73	11·59	12·46	13·35	14·25	15·16	16·08	17·02	17·96	54
55	09·90	10·74	11·60	12·48	13·36	14·26	15·18	16·10	17·03	17·97	55
56	09·92	10·76	11·62	12·49	13·38	14·28	15·19	16·11	17·05	17·99	56
57	09·93	10·77	11·63	12·51	13·39	14·29	15·21	16·13	17·06	18 00	57
58	09·94	10·79	11·65	12·52	13·41	14·31	15·22	16 15	17·08	18·02	58
59	09·96	10·80	11·66	12·53	13 42	14·32	15·24	16·16	17·09	18·04	59
60	09·97	10·82	11·67	12·55	13·44	14·34	15·25	16·18	17·11	18·05	60

Length of a Degree of Latitude.

′	39°	40°	41°	42°	43°	44°	45°	46°	47°	48°	′
	chains.	chains.	chains.	chains.	chains.	chains.	chains.	chains.	chains.	chains.	
0	5518·05	5519·00	5519·96	5520·92	5521·88	5522·85	5523·81	5524·78	5525·75	5526·72	0
1	18·07	19·02	19·97	20·93	21·90	22·86	23·83	24·80	25·77	26·73	1
2	18·08	19·03	19·99	20·95	21·91	22·88	23·85	24·82	25·78	26·75	2
3	18·10	19·05	20 00	20·96	21·93	22·89	23·86	24·83	25·80	26·76	3
4	18·11	19·06	20·02	20·98	21·94	22·91	23·88	24·85	25·82	26·78	4
5	18·13	19·08	20·04	21·00	21·96	22·93	23·90	24·86	25 83	26·80	5
6	18·15	19·10	20·05	21·01	21·98	22·94	23·91	24·88	25·85	26·81	6
7	18·16	19·11	20·07	21·03	21·99	22·96	23·93	24·90	25·86	26·83	7
8	18·18	19·13	20·08	21·04	22·01	22·98	23·94	24·91	25·88	26·84	8
9	18·19	19·14	20·10	21·06	22·02	22·99	23·96	24·93	25·90	26·86	9
10	18·21	19·16	20·12	21·08	22·04	23·01	23·98	24·94	25·91	26·88	10
11	18·22	19·18	20·13	21·09	22·06	23·02	23·99	24·96	25·93	26·89	11
12	18·24	19·19	20·15	21·11	22·07	23·04	24·01	24·98	25·94	26·91	12
13	18·26	19 21	20·16	21·12	22·09	23·06	24·02	24·99	25·96	26·92	13
14	18·27	19·22	20·18	21·14	22·11	23·07	24·04	25·01	25·98	26·94	14
15	18·29	19·24	20·20	21·16	22·12	23·09	24·06	25·03	25·99	26·96	15
16	18·30	19·25	20·21	21·17	22·14	23·10	24·07	25·04	26·01	26·97	16
17	18·32	19·27	20·23	21·19	22·15	23·12	24·09	25·06	26·02	26·99	17
18	18·34	19·29	20·24	21·20	22·17	23·14	24·11	25·07	26·04	27·00	18
19	18·35	19·30	20·26	21·22	22·19	23·15	24·12	25·09	26·06	27·02	19
20	18·37	19·32	20·28	21·24	22·20	23·17	24·14	25·11	26·07	27·04	20
21	18·38	19·33	20·29	21·25	22·22	23·19	24·15	25·12	26·09	27·05	21
22	18·40	19·35	20·31	21·27	22·23	23·20	24·17	25·14	26·10	27·07	22
23	18·41	19·37	20·32	21·29	22·25	23·22	24·19	25·15	26·12	27·09	23
24	18·43	19·38	20·34	21·30	22·27	23·23	24·20	25·17	26·14	27·10	24
25	18·45	19·40	20·36	21·32	22·28	23·25	24·22	25·19	26·15	27·12	25
26	18·46	19·41	20·37	21·33	22·30	23·27	24·23	25·20	26·17	27·13	26
27	18·48	19·43	20·39	21·35	22·31	23 28	24·25	25·22	26·19	27·15	27
28	18·49	19·45	20·40	21·36	22·33	23·30	24·27	25·23	26·20	27·17	28
29	18·51	19·46	20·42	21·38	22·35	23·31	24·28	25·25	26·22	27·18	29
30	18·53	19·48	20·44	21·40	22·36	23·33	24·30	25 27	26·23	27·20	30
31	18·54	19·49	20·45	21·41	22·38	23·35	24·32	25·28	26·25	27·21	31
32	18·56	19 51	20·47	21·43	22·40	23·36	24·33	25·30	26·27	27·23	32
33	18·57	19·53	20·48	21·45	22·41	23·38	24·35	25·32	26·28	27·25	33
34	18·59	19·54	20·50	21·46	22·43	23·40	24·36	25·33	26·30	27·26	34
35	18·60	19·56	20·52	21·48	22·44	23·41	24·38	25·35	26·31	27·28	35
36	18·62	19·57	20·53	21·49	22·46	23·43	24·40	25·36	26·33	27·29	36
37	18·64	19·59	20·55	21·51	22·48	23·44	24·41	25·38	26·35	27·31	37
38	18·65	19·60	20·56	21·53	22·49	23·46	24·43	25·40	26·36	27·33	38
39	18·67	19·62	20 58	21·54	22·51	23·48	24·44	25·41	26·38	27·34	39
40	18·68	19·64	20·60	21·56	22·52	23·49	24·46	25·43	26·39	27·36	40
41	18·70	19·65	20·61	21·57	22·54	23·51	24·48	25·44	26·41	27·37	41
42	18·72	19·67	20·63	21·59	22·56	23·52	24·49	25·46	26·43	27·39	42
43	18·73	19·68	20·64	21·61	22·57	23·54	24·51	25·48	26·44	27·41	43
44	18 75	19·70	20·66	21·62	22·59	23·56	24·52	25·49	26·46	27·42	44
45	18·76	19·72	20·68	21·64	22·60	23·57	24·54	25·51	26·47	27·44	45
46	18·78	19·73	20·69	21·65	22·62	23·59	24·56	25·52	26·49	27·45	46
47	18·79	19·75	20·71	21·67	22·64	23·60	24·57	25·54	26·51	27·47	47
48	18·81	19·76	20·72	21·69	22·65	23·62	24·59	25·56	26·52	27·49	48
49	18·83	19·78	20·74	21 70	22·67	23·64	24·61	25·57	26·54	27·50	49
50	18·84	19·80	20·76	21·72	22·69	23·65	24·62	25·59	26·56	27·52	50
51	18·86	19·81	20·77	21·74	22·70	23·67	24·64	25·61	26·57	27·53	51
52	18·87	19·83	20·79	21·75	22·72	23·69	24·65	25·62	26·59	27.55	52
53	18·89	19·84	20·80	21·77	22·73	23·70	24·67	25·64	26·60	27·57	53
54	18·91	19·86	20·82	21·78	22·75	23·72	24·69	25·65	26·62	27·58	54
55	18·92	19·88	20·84	21·80	22·77	23·73	24·70	25·67	26·64	27·60	55
56	18·94	19·89	20·85	21·82	22·78	23·75	24·72	25·69	26·65	27·61	56
57	18·95	19·91	20·87	21·83	22·80	23·77	24·73	25·70	26·67	27·63	57
58	18·97	19·92	20·88	21·85	22·81	23·78	24·75	25·72	26·68	27·65	58
59	18·98	19·94	20·90	21·86	22·83	23·80	24·77	25·73	26·70	27·66	59
60	19·00	19·96	20·92	21·88	22·85	23·81	24·78	25·75	26·72	27·68	60

Length of a Degree of Longitude.

′	29°	30°	31°	32°	33°	34°	35°	36°	37°	38°	′
	chains.	chains.	chains.	chains.	chains.	chains.	chains.	chains.	chains.	chains.	
0	4843·17	4795·82	4747·01	4696·75	4645·06	4591·96	4537·45	4481·56	4424·29	4365·68	0
1	42·40	95·02	46·19	95·90	44·19	91·06	36·53	80·61	23·33	64·69	1
2	41·62	94·22	45·36	95·05	43·32	90·16	35·61	79·67	22·36	63·70	2
3	40·84	93·42	44·53	94·20	42·44	89·26	34·69	78·73	21·40	62·72	3
4	40·06	92·61	43·71	93·35	41·57	88·37	33·77	77·78	20·43	61·73	4
5	39·28	91·81	42·88	92·50	40·69	87·47	32·84	76·84	19·46	60·74	5
6	38·50	91·01	42·05	91·65	39·82	86·57	31·92	75·89	18·49	59·75	6
7	37·72	90·20	41·22	90·80	38·94	85·67	31·00	74·95	17·53	58·76	7
8	36·94	89·40	40·39	89·94	38·06	84·77	30·08	74·00	16·56	57·77	8
9	36·16	88·59	39·56	89·09	37·19	83·87	29·15	73·05	15·59	56·77	9
10	35·38	87·79	38·73	88·24	36·31	82·97	28·23	72·11	14·62	55·78	10
11	34·60	86·98	37·90	87·38	35·43	82·07	27·30	71·16	13·65	54·79	11
12	33·82	86·18	37·07	86·53	34·55	81·17	26·38	70·21	12·68	53·80	12
13	33·04	85·37	36·24	85·67	33·68	80·26	25·46	69·26	11·71	52·81	13
14	32·26	84·56	35·41	84·82	32·80	79·36	24·53	68·32	10·74	51·81	14
15	31·47	83·76	34·58	83·96	31·92	78·46	23·60	67·37	09·77	50·82	15
16	30·69	82·95	33·75	83·11	31·04	77·56	22·68	66·42	08·80	49·83	16
17	29·91	82·14	32·92	82·25	30·16	76·65	21·75	65·47	07·82	48·83	17
18	29·12	81·33	32·08	81·40	29·28	75·75	20·83	64·52	06·85	47·84	18
19	28·34	80·52	31·25	80·54	28·40	74·85	19·90	63·57	05·88	46·84	19
20	27·55	79·71	30·42	79·68	27·52	73·94	18·97	62·62	04·91	45·85	20
21	26·77	78·90	29·58	78·82	26·64	73·04	18·04	61·67	03·93	44·85	21
22	25·98	78·09	28·75	77·97	25·75	72·13	17·11	60·72	02·96	43·85	22
23	25·20	77·28	27·92	77·11	24·87	71·23	16·19	59·77	01·98	42·86	23
24	24·41	76·47	27·08	76·25	23·99	70·32	15·26	58·81	01·01	41·86	24
25	23·62	75·66	26·25	75·39	23·11	69·41	14·33	57·86	00·04	40·86	25
26	22·83	74·85	25·41	74·53	22·22	68·51	13·40	56·91	4399·06	39·87	26
27	22·05	74·04	24·57	73·67	21·34	67·60	12·47	55·96	98·08	38·87	27
28	21·26	73·22	23·74	72·81	20·45	66·69	11·54	55·00	97·11	37·87	28
29	20·47	72·41	22·90	71·95	19·57	65·78	10·61	54·05	96·13	36·87	29
30	19·68	71·60	22·06	71·09	18·69	64·88	09·67	53·09	95·16	35·87	30
31	18·89	70·78	21·22	70·22	17·80	63·97	08·74	52·14	94·18	34·87	31
32	18·10	69·97	20·39	69·36	16·91	63·06	07·81	51·19	93·20	33·87	32
33	17·31	69·16	19·55	68·50	16·03	62·15	06·88	50·23	92·22	32·87	33
34	16·52	68·34	18·71	67·64	15·14	61·24	05·94	49·27	91·25	31·87	34
35	15·73	67·53	17·87	66·77	14·26	60·33	05·01	48·32	90·27	30·87	35
36	14·94	66·71	17·03	65·91	13·37	59·42	04·08	47·36	89·29	29·87	36
37	14·15	65·89	16·19	65·05	12·48	58·51	03·14	46·41	88·31	28·87	37
38	13·35	65·08	15·35	64·18	11·59	57·60	02·21	45·45	87·33	27·87	38
39	12·56	64·26	14·51	63·32	10·70	56·68	01·28	44·49	86·35	26·87	39
40	11·77	63·44	13·67	62·45	09·81	55·77	00·34	43·53	85·37	25·86	40
41	10·98	62·52	12·82	61·59	08·93	54·86	4499·40	42·57	84·39	24·86	41
42	10·18	61·81	11·98	60·72	08·04	53·95	98·47	41·62	83·41	23·86	42
43	09·39	60·99	11·14	59·85	07·15	53·03	97·53	40·66	82·42	22·85	43
44	08·59	60·17	10·30	58·99	06·26	52·12	96·59	39·70	81·44	21·85	44
45	07·80	59·35	09·45	58·12	05·36	51·21	95·66	38·74	80·46	20·85	45
46	07·00	58·53	08·61	57·25	04·47	50·29	94·72	37·78	79·48	19·84	46
47	06·21	57·71	07·76	56·38	03·58	49·38	93·78	36·82	78·49	18·84	47
48	05·41	56·89	06·92	55·51	02·69	48·46	92·84	35·86	77·51	17·83	48
49	04·61	56·07	06·07	54·65	01·80	47·55	91·91	34·89	76·53	16·82	49
50	03·82	55·25	05·23	53·78	00·90	46·63	90·97	33·93	75·54	15·82	50
51	03·02	54·43	04·38	52·91	00·01	45·71	90·03	32·97	74·56	14·81	51
52	02·22	53·60	03·54	52·04	4599·12	44·80	89·09	32·01	73·57	13·80	52
53	01·42	52·78	02·69	51·17	98·22	43·88	88·15	31·04	72·59	12·80	53
54	00·62	51·96	01·84	50·30	97·33	42·96	87·21	30·08	71·60	11·79	54
55	4799.82	51·13	01·00	49·42	96·44	42·04	86·27	29·12	70·62	10·78	55
56	99·02	50·31	00·15	48·55	95·54	41·13	85·32	28·15	69·63	09·77	56
57	98·22	49·49	4699.30	47·68	94·64	40·21	84·38	27·19	68·64	08·76	57
58	97·42	48·66	98·45	46·81	93·75	39·29	83·44	26·22	67·66	07·75	58
59	96·62	47·84	97·60	45·94	92·85	38·37	82·50	25·26	66·67	06·74	59
60	95·82	47·01	96·75	45·06	91·96	37·45	81·56	24·29	65·68	05·73	60

Length of a Degree of Longitude.

′	39°	40°	41°	42°	43°	44°	45°	46°	47°	48°	′
	chains.	chains.	chains.	chains.	chains.	chains.	chains.	chains.	chains.	chains.	
0	4305·73	4244·47	4181·91	4118·06	4052·96	3986·62	3919·05	3850.28	3780·33	3709·22	0
1	04·72	43·14	80·85	16·99	51·87	85·50	17·91	49·12	79·15	08·03	1
2	03·71	42·41	79·80	15·91	50·77	84·38	16·78	47·97	77·98	06·83	2
3	02·70	41·37	78·75	14·84	49·67	83·27	15·64	46·81	76·80	05·63	3
4	01·69	40·34	77·69	13·76	48·58	82·15	14·50	45·65	75·63	04·44	4
5	00·68	39·31	76·64	12·69	47·48	81·03	13·36	44·50	74·45	03·24	5
6	4299·67	38·27	75·58	11·61	46·38	79·91	12·23	43·34	73·27	02·05	6
7	98·65	37·24	74·52	10·53	45·28	78·79	11·09	42·18	72·09	00·85	7
8	97·64	36·20	73·47	09·46	44·19	77·68	09·95	41·02	70·92	3699·65	8
9	96·63	35·17	72·41	08·38	43·09	76·56	08·81	39·86	69·74	98·46	9
10	95·61	34·13	71·36	07·30	41·99	75·44	07·67	38·70	68·56	97·26	10
11	94·60	33·10	70·30	06·22	40·89	74·32	06·53	37·54	67·38	96·06	11
12	93·59	32·06	69·24	05·14	39·79	73·20	05·39	36·38	66·20	94·86	12
13	92·57	31·02	68·18	04·07	38·69	72·08	04·25	35·22	65·02	93·66	13
14	91·56	29·99	67·12	02·99	37·59	70·96	03·11	34·06	63·84	92·46	14
15	90·54	28·95	66·07	01·91	36·49	69·84	01·97	32·90	62·66	91·26	15
16	89·52	27·91	65·01	00·83	35·39	68·72	00·83	31·74	61·48	90·06	16
17	88·51	26·87	63·95	4099·75	34·29	67·59	3899·69	30·58	60·30	88·86	17
18	87·49	25·84	62·89	98·67	33·19	66·47	98·54	29·42	59·12	87·66	18
19	86·48	24·80	61·83	97·58	32·09	65·35	97·40	28·26	57·94	86·46	19
20	85·46	23·76	60·77	96·50	30·98	64·23	96·26	27·09	56·76	85·26	20
21	84·44	22·72	59·71	95·42	29·88	63·11	95·12	25·93	55·57	84·06	21
22	83·42	21·68	58·65	94·34	28·78	61·98	93·97	24·77	54·39	82·86	22
23	82·40	20·64	57·58	93·26	27·67	60·86	92·83	23·60	53·21	81·66	23
24	81·39	19·60	56·52	92·17	26·57	59·73	91·68	22·44	52·02	80·46	24
25	80·37	18·56	55·46	91·09	25·47	58·61	90·54	21·28	50·84	79·25	25
26	79·35	17·52	54·40	90·01	24·36	57·49	89·40	20·11	49·66	78·05	26
27	78·33	16·48	53·44	88·92	23·26	56·36	88·25	18·95	48·47	76·85	27
28	77·31	15·43	52·27	87·84	22·15	55·24	87·11	17·78	47·29	75·64	28
29	76·29	14·39	51·21	86·75	21·05	54·11	85·96	16·62	46·10	74·44	29
30	75·27	13·35	50·14	85·67	19·94	52·98	84·81	15·45	44·92	73·24	30
31	74·24	12·31	49·08	84·58	18·84	51·86	83·67	14·29	43·73	72·03	31
32	73·22	11·26	48·02	83·50	17·73	50·73	82·52	13·12	42·55	70·83	32
33	72·20	10·22	46·95	82·41	16·62	49·60	81·37	11·95	41·36	69·62	33
34	71·18	09·18	45·89	81·33	15·52	48·48	80·23	10·79	40·18	68·42	34
35	70·16	08·13	44·82	80·24	14·41	47·35	79·08	09·62	38·99	67·21	35
36	69·13	07·09	43·75	79·15	13·30	46·22	77·93	08·45	37·80	66·01	36
37	68·11	06·04	42·69	78·07	12·19	45·09	76·78	07·28	36·62	64·80	37
38	67·09	05·00	41·62	76·98	11·09	43·96	75·63	06·11	35·43	63·59	38
39	66·06	03·95	40·55	75·89	09·98	42·83	74·48	04·95	34·24	62·39	39
40	65·04	02·90	39·49	74·80	08·87	41·71	73·34	03·78	33·05	61·18	40
41	64·01	01·86	38·42	73·71	07·76	40·58	72·19	02·61	31·86	59·97	41
42	62·99	00·81	37·35	72·62	06·65	39·45	71·04	01·44	30·67	58·76	42
43	61·96	4199.76	36·28	71·53	05·54	38·32	69·89	00·27	29·48	57·56	43
44	60·93	98·72	35·21	70·44	04·43	37·18	68·74	3799·10	28·30	56·35	44
45	59·91	97·67	34·14	69·35	03·32	36·05	67·58	97·93	27·11	55·14	45
46	58·88	96·62	33·08	68·26	02·21	34·92	66·43	96·76	25·92	53·93	46
47	57·85	95·57	32·01	67·17	01·10	33·79	65·28	95·59	24·73	52·72	47
48	56·83	94·52	30·93	66·08	3999·98	32·66	64·13	94·41	23·53	51·51	48
49	55·80	93·47	29·86	64·99	98·87	31·53	62·98	93·24	22·34	50·30	49
50	54·77	92·42	28·79	63·90	97·76	30·39	61·82	92·07	21·15	49·09	50
51	53·74	91·37	27·72	62·81	96·65	29·26	60·67	90·90	19·96	47·88	51
52	52·71	90·32	26·65	61·71	95·53	28·13	59·52	89·72	18·77	46·67	52
53	51·68	89·27	25·58	60·62	94·42	26·99	58·36	88·55	17·58	45·46	53
54	50·66	88·22	24·51	59·53	93·31	25·86	57·21	87·38	16·38	44·25	54
55	49·63	87·17	23·43	58·43	92·19	24·73	56·06	86·20	15·19	43·03	55
56	48·59	86·12	22·36	57·34	91·08	23·59	54·90	85·03	14·00	41·82	56
57	47·56	85·07	21·29	56·25	89·96	22·46	53·75	83·86	12·80	40·61	57
58	46·53	84·02	20·21	55·15	88·85	21·32	52·59	82·68	11·61	39·40	58
59	45·50	82·96	19·14	54·06	87·73	20·19	51·44	81·51	10·41	38·18	59
60	44·47	81·91	18·06	52·96	86·62	19·05	50·28	80·33	09·22	36·97	60

Arc in Equivalents of Sideral Time.

Arc.	Time.	Arc.	Time.	Arc.	Time.	Arc.	Time.	Arc.	Time.
″	s.	′	m. s.	°	h. m.	°	h. m.	°	h. m.
1	0·07	1	0 4	1	0 4	61	4 4	121	8 4
2	0·13	2	0 8	2	0 8	62	4 8	122	8 8
3	0·20	3	0 12	3	0 12	63	4 12	123	8 12
4	0·27	4	0 16	4	0 16	64	4 16	124	8 16
5	0·33	5	0 20	5	0 20	65	4 20	125	8 20
6	0·40	6	0 24	6	0 24	66	4 24	126	8 24
7	0·47	7	0 28	7	0 28	67	4 28	127	8 28
8	0·53	8	0 32	8	0 32	68	4 32	128	8 32
9	0·60	9	0 36	9	0 36	69	4 36	129	8 36
10	0·67	10	0 40	10	0 40	70	4 40	130	8 40
11	0·73	11	0 44	11	0 44	71	4 44	131	8 44
12	0·80	12	0 48	12	0 48	72	4 48	132	8 48
13	0·87	13	0 52	13	0 52	73	4 52	133	8 52
14	0·93	14	0 56	14	0 56	74	4 56	134	8 56
15	1·00	15	1 0	15	1 0	75	5 0	135	9 0
16	1·07	16	1 4	16	1 4	76	5 4	136	9 4
17	1·13	17	1 8	17	1 8	77	5 8	137	9 8
18	1·20	18	1 12	18	1 12	78	5 12	138	9 12
19	1·27	19	1 16	19	1 16	79	5 16	139	9 16
20	1·33	20	1 20	20	1 20	80	5 20	140	9 20
21	1·40	21	1 24	21	1 24	81	5 24	141	9 24
22	1·47	22	1 28	22	1 28	82	5 28	142	9 28
23	1·53	23	1 32	23	1 32	83	5 32	143	9 32
24	1·60	24	1 36	24	1 36	84	5 36	144	9 36
25	1·67	25	1 40	25	1 40	85	5 40	145	9 40
26	1·73	26	1 44	26	1 44	86	5 44	146	9 44
27	1·80	27	1 48	27	1 48	87	5 48	147	9 48
28	1·87	28	1 52	28	1 52	88	5 52	148	9 52
29	1·93	29	1 56	29	1 56	89	5 56	149	9 56
30	2·00	30	2 0	30	2 0	90	6 0	150	10 0
31	2·07	31	2 4	31	2 4	91	6 4	151	10 4
32	2·13	32	2 8	32	2 8	92	6 8	152	10 8
33	2·20	33	2 12	33	2 12	93	6 12	153	10 12
34	2·27	34	2 16	34	2 16	94	6 16	154	10 16
35	2·33	35	2 20	35	2 20	95	6 20	155	10 20
36	2·40	36	2 24	36	2 24	96	6 24	156	10 24
37	2·47	37	2 28	37	2 28	97	6 28	157	10 28
38	2·53	38	2 32	38	2 32	98	6 32	158	10 32
39	2·60	39	2 36	39	2 36	99	6 36	159	10 36
40	2·67	40	2 40	40	2 40	100	6 40	160	10 40
41	2·73	41	2 44	41	2 44	101	6 44	161	10 44
42	2·80	42	2 48	42	2 48	102	6 48	162	10 48
43	2·87	43	2 52	43	2 52	103	6 52	163	10 52
44	2·93	44	2 56	44	2 56	104	6 56	164	10 56
45	3·00	45	3 0	45	3 0	105	7 0	165	11 0
46	3·07	46	3 4	46	3 4	106	7 4	166	11 4
47	3·13	47	3 8	47	3 8	107	7 8	167	11 8
48	3·20	48	3 12	48	3 12	108	7 12	168	11 12
49	3·27	49	3 16	49	3 16	109	7 16	169	11 16
50	3·33	50	3 20	50	3 20	110	7 20	170	11 20
51	3·40	51	3 24	51	3 24	111	7 24	171	11 24
52	3·47	52	3 28	52	3 28	112	7 28	172	11 28
53	3·53	53	3 32	53	3 32	113	7 32	173	11 32
54	3·60	54	3 36	54	3 36	114	7 36	174	11 36
55	3·67	55	3 40	55	3 40	115	7 40	175	11 40
56	3·73	56	3 44	56	3 44	116	7 44	176	11 44
57	3·80	57	3 48	57	3 48	117	7 48	177	11 48
58	3·87	58	3 52	58	3 52	118	7 52	178	11 52
59	3 93	59	3 56	59	3 56	119	7 56	179	11 56
60	4·00	60	4 0	60	4 0	120	8 0	180	12 0

Sideral Time in Equivalents of Arc.

Time.	Arc.	Time.	Arc.	Time.	Arc.	Time.	Arc.
s.	"	s.	′ "	m. s.	° ′ "	h. m.	° ′
·01	0·15	0·61	0 9·15	0 22	0 5 30	0 23	5 45
·02	0·30	·62	9·30	23	5 45	24	6 0
·03	0·45	·63	9·45	24	6 0	25	6 15
·04	0·60	·64	9·60	25	6 15	26	6 30
·05	0·75	·65	9·75	26	6 30	27	6 45
·06	0·90	·66	9·90	27	6 45	28	7 0
·07	1·05	·67	10·05	28	7 0	29	7 15
·08	1·20	·68	10·20	29	7 15	30	7 30
·09	1·35	·69	10·35	30	7 30	31	7 45
·10	1·50	·70	10·50	31	7 45	32	8 0
·11	1·65	·71	10·65	32	8 0	33	8 15
·12	1·80	·72	10·80	33	8 15	34	8 30
·13	1·95	·73	10·95	34	8 30	35	8 45
·14	2·10	·74	11·10	35	8 45	36	9 0
·15	2·25	·75	11·25	36	9 0	37	9 15
·16	2·40	·76	11·40	37	9 15	38	9 30
·17	2·55	·77	11·55	38	9 30	39	9 45
·18	2·70	·78	11·70	39	9 45	40	10 0
·19	2·85	·79	11·85	40	10 0	41	10 15
·20	3·00	·80	12·00	41	10 15	42	10 30
·21	3·15	·81	12·15	42	10 30	43	10 45
·22	3·30	·82	12·30	43	10 45	44	11 0
·23	3·45	·83	12·45	44	11 0	45	11 15
·24	3·60	·84	12·60	45	11 15	46	11 30
·25	3·75	·85	12·75	46	11 30	47	11 45
·26	3·90	·86	12·90	47	11 45	48	12 0
·27	4·05	·87	13·05	48	12 0	49	12 15
·28	4·20	·88	13·20	49	12 15	50	12 30
·29	4 35	·89	13 35	50	12 30	51	12 45
·30	4·50	·90	13·50	51	12 45	52	13 0
·31	4·65	·91	13·65	52	13 0	53	13 15
·32	4 80	·92	13·80	53	13 15	54	13 30
·33	4·95	·93	13·95	54	13 30	55	13 45
·34	5·10	·94	14·10	55	13 45	56	14 0
·35	5·25	·95	14·25	56	14 0	57	14 15
·36	5·40	·96	14·40	57	14 15	58	14 30
·37	5·55	·97	14·55	58	14 30	59	14 45
·38	5·70	·98	14·70	59	14 45	1	15
·39	5·85	·99	14·85	1	15	2	30
·40	6·00	1	15	2	30	3	45
·41	6·15	2	30	3	45	4	60
·42	6·30	3	45	4	1 0	5	75
·43	6·45	4	1 0	5	1 15	6	90
·44	6·60	5	1 15	6	1 30	7	105
·45	6·75	6	1 30	7	1 45	8	120
·46	6·90	7	1 45	8	2 0	9	135
·47	7·05	8	2 0	9	2 15	10	150
·48	7·20	9	2 15	10	2 30	11	165
·49	7·35	10	2 30	11	2 45	12	180
·50	7·50	11	2 45	12	3 0	13	195
·51	7·65	12	3 0	13	3 15	14	210
·52	7·80	13	3 15	14	3 30	15	225
·53	7·95	14	3 30	15	3 45	16	240
·54	8·10	15	3 45	16	4 0	17	255
·55	8·25	16	4 0	17	4 15	18	270
·56	8·40	17	4 15	18	4 30	19	285
·57	8·55	18	4 30	19	4 45	20	300
·58	8·70	19	4 45	20	5 0	21	315
·59	8·85	20	5 0	21	5 15	22	330
·60	9·00	21	5 15	22	5 30	23	345

Mean Solar Time in Equivalent Intervals of Sideral Time.

Sol. T.	Sid. T.	Sol. T.	Sid. T.	Sol. T.	Sid. Time.	Sol. T.	Sid. Time.
s.	s.	s.	s.	m. s.	m. s.	h. m.	h. m. s
·01	·010	·61	·612	0 22	0 22·060	0 23	0 23 3·778
·02	·020	·62	·622	23	23·063	24	24 3·943
·03	·030	·63	·632	24	24·066	25	25 4·107
·04	·040	·64	·642	25	25·068	26	26 4·271
·05	·050	·65	·652	26	26·071	27	27 4·435
·06	·060	·66	·662	27	27·074	28	28 4·600
·07	·070	·67	·672	28	28·077	29	29 4·764
·08	·080	·68	·682	29	29·079	30	30 4·928
·09	·090	·69	·692	30	30·082	31	31 5·093
·10	·100	·70	·702	31	31·085	32	32 5·257
·11	·110	·71	·712	32	32·088	33	33 5 421
·12	·120	·72	·722	33	33·090	34	34 5·585
·13	·130	·73	·732	34	34·093	35	35 5·750
·14	·140	·74	·742	35	35·096	36	36 5·914
·15	·150	·75	·752	36	36·099	37	37 6·078
·16	·160	·76	·762	37	37·101	38	38 6·242
·17	·170	·77	·772	38	38·104	39	39 6·407
·18	·180	·78	·782	39	39·107	40	40 6 571
·19	·191	·79	·792	40	40·110	41	41 6·735
·20	·201	·80	·802	41	41·112	42	42 6·900
·21	·211	·81	·812	42	42·115	43	43 7·064
·22	·221	·82	·822	43	43·118	44	44 7·228
·23	·231	·83	·832	44	44·120	45	45 7·392
·24	·241	·84	·842	45	45·123	46	46 7·557
·25	·251	·85	·852	46	46·126	47	47 7·721
·26	·261	·86	·862	47	47·129	48	48 7 885
·27	·271	·87	·872	48	48·131	49	49 8·049
·28	·281	·88	·882	49	49·134	50	50 8·214
·29	·291	·89	·892	50	50·137	51	51 8·378
·30	·301	·90	·902	51	51·140	52	52 8 542
·31	·311	·91	·912	52	52·142	53	53 8·707
·32	·321	·92	·923	53	53·145	54	54 8·871
·33	·331	·93	·933	54	54·148	55	55 9·035
·34	·341	·94	·943	55	55·151	56	56 9·199
·35	·351	·95	·953	56	56·153	57	57 9·364
·36	·361	·96	·963	57	57 156	58	58 9·528
·37	·371	·97	·973	58	58·159	59	59 9·692
·38	·381	·98	·983	59	59·162	1	1 0 9·856
·39	·391	·99	·993	1	1 0·164	2	2 0 19·713
·40	·401	1	1·003	2	2 0·329	3	3 0 29·569
·41	·411	2	2·005	3	3 0·493	4	4 0 39·426
·42	·421	3	3·008	4	4 0·657	5	5 0 49·282
·43	·431	4	4·011	5	5 0·821	6	6 0 59·139
·44	·441	5	5·014	6	6 0·986	7	7 1 8·995
·45	·451	6	6·016	7	7 1·150	8	8 1 18 852
·46	·461	7	7·019	8	8 1·314	9	9 1 28·708
·47	·471	8	8·022	9	9 1·478	10	10 1 38·565
·48	·481	9	9·025	10	10 1·643	11	11 1 48·421
·49	·491	10	10·027	11	11 1·807	12	12 1 58·278
·50	·501	11	11·030	12	12 1·971	13	13 2 8·134
·51	·511	12	12·033	13	13 2·136	14	14 2 17·991
·52	·521	13	13·036	14	14 2·300	15	15 2 27·847
·53	·531	14	14·038	15	15 2·464	16	16 2 37·704
·54	·541	15	15·041	16	16 2·628	17	17 2 47·560
·55	·552	16	16·044	17	17 2·793	18	18 2 57·417
·56	·562	17	17·047	18	18 2·957	19	19 3 7·273
·57	·572	18	18·049	19	19 3·121	20	20 3 17·129
·58	·582	19	19·052	20	20 3·285	21	21 3 26·986
·59	·592	20	20·055	21	21 3·450	22	22 3 36·842
·60	·602	21	21·057	22	22 3·614	23	23 3 46·699

Sideral Time in Equivalent Intervals of Mean Solar Time.

Sid. T.	Sol. T.	Sid. T.	Sol. T.	Sid. T.	Solar Time.	Sid. T.	Sol. Time.
s.	s.	s.	s.	m. s.	m. s.	h. m.	h. m. s.
·01	·010	·61	·608	0 22	0 21·940	0 23	0 22 56·232
·02	·020	·62	·618	23	22·937	24	23 56·068
·03	·030	·63	·628	24	23·934	25	24 55·904
·04	·040	·64	·638	25	24·932	26	25 55·741
·05	·050	·65	·648	26	25·929	27	26 55·577
·06	·060	·66	·658	27	26·926	28	27 55·413
·07	·070	·67	·668	28	27·924	29	28 55·249
·08	·080	·68	·678	29	28·921	30	29 55·085
·09	·090	·69	·688	30	29·918	31	30 54·921
·10	·100	·70	698	31	30·915	32	31 54·758
·11	·110	·71	·708	32	31 913	33	32 54·594
·12	·120	·72	·718	33	32·910	34	33 54·430
·13	·130	·73	·728	34	33·907	35	34 54·266
·14	·140	·74	·738	35	34·904	36	35 54·102
·15	·150	·75	·748	36	35·902	37	36 53·938
·16	·160	·76	·758	37	36·899	38	37 53·775
·17	·170	·77	·768	38	37·896	39	38 53·611
·18	·180	·78	·778	39	38·894	40	39 53·447
·19	·189	·79	·788	40	39·891	41	40 53·283
·20	·199	·80	·798	41	40·888	42	41 53·119
·21	·209	·81	·808	42	41·885	43	42 52·955
·22	·219	·82	·818	43	42·883	44	43 52·792
·23	·229	·83	·828	44	43·880	45	44 52·628
·24	·239	·84	·838	45	44·877	46	45 52·464
·25	·249	·85	·848	46	45·874	47	46 52 300
·26	·259	·86	·858	47	46·872	48	47 52·136
·27	·269	·87	·868	48	47·869	49	48 51·973
·28	·279	·88	·878	49	48·866	50	49 51·809
·29	·289	·89	·888	50	49·863	51	50 51·645
·30	·299	·90	·898	51	50·861	52	51 51·481
·31	·309	·91	·908	52	51·858	53	52 51·317
·32	·319	·92	·917	53	52·855	54	53 51·153
·33	·329	·93	·927	54	53·853	55	54 50·990
·34	·339	·94	·937	55	54·850	56	55 50·826
·35	·349	·95	·947	56	55·847	57	56 50·662
·36	·359	·96	·957	57	56·844	58	57 50·498
·37	·369	·97	·967	58	57·842	59	58 50·334
·38	·379	·98	·977	59	58·839	1	59 50·170
·39	·389	·99	·987	1	59·836	2	1 59 40·341
·40	·399	1	·997	2	1 59·672	3	2 59 30·511
·41	·409	2	1·995	3	2 59·509	4	3 59 20·682
·42	·419	3	2·992	4	3 59·345	5	4 59 10·852
·43	·429	4	3·989	5	4 59·181	6	5 59 1·023
·44	·439	5	4·986	6	5 59·017	7	6 58 51·193
·45	·449	6	5·984	7	6 58·853	8	7 58 41·364
·46	·459	7	6·981	8	7 58·689	9	8 58 31·534
·47	·469	8	7·978	9	8 58·526	10	9 58 21·704
·48	·479	9	8·975	10	9 58·362	11	10 58 11·875
·49	·489	10	9·973	11	10 58·198	12	11 58 2·045
·50	·499	11	10·970	12	11 58·034	13	12 57 52·216
·51	·509	12	11·967	13	12 57·870	14	13 57 42·386
·52	·519	13	12·965	14	13 57·706	15	14 57 32·557
·53	·529	14	13·962	15	14 57·543	16	15 57 22·727
·54	·539	15	14·959	16	15 57·379	17	16 57 12·897
·55	·548	16	15·956	17	16 57·215	18	17 57 3·068
·56	·558	17	16·954	18	17 57·051	19	18 56 53·238
·57	·568	18	17·951	19	18 56·887	20	19 56 43·409
·58	·578	19	18·948	20	19 56·723	21	20 56 33·579
·59	·588	20	19·945	21	20 56·560	22	21 56 23·750
·60	·598	21	20·943	22	21 56·396	23	22 56 13 920

Azimuths of Polaris.

Sideral Time.	Latitudes.										Sideral Time.
West.	28°	30°	32°	34°	36°	38°	40°	42°	44°	46°	48°	East.
h. m.	° ′	° ′	° ′	° ′	° ′	° ′	° ′	° ′	° ′	° ′	° ′	h. m.
0 4	0 2	0 2	0 2	0 2	0 2	0 2	0 2	0 2	0 2	0 2	0 2	23 56
0 8	3	4	4	4	4	4	4	4	4	4	5	23 52
0 12	5	5	5	6	6	6	6	6	6	7	7	23 48
0 16	7	7	7	7	8	8	8	8	9	9	9	23 44
0 20	9	9	9	9	9	10	10	10	11	11	12	23 40
0 24	10	11	11	11	11	12	12	12	13	13	14	23 36
0 28	12	12	13	13	13	14	14	14	15	16	16	23 32
0 32	14	14	14	15	15	16	16	17	17	18	18	23 28
0 36	15	16	16	17	17	17	18	19	19	20	21	23 24
0 40	17	18	18	18	19	19	20	21	21	22	23	23 20
0 44	19	19	20	20	21	21	22	23	23	24	25	23 16
0 48	21	21	21	22	23	23	24	25	25	26	28	23 12
0 52	22	23	23	24	24	25	26	27	28	29	30	23 8
0 56	24	24	25	26	26	27	28	29	30	31	32	23 4
1 0	26	26	27	27	28	29	30	31	32	33	34	23 0
1 5	28	28	29	30	31	31	32	33	34	36	37	22 55
1 10	30	30	31	32	33	34	35	36	37	38	40	22 50
1 15	32	32	33	34	35	36	37	38	39	41	43	22 45
1 20	34	35	35	36	37	38	39	41	42	44	45	22 40
1 25	36	37	37	38	39	40	42	43	44	46	48	22 35
1 30	38	39	39	40	41	43	44	45	47	49	51	22 30
1 35	40	41	42	43	44	45	46	48	49	51	53	22 25
1 40	42	43	44	45	46	47	49	50	52	54	56	22 20
1 45	44	45	46	47	48	49	51	52	54	56	58	22 15
1 50	46	47	48	49	50	51	53	55	57	59	1 1	22 10
1 55	48	49	50	51	52	54	55	57	59	1 1	4	22 5
2 0	49	50	52	53	54	56	57	59	1 1	4	6	22 0
2 5	51	52	53	55	56	58	59	1 1	3	6	8	21 55
2 10	53	54	55	57	58	1 0	1 2	4	6	8	11	21 50
2 15	55	56	57	59	1 0	2	4	6	8	10	13	21 45
2 20	57	58	59	1 1	2	4	6	8	10	13	16	21 40
2 25	58	1 0	1 1	2	4	6	8	10	12	15	18	21 35
2 30	1 0	1	3	4	6	8	10	12	14	17	20	21 30
2 35	2	3	4	6	8	10	12	14	16	19	22	21 25
2 40	3	5	6	8	9	11	14	16	18	21	25	21 20
2 45	5	6	8	9	11	13	15	18	20	23	27	21 15
2 50	7	8	10	11	13	15	17	20	22	26	29	21 10
2 55	8	10	11	13	15	17	19	22	24	27	31	21 5
3 0	10	11	13	14	16	18	21	23	26	29	33	21 0
3 6	11	13	15	16	18	20	23	25	28	32	35	20 54
3 12	13	15	16	18	20	22	25	28	31	34	38	20 48
3 18	15	16	18	20	22	24	27	30	33	36	40	20 42
3 24	16	18	20	22	24	26	29	31	35	38	42	20 36
3 30	18	20	21	23	26	28	30	33	37	40	44	20 30
3 37	20	21	23	25	27	30	32	35	39	42	46	20 23
3 44	22	23	25	27	29	32	34	37	41	44	49	20 16
3 51	23	25	27	29	31	34	36	39	43	46	51	20 9
4 0	25	27	29	31	33	36	38	42	45	49	53	20 0
4 10	27	29	31	33	35	38	41	44	47	51	56	19 50
4 20	29	31	33	35	37	40	43	46	50	54	58	19 40
4 30	31	32	34	37	39	42	45	48	52	56	2 0	19 30
4 45	33	35	37	39	42	44	47	51	54	59	3	19 15
5 0	35	37	39	41	43	46	49	53	56	2 1	5	19 0
5 20	36	38	40	43	45	48	51	55	58	3	7	18 40
6 0	38	40	42	44	47	50	53	56	2 0	4	9	18 0

I. To the sideral time at mean noon, on any day, add the sideral equivalent of the mean time of observation, diminished by the right ascension of Polaris, and the remainder will be the sideral time of the star from the meridian.

Azimuths of Polaris.

Sideral Time.	Latitudes.											Sideral Time.
West.	28°	30°	32°	34°	36°	38°	40°	42°	44°	46°	48°	East.
h. m.	° ′	° ′	° ′	° ′	° ′	° ′	° ′	° ′	° ′	° ′	° ′	h. m.
11 56	0 2	0 2	0 2	0 2	0 2	0 2	0 2	0 2	0 2	0 2	0 2	12 4
11 52	3	3	4	4	4	4	4	4	4	4	4	12 8
11 48	5	5	5	5	5	6	6	6	6	6	7	12 12
11 44	7	7	7	7	7	7	8	8	8	8	9	12 16
11 40	8	9	9	9	9	9	10	10	10	11	11	12 20
11 36	10	10	10	11	11	11	11	12	12	13	13	12 24
11 32	12	12	12	12	13	13	13	14	14	15	15	12 28
11 28	13	14	14	14	15	15	15	16	16	17	17	12 32
11 24	15	15	16	16	16	17	17	18	18	19	20	12 36
11 20	17	17	17	18	18	19	19	20	20	21	22	12 40
11 16	18	19	19	20	20	20	21	22	22	23	24	12 44
11 12	20	20	21	21	22	22	23	24	24	25	26	12 48
11 8	22	22	22	23	24	24	25	26	26	27	28	12 52
11 4	23	24	24	25	25	26	27	27	28	29	30	12 56
11 0	25	25	26	26	27	28	29	29	30	31	32	13 0
10 55	27	27	28	29	29	30	31	32	33	34	35	13 5
10 50	29	30	30	31	31	32	33	34	35	36	38	13 10
10 45	31	32	32	33	34	35	35	37	38	39	40	13 15
10 40	33	34	34	35	36	37	38	39	40	41	43	13 20
10 35	35	36	36	37	38	39	40	41	42	44	45	13 25
10 30	37	38	38	39	40	41	42	44	45	46	48	13 30
10 25	39	40	40	41	42	43	44	46	47	49	51	13 35
10 20	41	42	42	43	44	45	47	48	50	51	53	13 40
10 15	43	43	44	45	46	48	49	50	52	54	56	13 45
10 10	45	45	46	47	48	50	51	53	54	56	58	13 50
10 5	47	47	48	49	50	52	53	55	56	58	1 1	13 55
10 0	48	49	50	51	52	54	55	57	59	1 1	3	14 0
9 55	50	51	52	53	54	56	57	59	1 1	3	5	14 5
9 50	52	53	54	55	56	58	59	1 1	3	5	8	14 10
9 45	54	55	56	57	58	1 0	1 1	3	5	8	10	14 15
9 40	55	56	58	59	1 0	2	3	5	7	10	12	14 20
9 35	57	58	59	1 1	2	4	5	7	10	12	15	14 25
9 30	59	1 0	1 1	2	4	6	7	9	12	14	17	14 30
9 25	1 1	2	3	4	6	7	9	11	14	16	19	14 35
9 20	2	3	5	6	8	9	11	13	16	18	21	14 40
9 15	4	5	6	8	9	11	13	15	18	20	23	14 45
9 10	5	7	8	9	11	13	15	17	20	22	25	14 50
9 5	7	8	10	11	13	15	17	19	21	24	27	14 55
9 0	8	10	11	13	14	16	18	21	23	26	29	15 0
8 54	10	12	13	15	16	18	20	23	26	28	32	15 6
8 48	12	13	15	16	18	20	22	25	28	31	34	15 12
8 42	14	15	17	18	20	22	24	27	30	33	36	15 18
8 36	15	17	18	20	22	24	26	29	32	35	38	15 24
8 30	17	18	20	22	24	26	28	31	34	37	40	15 30
8 23	19	20	22	24	26	28	30	33	36	39	43	15 37
8 16	20	22	24	25	27	30	32	35	38	41	45	15 44
8 9	22	24	25	27	29	32	34	37	40	44	47	15 51
8 0	24	26	27	29	31	34	36	39	43	46	50	16 0
7 50	26	28	30	32	34	36	39	42	45	49	53	16 10
7 40	28	30	32	34	36	38	41	44	48	51	55	16 20
7 30	30	31	33	35	38	40	43	46	50	54	58	16 30
7 15	32	34	36	38	40	43	46	49	53	57	2 1	16 45
7 0	34	36	38	40	42	45	48	51	55	59	4	17 0
6 40	36	38	40	42	45	47	50	54	58	2 2	6	17 20
6 0	38	40	42	44	47	50	53	56	2 0	4	9	18 0

II. Find, in one of the right or left hand columns of the table, the sideral time of Polaris from the meridian; and opposite to it, under the latitude of the place, will be found the azimuth of the star, east or west, as indicated at the head of the column.

Altitudes by the Barometer.

Observed Hights of the Barometer at Lower and Upper Stations, H, H′.

H.H′	N. N′.	Diff.	H H′	N. N′.	Diff.	H H′	N. N′.	Diff.	H H′	N. N′.	Diff.
inch	feet.		inch	feet.		inch	feet.		inch	feet.	
11·0	1396·9		16·0	11186·3		21·0	18291·0		26·0	23871·0	
		236·4			162·8			124·1			100·3
11·1	1633·3		16·1	11349·1		21·1	18415·1		26·1	23971·3	
		234·3			161·8			123·6			99·9
11·2	1867·6		16·2	11510·9		21·2	18538·7		26·2	24071·2	
		232·3			160·8			122·9			99·5
11·3	2099·9		16·3	11671·7		21·3	18661·6		26·3	24170·7	
		230·2			159·8			122·4			99·1
11·4	2330·1		16·4	11831·5		21·4	18784·0		26·4	24269·8	
		228·2			158·8			121·8			98·8
11·5	2558·3		16·5	11990·3		21·5	18905·8		26·5	24368·6	
		226·2			157·9			121·2			98·4
11·6	2784 5		16·6	12148·2		21·6	19027·0		26·6	24467·0	
		224·2			156·9			120·7			98·1
11·7	3008·7		16 7	12305·1		21·7	19147·7		26·7	24565·1	
		222·4			155·9			120·1			97·6
11·8	3231 1		16·8	12461·0		21·8	19267·8		26·8	24662·7	
		220 5			155·1			119·6			97·3
11·9	3451·6		16·9	12616·1		21·9	19387·4		26·9	24760·0	
		218·6			154·1			119·0			97·0
12·0	3670·2		17·0	12770·2		22·0	19506·4		27·0	24857·0	
		216·8			153·3			118·5			96·6
12·1	3887·0		17·1	12923·5		22·1	19624·9		27·1	24953·6	
		215·0			152·3			118·0			96·2
12·2	4102·0		17·2	13075·8		22·2	19742·9		27·2	25049·8	
		213·3			151·5			117·4			95·9
12·3	4315·3		17·3	13227·3		22·3	19860·3		27·3	25145·7	
		211·6			150·6			116·9			95·5
12·4	4526·9		17·4	13377·9		22·4	19977·2		27·4	25241·2	
		209·8			149 7			116·4			95·2
12·5	4736·7		17·5	13527·6		22·5	20093·6		27·5	25336·4	
		208·2			148·9			115·8			94·8
12·6	4944·9		17·6	13676·5		22·6	20209·4		27·6	25431·2	
		206·5			148 0			115·4			94·5
12·7	5151·4		17·7	13824·5		22·7	20324·8		27·7	25525·7	
		205·0			147·2			114·8			94·2
12·8	5356·4		17·8	13971·7		22·8	20439·6		27·8	25619·9	
		203·3			146·3			114·4			93·8
12·9	5559·7		17·9	14118·0		22·9	20554·0		27·9	25713·7	
		201·7			145·6			113·8			93·4
13·0	5761·4		18·0	14263·6		23·0	20667·8		28·0	25807·1	
		200·2			144·7			113·3			93·2
13·1	5961·6		18·1	14408·3		23·1	20781·1		28·1	25900·3	
		198·7			144·0			112·9			92·8
13·2	6160·3		18·2	14552·3		23·2	20894·0		28·2	25993·1	
		197·2			143·1			112·4			92 5
13·3	6357·5		18·3	14695·4		23·3	21006·4		28·3	26085·6	
		195·7			142·4			111·9			92·1
13·4	6553·2		18·4	14837·8		23·4	21118·3		28·4	26177·7	
		194·3			141·6			111·4			91·9
13·5	6747·5		18·5	14979·4		23·5	21229·7		28·5	26269·6	
		192·8			140·9			110·9			91·5
13·6	6940·3		18·6	15120·3		23·6	21340·6		28·6	26361·1	
		191·4			140·0			110·5			91·2
13·7	7131·7		18·7	15260·3		23·7	21451·1		28·7	26452·3	
		190·0			139·4			110·0			90·9
13·8	7321 7		18·8	15399·7		23 8	21561·1		28·8	26543·2	
		188·6			138·6			109·5			90 5
13·9	7510·3		18 9	15538·3		23·9	21670·6		28·9	26633·7	
		187·3			137·9			109 1			90·3
14·0	7697·6		19·0	15676·2		24 0	21779·7		29·0	26724·0	
		186·0			137·1			108·7			89·9
14·1	7883 6		19·1	15813·3		24·1	21888·4		29·1	26813·9	
		184·6			136·5			108·2			89·6
14·2	8068·2		19·2	15949·8		24·2	21996·6		29·2	26903·5	
		183·3			135·7			107·7			89·3
14·3	8251·5		19·3	16085·5		24·3	22104·3		29·3	26992·8	
		182 1			135·0			107·3			89·1
14·4	8433·6		19·4	16220·5		24·4	22211·6		29·4	27081·9	
		180·8			134·3			106·8			88·7
14·5	8614·4		19 5	16354·8		24·5	22318·4		29·5	27170·6	
		179·6			133·7			106·4			88·4
14·6	8794·0		19·6	16488·5		24·6	22424·8		29·6	27259·0	
		178·3			132 9			106·0			88·1
14 7	8972·3		19·7	16621·4		24·7	22530·8		29·7	27347·1	
		177·2			132·3			105 6			87·8
14·8	9149 5		19·8	16753·7		24·8	22636·4		29·8	27434·9	
		176·0			131·6			105·1			87·6
14·9	9325·5		19·9	16885·3		24 9	22741·5		29·9	27522·5	
		174·8			131·0			104 8			87·2
15·0	9500·3		20 0	17016·3		25·0	22846·3		30·0	27609·7	
		173·5			130·3			104·3			86·9
15·1	9673 8		20·1	17146·6		25·1	22950·6		30·1	27696·6	
		172·4			129·7			103·8			86·7
15·2	9846·2		20·2	17276·3		25·2	23054·4		30·2	27783·3	
		171·3			129·0			103·5			86·4
15·3	10017·5		20·3	17405·3		25·3	23157·9		30·3	27869 7	
		170·2			128 4			103·1			86 0
15 4	10187·7		20·4	17533 7		25·4	23261·0		30·4	27955·7	
		169·1			127·7			102·6			85·8
15·5	10356·8		20·5	17661·4		25·5	23363·6		30·5	28041·5	
		168 0			127·2			102·3			85·6
15·6	10524·8		20·6	17788·6		25·6	23465·9		30·6	28127·1	
		167·0			126 5			101·8			85·2
15·7	10691·8		20·7	17915·1		25·7	23567·7		30·7	28212·3	
		165·9			125·9			101·5			85·0
15·8	10857·7		20·8	18041·0		25·8	23669·2		30·8	28297·3	
		164·8			125·3			101·1			84·7
15·9	11022·5		20 9	18166·3		25·9	23770·3		30·9	28382·0	
		163·8			124·7			100·7			84·4
16·0	11186·3		21·0	18291·0		26·0	23871·0		31·0	28466·4	

I. N — N′ = D, 1st ap.alt., in which $\left\{\begin{array}{l} N = \text{Tab. No. op. L. S. H.} \\ N' = \text{Tab. No. op. U. S. H′.} \end{array}\right\}$ Hight of Bar.

Temperatures of the Bar. T, T′.

II. D — 2·3409 (T — T′) = C, 2d ap. alt.

In which $\left\{\begin{array}{l} T = \text{L. Sta.} \\ T' = \text{U. Sta.} \end{array}\right\}$ Ht. of att.Th.

Temperatures of the air t, t′.

III. $C \mathbin{-|-} \frac{C}{900}(t \mathbin{-|-} t' - 64) = B$, 3d ap. al.

In which $\left\{\begin{array}{l} t = \text{L. Sta.} \\ t' = \text{U. Sta.} \end{array}\right\}$ Ht. of det. Th.

Altitudes by the Barometer.

Ap. Al. B.	Latitude L. 30° / 60°	32° / 58°	34° / 56°	36° / 54°	38° / 52°	40° / 50°	42° / 48°	44° / 46°	Eleva'n E	Hight of Bar. at L. Sta. S. 14 inch	16 inch	18 inch	20 inch	22 inch	24 inch	26 inch	28 inch
feet	feet	feet	feet	feet	feet	feet	ft.	ft.	feet	feet	feet	feet	feet	feet	feet	ft.	ft.
1000	1·3	1·2	1·0	0·8	0·6	0·5	0·3	0·1	2·5	1·9	1·6	1·3	1·0	0·8	0·6	0·4	0·2
1500	2·0	1·7	1·5	1·2	1·0	0·7	0·4	0·1	3·9	2·8	2·3	1·9	1·5	1·2	0·8	0·5	0·2
2000	2·6	2·3	2·0	1·6	1·3	0·9	0·6	0·2	5·2	3·8	3·1	2·5	2·0	1·5	1·1	0·7	0·3
2500	3·3	2·9	2·5	2·0	1·6	1·2	0·7	0·2	6·5	4·7	3·9	3·2	2·5	1·9	1·4	0·9	0·4
3000	4·0	3·5	3·0	2·5	1·9	1·4	0·8	0·3	7·9	5·7	4·7	3·8	3·0	2·3	1·7	1·1	0·5
3500	4·6	4·1	3·5	2·9	2·2	1·6	1·0	0·3	9·3	6·6	5·5	4·4	3·5	2·7	1·9	1·2	0·6
4000	5·3	4·6	4·0	3·3	2·6	1·8	1·1	0·4	10·8	7·6	6·3	5·1	4·0	3·1	2·2	1·4	0·7
4500	6·0	5·2	4·5	3·7	2·9	2·1	1·2	0·4	12·2	8·5	7·0	5·7	4·5	3·5	2·5	1·6	0·7
5000	6·6	5·8	5·0	4·1	3·2	2·3	1·4	0·5	13·7	9·5	7·8	6·4	5·0	3·8	2·8	1·8	0·8
5500	7·3	6·4	5·5	4·5	3·5	2·5	1·5	0·5	15·2	10·4	8·6	7·0	5·5	4·2	3·0	1·9	0·9
6000	7·9	7·0	6·0	4·9	3·8	2·8	1·7	0·6	16·7	11·4	9·4	7·6	6·0	4·6	3·3	2·1	1·0
6500	8·6	7·6	6·5	5·3	4·2	3·0	1·8	0·6	18·3	12·3	10·2	8·3	6·6	5·0	3·6	2·3	1·1
7000	9·3	8·1	7·0	5·7	4·5	3·2	1·9	0·6	19·9	13·3	11·0	8·9	7·1	5·4	3·9	2·5	1·2
7500	9·9	8·7	7·4	6·1	4·8	3·5	2·1	0·7	21·5	14·2	11·7	9·5	7·6	5·8	4·1	2·6	1·2
8000	10·6	9·3	7·9	6·6	5·1	3·7	2·2	0·7	23·1	15·2	12·5	10·2	8·1	6·2	4·4	2·8	1·3
8500	11·3	9·9	8·4	7·0	5·4	3·9	2·4	0·8	24·7	16·1	13·3	10·8	8·6	6·5	4·7	3·0	1·4
9000	11·9	10·5	8·9	7·4	5·8	4·1	2·5	0·8	26·4	17·1	14·1	11·4	9·1	6·9	5·0	3·2	1·5
9500	12·6	11·0	9·4	7·8	6·1	4·4	2·6	0·9	28·1	18·0	14·9	12·1	9·6	7·3	5·2	3·3	1·6
10000	13·2	11·6	9·9	8·2	6·4	4·6	2·8	0·9	29·8	19·0	15·7	12·7	10·1	7·7	5·5	3·5	1·7
10500	13·9	12·2	10·4	8·6	6·7	4·8	2·9	1·0	31·5	19·9	16·4	13·3	10·6	8·1	5·8	3·7	1·7
11000	14·6	12·8	10·9	9·0	7·1	5·1	3·0	1·0	33·3	20·9	17·2	14·0	11·1	8·5	6·1	3·9	1·8
11500	15·2	13·4	11·4	9·4	7·4	5·3	3·2	1·1	35·1	21·8	18·0	14·6	11·6	8·9	6·3	4·0	1·9
12000	15·9	13·9	11·9	9·8	7·7	5·5	3·3	1·1	36·9	22·8	18·8	15·3	12·1	9·2	6·6	4·2	2·0
12500	16·6	14·5	12·4	10·2	8·0	5·8	3·5	1·2	38·7	23·7	19·6	15·9	12·6	9·6	6·9	4·4	2·1
13000	17·2	15·1	12·9	10·6	8·3	6·0	3·6	1·2	40·6	24·7	20·4	16·5	13·1	10·0	7·2	4·6	2·2
13500	17·9	15·7	13·4	11·1	8·7	6·2	3·7	1·2	42·5	25·6	21·1	17·1	13·6	10·4	7·5	4·7	2·2
14000	18·5	16·3	13·9	11·5	9·0	6·4	3·9	1·3	44·4	26·6	21·9	17·8	14·1	10·8	7·7	4·9	2·3
14500	19·2	16·8	14·4	11·9	9·3	6·7	4·0	1·3	46·3	27·5	22·7	18·4	14·6	11·2	8·0	5·1	2·4
15000	19·9	17·4	14·9	12·3	9·6	6·9	4·2	1·4	48·3	28·5	23·5	19·1	15·1	11·5	8·3	5·3	2·5
15500	20·6	18·0	15·4	12·7	9·9	7·1	4·3	1·4	50·3	29·4	24·3	19·7	15·6	11·9	8·6	5·4	2·6
16000	21·2	18·6	15·9	13·1	10·3	7·4	4·4	1·5	52·3	30·4	25·1	20·3	16·1	12·3	8·8	5·6	2·7
16500	21·9	19·2	16·4	13·5	10·6	7·6	4·6	1·5	54·3	31·3	25·8	21·0	16·6	12·7	9·1	5·8	2·7
17000	22·5	19·8	16·9	13·9	10·9	7·8	4·7	1·6	56·3	32·3	26·6	21·6	17·1	13·1	9·4	6·0	2·8
17500	23·2	20·3	17·4	14·3	11·2	8·1	4·8	1·6	58·4	33·2	27·4	22·2	17·6	13·5	9·7	6·1	2·9
18000	23·8	20·9	17·9	14·7	11·5	8·3	5·0	1·7	60·5	34·2	28·2	22·9	18·1	13·8	9·9	6·3	3·0
18500	24·5	21·5	18·4	15·1	11·9	8·5	5·1	1·7	62·7	35·1	29·0	23·5	18·6	14·2	10·2	6·5	3·1
19000	25·2	22·1	18·9	15·6	12·2	8·7	5·3	1·8	64·8	36·1	29·8	24·1	19·2	14·6	10·5	6·7	3·2
19500	25·8	22·7	19·4	16·0	12·5	9·0	5·4	1·8	67·0	37·0	30·5	24·8	19·7	15·0	10·8	6·8	3·2
20000	26·5	23·2	19·9	16·4	12·8	9·2	5·5	1·8	69·2	38·0	31·3	25·4	20·2	15·4	11·0	7·0	3·3
20500	27·2	23·8	20·4	16·8	13·1	9·4	5·7	1·9	71·4	38·9	32·1	26·0	20·7	15·8	11·3	7·2	3·4
21000	27·8	24·4	20·8	17·2	13·5	9·7	5·8	1·9	73·6	39·9	32·9	26·7	21·2	16·1	11·6	7·4	3·5
21500	28·5	25·0	21·3	17·6	13·8	9·9	6·0	2·0	75·9	40·8	33·7	27·3	21·7	16·6	11·9	7·6	3·6
22000	29·1	25·6	21·8	18·0	14·1	10·1	6·1	2·0	78·2	41·8	34·5	28·0	22·2	16·9	12·1	7·7	3·7
22500	29·8	26·1	22·3	18·4	14·4	10·4	6·2	2·1	80·5	42·7	35·2	28·6	22·7	17·3	12·4	7·9	3·7
23000	30·5	26·7	22·8	18·8	14·7	10·6	6·4	2·1	82·9	43·7	36·0	29·2	23·2	17·7	12·7	8·1	3·8
23500	31·1	27·3	23·3	19·2	15·1	10·8	6·5	2·2	85·2	44·6	36·8	29·8	23·7	18·1	13·0	8·2	3·9
24000	31·8	27·9	23·8	19·7	15·4	11·0	6·6	2·2	87·6	45·6	37·6	30·5	24·2	18·5	13·2	8·4	4·0
24500	32·5	28·5	24·3	20·1	15·7	11·3	6·8	2·3	90·0	46·5	38·4	31·1	24·7	18·9	13·5	8·6	4·1
25000	33·1	29·0	24·8	20·5	16·0	11·5	6·9	2·3	92·5	47·5	39·1	31·7	25·2	19·2	13·8	8·8	4·1
25500	33·8	29·6	25·3	20·9	16·3	11·7	7·1	2·4	94·9	48·4	39·9	32·4	25·7	19·6	14·1	8·9	4·2
26000	34·4	30·2	25·8	21·3	16·7	12·0	7·2	2·4	97·4	49·4	40·7	33·0	26·2	20·0	14·4	9·1	4·3
26500	35·1	30·8	26·3	21·7	17·0	12·2	7·3	2·5	99·9	50·3	41·5	33·7	26·7	20·4	14·6	9·3	4·4
27000	35·8	31·4	26·8	22·1	17·3	12·4	7·5	2·5	102·4	51·3	42·3	34·3	27·2	20·8	14·9	9·5	4·5
27500	36·4	32·0	27·3	22·5	17·6	12·7	7·6	2·5	105·0	52·2	43·1	34·9	27·7	21·2	15·2	9·6	4·6

IV. B −|− L −|− E −|− S = A, the true altitude, in which L, E, and S are the tab. numbers, opp. the approx. alt. B, and respectively under L, E, and S; E and S being always *positive*, and L *positive south* but *negative north* of latitude 45°, where it vanishes.

Hight of the Bar. corresponding to the Temperature of Boiling Water.

Ther.	Bar.	Ther.	Bar.	Ther.	Bar.	Ther.	Bar.	Ther.	Bar.
°	inches.	°	inches.	°	inches.	°	inches.	°	inches.
185·0	17·049	190·9	19·363	196·8	21·943	202·7	24·799	208·6	27·957
·1	·086	191·0	·409	·9	·989	·8	·850	·7	28·013
·2	·123	·1	·450	197·0	22·035	·9	·901	·8	·069
·3	·161	·2	·492	·1	·081	203·0	·952	·9	·126
·4	·198	·3	·534	·2	·128	·1	25·008	209·0	·182
·5	·236	·4	·575	·3	·174	·2	·055	·1	·239
·6	·273	·5	·617	·4	·221	·3	·106	·2	·295
·7	·310	·6	·659	·5	·267	·4	·158	·3	·352
·8	·348	·7	·701	·6	·314	·5	·210	·4	·409
·9	·386	·8	·743	·7	·361	·6	·261	·5	·466
186·0	·424	·9	·785	·8	·407	·7	·313	·6	·523
·1	·462	192·0	·827	·9	·454	·8	·365	·7	·580
·2	·500	·1	·869	198·0	·501	·9	·417	·8	·637
·3	·538	·2	·912	·1	·548	204·0	·469	·9	·695
·4	·576	·3	·954	·2	·595	·1	·521	210·0	·752
·5	·615	·4	·996	·3	·642	·2	·573	·1	·810
·6	·653	·5	20·039	·4	·689	·3	·626	·2	·867
·7	·691	·6	·082	·5	·736	·4	·678	·3	·925
·8	·730	·7	·124	·6	·784	·5	·730	·4	·983
·9	·768	·8	·167	·7	·831	·6	·783	·5	29·041
187·0	·807	·9	·210	·8	·879	·7	·836	·6	·099
·1	·846	193·0	·258	·9	·926	·8	·888	·7	·157
·2	·884	·1	·296	199·0	·974	·9	·941	·8	·215
·3	·923	·2	·339	·1	23·022	205·0	·994	·9	·274
·4	·962	·3	·382	·2	·070	·1	26·047	211·0	·332
·5	18·001	·4	·426	·3	·118	·2	·100	·1	·391
·6	·040	·5	·469	·4	·166	·3	·153	·2	·449
·7	·079	·6	·512	·5	·214	·4	·206	·3	·508
·8	·118	·7	·556	·6	·262	·5	·259	·4	·567
·9	·158	·8	·599	·7	·311	·6	·313	·5	·626
188·0	·197	·9	·643	·8	·359	·7	·366	·6	·685
·1	·236	194·0	·687	·9	·407	·8	·42	·7	·744
·2	·276	·1	·731	200·0	·456	·9	·473	·8	·803
·3	·315	·2	·775	·1	·505	206·0	·527	·9	·863
·4	·355	·3	·819	·2	·553	·1	·581	212·0	·922
·5	·395	·4	·863	·3	·602	·2	·635	·1	·982
·6	·434	·5	·907	·4	·651	·3	·689	·2	30·041
·7	·474	·6	·951	·5	·700	·4	·743	·3	·101
·8	·514	·7	·996	·6	·749	·5	·797	·4	·161
·9	·554	·8	21·040	·7	·798	·6	·852	·5	·221
189·0	·594	·9	·084	·8	·847	·7	·906	·6	·281
·1	·634	195·0	·129	·9	·897	·8	·961	·7	·341
·2	·674	·1	·174	201·0	·946	·9	27·015	·8	·401
·3	·714	·2	·218	·1	·996	207·0	·070	·9	·462
·4	·755	·3	·263	·2	24·045	·1	·125	213·0	·522
·5	·795	·4	·308	·3	·095	·2	·180	·1	·583
·6	·835	·5	·353	·4	·145	·3	·235	·2	·644
·7	·876	·6	·398	·5	·195	·4	·290	·3	·704
·8	·917	·7	·443	·6	·245	·5	·345	·4	·765
·9	·957	·8	·488	·7	·295	·6	·400	·5	·826
190·0	·998	·9	·533	·8	·345	·7	·456	·6	·887
·1	19·039	196·0	·578	·9	·395	·8	·511	·7	·948
·2	·080	·1	·623	202·0	·445	·9	·566	·8	31·009
·3	·121	·2	·669	·1	·495	208·0	·622	·9	·071
·4	·162	·3	·714	·2	·546	·1	·678	214·0	·132
·5	·203	·4	·760	·3	·596	·2	·733	·1	·193
·6	·244	·5	·806	·4	·647	·3	·789	·2	·254
·7	·285	·6	·851	·5	·697	·4	·845	·3	·316
·8	·326	·7	·897	·6	·748	·5	·901	·4	·378
·9	·368	·8	·943	·7	·799	·6	·957	·5	·440

Atmospheric Refraction.

Ap. Al.	M'n Ref.	Ap. Al.	M'n Ref.	Ap. A	M'n Ref.	Barom. B.	Det. The. T
° ′	′ ″	° ′	′ ″	°	′ ″	inch's	°
0 0	34 54·1	9 30	5 32·0	19	2 46·1	27·9 0·943	—18 1·150
10	32 49·2	40	5 26·5	20	2 37·3	28·0 0·946	—16 1·145
20	30 52·3	50	5 21·3	21	2 29·3	28·1 0·949	—14 1·140
30	29 3·5	10 0	5 16·2	22	2 21·9	28·2 0·953	—12 1·135
40	27 22·7	10	5 11·2	23	2 15·2	28·3 0·956	—10 1·130
50	25 49·8	20	5 6·4	24	2 8·9	28·4 0·960	— 8 1·125
1 0	24 24·6	30	5 1·7	25	2 3·2	28·5 0·963	— 6 1·120
10	23 6·7	40	4 57·2	26	1 57·8	28·6 0·966	— 4 1·115
20	21 55·6	50	4 52·8	27	1 52·8	28·7 0·970	— 2 1·110
30	20 50·9	11 0	4 48·5	28	1 48·2	28·8 0·973	0 1·106
40	19 51·9	10	4 44·3	29	1 43·8	28·9 0·976	2 1·101
50	18 58·0	20	4 40·2	30	1 39·7	29·0 0·980	4 1·096
2 0	18 8·6	30	4 36·3	31	1 35·8	29·1 0·983	6 1·091
10	17 23·0	40	4 32·4	32	1 32·1	29·2 0·987	8 1·087
20	16 40·7	50	4 28·7	33	1 28·7	29 3 0·990	10 1·082
30	16 0·9	12 0	4 25·0	34	1 25·4	29·4 0·993	12 1·078
40	15 23·4	10	4 21·4	35	1 22·3	29·5 0·999	14 1·073
50	14 47·8	20	4 18·0	36	1 19·3	29·6 1·000	16 1·069
3 0	14 14·6	30	4 14·6	37	1 16·5	29·7 1·003	18 1·064
10	13 43·7	40	4 11·3	38	1 13·8	29·8 1·007	20 1·060
20	13 15·0	50	4 8·0	39	1 11·2	29·9 1·010	22 1·055
30	12 48·3	13 0	4 4·9	40	1 8·7	30·0 1·014	24 1·051
40	12 23 7	10	4 1·8	41	1 6·3	30·1 1·017	26 1·047
50	12 0·7	20	3 58·8	42	1 4·0	30·2 1·020	28 1·042
4 0	11 38·9	30	3 55·9	43	1 1·8	30·3 1·024	30 1·038
10	11 18·3	40	3 53·0	44	0 59·7	30·4 1·027	32 1·034
20	10 58·6	50	3 50·2	45	0 57·7	30·5 1·031	34 1·030
30	10 39·6	14 0	3 47·4	46	0 55·7	30·6 1·034	36 1·026
40	10 21·2	10	3 44·7	47	0 53·8	30·7 1·037	38 1·022
50	10 3·3	20	3 42·1	48	0 51·9	30·8 1·041	40 1·017
5 0	9 46·5	30	3 39·5	49	0 50·2	30·9 1·044	42 1·013
10	9 30·9	40	3 37·0	50	0 48·4	31·0 1·047	44 1·009
20	9 16·0	50	3 34·5	51	0 46·7	Att. Ther. T.	46 1·005
30	9 1·9	15 0	3 32·1	52	0 45·1	—20° 1·005	48 1·001
40	8 48·4	10	3 29·7	53	0 43·5	—15 1·004	50 0·998
50	8 35·6	20	3 27·4	54	0 41·9	—10 1·004	52 0·994
6 0	8 23·3	30	3 25·1	55	0 40·4	— 5 1·003	54 0·990
10	8 11·6	40	3 22·9	56	0 38·9	0 1·003	56 0·986
20	8 0·3	50	3 20·7	57	0 37·5	5 1·003	58 0·982
30	7 49·5	16 0	3 18·6	58	0 36·1	10 1·002	60 0·978
40	7 39·2	10	3 16·5	59	0 34·7	15 1·002	62 0·975
50	7 29·2	20	3 14·4	60	0 33·3	20 1·001	64 0·971
7 0	7 19·7	30	3 12·4	62	0 30·7	25 1·001	66 0·967
10	7 10·5	40	3 10·4	64	0 28·2	30 1·000	68 0·964
20	7 1·7	50	3 8·5	66	0 25·7	35 1·000	70 0·960
30	6 53·3	17 0	3 6·6	68	0 23·3	40 0·999	72 0·956
40	6 45·1	10	3 4·7	70	0 21·0	45 0 999	74 0·953
50	6 37·2	20	3 2·9	72	0 18·8	50 0·998	76 0·949
8 0	6 29·6	30	3 1 1	74	0 16·6	55 0·998	78 0·946
10	6 22·3	40	2 59·3	76	0 14·4	60 0·997	80 0·942
20	6 15·2	50	2 57·5	78	0 12·3	65 0·997	82 0·939
30	6 8·4	18 0	2 55·8	80	0 10·2	70 0·997	84 0·935
40	6 1 8	10	2 54·1	82	0 8·2	75 0·996	86 0·932
50	5 55·4	20	2 52·4	84	0 6·1	80 0·996	88 0·929
9 0	5 49·3	30	2 50·8	86	0 4·1	85 0·995	90 0·925
10	5 43·3	40	2 49·2	88	0 2·0	90 0·995	92 0·922
20	5 37·6	50	2 47·6	90	0 0·0	95 0·994	94 0·919

M × B × T × T′ = R, the true refraction; in which M is the mean refraction, opposite the apparent altitude; and B, T, and T′, the numbers respectively opposite the hights of the Bar. and the attached and detached Ther's.

Divergency of the Parallel of Latitude and the Prime Vertical.

Dist	28°	30°	32°	34°	36°	38°	40°	42°	44°	46°	48°	Dist
mile	chns	chns	chns	chns	chns	chns.	chns.	chns.	chns.	chns.	chns.	mile
1	0·01	0·01	0·01	0·01	0·01	0·01	0·01	0·01	0·01	0·01	0·01	1
2	0·02	0·02	0·03	0·03	0·03	0·03	0·03	0·04	0·04	0·04	0·04	2
3	0·05	0·05	0·06	0·06	0·07	0·07	0·08	0·08	0·09	0·09	0·10	3
4	0·09	0·09	0·10	0·11	0·12	0·13	0·13	0·14	0·16	0·17	0·18	4
5	0·13	0·14	0·16	0·17	0·18	0·20	0·21	0·23	0·24	0·26	0·28	5
6	0·19	0·21	0·23	0·24	0·26	0·28	0·30	0·33	0·35	0·37	0·40	6
7	0·26	0·28	0·31	0·33	0·36	0·38	0·41	0·44	0·48	0·51	0·55	7
8	0·34	0·37	0·40	0·43	0·47	0·50	0·54	0·58	0·62	0.67	0·71	8
9	0·43	0·47	0·51	0·55	0·59	0 64	0·68	0·73	0·79	0·84	0·90	9
10	0·53	0·58	0·63	0·68	0·73	0·78	0·84	0·90	0·97	1·04	1 11	10
11	0·65	0·70	0·76	0·82	0·88	0·95	1·02	1·09	1·17	1·26	1·35	11
12	0·77	0·83	0·90	0·97	1·05	1·13	1·21	1·30	1·40	1·50	1·61	12
13	0·90	0·98	1·06	1·14	1·23	1·33	1·42	1·53	1·64	1·76	1·88	13
14	1·05	1·14	1·23	1·33	1·43	1·54	1·65	1·77	1·90	2·04	2·19	14
15	1·20	1·30	1·41	1·52	1·64	1·76	1·90	2·03	2·18	2·34	2·51	15
16	1·36	1·48	1·60	1·73	1·87	2·01	2·16	2·32	2 48	2·66	2·85	16
17	1·54	1·67	1·81	1·96	2·11	2·27	2·44	2·61	2·80	3·00	3·22	17
18	1·73	1·88	2·03	2·19	2·36	2·54	2·73	2·93	3·14	3·37	3·61	18
19	1·92	2·09	2·26	2·44	2·63	2·83	3·04	3·26	3·50	3·75	4·03	19
20	2·13	2·32	2·51	2·71	2·92	3·14	3·37	3·62	3·88	4·16	4·46	20
21	2 35	2·55	2·76	2·98	3·22	3·46	3·72	3·99	4·28	4·59	4·92	21
22	2·58	2·80	3·03	3·28	3·53	3·80	4·08	4·38	4·69	5·03	5·40	22
23	2·82	3 06	3·32	3·58	3·86	4·15	4.46	4·78	5·13	5·50	5·90	23
24	3·07	3·34	3·61	3·90	4·20	4·52	4·85	5·21	5·59	5·99	6·42	24
25	3·33	3·62	3·92	4·23	4·56	4·90	5·27	5·65	6 06	6·50	6·97	25
26	3·60	3·91	4·24	4·57	4·93	5·30	5·70	6·11	6·56	7·03	7·54	26
27	3·89	4·22	4·57	4·93	5·32	5·72	6 14	6·59	7·07	7·58	8·13	27
28	4·18	4 54	4·91	5·31	5·72	6·15	6·61	7·09	7·60	8·15	8·74	28
29	4·48	4·87	5·27	5·69	6·13	6·60	7·09	7·61	8·16	8·74	9·38	29
30	4·80	5·21	5·64	6·09	6·56	7·06	7·58	8·14	8·73	9·36	10·04	30
31	5·12	5·57	6·02	6·50	7·01	7·54	8·10	8·69	9·32	9·99	10·72	31
32	5·46	5·93	6·42	6·93	7·47	8·03	8·63	9·26	9·93	10·65	11·42	32
33	5·81	6·31	6·83	7 37	7·94	8·54	9·18	9·85	10·56	11·32	12·14	33
34	6·16	6·69	7·25	7·82	8·43	9·07	9·74	10·45	11·21	12·02	12·89	34
35	6·53	7·09	7·68	8·29	8·93	9·61	10·32	11·08	11·88	12·74	13·66	35
36	6·91	7·51	8·12	8·77	9·45	10·16	10·92	11·72	12·57	13·47	14·45	36

Equivalents of Lineal Measures.

Inches.	Links.	Feet.	Varas.	Yards.	Chains.	Miles.	Sp. Lea.	En. Lea.
1	0·126233	0·083333	0·029965	0·027778	0·001263	0·000016	0·000006	0·000005
7·92	1	0·66	0·237325	0·22	0·01	0·000125	0·000047	0·000042
12	1·515152	1	0·359583	0·333333	0·015152	0·000189	0·000072	0 000063
33·372	4.213636	2·781	1	0·927	0·042136	0·000527	0·0002	0·000176
36	4·545455	3	1·078749	1	0·045455	0·000568	0 000216	0·000189
792	100	66	23·73247	22	1	0·0125	0·004746	0·004167
63360	8000	5280	1898·598	1760	80	1	0·379720	0·333333
166860	21063·18	13905	5000	4635	210·6818	2·633523	1	0·877841
190080	24000	15840	5695·793	5280	240	3	1·139159	1

Equivalents of Superficial Measures.

Varas.	Yards.	Chains.	Acres.	Miles.	Sp. League	Eng Lea.
1	0·859329	0·00177547	0·00017755	0·00000028	0·00000004	0·00000003
1·16369865	1	0·00206612	0·00020661	0·00000032	0·00000005	0·00000004
563·230148	484	1	0·1	0·00015625	0·00002253	0 00001736
5632·30148	4840	10	1	0·0015625	0·00022533	0·00017361
3604672·95	3097600	6400	640	1	0·14418692	0·11111111
25000000	21483225	44386·8285	4438·68285	6·93544195	1	0·77060466
32442056·5	27878400	57600	5760	9	1·29768226	1

PART THIRD.

TRAVERSE TABLE.

SHOWING THE DIFFERENCE OF

LATITUDE AND DEPARTURE

FOR

DISTANCES BETWEEN 1 AND 100;

AND FOR

ANGLES TO QUARTER DEGREES BETWEEN 1° AND 90°,

AND

NATURAL SINES AND TANGENTS

TO EVERY DEGREE AND MINUTE OF THE QUADRANT.

Distance.	¼ Deg.		½ Deg.		¾ Deg.		Distance.
	Lat.	Dep.	Lat.	Dep.	Lat.	Dep.	
1	1·00	0·00	1·00	0·01	1·00	0·01	1
2	2·00	0·01	2·00	0·02	2·00	0·03	2
3	3·00	0·01	3·00	0·03	3·00	0·04	3
4	4·00	0·02	4·00	0·03	4·00	0·05	4
5	5·00	0·02	5·00	0·04	5·00	0·07	5
6	6·00	0·03	6·00	0·05	6·00	0·08	6
7	7·00	0·03	7·00	0·06	7·00	0·09	7
8	8·00	0·03	8·00	0·07	8·00	0·10	8
9	9·00	0·04	9·00	0·08	9·00	0·12	9
10	10·00	0·04	10.00	0·09	10·00	0.13	10
11	11·00	0·05	11·00	0·10	11·00	0·14	11
12	12·00	0·05	12·00	0·10	12·00	0·16	12
13	13·00	0·06	13·00	0.11	13·00	0·17	13
14	14·00	0·06	14·00	0·12	14·00	0.18	14
15	15·00	0·07	15·00	0·13	15·00	0·20	15
16	16·00	0·07	16·00	0·14	16.00	0·21	16
17	17·00	0·07	17·00	0·15	17·00	0·22	17
18	18·00	0·08	18·00	0·16	18·00	0·24	18
19	19·00	0·08	19·00	0·17	19·00	0·25	19
20	20·00	0·09	20·00	0·17	20·00	0·26	20
21	21·00	0·09	21·00	0·18	21·00	0·27	21
22	22·00	0·10	22·00	0·19	22·00	0·29	22
23	23·00	0·10	23·00	0·20	23·00	0·30	23
24	24·00	0·10	24·00	0·21	24·00	0·31	24
25	25·00	0·11	25·00	0·22	25·00	0·33	25
26	26·00	0·11	26·00	0·23	26.00	0·34	26
27	27·00	0·12	27·00	0·24	27·00	0·35	27
28	28·00	0·12	28·00	0·24	28·00	0·37	28
29	29·00	0.13	29·00	0·25	29·00	0·38	29
30	30·00	0·13	30·00	0·26	30·00	0·39	30
31	31·00	0·14	31·00	0.27	31·00	0·41	31
32	32·00	0·14	32·00	0·28	32·00	0·42	32
33	33·00	0·14	33·00	0·29	33·00	0·43	33
34	34·00	0·15	34·00	0·30	34·00	0·45	34
35	35·00	0·15	35·00	0·31	35·00	0·46	35
36	36·00	0·16	36·00	0·31	36·00	0·47	36
37	37·00	0·16	37·00	0·32	37·00	0·48	37
38	38·00	0·17	38·00	0·33	38·00	0·50	38
39	39·00	0·17	39·00	0·34	39·00	0·51	39
40	40·00	0·17	40·00	0·35	40·00	0·52	40
41	41·00	0·18	41·00	0.36	41·00	0·54	41
42	42·00	0·18	42·00	0·37	42·00	0·55	42
43	43·00	0·19	43·00	0·38	43·00	0·56	43
44	44·00	0·19	44·00	0.38	44·00	0·58	44
45	45·00	0·20	45·00	0·39	45·00	0·59	45
46	46·00	0·20	46·00	0·40	46·00	0·60	46
47	47·00	0·21	47·00	0·41	47·00	0·62	47
48	48·00	0·21	48·00	0·42	48·00	0·63	48
49	49·00	0·21	49·00	0·43	49·00	0·64	49
50	50·00	0·22	50·00	0·44	50·00	0·65	50
Distance.	Dep.	Lat.	Dep.	Lat.	Dep.	Lat.	Distance.
	89 ¾ Deg.		89½ Deg.		89¼ Deg.		

Distance.	¼ Deg.		½ Deg.		¾ Deg.		Distance.
	Lat.	Dep.	Lat.	Dep.	Lat.	Dep.	
51	51·00	0·22	51·00	0·45	51·00	0·67	51
52	52·00	0·23	52·00	0·45	52·00	0·68	52
53	53·00	0·23	53·00	0·46	53·00	0·69	53
54	54·00	0·24	54·00	0·47	54·00	0·71	54
55	55·00	0·24	55·00	0·48	55·00	0·72	55
56	56·00	0·24	56·00	0·49	56·00	0·73	56
57	57·00	0·25	57·00	0·50	57·00	0·75	57
58	58·00	0·25	58·00	0·51	57·99	0·76	58
59	59·00	0·26	59·00	0·51	58·99	0·77	59
60	60·00	0·26	60·00	0·52	59·99	0·79	60
61	61·00	0·27	61·00	0·53	60·99	0·80	61
62	62·00	0·27	62·00	0·54	61·99	0·81	62
63	63·00	0·27	63·00	0·55	62·99	0·82	63
64	64·00	0·28	64·00	0·56	63·99	0·84	64
65	65·00	0·28	65·00	0·57	64·99	0·85	65
66	66·00	0·29	66·00	0·58	65·99	0·86	66
67	67·00	0·29	67·00	0·58	66·99	0·88	67
68	68·00	0·30	68·00	0·59	67·99	0·89	68
69	69·00	0·30	69·00	0·60	68·99	0·90	69
70	70·00	0·31	70·00	0·61	69·99	0·92	70
71	71·00	0·31	71·00	0·62	70·99	0·93	71
72	72·00	0·31	72·00	0·63	71·99	0·94	72
73	73·00	0·32	73·00	0·64	72·99	0·96	73
74	74·00	0·32	74·00	0·65	73·99	0·97	74
75	75·00	0·33	75·00	0·65	74·99	0·98	75
76	76·00	0·33	76·00	0·66	75·99	0·99	76
77	77·00	0·34	77·00	0·67	76·99	1·01	77
78	78·00	0·34	78·00	0·68	77·99	1·02	78
79	79·00	0·34	79·00	0·69	78·99	1·03	79
80	80·00	0·35	80·00	0·70	79·99	1·05	80
81	81·00	0·35	81·00	0·71	80·99	1·06	81
82	82·00	0·36	82·00	0·72	81·99	1·07	82
83	83·00	0·36	83·00	0·72	82·99	1·09	83
84	84·00	0·37	84·00	0·73	83·99	1·10	84
85	85·00	0·37	85·00	0·74	84·99	1·11	85
86	86·00	0·38	86·00	0·75	85·99	1·13	86
87	87·00	0·38	87·00	0·76	86·99	1·14	87
88	88·00	0·38	88·00	0·77	87·99	1·15	88
89	89·00	0·39	89·00	0·78	88·99	1·16	89
90	90·00	0·39	90·00	0·79	89·99	1·18	90
91	91·00	0·40	91·00	0·79	90·99	1·19	91
92	92·00	0·40	92·00	0·80	91·99	1·20	92
93	93·00	0·41	93·00	0·81	92·99	1·22	93
94	94·00	0·41	94·00	0·82	93·99	1·23	94
95	95·00	0·41	95·00	0·83	94·99	1·24	95
96	96·00	0·42	96·00	0·84	95·99	1·26	96
97	97·00	0·42	97·00	0·85	96·99	1·27	97
98	98·00	0·43	98·00	0·86	97·99	1·28	98
99	99·00	0·43	99·00	0·86	98·99	1·30	99
100	100·00	0·44	100·00	0·87	99·99	1·31	100
Distance.	Dep.	Lat.	Dep.	Lat.	Dep.	Lat.	Distance.
	89¾ Deg.		89½ Deg.		89¼ Deg.		

Distance.	1 Deg.		1¼ Deg.		1½ Deg.		1¾ Deg.		Distance.
	Lat.	Dep.	Lat.	Dep.	Lat.	Dep.	Lat.	Dep.	
1	1·00	0·02	1·00	0·02	1·00	0·03	1·00	0·03	1
2	2·00	0·03	2·00	0·04	2·00	0·05	2·00	0·06	2
3	3·00	0·05	3·00	0·07	3·00	0·08	3·00	0·09	3
4	4·00	0·07	4·00	0·09	4·00	0·10	4·00	0·12	4
5	5·00	0·09	5·00	0·11	5·00	0·13	5·00	0·15	5
6	6·00	0·10	6·00	0·13	6·00	0·16	6·00	0·18	6
7	7·00	0·12	7·00	0·15	7·00	0·18	7·00	0·21	7
8	8·00	0·14	8·00	0·17	8·00	0·21	8·00	0·25	8
9	9·00	0·16	9·00	0·20	9·00	0·24	9·00	0·28	9
10	10·00	0·17	10·00	0·22	10·00	0·26	10·00	0·31	10
11	11·00	0·19	11·00	0·24	11·00	0·28	10·99	0·34	11
12	12·00	0·21	12·00	0·26	12·00	0·31	11·99	0·37	12
13	13·00	0·23	13·00	0·28	13·00	0·34	12·99	0·40	13
14	14·00	0·24	14·00	0·31	14·00	0·37	13·99	0·43	14
15	15·00	0·26	15·00	0·33	14·99	0·39	14·99	0·46	15
16	16·00	0·28	16·00	0·35	15·99	0·42	15·99	0·49	16
17	17·00	0·30	17·00	0·37	16·99	0·45	16·99	0·52	17
18	18·00	0·31	18·00	0·39	17·99	0·47	17·99	0·55	18
19	19·00	0·33	19·00	0·41	18·99	0·50	18·99	0·58	19
20	20·00	0·35	20·00	0·44	19·99	0·52	19·99	0·61	20
21	21·00	0·77	21·00	0·46	20·99	0·55	20·99	0·64	21
22	22·00	0·38	21·99	0·48	21·99	0·58	21·99	0·67	22
23	23·00	0·40	22·99	0·50	22·99	0·60	22·99	0·70	23
24	24·00	0·42	23·99	0·52	23·99	0·63	23·99	0·73	24
25	25·00	0·44	24·99	0·55	24·99	0·65	24·99	0·76	25
26	26·00	0·45	25·99	0·57	25·99	0·68	25·99	0·79	26
27	27·00	0·47	26·99	0·59	26·99	0·71	26·99	0·83	27
28	28·00	0·49	27·99	0·61	27·99	0·73	27·99	0·86	28
29	29·00	0·51	28·99	0·63	28·99	0·76	28·99	0·89	29
30	30·00	0·52	29·99	0·65	29·99	0·79	29·99	0·92	30
31	31·00	0·54	30·99	0·68	30·99	0·81	30·99	0·95	31
32	32·00	0·56	31·99	0·70	31·99	0·84	31·99	0·98	32
33	32·99	0·58	32·99	0·72	32·99	0·86	32·98	1·01	33
34	33·99	0·59	33·99	0·74	33·99	0·89	33·98	1·04	34
35	34·99	0·61	34·99	0·76	34·99	0·92	34·98	1·07	35
36	35·99	0·63	35·99	0·79	35·99	0·94	35·98	1·10	36
37	36·99	0·65	36·99	0·81	36·99	0·97	36·98	1·13	37
38	37·99	0·66	37·99	0·83	37·99	0·99	37·98	1·16	38
39	38·99	0·68	38·99	0·85	38·99	1·02	38·98	1·19	39
40	39·99	0·70	39·99	0·87	39·99	1·05	39·98	1·22	40
41	40·99	0·72	40·99	0·89	40·99	1·07	40·98	1·25	41
42	41·99	0·73	41·99	0·92	41·99	1·10	41·98	1·28	42
43	42·99	0·75	42·99	0·94	42·99	1·13	42·98	1·31	43
44	43·99	0·77	43·99	0·96	43·99	1·15	43·98	1·34	44
45	44·99	0·79	44·99	0·98	44·99	1·18	44·98	1·37	45
46	45·99	0·80	45·99	1·00	45·99	1·20	45·98	1·40	46
47	46·99	0·82	46·99	1·03	46·99	1·24	46·98	1·44	47
48	47·99	0·84	47·99	1·05	47·99	1·26	47·98	1·47	48
49	48·99	0·86	48·99	1·07	48·99	1·78	48·98	1·50	49
50	49·99	0·87	49·99	1·09	49·99	1·31	49·98	1·53	50
Distance.	Dep.	Lat.	Dep.	Lat.	Dep.	Lat.	Dep.	Lat.	Distance.
	89 Deg.		88¾ Deg.		88½ Deg.		88¼ Deg.		

Distance.	1 Deg.		1¼ Deg.		1½ Deg.		1¾ Deg.		Distance.
	Lat.	Dep.	Lat.	Dep.	Lat.	Dep.	Lat.	Dep.	
51	50·99	0·89	50·99	1·11	50·98	1·34	50·98	1·56	51
52	51·99	0·91	51·99	1·13	51·98	1·36	51·98	1·59	52
53	52·99	0·92	52·99	1·16	52·98	1·39	52·98	1·62	53
54	53·99	0·94	53·99	1·18	53·98	1·41	53·97	1·65	54
55	54·99	0·96	54·99	1·20	54·98	1·44	54·97	1·68	55
56	55·99	0·98	55·99	1·22	55·98	1·47	55·97	1·71	56
57	56·99	0·99	56·99	1·24	56·98	1·49	56·97	1·74	57
58	57·99	1·01	57·99	1·27	57·98	1·52	57·97	1·77	58
59	58·99	1·03	58·99	1·29	58·98	1·54	58·97	1·80	59
60	59·99	1·05	59·99	1·31	59·98	1·57	59·97	1·83	60
61	60·99	1·06	60·99	1·33	60·98	1·60	60·97	1·86	61
62	61·99	1·08	61·99	1·35	61·98	1·62	61·97	1·89	62
63	62·99	1·10	62·99	1·37	62·98	1·65	62·97	1·92	63
64	63·99	1·12	63·98	1·40	63·98	1·68	63·97	1·95	64
65	64·99	1·13	64·98	1·42	64·98	1·70	64·97	1·99	65
66	65·99	1·15	65·98	1·44	65·98	1·73	65·97	2·02	66
67	66·99	1·17	66·98	1·46	66·98	1·75	66·97	2·05	67
68	67·99	1·19	67·98	1·48	67·98	1·78	67·97	2·08	68
69	68·99	1·20	68·98	1·51	68·98	1·81	68·97	2·11	69
70	69·99	1·22	69·98	1·53	69·98	1·83	69·97	2·14	70
71	70·99	1·24	70·98	1·55	70·98	1·86	70·97	2·17	71
72	71·99	1·26	71·98	1·57	71·98	1·88	71·97	2·20	72
73	72·99	1·27	72·98	1·59	72·97	1.91	72·97	2·23	73
74	73·99	1·29	73·98	1·61	73·97	1·94	73·97	2·26	74
75	74·99	1·31	74·98	1·64	74·97	1·96	74·97	2·29	75
76	75·99	1·33	75·98	1·66	75·97	1·99	75·96	2·32	76
77	76·99	1·34	76·98	1·68	76·97	2·02	76·96	2·35	77
78	77·99	1·36	77·98	1·70	77·97	2·04	77·96	2·38	78
79	78·99	1·38	78·98	1·72	78·97	2·07	78·96	2·41	79
80	79·99	1·40	79·98	1·75	79·97	2·09	79·96	2·44	80
81	80·99	1·41	80·98	1·77	80·97	2·12	80·96	2·47	81
82	81·99	1·43	81·98	1·79	81·97	2·15	81·96	2·50	82
83	82·99	1·45	82·98	1·81	82·97	2·17	82·96	2·53	83
84	83·99	1·47	83·98	1·83	83·97	2·20	83·96	2·57	84
85	84·99	1·48	84·98	1·85	84·97	2·23	84·96	2·60	85
86	85·99	1·50	85·98	1·88	85·97	2·25	85·96	2·63	86
87	86·99	1·52	86·98	1·90	86·97	2·28	86·96	2·66	87
88	87·99	1·54	87·98	1·92	87·97	2·30	87·96	2·69	88
89	88·99	1·55	88·98	1·94	88·97	2·33	88·96	2·72	89
90	89·99	1·57	89·98	1·96	89·97	2·36	89·96	2·75	90
91	90·99	1·59	90·98	1·99	90·97	2·38	90·96	2·78	91
92	91·99	1·61	91·98	2·01	91·97	2·41	91·96	2·81	92
93	92·99	1·62	92·98	2·03	92·97	2·43	92·96	2·84	93
94	93·99	1·64	93·98	2·05	93·97	2·46	93·96	2·87	94
95	94·99	1·66	94·98	2·07	94·97	2·49	94·96	2·90	95
96	95·99	1·68	95·98	2·09	95·97	2·51	95·96	2·94	96
97	96·99	1·69	96·98	2·12	96·97	2.54	96·95	2·96	97
98	97·99	1·71	97·98	2·14	97·97	2·57	97·95	2·99	98
99	98·98	1·73	98·98	2·16	98·97	2·59	98·95	3·02	99
100	99·98	1·75	99·98	2·18	99·97	2·62	99·95	3·05	100
Distance.	Dep.	Lat.	Dep.	Lat.	Dep.	Lat.	Dep.	Lat.	Distance.
	89 Deg.		88¾ Deg.		88½ Deg.		88¼ Deg.		

Distance.	2 Deg.		2¼ Deg.		2½ Deg.		2¾ Deg.		Distance.
	Lat.	Dep.	Lat.	Dep.	Lat.	Dep.	Lat.	Dep.	
1	1·00	0·03	1·00	0·04	1·00	0·04	1·00	0·05	1
2	2·00	0·07	2·00	0·08	2·00	0·09	2·00	0·10	2
3	3·00	0·10	3·00	0·12	3·00	0·13	3·00	0·14	3
4	4·00	0·14	4·00	0·16	4·00	0·17	4·00	0·19	4
5	5·00	0·17	5·00	0·20	5·00	0·22	4·99	0·24	5
6	6·00	0·21	6·00	0·24	5·99	0·26	5·99	0·29	6
7	7·00	0·24	6·99	0·27	6·99	0·31	6·99	0·34	7
8	7·99	0·28	7·99	0·31	7·99	0·35	7·99	0·38	8
9	8·99	0·31	8·99	0·35	8·99	0·39	8·99	0·43	9
10	9·99	0·35	9·99	0·39	9·99	0·44	9·99	0·48	10
11	10·99	0·38	10·99	0·43	10·99	0·48	10·99	0·53	11
12	11·99	0·42	11·99	0·47	11·99	0·52	11·99	0·58	12
13	12·99	0·45	12·99	0·51	12·99	0·57	12·99	0·62	13
14	13·99	0·49	13·99	0·55	13·99	0·61	13·98	0·67	14
15	14·99	0·52	14·99	0·59	14·99	0·65	14·98	0·72	15
16	15·99	0·56	15·99	0·63	15·99	0·70	15·98	0·77	16
17	16·99	0·59	16·99	0·67	16·98	0·74	16·98	0·82	17
18	17·99	0·63	17·99	0·71	17·98	0·79	17·98	0·86	18
19	18·99	0·66	18·99	0·75	18·98	0·83	18·98	0·91	19
20	19·99	0·70	19·98	0·79	19·98	0·87	19·98	0·96	20
21	20·99	0·73	20·98	0·82	20·98	0·92	20·98	1·01	21
22	21·99	0·77	21·98	0·86	21·98	0·96	21·97	1·06	22
23	22·99	0·80	22·98	0·90	22·98	1·00	22·97	1·10	23
24	23·99	0·84	23·98	0·94	23·98	1·05	23·97	1·15	24
25	24·98	0·87	24·98	0·98	24·98	1·09	24·97	1·20	25
26	25·98	0·91	25·98	1·02	25·98	1·13	25·97	1·25	26
27	26·98	0·94	26·98	1·06	26·97	1·18	26·97	1·30	27
28	27·98	0·98	27·98	1·10	27·97	1·22	27·97	1·34	28
29	28·98	1·01	28·98	1·14	28·97	1·26	28·97	1·39	29
30	29·98	1·05	29·98	1·18	29·97	1·31	29·97	1·44	30
31	30·98	1·08	30·98	1·22	30·97	1·35	30·96	1·49	31
32	31·98	1·12	31·98	1·26	31·97	1·40	31·96	1·54	32
33	32·98	1·15	32·97	1·30	32·97	1·44	32·96	1·58	33
34	33·98	1·19	33·97	1·33	33·97	1·48	33·96	1·63	34
35	34·98	1·22	34·97	1·37	34·97	1·53	34·96	1·68	35
36	35·98	1.26	35·97	1·41	35·97	1·57	35·96	1·73	36
37	36·98	1·29	36·97	1·45	36·96	1·61	36·96	1·78	37
38	37·98	1·33	37·97	1·49	37·96	1·66	37·96	1·82	38
39	38·98	1·36	38·97	1·53	38·96	1·70	38·96	1·87	39
40	39·98	1·40	39·97	1·57	39·96	1·75	39·95	1·92	40
41	40·98	1·43	40·97	1·61	40·96	1·77	40·95	1·97	41
42	41·97	1·47	41·97	1·65	41·96	1·83	41·95	2·02	42
43	42·97	1·50	42·97	1·69	42·96	1·88	42·95	2·06	43
44	43·97	1·54	43·97	1·73	43·96	1·92	43.95	2·11	44
45	44·97	1·57	44·97	1·77	44·96	1·96	44·95	2·16	45
46	45·97	1·61	45·96	1·81	45·96	2·01	45·95	2·21	46
47	46·97	1·64	46·96	1·85	46·96	2·05	46·95	2·25	47
48	47·97	1·68	47·96	1·88	47·95	2·09	47·95	2·30	48
49	48·97	1·71	48·96	1·92	48·95	2·14	48·94	2·35	49
50	49·97	1·74	49·96	1·96	49·95	2·18	49·94	2·40	50
Distance.	Dep.	Lat.	Dep.	Lat.	Dep.	Lat.	Dep.	Lat.	Distance.
	88 Deg.		87¾ Deg.		87½ Deg.		87¼ Deg.		

Distance.	2 Deg.		2¼ Deg.		2½ Deg.		2¾ Deg.		Distance.
	Lat.	Dep.	Lat.	Dep.	Lat.	Dep.	Lat.	Dep.	
51	50·97	1·78	50·96	2·00	50·95	2·22	50·94	2·45	51
52	51·97	1·81	51·96	2·04	51·95	2·27	51·94	2·50	52
53	52·97	1·85	52·96	2·08	52·95	2·31	52·94	2·54	53
54	53·97	1·88	53·96	2·12	53·95	2·36	53·94	2·59	54
55	54·97	1·92	54·96	2·16	54·95	2·40	54·94	2·64	55
56	55·97	1·95	55·96	2·20	55·95	2·44	55·94	2·69	56
57	56·97	1·99	56·96	2·24	56·95	2·49	56·93	2·73	57
58	57·96	2·02	57·96	2·28	57·94	2·53	57·93	2·78	58
59	58·96	2·06	58·95	2·32	58·94	2·57	58·93	2·83	59
60	59·96	2·09	59·95	2·36	59·94	2·62	59·93	2·88	60
61	60·96	2·13	60·95	2·39	60·94	2·66	60·93	2·93	61
62	61·96	2·16	61·95	2·43	61·94	2·70	61·93	2·97	62
63	62·96	2·20	62·95	2·47	62·94	2·75	62·93	3·02	63
64	63·96	2·23	63·95	2·51	63·94	2·79	63·93	3·07	64
65	64·96	2·27	64·95	2·55	64·94	2·84	64·93	3·12	65
66	65·96	2·30	65·95	2·59	65·94	2·88	65·92	3·17	66
67	66·96	2·34	66·95	2·63	66·94	2·92	66·92	3·21	67
68	67·96	2·37	67·95	2·67	67·94	2·97	67·92	3·26	68
69	68·96	2·41	68·95	2·71	68·93	3·01	68·92	3·31	69
70	69·96	2·44	69·95	2·75	69·93	3·05	69·92	3·36	70
71	70·96	2·48	70·95	2·79	70·93	3·10	70·92	3·41	71
72	71·96	2·51	71·94	2·83	71·93	3·14	71·92	3·45	72
73	72·96	2·55	72·94	2·87	72·93	3·18	72·92	3·50	73
74	73·95	2·58	73·94	2·91	73·93	3·23	73·91	3·55	74
75	74·95	2·62	74·94	2·94	74·93	3·27	74·91	3·60	75
76	75·95	2·65	75·94	2·98	75·93	3·31	75·91	3·65	76
77	76·95	2·69	76·94	3·02	76·93	3·36	76·91	3·70	77
78	77·95	2·72	77·94	3·06	77·93	3·40	77·91	3·74	78
79	78·95	2·76	78·94	3·10	78·92	3·45	78·91	3·79	79
80	79·95	2·79	79·94	3·14	79·92	3·49	79·91	3·84	80
81	80·95	2·83	80·94	3·18	80·92	3·53	80·91	3·89	81
82	81·95	2·86	81·94	3·22	81·92	3·58	81·91	3·93	82
83	82·95	2·90	82·94	3·26	82·92	3·62	82·90	3·98	83
84	83·95	2·93	83·94	3·30	83·92	3·66	83·90	4·03	84
85	84·95	2·97	84·93	3·34	84·92	3·71	84·90	4·08	85
86	85·95	3·00	85·93	3·38	85·92	3·75	85·90	4·13	86
87	86·95	3·04	86·93	3·42	86·92	3·79	86·90	4·17	87
88	87·95	3·07	87·93	3·45	87·92	3·84	87·90	4·22	88
89	88·95	3·11	88·93	3·49	88·92	3·88	88·90	4·27	89
90	89·95	3·14	89·93	3·53	89·91	3·93	89·90	4·32	90
91	90·95	3·18	90·93	3·57	90·91	3·97	90·90	4·37	91
92	91·94	3·21	91·93	3·61	91·91	4·01	91·89	4·41	92
93	92·94	3·25	92·93	3·65	92·91	4·06	92·89	4·46	93
94	93·94	3·28	93·93	3·69	93·91	4·10	93·89	4·51	94
95	94·94	3·32	94·93	3·73	94·91	4·14	94·89	4·56	95
96	95·94	3·35	95·93	3·77	95·91	4·19	95·89	4·61	96
97	96·94	3·39	96·93	3·81	96·91	4·23	96·89	4·65	97
98	97·94	3·42	97·92	3·85	97·91	4·27	97·89	4·70	98
99	98·94	3·46	98·92	3·89	98·91	4·32	98·89	4·75	99
100	99·94	3·49	99·92	3·93	99·91	4·36	99·88	4·80	100
Distance.	Dep.	Lat.	Dep.	Lat.	Dep.	Lat.	Dep.	Lat.	Distance.
	88 Deg.		87¾ Deg.		87½ Deg.		87¼ Deg.		

Distance.	3 Deg.		3¼ Deg.		3½ Deg.		3¾ Deg.		Distance.
	Lat.	Dep.	Lat.	Dep.	Lat.	Dep.	Lat.	Dep.	
1	1·00	0·05	1·00	0·06	1·00	0·06	1·00	0·06	1
2	2·00	0·10	2·00	0·11	2·00	0·12	2·00	0·13	2
3	3·00	0·16	3·00	0·17	2·99	0·18	2·99	0·20	3
4	3·99	0·21	3·99	0·23	3·99	0·24	3·99	0·26	4
5	4·99	0·26	4·99	0·28	4·99	0·31	4·99	0·33	5
6	5·99	0·31	5·99	0·34	5·99	0·37	5·99	0·39	6
7	6·99	0·37	6·99	0·40	6·99	0·43	6·99	0·46	7
8	7·99	0·42	7·99	0·45	7·99	0·49	7·98	0·52	8
9	8·99	0·47	8·99	0·51	8·98	0·55	8·98	0·59	9
10	9·99	0·52	9·98	0·57	9·98	0·61	9·98	0·65	10
11	10·98	0·58	10·98	0·62	10·98	0·67	10·98	0·72	11
12	11·98	0·63	11·98	0·68	11·98	0·73	11·97	0·78	12
13	12·98	0·68	12·98	0·73	12·98	0·79	12·97	0·85	13
14	13·98	0·73	13·98	0·79	13·97	0·85	13·97	0·92	14
15	14·98	0·79	14·98	0·85	14·97	0·92	14·97	0·98	15
16	15·98	0·84	15.97	0·91	15·97	0·98	15·97	1·05	16
17	16·98	0·89	16·97	0·96	16·97	1·04	16·96	1·11	17
18	17·98	0·94	17·97	1·02	17·97	1·10	17·96	1·18	18
19	18·98	0·99	18·97	1·08	18·96	1·16	18·96	1·24	19
20	19·97	1·05	19·97	1·13	19·96	1·22	19·96	1·31	20
21	20·97	1·10	20·97	1·19	20·96	1·28	20·96	1·37	21
22	21·97	1·15	21·96	1·25	21·96	1·34	21·95	1·44	22
23	22·97	1·20	22·96	1·30	22·96	1·40	22·95	1·50	23
24	23·97	1·26	23·96	1·36	23·96	1·47	23·95	1·57	24
25	24·97	1·31	24·96	1·42	24·95	1·53	24·95	1·64	25
26	25·96	1·36	25·96	1·47	25·95	1·59	25·94	1·70	26
27	26·96	1·41	26·96	1·53	26·95	1·65	26·94	1·77	27
28	27·96	1·47	27·95	1·59	27·95	1·71	27·94	1·83	28
29	28·96	1·52	28·95	1·64	28·95	1·77	28·94	1·90	29
30	29·96	1·57	29·95	1·70	29·94	1·83	29·94	1·96	30
31	30·96	1·62	30·95	1·76	30·94	1·89	30·93	2·03	31
32	31·96	1·67	31·95	1·81	31·94	1·95	31·93	2·09	32
33	32·95	1·73	32·95	1·87	32·94	2·01	32·93	2·16	33
34	33·95	1·78	33·95	1·93	33·94	2·08	33·93	2·22	34
35	34·95	1·83	34·94	1·98	34·93	2·14	34·92	2·29	35
36	35·95	1·88	35·94	2·04	35·93	2·20	35·92	2·35	36
37	36·95	1·94	36·94	2·10	36·93	2·26	36·92	2·42	37
38	37·95	1·99	37·94	2·15	37·93	2·32	37·92	2·49	38
39	38·95	2·04	38·94	2·21	38·93	2·38	38·92	2·55	39
40	39·95	2·09	39·94	2·27	39·93	2·44	39·91	2·62	40
41	40·94	2·15	40·93	2·32	40·92	2·50	40·91	2·68	41
42	41·94	2·20	41·93	2·38	41·92	2·56	41·91	2·75	42
43	42·94	2·25	42·93	2·44	42·92	2·63	42·91	2·81	43
44	43·94	2·30	43·93	2·49	43·92	2·69	43·91	2·88	44
45	44·94	2·36	44·93	2·55	44·92	2·75	44·90	2·94	45
46	45·94	2·41	45·93	2·61	45·91	2·81	45·90	3·01	46
47	46·94	2·46	46·92	2·66	46·91	2·87	46·90	3·07	47
48	47·93	2·51	47·92	2·72	47·91	2·93	47·90	3·14	48
49	48·93	2.56	48·92	2·78	48·91	2·99	48·90	3·20	49
50	49·93	2·62	49·92	2·83	49·91	3·05	49·89	3·27	50
Distance.	Dep.	Lat.	Dep.	Lat.	Dep.	Lat.	Dep.	Lat.	Distance.
	87 Deg.		86¾ Deg.		86½ Deg.		86¼ Deg.		

Distance.	3 Deg.		3¼ Deg.		3½ Deg.		3¾ Deg.		Distance.
	Lat.	Dep.	Lat.	Dep.	Lat.	Dep.	Lat.	Dep.	
51	50·93	2·67	50·92	2·89	50·90	3·11	50·89	3·34	51
52	51·93	2·72	51·92	2·95	51·90	3·17	51·89	3·40	52
53	52·93	2·77	52·91	3·00	52·90	3·24	52·89	3·47	53
54	53·93	2·83	53·91	3·06	53·90	3·30	53·88	3·53	54
55	54·92	2·88	54·91	3·12	54·90	3·36	54·88	3·60	55
56	55·92	2·93	55·91	3·17	55·90	3·42	55·88	3·66	56
57	56·92	2·98	56·91	3·23	56·89	3·48	56·88	3·73	57
58	57·92	3·04	57·91	3·29	57·89	3·54	57·88	3·79	58
59	58·92	3·09	58·91	3·34	58·89	3·60	58·87	3·86	59
60	59·92	3·14	59·90	3·40	59·89	3·66	59·87	3·92	60
61	60·92	3·19	60·90	3·46	60·89	3·72	60·87	3·99	61
62	61·92	3·24	61·90	3·51	61·88	3·79	61·87	4·05	62
63	62·91	3·30	62·90	3·57	62·88	3·85	62·87	4·12	63
64	63·91	3·35	63·90	3·63	63·88	3·91	63·86	4·19	64
65	64·91	3·40	64·90	3·69	64·88	3·97	64·86	4·25	65
66	65·91	3·45	65·89	3·74	65·88	4·03	65·86	4·32	66
67	66·91	3·51	66·89	3·80	66·88	4·09	66·86	4·38	67
68	67·91	3·56	67·89	3·86	67·87	4·15	67·85	4·45	68
69	68·91	3·61	68·89	3·91	68·87	4·21	68·85	4·51	69
70	69·90	3·66	69·89	3·97	69·87	4·27	69·85	4·58	70
71	70·90	3·72	70·89	4·03	70·87	4·33	70·85	4·64	71
72	71·90	3·77	71·88	4·08	71·87	4·40	71·85	4·71	72
73	72·90	3·82	72·88	4·14	72·86	4·46	72·84	4·77	73
74	73·90	3·87	73·88	4·20	73·86	4·52	73·84	4·84	74
75	74·90	3·93	74·88	4·25	74·86	4·58	74·84	4·91	75
76	75·90	3·98	75·88	4·31	75·86	4·64	75·84	4·97	76
77	76·89	4·03	76·88	4·37	76·86	4·70	76·84	5·04	77
78	77·89	4·08	77·87	4·42	77·85	4·76	77·83	5·10	78
79	78·89	4·13	78·87	4·48	78·85	4·82	78·83	5·17	79
80	79·89	4·19	79·87	4·54	79·85	4·88	79·83	5·23	80
81	80·89	4·24	80·87	4·59	80·85	4·94	80·83	5·30	81
82	81·89	4·29	81·87	4·65	81·85	5·01	81·82	5·36	82
83	82·89	4·34	82·87	4·71	82·85	5·07	82·82	5·43	83
84	83·88	4·40	83·86	4·76	83·84	5·13	83·82	5·49	84
85	84·88	4·45	84·86	4·82	84·84	5·19	84·82	5·56	85
86	85·88	4·50	85·86	4·88	85·84	5·25	85·82	5·62	86
87	86·88	4·55	86·86	4·93	86·84	5·31	86·81	5·69	87
88	87·88	4·61	87·86	4·99	87·84	5·37	87·81	5·76	88
89	88·88	4·66	88·86	5·05	88·83	5·43	88·81	5·82	89
90	89·88	4·71	89·86	5·10	89·83	5·49	89·81	5·89	90
91	90·88	4·76	90·85	5·16	90·83	5·56	90·81	5·95	91
92	91·87	4·81	91·85	5·22	91·83	5·62	91·80	6·02	92
93	92·87	4·87	92·85	5·27	92·83	5·68	92·80	6·08	93
94	93·87	4·92	93·85	5·33	93·82	5·74	93·80	6·15	94
95	94·87	4·97	94·85	5·39	94·82	5·80	94·80	6·21	95
96	95·87	5·02	95·85	5·44	95·82	5·86	95·79	6·28	96
97	96·87	5·08	96·84	5·50	96·82	5·92	96·79	6·34	97
98	97·87	5·13	97·84	5·56	97·82	5·98	97·79	6·41	98
99	98·86	5·18	98·84	5·61	98·82	6·04	98·79	6·47	99
100	99·86	5·23	99·84	5·67	99·81	6·10	99·79	6·54	100
Distance.	Dep.	Lat.	Dep.	Lat.	Dep.	Lat.	Dep.	Lat.	Distance.
	87 Deg.		86¾ Deg.		86½ Deg.		86¼ Deg.		

Distance.	4 Deg.		4¼ Deg.		4½ Deg.		4¾ Deg.		Distance.
	Lat.	Dep.	Lat.	Dep.	Lat.	Dep.	Lat.	Dep.	
1	1·00	0·07	1·00	0·07	1·00	0·08	1·00	0·08	1
2	2·00	0·14	1·99	0·15	1·99	0·16	1·99	0·17	2
3	2·99	0·21	2·99	0·22	2·99	0·24	2·99	0·25	3
4	3·99	0·28	3·99	0·30	3·98	0·31	3·98	0·33	4
5	4·99	0·35	4·99	0·37	4·98	0·39	4·98	0·41	5
6	5·99	0·42	5·98	0·44	5·98	0·47	5·98	0·50	6
7	6·98	0·49	6·98	0·52	6·98	0·55	6·97	0·58	7
8	7·98	0·56	7·98	0·59	7·98	0·63	7·97	0·66	8
9	8·98	0·63	8·98	0·67	8·97	0·71	8·97	0·75	9
10	9·98	0·70	9·97	0·74	9·97	0·78	9·97	0·83	10
11	10·97	0·77	10·97	0·82	10·97	0·86	10·96	0·91	11
12	11·97	0·84	11·97	0·89	11·96	0·94	11·96	0·99	12
13	12·97	0·91	12·96	0·96	12·96	1·02	12·96	1·08	13
14	13·97	0·98	13·96	1·04	13·96	1·10	13·95	1·16	14
15	14·96	1·05	14·96	1·11	14·95	1·18	14·95	1·24	15
16	15·96	1·12	15·96	1·19	15·95	1·26	15·95	1·32	16
17	16·96	1·19	16·95	1·26	16·95	1·33	16·94	1·41	17
18	17·96	1·26	17·95	1·33	17·94	1·41	17·94	1·49	18
19	18·95	1·33	18·95	1·40	18·94	1·49	18·93	1·57	19
20	19·95	1·40	19·95	1·48	19·94	1·57	19·93	1·66	20
21	20·95	1·46	20·94	1·56	20·94	1·65	20·93	1·74	21
22	21·95	1·53	21·94	1·63	21·93	1·73	21·92	1·82	22
23	22·94	1·60	22·94	1·70	22·93	1·80	22·92	1·90	23
24	23·94	1·67	23·93	1·78	23·93	1·88	23·92	1·99	24
25	24·94	1·74	24·93	1·85	24·92	1·96	24·91	2·07	25
26	25·94	1·81	25·93	1·93	25·92	2·04	25·91	2·15	26
27	26·93	1·88	26·93	2·00	26·92	2·12	26·91	2·24	27
28	27·93	1·95	27·92	2·08	27·91	2·20	27·90	2·32	28
29	28·93	2·02	28·92	2·15	28·91	2·28	28·90	2·40	29
30	29·93	2·09	29·92	2·22	29·91	2·35	29·90	2·48	30
31	30·92	2·16	30·91	2·30	30·90	2·43	30·89	2·57	31
32	31·92	2·23	31·91	2·37	31·90	2·51	31·89	2·65	32
33	32·92	2·30	32·91	2·45	32·90	2·59	32·89	2·73	33
34	33·92	2·37	33·91	2·52	33·90	2·67	33·88	2·82	34
35	34·91	2·44	34·90	2·59	34·89	2·75	34·88	2·90	35
36	35·91	2·51	35·90	2·67	35·89	2·82	35·88	2·98	36
37	36·91	2·58	36·90	2·74	36·89	2·90	36·87	3·06	37
38	37·91	2·65	37·90	2·82	37·88	2·98	37·87	3·15	38
39	38·90	2·72	38·89	2·89	38·88	3·06	38·87	3·23	39
40	39·90	2·79	39·89	2·96	39·88	3·14	39·86	3·31	40
41	40·90	2·86	40·89	3·04	40·87	3·22	40·86	3·40	41
42	41·90	2·93	41·88	3 11	41·87	3·30	41·86	3·48	42
43	42·90	3·00	42·88	3·19	42·87	3·37	42·85	3·56	43
44	43·89	3·07	43·88	3·26	43·86	3·45	43·85	3·64	44
45	44·89	3·14	44·88	3·33	44·86	3·53	44·85	3·73	45
46	45·89	3·21	45·87	3·41	45·86	3·61	45·84	3·81	46
47	46·89	3·28	46·87	3·48	46·86	3·69	46·84	3·89	47
48	47·88	3·35	47·87	3·56	47·85	3·77	47·84	3·97	48
49	48·88	3·42	48·87	3·63	48·85	3·84	48·83	4·06	49
50	49·88	3·49	49·86	3·71	49·85	3·92	49·83	4·14	50
Distance.	Dep.	Lat.	Dep.	Lat.	Dep.	Lat.	Dep.	Lat.	Distance.
	86 Deg.		85¾ Deg.		85½ Deg.		85¼ Deg.		

Distance.	4 Deg.		4¼ Deg.		4½ Deg.		4¾ Deg.		Distance.
	Lat.	Dep.	Lat.	Dep.	Lat.	Dep.	Lat.	Dep.	
51	50·88	3·56	50·86	3·78	50·84	4·00	50·82	4·22	51
52	51·87	3·63	51·86	3·85	51·84	4·08	51·82	4·31	52
53	52·87	3·70	52·85	3·93	52·84	4·16	52·82	4·39	53
54	53·87	3·77	53·85	4·00	53·83	4·24	53·81	4·47	54
55	54·87	3·84	54·85	4·08	54·83	4·32	54·81	4·55	55
56	55·86	3·91	55·85	4·15	55·83	4·39	55·81	4·64	56
57	56·86	3·98	56·84	4·22	56·82	4·47	56·80	4·72	57
58	57·86	4·05	57·84	4·30	57·82	4·55	57·80	4·80	58
59	58·86	4·12	58·84	4·37	58·82	4·63	58·80	4·89	59
60	59·85	4·19	59·84	4·45	59·82	4·71	59·79	4·97	60
61	60·85	4·26	60·83	4·52	60·81	4·79	60·79	5·05	61
62	61·85	4·32	61·83	4·59	61·81	4·86	61·79	5·13	62
63	62·85	4·39	62·83	4·67	62·81	4·94	62·78	5·22	63
64	63·84	4·46	63·82	4·74	63·80	5·02	63·78	5·30	64
65	64·84	4·53	64·82	4·82	64·80	5·10	64·78	5·38	65
66	65·84	4·60	65·82	4·89	65·80	5·18	65·77	5·47	66
67	66·84	4·67	66·82	4·97	66·79	5·26	66·77	5·55	67
68	67·83	4·74	67·81	5·04	67·79	5·34	67·77	5·63	68
69	68·83	4·81	68·81	5·11	68·79	5·41	68·76	5·71	69
70	69·83	4·88	69·81	5·19	69·78	5·49	69·76	5·80	70
71	70·83	4·95	70·80	5·26	70·78	5·57	70·76	5·88	71
72	71·82	5·02	71·80	5·34	71·78	5·65	71·75	5·96	72
73	72·82	5·09	72·80	5·41	72·77	5·73	72·75	6·04	73
74	73·82	5·16	73·80	5·48	73·77	5·81	73·75	6·13	74
75	74·82	5·23	74·79	5·56	74·77	5·88	74·74	6·21	75
76	75·81	5·30	75·79	5·63	75·77	5·96	75·74	6·29	76
77	76·81	5·37	76·79	5·71	76·76	6·04	76·74	6·38	77
78	77·81	5·44	77·79	5·78	77·76	6·12	77·73	6·46	78
79	78·81	5·51	78·78	5·85	78·76	6·20	78·73	6·54	79
80	79·81	5·58	79·78	5·93	79·75	6·28	79·73	6·62	80
81	80·80	5·65	80·78	6·00	80·75	6·36	80·72	6·71	81
82	81·80	5·72	81·78	6·08	81·75	6·43	81·72	6·79	82
83	82·80	5·79	82·77	6·15	82·74	6·51	82·71	6·87	83
84	83·80	5·86	83·77	6·23	83·74	6·59	83·71	6·96	84
85	84·79	5·93	84·77	6·30	84·74	6·67	84·71	7·04	85
86	85·79	6·00	85·76	6·37	85·73	6·75	85·70	7·12	86
87	86·79	6·07	86·76	6·45	86·73	6·83	86·70	7·20	87
88	87·79	6·14	87·76	6·52	87·73	6·90	87·70	7·29	88
89	88·78	6·21	88·76	6·60	88·73	6·98	88·70	7·37	89
90	89·78	6·28	89·75	6·67	89·72	7·06	89·69	7·45	90
91	90·78	6·35	90·75	6·74	90·72	7·14	90·69	7·54	91
92	91·78	6·42	91·75	6·82	91·72	7·22	91·68	7·62	92
93	92·77	6·49	92·74	6·89	92·71	7·30	92·68	7·70	93
94	93·77	6·56	93·74	6·97	93·71	7·38	93·68	7·78	94
95	94·77	6·63	94·74	7·04	94·71	7·45	94·67	7·87	95
96	95·77	6·70	95·74	7·11	95·70	7·53	95·67	7·95	96
97	96·76	6·77	96·73	7·19	96·70	7·61	96·67	8·03	97
98	97·76	6·84	97·73	7·26	97·70	7·69	97·66	8·12	98
99	98·76	6·91	98·73	7·34	98·69	7·77	98·66	8·20	99
100	99·76	6·98	99·73	7·41	99·69	7·85	99·66	8·28	100
Distance.	Dep.	Lat.	Dep.	Lat.	Dep.	Lat.	Dep.	Lat.	Distance.
	86 Deg.		85¾ Deg.		85½ Deg.		85¼ Deg.		

Distance.	5 Deg.		5¼ Deg.		5½ Deg.		5¾ Deg.		Distance.
	Lat.	Dep.	Lat.	Dep.	Lat.	Dep.	Lat.	Dep.	
1	1·00	0·09	1·00	0·09	1·00	0·10	0·99	0·10	1
2	1·99	0·17	1·99	0·18	1·99	0·19	1·99	0·20	2
3	2·99	0·26	2·99	0·27	2·99	0·29	2·98	0·30	3
4	3·98	0·35	3·98	0·37	3·98	0·38	3·98	0·40	4
5	4·98	0·44	4·98	0·46	4·98	0·48	4·97	0·50	5
6	5·98	0·52	5·97	0·55	5·97	0·58	5·97	0·60	6
7	6·97	0·61	6·97	0·64	6·97	0·67	6·96	0·70	7
8	7·97	0·70	7·97	0·73	7·96	0·76	7·96	0·80	8
9	8·97	0·78	8·96	0·82	8·96	0·86	8·95	0·90	9
10	9·96	0·87	9·96	0·92	9·95	0·96	9·95	1·00	10
11	10·96	0·96	10·95	1·01	10·95	1·05	10·94	1·10	11
12	11·95	1·05	11·95	1·10	11·94	1·15	11·94	1·20	12
13	12·95	1·13	12·95	1·19	12·94	1·25	12·93	1·30	13
14	13·95	1·22	13·94	1·28	13·94	1·34	13·93	1·40	14
15	14·94	1·31	14·94	1·37	14·93	1·44	14·92	1·50	15
16	15·94	1·39	15.93	1·46	15·93	1·53	15·92	1·60	16
17	16·94	1·48	16·93	1·56	16·92	1·63	16·91	1·70	17
18	17·93	1·57	17·92	1·65	17·92	1·73	17·91	1·80	18
19	18·93	1·66	18·92	1·74	18·91	1·82	18·90	1·90	19
20	19·92	1·74	19·92	1·83	19·91	1·92	19·90	2·00	20
21	20·92	1·83	20·91	1·92	20·90	2·01	20·89	2·10	21
22	21·92	1·92	21·91	2·01	21·90	2·11	21·89	2·20	22
23	22·91	2·00	22·90	2·10	22·89	2·20	22·88	2·30	23
24	23·91	2·09	23·90	2·20	23·89	2·30	23·88	2·40	24
25	24·90	2·18	24·90	2·29	24·88	2·40	24·87	2·50	25
26	25·90	2·27	25·89	2·38	25·88	2·49	25·87	2·60	26
27	26·90	2·35	26·89	2·47	26·88	2·59	26·86	2·71	27
28	27·89	2·44	27·88	2·56	27·87	2·68	27·86	2·81	28
29	28·89	2·53	28·88	2·65	28·87	2·78	28·85	2·91	29
30	29·89	2·61	29·87	2·75	29·86	2·88	29·85	3·01	30
31	30·88	2·70	30·87	2·84	30·86	2·97	30·84	3·11	31
32	31·88	2·79	31·87	2·93	31·85	3·07	31·84	3·21	32
33	32·87	2·88	32·86	3·02	32·85	3·16	32·83	3·31	33
34	33·87	2·96	33·86	3·11	33·84	3·26	33·83	3·41	34
35	34·87	3·05	34·85	3·20	34·84	3·35	34·82	3·51	35
36	35·86	3·14	35·85	3·29	35·83	3·45	35·82	3·61	36
37	36·86	3·22	36·84	3·39	36·83	3·55	36·81	3·71	37
38	37·86	3·31	37·84	3·48	37·83	3·64	37·81	3·81	38
39	38·85	3·40	38·84	3·57	38·82	3·74	38·80	3·91	39
40	39·85	3·49	39·83	3·66	39·82	3·83	39·80	4·01	40
41	40·84	3·57	40·82	3·75	40·81	3·93	40·79	4·11	41
42	41·84	3·66	41·82	3·84	41·81	4·03	41·79	4·21	42
43	42·84	3·75	42·82	3·93	42·80	4·12	42·78	4·31	43
44	43·83	3·83	43·82	4·03	43·80	4·22	43·78	4·41	44
45	44·83	3·92	44·81	4·12	44·79	4·31	44·77	4·51	45
46	45·82	4·01	45·81	4·21	45·79	4·41	45·77	4·61	46
47	46·82	4·10	46·80	4·30	46·78	4·50	46·76	4·71	47
48	47·82	4·18	47·80	4·39	47·78	4·60	47·76	4·81	48
49	48·81	4.27	48·79	4·48	48·77	4·70	48·75	4·91	49
50	49·81	4·36	49·79	4·58	49·77	4·79	49·75	5·01	50
Distance.	Dep.	Lat.	Dep.	Lat.	Dep.	Lat.	Dep.	Lat.	Distance.
	85 Deg.		84¾ Deg.		84½ Deg.		84¼ Deg.		

Distance.	5 Deg.		5¼ Deg.		5½ Deg.		5¾ Deg.		Distance.
	Lat.	Dep.	Lat.	Dep.	Lat.	Dep.	Lat.	Dep.	
51	50·81	4·44	50·79	4·67	50·77	4·89	50·74	5·11	51
52	51·80	4·53	51·78	4·76	51·76	4·98	51·74	5·21	52
53	52·80	4·62	52·78	4·85	52·76	5·08	52·73	5·31	53
54	53·79	4·71	53·77	4·94	53·75	5·18	53·73	5·41	54
55	54·79	4·79	54·77	5·03	54·75	5·27	54·72	5·51	55
56	55·79	4·88	55·77	5·12	55·74	5·37	55·72	5·61	56
57	56·78	4·97	56·76	5·22	56·74	5·46	56·71	5·71	57
58	57·78	5·06	57·76	5·31	57·73	5·56	57·71	5·81	58
59	58·78	5·14	58·75	5·40	58·73	5·65	58·70	5·91	59
60	59·77	5·23	59·75	5·49	59·72	5·75	59·70	6·01	60
61	60·77	5·32	60·74	5·58	60·72	5·85	60·69	6·11	61
62	61·76	5·40	61·74	5·67	61·71	5·94	61·69	6·21	62
63	62·76	5·49	62·74	5·76	62·71	6·04	62·68	6·31	63
64	63·76	5·58	63·73	5·86	63·71	6·13	63·68	6·41	64
65	64·75	5·67	64·73	5·95	64·70	6·23	64·67	6·51	65
66	65·75	5·75	65·72	6·04	65·70	6·33	65·67	6·61	66
67	66·75	5·84	66·72	6·13	66·69	6·42	66·66	6·71	67
68	67·74	5·93	67·71	6·22	67·69	6·52	67·66	6·81	68
69	68·74	6·01	68·71	6·31	68·68	6·61	68·65	6·91	69
70	69·73	6·10	69·71	6·41	69·68	6·71	69·65	7·01	70
71	70·73	6·19	70·70	6·50	70·67	6·81	70·64	7·11	71
72	71·73	6·28	71·70	6·59	71·67	6·90	71·64	7·21	72
73	72·72	6·36	72·69	6·68	72·66	7·00	72·63	7·31	73
74	73·72	6·45	73·69	6·77	73·66	7·09	73·63	7·41	74
75	74·71	6·54	74·69	6·86	74·65	7·19	74·62	7·51	75
76	75·71	6·62	75·68	6·95	75·65	7·28	75·62	7·61	76
77	76·71	6·71	76·68	7·05	76·65	7·38	76·61	7·71	77
78	77·70	6·80	77·67	7·14	77·64	7·48	77·61	7·81	78
79	78·70	6·89	78·67	7·23	78·64	7·57	78·60	7·91	79
80	79·70	6·97	79·66	7·32	79·63	7·67	79·60	8·02	80
81	80·69	7·06	80·66	7·41	80·63	7·76	80·59	8·12	81
82	81·69	7·15	81·66	7·50	81·62	7·86	81·59	8·22	82
83	82·68	7·23	82·65	7·59	82·62	7·96	82·58	8·32	83
84	83·68	7·32	83·65	7·69	83·61	8·05	83·58	8·42	84
85	84·68	7·41	84·64	7·78	84·61	8·15	84·57	8·52	85
86	85·67	7·50	85·64	7·87	85·60	8·24	85·57	8·62	86
87	86·67	7·58	86·64	7·96	86·60	8·34	86·56	8·72	87
88	87·67	7·67	87·63	8·05	87·59	8·43	87·56	8·82	88
89	88·66	7·76	88·63	8·14	88·59	8·53	88·55	8·92	89
90	89·66	7·84	89·62	8·24	89·59	8·63	89·55	9·02	90
91	90·65	7·93	90·62	8·33	90·58	8·72	90·54	9·12	91
92	91·65	8·02	91·61	8·42	91·58	8·82	91·54	9·22	92
93	92·65	8·11	92·61	8·51	92·57	8·91	92·53	9·32	93
94	93·64	8·19	93·61	8·60	93·57	9·01	93·53	9·42	94
95	94·64	8·28	94·60	8·69	94·56	9·11	94·52	9·52	95
96	95·63	8·37	95·60	8·78	95·56	9·20	95·52	9·62	96
97	96·63	8·45	96·59	8·88	96·55	9·30	96·51	9·72	97
98	97·63	8·54	97·59	8·97	97·55	9·39	97·51	9·82	98
99	98·62	8·63	98·59	9·06	98·54	9·49	98·50	9·92	99
100	99·62	8·72	99·58	9·15	99·54	9·58	99·50	10·02	100
Distance.	Dep.	Lat.	Dep.	Lat.	Dep.	Lat.	Dep.	Lat.	Distance.
	85 Deg.		84¾ Deg.		84½ Deg.		84¼ Deg.		

Distance.	6 Deg.		6¼ Deg.		6½ Deg.		6¾ Deg.		Distance.
	Lat.	Dep.	Lat.	Dep.	Lat.	Dep.	Lat.	Dep.	
1	0·99	0·10	0·99	0·11	0·99	0·11	0·99	0·12	1
2	1·99	0·21	1·99	0·22	1·99	0·23	1·99	0·24	2
3	2·98	0·31	2·98	0·33	2·98	0·34	2·98	0·35	3
4	3·98	0·41	3·98	0·44	3·97	0·45	3·97	0·47	4
5	4·97	0·52	4·97	0·54	4·97	0·57	4·97	0·59	5
6	5·97	0·63	5·96	0·65	5·96	0·68	5·96	0·71	6
7	6·96	0·73	6·96	0·76	6·96	0·79	6·95	0·82	7
8	7·96	0·84	7·95	0·87	7·95	0·91	7·94	0·94	8
9	8·95	0·94	8·95	0·98	8·94	1·02	8·94	1·06	9
10	9·95	1·05	9·94	1·09	9·94	1·13	9·93	1·18	10
11	10·94	1·15	10·93	1·20	10·93	1·25	10·92	1·29	11
12	11·93	1·25	11·93	1·31	11·92	1·36	11·92	1·41	12
13	12·93	1·36	12·92	1·42	12·92	1·47	12·91	1·53	13
14	13·92	1·46	13·92	1·52	13·91	1·59	13·90	1·65	14
15	14·92	1·57	14·91	1·63	14·90	1·70	14·90	1·76	15
16	15·91	1·67	15·90	1·74	15·90	1·81	15·89	1·88	16
17	16·91	1·78	16·90	1·85	16·89	1·92	16·88	2·00	17
18	17·90	1·88	17·89	1·96	17·88	2·04	17·88	2·12	18
19	18·90	1·99	18·89	2·07	18·88	2·15	18·87	2·23	19
20	19·89	2·09	19·88	2·18	19·87	2·26	19·86	2·35	20
21	20·88	2·20	20·88	2·29	20·87	2·38	20·85	2·47	21
22	21·88	2·30	21·87	2·40	21·86	2·49	21·85	2·59	22
23	22·87	2·40	22·86	2·50	22·85	2·60	22·84	2·70	23
24	23·87	2·51	23·86	2·61	23·85	2·72	23·83	2·82	24
25	24·86	2·61	24·85	2·72	24·84	2·83	24·83	2·94	25
26	25·86	2·72	25·85	2·83	25·83	2·94	25·82	3·06	26
27	26·85	2·82	26·84	2·94	26·83	3·06	26·81	3·17	27
28	27·85	2·93	27·83	3·05	27·82	3·17	27·81	3·29	28
29	28·84	3·03	28·83	3·16	28·81	3·28	28·80	3·41	29
30	29·84	3·14	29·82	3·27	29·81	3·40	29·79	3·53	30
31	30·83	3·24	30·82	3·37	30·80	3·51	30·79	3·64	31
32	31·82	3·34	31·81	3·48	31·79	3·62	31·78	3·76	32
33	32·82	3·45	32·80	3·59	32·79	3·74	32·77	3·88	33
34	33·81	3·55	33·80	3·70	33·78	3·85	33·76	4·00	34
35	34·81	3·66	34·79	3·81	34·78	3·96	34·76	4·11	35
36	35·80	3·76	35·79	3·92	35·77	4·08	35·75	4·23	36
37	36·80	3·87	36·78	4·03	36·76	4·19	36·75	4·35	37
38	37·79	3·97	37·77	4·14	37·76	4·30	37·74	4·47	38
39	38·79	4·08	38·77	4·25	38·75	4·41	38·73	4·58	39
40	39·78	4·18	39·76	4·35	39·74	4·53	39·72	4·70	40
41	40·78	4·29	40·76	4·46	40·74	4·64	40·72	4·82	41
42	41·77	4·39	41·75	4·57	41·73	4·76	41·71	4·94	42
43	42·76	4·49	42·74	4·68	42·72	4·87	42·70	5·05	43
44	43·76	4·60	43·74	4·79	43·72	4·98	43.70	5·17	44
45	44·75	4·70	44·73	4·90	44·71	5·09	44·69	5·29	45
46	45·75	4·81	45·73	5·01	45·70	5·21	45·68	5·41	46
47	46·74	4·91	46·72	5·12	46·70	5·32	46·67	5·52	47
48	47·74	5·02	47·71	5·23	47·69	5·43	47·67	5·64	48
49	48·73	5·12	48·71	5·34	48·69	5·55	48·66	5·76	49
50	49·73	5·23	49·70	5·44	49·68	5·66	49·65	5·88	50
Distance.	Dep.	Lat.	Dep.	Lat.	Dep.	Lat.	Dep.	Lat.	Distance.
	84 Deg.		83¾ Deg.		83½ Deg.		Deg. 83¼		

Distance.	6 Deg.		6¼ Deg.		6½ Deg.		6¾ Deg.		Distance.
	Lat.	Dep.	Lat.	Dep.	Lat.	Dep.	Lat.	Dep.	
51	50·72	5·33	50·70	5·55	50·67	5·77	50·65	5·99	51
52	51·72	5·44	51·69	5·66	51·67	5·89	51·64	6·11	52
53	52·71	5·54	52·68	5·77	52·66	6·00	52·63	6·23	53
54	53·70	5·64	53·68	5·88	53·65	6·11	53·63	6·35	54
55	54·70	5·75	54·67	5·99	54·65	6·23	54·62	6·46	55
56	55·69	5·85	55·67	6·10	55·64	6·34	55·61	6·58	56
57	56·69	5·96	56·66	6·21	56·63	6·45	56·60	6·70	57
58	57·68	6·06	57·66	6·31	57·63	6·57	57·60	6·82	58
59	58·68	6·17	58·65	6·42	58·62	6·68	58·59	6·93	59
60	59·67	6·27	59·64	6·53	59·61	6·79	59·58	7·05	60
61	60·67	6·38	60·64	6·64	60·61	6·91	60·58	7·17	61
62	61·66	6·48	61·63	6·75	61·60	7·02	61·57	7·29	62
63	62·65	6·59	62·63	6·86	62·60	7·13	62·56	7·40	63
64	63·65	6·69	63·62	6·97	63·59	7·25	63·56	7·52	64
65	64·64	6·79	64·61	7·08	64·58	7·36	64·55	7·64	65
66	65·64	6·90	65·61	7·19	65·58	7·47	65·54	7·76	66
67	66·63	7·00	66·60	7·29	66·57	7·58	66·54	7·88	67
68	67·63	7·11	67·60	7·40	67·56	7·70	67·53	7·99	68
69	68·62	7·21	68·59	7·51	68·56	7·81	68·52	8·11	69
70	69·62	7·32	69·58	7·62	69·55	7·92	69·51	8·23	70
71	70·61	7·42	70·58	7·73	70·54	8·04	70·51	8·35	71
72	71·61	7·53	71·57	7·84	71·54	8·15	71·50	8·46	72
73	72·60	7·63	72·57	7·95	72·53	8·26	72·49	8·58	73
74	73·59	7·74	73·56	8·06	73·52	8·38	73·49	8·70	74
75	74·59	7·84	74·55	8·17	74·52	8·49	74·48	8·82	75
76	75·58	7·94	75·55	8·27	75·51	8·60	75·47	8·93	76
77	76·58	8·05	76·54	8·38	76·51	8·72	76·47	9·05	77
78	77·57	8·15	77·54	8·49	77·50	8·83	77·46	9·17	78
79	78·57	8·26	78·53	8·60	78·49	8·94	78·45	9·29	79
80	79·56	8·36	79·53	8·71	79·49	9·06	79·45	9·40	80
81	80·56	8·47	80·52	8·82	80·48	9·17	80·44	9·52	81
82	81·55	8·57	81·51	8·93	81·47	9·28	81·43	9·64	82
83	82·55	8·68	82·51	9·04	82·47	9·40	82·42	9·76	83
84	83·54	8·78	83·50	9·14	83·46	9·51	83·42	9·87	84
85	84·53	8·88	84·50	9·25	84·45	9·62	84·41	9·99	85
86	85·53	8·99	85·49	9·36	85·45	9·74	85·40	10·11	86
87	86·52	9·09	86·48	9·47	86·44	9·85	86·40	10·23	87
88	87·52	9·20	87·48	9·58	87·43	9·96	87·39	10·34	88
89	88·51	9·30	88·47	9·69	88·43	10·08	88·38	10·46	89
90	89·51	9·41	89·47	9·80	89·42	10·19	89·38	10·58	90
91	90·50	9·51	90·46	9·91	90·42	10·30	90·37	10·70	91
92	91·50	9·62	91·45	10·02	91·41	10·41	91·36	10·81	92
93	92·49	9·72	92·45	10·12	92·40	10·53	92·36	10·93	93
94	93·49	9·83	93·44	10·23	93·40	10·64	93·35	11·05	94
95	94·48	9·93	94·44	10·34	94·39	10·75	94·34	11·17	95
96	95·47	10·03	95·43	10·45	95·38	10·87	95·33	11·28	96
97	96·47	10·14	96·42	10·56	96·38	10·98	96·33	11·40	97
98	97·46	10·24	97·42	10·67	97·37	11·09	97·32	11·52	98
99	98·46	10·35	98·41	10·78	98·36	11·21	98·31	11·64	99
100	99·45	10·45	99·41	10·89	99·36	11·32	99·31	11·75	100
Distance.	Dep.	Lat.	Dep.	Lat.	Dep.	Lat.	Dep.	Lat.	Distance.
	84 Deg.		83¾ Deg.		83½ Deg.		83¼ Deg.		

Distance.	7 Deg.		7¼ Deg		7½ Deg.		7¾ Deg.		Distance.
	Lat.	Dep.	Lat.	Dep.	Lat.	Dep.	Lat.	Dep.	
1	0·99	0·12	0·99	0·13	0·99	0·13	0·99	0·13	1
2	1·99	0·24	1·98	0·25	1·98	0·26	1·98	0·27	2
3	2·98	0·37	2·98	0·38	2·97	0·39	2·97	0·40	3
4	3·97	0·49	3·97	0·50	3·97	0·52	3·96	0·54	4
5	4·96	0·61	4·96	0·63	4·96	0·65	4·95	0·67	5
6	5·96	0·73	5·95	0·76	5·95	0·78	5·95	0·81	6
7	6·95	0·85	6·94	0·88	6·94	0·91	6·94	0·94	7
8	7·94	0·97	7·94	1·01	7·93	1·04	7·93	1·08	8
9	8·93	1·10	8·93	1·14	8·92	1·17	8·92	1·21	9
10	9·93	1·22	9·92	1·26	9·91	1·31	9·91	1·35	10
11	10·92	1·34	10·91	1·39	10·91	1·44	10·90	1·48	11
12	11·91	1·46	11·90	1·51	11·90	1·57	11·89	1·62	12
13	12·90	1·58	12·90	1·64	12·89	1·70	12·88	1·75	13
14	13·90	1·71	13·89	1·77	13·88	1·83	13·87	1·89	14
15	14·89	1·83	14·88	1·89	14·87	1·96	14·86	2·02	15
16	15·88	1·95	15·87	2·02	15·86	2·09	15·85	2·16	16
17	16·87	2·07	16·86	2·15	16·85	2·22	16·84	2·29	17
18	17·87	2·19	17·86	2·27	17·85	2·35	17·84	2·43	18
19	18·86	2·32	18·85	2·40	18·84	2·48	18·83	2·56	19
20	19·85	2·44	19·84	2·52	19·83	2·61	19·82	2·70	20
21	20·84	2·56	20·83	2·65	20·82	2·74	20·81	2·83	21
22	21·84	2·68	21·82	2·78	21·81	2·87	21·80	2·97	22
23	22·83	2·80	22·82	2·90	22·80	3·00	22·79	3·10	23
24	23·82	2·92	23·81	3·03	23·79	3·13	23·78	3·24	24
25	24·81	3·05	24·80	3·15	24·79	3·26	24·77	3·37	25
26	25·81	3·17	25·79	3·28	25·78	3·39	25·76	3·51	26
27	26·80	3·29	26·78	3·41	26·77	3·52	26·75	3·64	27
28	27·79	3·41	27·78	3·53	27·76	3·65	27·74	3·78	28
29	28·78	3·53	28·77	3·66	28·75	3·79	28·74	3·91	29
30	29·78	3·66	29·76	3·79	29·74	3·92	29·73	4·05	30
31	30·77	3·78	30·75	3·91	30·73	4·05	30·72	4·18	31
32	31·76	3·90	31·74	4·04	31·73	4·18	31·71	4·32	32
33	32·75	4·02	32·74	4·16	32·72	4·31	32·70	4·45	33
34	33·75	4·14	33·73	4·29	33·71	4·44	33·69	4·58	34
35	34·74	4·27	34·72	4·42	34·70	4·57	34·68	4·72	35
36	35·73	4·39	35·71	4·54	35·69	4·70	35·67	4·85	36
37	36·72	4·51	36·70	4·67	36·68	4·83	36·66	4·99	37
38	37·72	4·63	37·70	4·80	37·67	4·96	37·65	5·12	38
39	38·71	4·75	38·69	4·92	38·67	5·09	38·64	5·26	39
40	39·70	4·87	39·68	5·05	39·66	5·22	39·63	5·39	40
41	40·70	5·00	40·67	5·17	40·65	5·35	40·63	5·53	41
42	41·69	5·12	41·66	5·30	41·64	5·48	41·62	5·66	42
43	42·68	5·24	42·66	5·43	42·63	5·61	42·61	5·80	43
44	43·67	5·36	43·65	5·55	43·62	5·74	43·60	5·93	44
45	44·67	5·48	44·64	5·68	44·62	5·87	44·59	6·07	45
46	45·66	5·61	45·63	5·81	45·61	6·00	45·58	6·20	46
47	46·65	5·73	46·62	5·93	46·60	6·13	46·57	6·34	47
48	47·64	5·85	47·62	6·06	47·59	6·27	47·56	6·47	48
49	48·63	5·97	48·61	6·18	48·58	6·40	48·55	6·61	49
50	49·63	6·09	49·60	6·31	49·57	6·53	49·54	6·74	50
Distance.	Dep.	Lat.	Dep.	Lat.	Dep.	Lat.	Dep.	Lat.	Distance.
	83 Deg.		82¾ Deg.		82½ Deg.		82¼ Deg.		

Distance.	7 Deg.		7¼ Deg.		7½ Deg.		7¾ Deg.		Distance.
	Lat.	Dep.	Lat.	Dep.	Lat.	Dep.	Lat.	Dep.	
51	50·62	6·22	50·59	6·44	50·56	6·66	50·53	6·88	51
52	51·61	6·34	51·58	6·56	51·56	6·79	51·53	7·01	52
53	52·60	6·46	52·58	6·69	52·55	6·92	52·52	7·15	53
54	53·60	6·58	53·57	6·81	53·54	7·05	53·51	7·28	54
55	54·59	6·70	54·56	6·94	54·53	7·18	54·50	7·42	55
56	55·58	6·82	55·55	7·07	55·52	7·31	55·49	7·55	56
57	56·58	6·95	56·54	7·19	56·51	7·44	56·48	7·69	57
58	57·57	7·07	57·54	7·32	57·50	7·57	57·47	7·82	58
59	58·56	7·19	58·53	7·45	58·50	7·70	58·46	7·96	59
60	59·55	7·31	59·52	7·57	59·49	7·83	59·45	8·09	60
61	60·55	7·43	60·51	7·70	60·48	7·96	60·44	8·23	61
62	61·54	7·56	61·50	7·82	61·47	8·09	61·43	8·36	62
63	62·53	7·68	62·50	7·95	62·46	8·22	62·42	8·50	63
64	63·52	7·80	63·49	8·08	63·45	8·35	63·42	8·63	64
65	64·52	7·92	64·48	8·20	64·44	8·48	64·41	8·77	65
66	65·51	8·04	65·47	8·33	65·44	8·61	65·40	8·90	66
67	66·50	8·17	66·46	8·46	66·43	8·75	66·39	9·04	67
68	67·49	8·29	67·46	8·58	67·42	8·88	67·38	9·17	68
69	68·49	8·41	68·45	8·71	68·41	9·01	68·37	9·30	69
70	69·48	8·53	69·44	8·83	69·40	9·14	69·36	9·44	70
71	70·47	8·65	70·43	8·96	70·39	9·27	70·35	9·57	71
72	71·46	8·77	71·42	9·09	71·38	9·40	71·34	9·71	72
73	72·46	8·90	72·42	9·21	72·38	9·53	72·33	9·84	73
74	73·45	9·02	73·41	9·34	73·37	9·66	73·32	9·98	74
75	74·44	9·14	74·40	9·46	74·36	9·79	74·31	10·11	75
76	75·43	9·26	75·39	9·59	75·35	9·92	75·31	10·25	76
77	76·43	9·38	76·38	9·72	76·34	10·05	76·30	10·38	77
78	77·42	9·51	77·38	9·84	77·33	10·18	77·29	10·52	78
79	78·41	9·63	78·37	9·97	78·32	10·31	78·28	10·65	79
80	79·40	9·75	79·36	10·10	79·32	10·44	79·27	10·79	80
81	80·40	9·87	80·35	10·22	80·31	10·57	80·26	10·92	81
82	81·39	9·99	81·34	10·35	81·30	10·70	81·25	11·06	82
83	82·38	10·12	82·34	10·47	82·29	10·83	82·24	11·19	83
84	83·37	10·24	83·33	10·60	83·28	10·96	83·23	11·33	84
85	84·37	10·36	84·32	10·73	84·27	11·09	84·22	11·46	85
86	85·36	10·48	85·31	10·85	85·26	11·23	85·21	11·60	86
87	86·35	10·60	86·30	10·98	86·26	11·36	86·21	11·73	87
88	87·34	10·72	87·30	11·11	87·25	11·49	87·20	11·87	88
89	88·34	10·85	88·29	11·23	88·24	11·62	88·19	12.00	89
90	89·33	10·97	89·28	11·36	89·23	11·75	89·18	12·14	90
91	90·32	11·09	90·27	11·48	90·22	11·88	90·17	12·27	91
92	91·31	11·21	91·26	11·61	91·21	12·01	91·16	12·41	92
93	92·31	11·33	92·26	11·74	92·20	12·14	92·15	12·54	93
94	93·30	11·46	93·25	11·86	93·20	12·27	93·14	12·68	94
95	94·29	11·58	94·24	11·99	94·19	12·40	94·13	12·81	95
96	95·28	11·70	95·23	12·12	95·18	12·53	95·12	12·95	96
97	96·28	11·82	96·22	12·24	96·17	12·66	96·11	13·08	97
98	97·27	11·94	97·22	12·37	97·16	12·79	97·10	13·22	98
99	98·26	12·07	98·21	12·49	98·15	12·92	98·10	13·35	99
100	99·25	12·19	99·20	12·62	99·14	13·05	99.09	13·49	100
Distance.	Dep.	Lat.	Dep.	Lat.	Dep.	Lat.	Dep.	Lat.	Distance.
	83 Deg.		82¾ Deg.		82½ Deg.		82¼ Deg.		

Distance.	8 Deg.		8¼ Deg.		8½ Deg.		8¾ Deg.		Distance.
	Lat.	Dep.	Lat.	Dep.	Lat.	Dep.	Lat.	Dep.	
1	0·99	0·14	0·99	0·14	0·99	0·15	0·99	0·15	1
2	1·98	0·28	1·98	0·29	1·98	0·30	1·98	0·30	2
3	2·97	0·42	2·97	0·43	2·97	0·44	2·97	0·46	3
4	3·96	0·56	3·96	0·57	3·96	0·59	3·95	0·61	4
5	4·95	0·70	4·95	0·72	4·95	0·74	4·94	0·76	5
6	5·94	0·84	5·94	0·86	5·93	0·89	5·93	0·91	6
7	6·93	0·97	6·93	1·00	6·92	1·03	6·92	1·06	7
8	7·92	1·11	7·92	1·15	7·91	1·18	7·91	1·22	8
9	8·91	1·25	8·91	1·29	8·90	1·33	8·90	1·37	9
10	9.90	1·39	9·90	1·43	9·89	1·48	9·88	1·52	10
11	10·89	1·53	10·89	1·58	10·88	1·63	10·87	1·67	11
12	11·88	1·67	11·88	1·72	11·87	1·77	11·86	1·83	12
13	12·87	1·81	12·87	1·87	12·86	1·92	12·85	1·98	13
14	13·86	1·95	13·86	2·01	13·85	2·07	13·84	2·13	14
15	14·85	2·09	14·85	2·15	14·84	2·22	14·83	2·28	15
16	15·84	2·23	15·84	2·30	15·82	2·36	15·81	2·43	16
17	16·83	2·37	16·83	2·44	16·81	2·51	16·80	2·59	17
18	17·82	2·51	17·81	2·58	17·80	2·66	17·79	2·74	18
19	18·82	2·64	18·80	2·73	18·79	2·81	18·78	2·89	19
20	19·81	2·78	19·79	2·87	19·78	2·96	19·77	3·04	20
21	20·80	2·92	20·78	3·01	20·77	3·10	20·76	3·19	21
22	21·79	3·06	21·77	3·16	21·76	3·25	21·74	3·35	22
23	22·78	3·20	22·76	3·30	22·75	3·40	22·73	3·50	23
24	23·77	3·34	23·75	3·44	23·74	3·55	23·72	3·65	24
25	24·76	3·48	24·74	3·59	24·73	3·70	24·71	3·80	25
26	25·75	3·62	25·73	3·73	25·71	3·84	25·70	3·96	26
27	26·74	3·76	26·72	3·87	26·70	3·99	26·69	4·11	27
28	27·73	3·90	27·71	4·02	27·69	4·14	27·67	4·26	28
29	28·72	4·04	28·70	4·16	28·68	4·29	28·66	4·41	29
30	29·71	4·18	29·69	4·30	29·67	4·43	29·65	4·56	30
31	30·70	4·31	30·68	4·45	30·66	4·58	30·64	4·72	31
32	31·69	4·45	31·67	4·59	31·65	4·73	31·63	4·87	32
33	32·68	4·59	32·66	4·74	32·64	4·88	32·62	5·02	33
34	33·67	4·73	33·65	4·88	33·63	5·03	33·60	5·17	34
35	34·66	4·87	34·64	5·02	34·62	5·17	34·59	5·32	35
36	35·65	5·01	35·63	5·17	35·60	5·32	35·58	5·48	36
37	36·64	5·15	36·62	5·31	36·59	5·47	36·57	5·63	37
38	37·63	5·29	37·61	5·45	37·58	5·62	37·56	5·78	38
39	38·62	5·43	38·60	5·60	38·57	5·76	38·55	5·93	39
40	39·61	5·57	39·59	5·74	39·56	5·91	39·53	6·08	40
41	40·60	5·71	40·58	5·88	40·55	6·06	40·52	6·24	41
42	41·59	5·85	41·57	6·03	41·54	6·21	41·51	6·39	42
43	42·58	5·98	42·56	6·17	42·53	6·36	42·50	6·54	43
44	43·57	6·12	43·54	6·31	43·52	6·50	43·49	6·69	44
45	44·56	6·26	44·53	6·46	44·51	6·65	44·48	6·85	45
46	45·55	6·40	45·52	6·60	45·49	6·80	45·46	7·00	46
47	46·54	6·54	46·51	6·74	46·48	6·95	46·45	7·15	47
48	47·53	6·68	47·50	6·89	47·47	7·09	47·44	7·30	48
49	48·52	6·82	48·49	7·03	48·46	7·24	48·43	7·45	49
50	49·51	6·96	49·48	7·17	49·45	7·39	49·42	7·61	50
Distance.	Dep.	Lat.	Dep.	Lat.	Dep.	Lat.	Dep.	Lat.	Distance.
	82 Deg.		81¾ Deg.		81½ Deg.		81¼ Deg.		

Distance.	8 Deg.		8¼ Deg.		8½ Deg.		8¾ Deg.		Distance.
	Lat.	Dep.	Lat.	Dep.	Lat.	Dep.	Lat.	Dep.	
51	50·50	7·10	50·47	7·32	50·44	7·54	50·41	7·76	51
52	51·49	7·24	51·46	7·46	51·43	7·69	51·39	7·91	52
53	52·48	7·38	52·45	7·61	52·42	7·83	52·38	8·06	53
54	53·47	7·52	53·44	7·75	53·41	7·98	53·37	8·21	54
55	54·46	7·65	54·43	7·89	54·40	8·13	54·36	8·37	55
56	55·46	7·79	55·42	8·04	55·38	8·28	55·35	8·52	56
57	56·45	7·93	56·41	8·18	56·37	8·43	56·34	8·67	57
58	57·44	8·07	57·40	8·32	57·36	8·57	57·32	8·82	58
59	58·43	8·21	58·39	8·47	58·35	8·72	58·31	8·98	59
60	59·42	8·35	59·38	8·61	59·34	8·87	59·30	9·13	60
61	60·41	8·49	60·37	8·75	60·33	9·02	60·29	9·28	61
62	61·40	8·63	61·36	8·90	61·32	9·16	61·28	9·43	62
63	62·39	8·77	62·35	9·04	62·31	9·31	62·27	9·58	63
64	63·38	8·91	63·34	9·18	63·30	9·46	63·26	9·74	64
65	64·37	9·05	64·33	9·33	64·29	9·61	64·24	9·89	65
66	65·36	9·19	65·32	9·47	65·28	9·76	65·23	10·04	66
67	66·35	9·32	66·31	9·61	66·26	9·90	66·22	10·19	67
68	67·34	9·46	67·30	9·76	67·25	10·05	67·21	10·34	68
69	68·33	9·60	68·29	9·90	68·24	10·20	68·20	10·50	69
70	69·32	9·74	69·28	10·04	69·23	10·35	69·19	10·65	70
71	70·31	9·88	70·27	10·19	70·22	10·49	70·17	10·80	71
72	71·30	10·02	71·25	10·33	71·21	10·64	71·16	10·95	72
73	72·29	10·16	72·24	10·47	72·20	10·79	72·15	11·10	73
74	73·28	10·30	73·23	10·62	73·19	10·94	73·14	11·26	74
75	74·27	10·44	74·22	10·76	74·18	11·09	74·13	11·41	75
76	75·26	10·58	75·21	10·91	75·17	11·23	75·12	11·56	76
77	76·25	10·72	76·20	11·05	76·15	11·38	76·10	11·71	77
78	77·24	10·86	77·19	11·19	77·14	11·53	77·09	11·87	78
79	78·23	10·99	78·18	11·34	78·13	11·68	78·08	12·02	79
80	79·22	11·13	79·17	11·48	79·12	11·82	79·07	12·17	80
81	80·21	11·27	80·16	11·62	80·11	11·97	80·06	12·32	81
82	81·20	11·41	81·15	11·77	81·10	12·12	81·05	12·47	82
83	82·19	11·55	82·14	11·91	82·09	12·27	82·03	12·63	83
84	83·18	11·69	83·13	12·05	83·08	12·42	83·02	12·78	84
85	84·17	11·83	84·12	12·20	84·07	12·56	84·01	12·93	85
86	85·16	11·97	85·11	12·34	85·06	12·71	85·00	13·08	86
87	86·15	12·11	86·10	12·48	86·04	12·86	85·99	13·23	87
88	87·14	12·25	87·09	12·63	87·03	13·01	86·98	13·39	88
89	88·13	12·39	88·08	12·77	88·02	13·16	87·96	13·54	89
90	89·12	12·53	89·07	12·91	89·01	13·30	88·95	13·69	90
91	90·11	12·66	90·06	13·06	90·00	13·45	89·94	13·84	91
92	91·10	12·80	91·05	13·20	90·99	13·60	90·93	14·00	92
93	92·09	12·94	92·04	13·34	91·98	13·75	91·92	14·15	93
94	93·09	13·08	93·03	13·49	92·97	13·89	92·91	14·30	94
95	94·08	13·22	94·02	13·63	93·96	14·04	93·89	14·45	95
96	95·07	13·36	95·01	13·78	94·95	14·19	94·88	14·60	96
97	96·06	13·50	96·00	13·92	95·93	14·34	95·87	14·76	97
98	97·05	13·64	96·99	14·06	96·92	14·49	96·86	14·91	98
99	98·04	13·78	97·98	14·21	97·91	14·63	97·85	15·06	99
100	99·03	13·92	98·97	14·35	98·90	14·78	98·84	15·21	100
Distance.	Dep.	Lat.	Dep.	Lat.	Dep.	Lat.	Dep.	Lat.	Distance.
	82 Deg.		81¾ Deg.		81½ Deg.		81¼ Deg.		

Distance.	9 Deg.		9¼ Deg.		9½ Deg.		9¾ Deg.		Distance.
	Lat.	Dep.	Lat.	Dep.	Lat.	Dep.	Lat.	Dep.	
1	0·99	0·16	0·99	0·16	0·99	0·17	0·99	0·17	1
2	1·98	0·31	1·97	0·32	1·97	0·33	1·97	0·34.	2
3	2·96	0·47	2·96	0·48	2·96	0·50	2·96	0·51	3
4	3·95	0·63	3·95	0·64	3·95	0·66	3·94	0·68	4
5	4·94	0·78	4·93	0·80	4·93	0·83	4·93	0·85	5
6	5·93	0·94	5·92	0·96	5·92	0·99	5·91	1·02	6
7	6·91	1·10	6·91	1·13	6·90	1·16	6·90	1·19	7
8	7·90	1·25	7·90	1·29	7·89	1·32	7·88	1·35	8
9	8·89	1·41	8·88	1·45	8·88	1·49	8·87	1·52	9
10	9·88	1·56	9·87	1·61	9·86	1·65	9·86	1·69	10
11	10·86	1·72	10·86	1·77	10·85	1·82	10·84	1·86	11
12	11·85	1·88	11·84	1·93	11·84	1·98	11·83	2·03	12
13	12·84	2·03	12·83	2·09	12·82	2·15	12·81	2·20	13
14	13·83	2·19	13·82	2·25	13·81	2·31	13·80	2·37	14
15	14·82	2·35	14·80	2·41	14·79	2·48	14·78	2·54	15
16	15·80	2·50	15·79	2·57	15·78	2·64	15·77	2·71	16
17	16·79	2·66	16·78	2·73	16·77	2·81	16·75	2·88	17
18	17·78	2·82	17·77	2·89	17·75	2·97	17·74	3·05	18
19	18·77	2·97	18·75	3·05	18·74	3·14	18·73	3·22	19
20	19·75	3·13	19·74	3·21	19·73	3·30	19·71	3·39	20
21	20·74	3·29	20·73	3·38	20·71	3·47	20·70	3·56	21
22	21·73	3·44	21·71	3·54	21·70	3·63	21·68	3·73	22
23	22·72	3·60	22·70	3·70	22·68	3·80	22·67	3·90	23
24	23·70	3·75	23·69	3·86	23·67	3·96	23·65	4·06	24
25	24·69	3·91	24·67	4·02	24·66	4·13	24·64	4·23	25
26	25·68	4·07	25·66	4·18	25·64	4·29	25·62	4·40	26
27	26·67	4·22	26·65	4·34	26·63	4·46	26·61	4·57	27
28	27·66	4·38	27·64	4·50	27·62	4·62	27·60	4·74	28
29	28·64	4·54	28·62	4·66	28·60	4·79	28·58	4·91	29
30	29·63	4·69	29·61	4·82	29·59	4·95	29·57	5·08	30
31	30·62	4·85	30·60	4·98	30·57	5·12	30·55	5·25	31
32	31·61	5·01	31·58	5·14	31·56	5·28	31·54	5·42	32
33	32·59	5·16	32·57	5·30	32·55	5·45	32·52	5·59	33
34	33·58	5·32	33·56	5·47	33·53	5·61	33·51	5·76	34
35	34·57	5·48	34·54	5·63	34·52	5·78	34·49	5·93	35
36	35·56	5·63	35·53	5·79	35·51	5·94	35·48	6·10	36
37	36·54	5·79	36·52	5·95	36·49	6·11	36·47	6·27	37
38	37·53	5·94	37·51	6·11	37·48	6·27	37·45	6·44	38
39	38·52	6·10	38·49	6·27	38·47	6·44	38·44	6·60	39
40	39·51	6·26	39·48	6·43	39·45	6·60	39·42	6·77	40
41	40·50	6·41	40·47	6·59	40·44	6·77	40·41	6·94	41
42	41·48	6·57	41·45	6·75	41·42	6·92	41·39	7·11	42
43	42·47	6·73	42·44	6·91	42·41	7·10	42·38	7·28	43
44	43·46	6·88	43·43	7·07	43·40	7·26	43·36	7·45	44
45	44·45	7·04	44·41	7·23	44·38	7·43	44·35	7·62	45
46	45·43	7·20	45·40	7·39	45·37	7·59	45·34	7·79	46
47	46·42	7·35	46·39	7·55	46·36	7·76	46·32	7·96	47
48	47·41	7·51	47·38	7·72	47·34	7·92	47·31	8·13	48
49	48·40	7·67	48·36	7·88	48·33	8·09	48·29	8·30	49
50	49·38	7·82	49·35	8·04	49·32	8·25	49·28	8·47	50
Distance.	Dep.	Lat.	Dep.	Lat.	Dep.	Lat.	Dep.	Lat.	Distance.
	81 Deg.		80¾ Deg.		80½ Deg.		80¼ Deg.		

Distance.	9 Deg.		9¼ Deg.		9½ Deg.		9¾ Deg.		Distance.
	Lat.	Dep.	Lat.	Dep.	Lat.	Dep.	Lat.	Dep.	
51	50·37	7·98	50·34	8·20	50·30	8·42	50·26	8·64	51
52	51·36	8·13	51·32	8·36	51·29	8·58	51·25	8·81	52
53	52·35	8·29	52·31	8·52	52·27	8·75	52·23	8·98	53
54	53·34	8·45	53·30	8·68	53·26	8·91	53·22	9·14	54
55	54·32	8·60	54·28	8·84	54·25	9·08	54·21	9·31	55
56	55·31	8·76	55·27	9·00	55·23	9·24	55·19	9·48	56
57	56·30	8·92	56·26	9·16	56·22	9·41	56·18	9·65	57
58	57·29	9·07	57·25	9·32	57·20	9·57	57·16	9·82	58
59	58·27	9·23	58·23	9·48	58·19	9·74	58·15	9·99	59
60	59·26	9·39	59·22	9·64	59·18	9·90	59·13	10·16	60
61	60·25	9·54	60·21	9·81	60·16	10·07	60·12	10·33	61
62	61·24	9·70	61·19	9·97	61·15	10·23	61·10	10·50	62
63	62·22	9·86	62·18	10·13	62·14	10·40	62·09	10·67	63
64	63·21	10·01	63·17	10·29	63·12	10·56	63·08	10·84	64
65	64·20	10·17	64·15	10·45	64·11	10·73	64·06	11·01	65
66	65·19	10·32	65·14	10·61	65·09	10·89	65·05	11·18	66
67	66·18	10·48	66·13	10·77	66·08	11·06	66·03	11·35	67
68	67·16	10·64	67·12	10·93	67·07	11·22	67·02	11·52	68
69	68·15	10·79	68·10	11·09	68·05	11·39	68·00	11·69	69
70	69·14	10·95	69·09	11·25	69·04	11·55	68·99	11·85	70
71	70·13	11·11	70·08	11·41	70·03	11·72	69·97	12·02	71
72	71·11	11·26	71·06	11·57	71·01	11·88	70·96	12·19	72
73	72·10	11·42	72·05	11·73	72·00	12·05	71·95	12·36	73
74	73·09	11·58	73·04	11·89	72·99	12·21	72·93	12·53	74
75	74·08	11·73	74·02	12·06	73·97	12·38	73·92	12·70	75
76	75·06	11·89	75·01	12·22	74·96	12·54	74·90	12·87	76
77	76·05	12·05	76·00	12·38	75·94	12·71	75·89	13·04	77
78	77·04	12·20	76·99	12·54	76·93	12·87	76·87	13·21	78
79	78·03	12·36	77·97	12·70	77·92	13·04	77·86	13·38	79
80	79·02	12·51	78·96	12·86	78·90	13·20	78·84	13·55	80
81	80·00	12·67	79·95	13·02	79·89	13·37	79·83	13·72	81
82	80·99	12·83	80·93	13·18	80·88	13·53	80·82	13·89	82
83	81·98	12·98	81·92	13·34	81·86	13·70	81·80	14·06	83
84	82·97	13·14	82·91	13·50	82·85	13·86	82·79	14·23	84
85	83·95	13·30	83·89	13·66	83·83	14·03	83·77	14·39	85
86	84·94	13·45	84·88	13·82	84·82	14·19	84·76	14·56	86
87	85·93	13·61	85·87	13·98	85·81	14·36	85·74	14·73	87
88	86·92	13·77	86·86	14·15	86·79	14·52	86·73	14·90	88
89	87·90	13·92	87·84	14·31	87·78	14·69	87·71	15·07	89
90	88·89	14·08	88·83	14·47	88·77	14·85	88·70	15·24	90
91	89·88	14·24	89·82	14·63	89·75	15·02	89·69	15·41	91
92	90·87	14·39	90·80	14·79	90·74	15·18	90·67	15·58	92
93	91·86	14·55	91·79	14·95	91·72	15·35	91·66	15·75	93
94	92·84	14·70	92·78	15·11	92·71	15·51	92·64	15·92	94
95	93·83	14·86	93·76	15·27	93·70	15·68	93·63	16·09	95
96	94·82	15·02	94·75	15·43	94·68	15·84	94·61	16·26	96
97	95·81	15·17	95·74	15·59	95·67	16·01	95·60	16·43	97
98	96·79	15·33	96·73	15·75	96·66	16·17	96·58	16·60	98
99	97·78	15·49	97·71	15·91	97·64	16·34	97·57	16·77	99
100	98·77	15·64	98·70	16·07	98·63	16·50	98·56	16·93	100
Distance.	Dep.	Lat.	Dep.	Lat.	Dep.	Lat.	Dep.	Lat.	Distance.
	81 Deg.		80¾ Deg.		80½ Deg.		80¼ Deg.		

Distance.	10 Deg.		10¼ Deg.		10½ Deg.		10¾ Deg.		Distance.
	Lat.	Dep.	Lat.	Dep.	Lat.	Dep.	Lat.	Dep.	
1	0·98	0·17	0·98	0·18	0·98	0·18	0·98	0·19	1
2	1·97	0·35	1·97	0·36	1·97	0·36	1·96	0·37	2
3	2·95	0·52	2·95	0·53	2·95	0·55	2·95	0·56	3
4	3·94	0·69	3·94	0·71	3·93	0·73	3·93	0·75	4
5	4·92	0·87	4·92	0·89	4·92	0·91	4·91	0·93	5
6	5·91	1·04	5·90	1·07	5·90	1·09	5·89	1·12	6
7	6·89	1·22	6·89	1·25	6·88	1·28	6·88	1·31	7
8	7·88	1·39	7·87	1·42	7·87	1·46	7·86	1·49	8
9	8·86	1·56	8·86	1·60	8·85	1·64	8·84	1·68	9
10	9·85	1·74	9·84	1·78	9·83	1·82	9·82	1·87	10
11	10·83	1·91	10·82	1·96	10·82	2·00	10·81	2·05	11
12	11·82	2·08	11·81	2·14	11·80	2·19	11·79	2·24	12
13	12·80	2·26	12·79	2·31	12·78	2·37	12·77	2·42	13
14	13·79	2·43	13·78	2·49	13·77	2·55	13·75	2·61	14
15	14·77	2·60	14·76	2·67	14·75	2·73	14·74	2·80	15
16	15·76	2·78	15·74	2·85	15·73	2·92	15·72	2·98	16
17	16·74	2·95	16·73	3·03	16·72	3·10	16·70	3·17	17
18	17·73	3·13	17·71	3·20	17·70	3·28	17·68	3·36	18
19	18·71	3·30	18·70	3·38	18·68	3·46	18·67	3·54	19
20	19·70	3·47	19·68	3·56	19·67	3·64	19·65	3·73	20
21	20·68	3·65	20·66	3·74	20·65	3·83	20·63	3·92	21
22	21·67	3·82	21·65	3·91	21·63	4·01	21·61	4·10	22
23	22·65	3·99	22·63	4·09	22·61	4·19	22·60	4·29	23
24	23·64	4·17	23·62	4·27	23·60	4·37	23·58	4·48	24
25	24·62	4·34	24·60	4·45	24·58	4·56	24·56	4·66	25
26	25·61	4·51	25·59	4·63	25·56	4·74	25·54	4·85	26
27	26·59	4·69	26·57	4·80	26·55	4·92	26·53	5·04	27
28	27·57	4·86	27·55	4·98	27·53	5·10	27·51	5·22	28
29	28·56	5·04	28·54	5·16	28·51	5·28	28·49	5·41	29
30	29·54	5·21	29·52	5·34	29·50	5·47	29·47	5·60	30
31	30·53	5·38	30·51	5·52	30·48	5·65	30·46	5·78	31
32	31·51	5·56	31·49	5·69	31·46	5·83	31·44	5·97	32
33	32·50	5·73	32·47	5·87	32·45	6·01	32·42	6·16	33
34	33·48	5·90	33·46	6·05	33·43	6·20	33·40	6·34	34
35	34·47	6·08	34·44	6·23	34·41	6·38	34·39	6·53	35
36	35·45	6·25	35·43	6·41	35·40	6·56	35·37	6·71	36
37	36·44	6·42	36·41	6·58	36·38	6·74	36·35	6·90	37
38	37·42	6·60	37·39	6·76	37·36	6·92	37·33	7·09	38
39	38·41	6·77	38·38	6·94	38·35	7·11	38·32	7·27	39
40	39·39	6·95	39·36	7·12	39·33	7·29	39·30	7·46	40
41	40·38	7·12	40·35	7·30	40·31	7·47	40·28	7·65	41
42	41·36	7·29	41·33	7·47	41·30	7·65	41·26	7·83	42
43	42·35	7·47	42·31	7·65	42·28	7·84	42·25	8·02	43
44	43·33	7·64	43·30	7·83	43·26	8·02	43·23	8·21	44
45	44·32	7·81	44·28	8·01	44·25	8·20	44·21	8·39	45
46	45·30	7·99	45·27	8·19	45·23	8·38	45·19	8·58	46
47	46·29	8·16	46·25	8·36	46·21	8·57	46·18	8·77	47
48	47·27	8·34	47·23	8·54	47·20	8·75	47·16	8·95	48
49	48·26	8·51	48·22	8·72	48·18	8·93	48·14	9·14	49
50	49·24	8·68	49·20	8·90	49·16	9·11	49·12	9·33	50
Distance.	Dep.	Lat.	Dep.	Lat.	Dep.	Lat.	Dep.	Lat.	Distance.
	80 Deg.		79¾ Deg.		79 ½ Deg.		79¼ Deg.		

Distance.	10 Deg.		10¼ Deg.		10½ Deg.		10¾ Deg.		Distance.
	Lat.	Dep.	Lat.	Dep.	Lat.	Dep.	Lat.	Dep.	
51	50.23	8·86	50·19	9·08	50·15	9·29	50·10	9·51	51
52	51·21	9·03	51·17	9·25	51·13	9·48	51·09	9·70	52
53	52·19	9·20	52·15	9·43	52·11	9·66	52·07	9·89	53
54	53·18	9·38	53·14	9·61	53·10	9·84	53·05	10·07	54
55	54·16	9·55	54·12	9·79	54·08	10·02	54·03	10·26	55
56	55·15	9·72	55·11	9·96	55·06	10·21	55·02	10·45	56
57	56·13	9·90	56·09	10·14	56·05	10·39	56·00	10·63	57
58	57·12	10·07	57·07	10·32	57·03	10·57	56·98	10·82	58
59	58·10	10·25	58·06	10·50	58·01	10·75	57·96	11·00	59
50	59·09	10.42	59·04	10·68	59·00	10·93	58·95	11·19	60
61	60·07	10·59	60·03	10·85	59·98	11·12	59·93	11·38	61
62	61·06	10·77	61·01	11·03	60·96	11·30	60·91	11·56	62
63	62·04	10·94	61·99	11·21	61·95	11·48	61·89	11·75	63
64	63·03	11·11	62·98	11·39	62·93	11·66	62·88	11·94	64
65	64·01	11·29	63·96	11·57	63·91	11·85	63·86	12·12	65
66	65·00	11·46	64·95	11·74	64·89	12·03	64·84	12·31	66
67	65·98	11·63	65·93	11·92	65·88	12·21	65·82	12·50	67
68	66·97	11·81	66·91	12·10	66·86	12·39	66·81	12·68	68
69	67·95	11·98	67·90	12·28	67·84	12·57	67·79	12·87	69
70	68·94	12·16	68·88	12·46	68·83	12·76	68·77	13·06	70
71	69·92	12·33	69·87	12·63	69·81	12·94	69·75	13·24	71
72	70·91	12·50	70·85	12·81	70·79	13·12	70·74	13·43	72
73	71·89	12·68	71·83	12·99	71·78	13·30	71·72	13·62	73
74	72·88	12·85	72·82	13·17	72·76	13·49	72·70	13·80	74
75	73·86	13·02	73·80	13·35	73·74	13·67	73·68	13·99	75
76	74·85	13·20	74·79	13·52	74·73	13·85	74·67	14·18	76
77	75·83	13·37	75·77	13·70	75·71	14·03	75·65	14·36	77
78	76·82	13·54	76·76	13·88	76·69	14·21	76·63	14·55	78
79	77·80	13·72	77·74	14·06	77·68	14·40	77·61	14·74	79
80	78·78	13·89	78·72	14·24	78·66	14·58	78·60	14·92	80
81	79·77	14·07	79·71	14·41	79·64	14·76	79·58	15·11	81
82	80·75	14·24	80·69	14·59	80·63	14·94	80·56	15·29	82
83	81·74	14·41	81·68	14·77	81·61	15·13	81·54	15·48	83
84	82·72	14·59	82·66	14·95	82·59	15·31	82·53	15·67	84
85	83·71	14·76	83·64	15·13	83·58	15·49	83·51	15·85	85
86	84·69	14·93	84·63	15·30	84·56	15·67	84·49	16·04	86
87	85·68	15·11	85·61	15·48	85·54	15·85	85·47	16·23	87
88	86·66	15·28	86·60	15·66	86·53	16·04	86·46	16·41	88
89	87·65	15·45	87·58	15·84	87·51	16·22	87·44	16·60	89
90	88·63	15·63	88·56	16·01	88·49	16·40	88·42	16·79	90
91	89.62	15·80	89·55	16·19	89·48	16·58	89·40	16·97	91
92	90·60	15·98	90·53	16·37	90·46	16·77	90·39	17·16	92
93	91·59	16·15	91·52	16·55	91·44	16·95	91·37	17·35	93
94	92·57	16·32	92·50	16·73	92·43	17·13	92·35	17·53	94
95	93·56	16·50	93·48	16·90	93·41	17·31	93·33	17·72	95
96	94·54	16·67	94·47	17·08	94·39	17·49	94·32	17·91	96
97	95·53	16·84	95·45	17·26	95·38	17·68	95·30	18·09	97
98	96·51	17·02	96·44	17·44	96·36	17·86	96·28	18·28	98
99	97·50	17·19	97·42	17·62	97·34	18·04	97·26	18·47	99
100	98·48	17·36	98·40	17·79	98·33	18·22	98·25	18·65	100
Distance.	Dep.	Lat.	Dep.	Lat.	Dep.	Lat.	Dep.	Lat.	Distance.
	80 Deg.		79¾ Deg.		79½ Deg.		79¼ Deg.		

Distance.	11 Deg.		11¼ Deg.		11½ Deg.		11¾ Deg.		Distance.
	Lat.	Dep.	Lat.	Dep.	Lat.	Dep.	Lat.	Dep.	
1	0·98	0·19	0·98	0·20	0·98	0·20	0·98	0·20	1
2	1·96	0·38	1·96	0·39	1·96	0·40	1·96	0·41	2
3	2·94	0·57	2·94	0·59	2·94	0·60	2·94	0·61	3
4	3·93	0·76	3·92	0·78	3·92	0·80	3·92	0·82	4
5	4·91	0·95	4·90	0·98	4·90	1·00	4·90	1·02	5
6	5·89	1·14	5·88	1·17	5·88	1·20	5·87	1·22	6
7	6·87	1·34	6·87	1·37	6·86	1·40	6·85	1·43	7
8	7·85	1·53	7·85	1·56	7·84	1·59	7·83	1·63	8
9	8·83	1·72	8·83	1·76	8·82	1·79	8·81	1·83	9
10	9·82	1·91	9·81	1·95	9·80	1·99	9·79	2·04	10
11	10·80	2·10	10·79	2·15	10·78	2·19	10·77	2·24	11
12	11·78	2·29	11·77	2·34	11·76	2·39	11·75	2·44	12
13	12·76	2·48	12·75	2·54	12·74	2·59	12·73	2·65	13
14	13·74	2·67	13·73	2·73	13·72	2·79	13·71	2·85	14
15	14·72	2·86	14·71	2·93	14·70	2·99	14·69	3·06	15
16	15·71	3·05	15·69	3·12	15·68	3·19	15·66	3·26	16
17	16·69	3·24	16·67	3·32	16·66	3·39	16·64	3·46	17
18	17·67	3·43	17·65	3·51	17·64	3·59	17·62	3·66	18
19	18·65	3·63	18·63	3·71	18·62	3·79	18·60	3·87	19
20	19·63	3·82	19·62	3·90	19·60	3·99	19·58	4·07	20
21	20·61	4·01	20·60	4·10	20·58	4·19	20·56	4·28	21
22	21·60	4·20	21·58	4·29	21·56	4·39	21·54	4·48	22
23	22·58	4·39	22·56	4·49	22·54	4·59	22·52	4·68	23
24	23·56	4·58	23·54	4·68	23·52	4·78	23·50	4·89	24
25	24·54	4·77	24·52	4·88	24·50	4·98	24·48	5·09	25
26	25·52	4·96	25·50	5·07	25·48	5·18	25·46	5·30	26
27	26·50	5·15	26·48	5·27	26·46	5·38	26·43	5·50	27
28	27·49	5·34	27·46	5·46	27·44	5·58	27·41	5·70	28
29	28·47	5·53	28·44	5·66	28·42	5·78	28·39	5·91	29
30	29·45	5·72	29·42	5·85	29·40	5·98	29·37	6·11	30
31	30·43	5·92	30·40	6·05	30·38	6·18	30·35	6·31	31
32	31·41	6·11	31·39	6·24	31·36	6·38	31·33	6·52	32
33	32·39	6·30	32·37	6·44	32·34	6·58	32·31	6·72	33
34	33·38	6·49	33·35	6·63	33·32	6·78	33·29	6·92	34
35	34·36	6·68	34·33	6·83	34·30	6·98	34·27	7·13	35
36	35·34	6·87	35·31	7·02	35·28	7·18	35·25	7·33	36
37	36·32	7·06	36·29	7·22	36·26	7·38	36·22	7·53	37
38	37·30	7·25	37·27	7·41	37·24	7·58	37·20	7·74	38
39	38·28	7·44	38·25	7·61	38·22	7·78	38·18	7·94	39
40	39·27	7·63	39·23	7·80	39·20	7·97	39·16	8·15	40
41	40·25	7·82	40·21	8·00	40·18	8·17	40·14	8·35	41
42	41·23	8·01	41·19	8·19	41·16	8·37	41·12	8·55	42
43	42·21	8·20	42·17	8·39	42·14	8·57	42·10	8·76	43
44	43·19	8·40	43·15	8·58	43·12	8·77	43·08	8·96	44
45	44·17	8·59	44·14	8·78	44·10	8·97	44·06	9·16	45
46	45·15	8·78	45·12	8·97	45·08	9·17	45·04	9·37	46
47	46·14	8·97	46·10	9·17	46·06	9·37	46·02	9·57	47
48	47·12	9·16	47·08	9·36	47·04	9·57	46·99	9·78	48
49	48·10	9·35	48·06	9·56	48·02	9·77	47·97	9·98	49
50	49·08	9·54	49·04	9·75	49·00	9·97	48·95	10·18	50
Distance.	Dep.	Lat.	Dep.	Lat.	Dep.	Lat.	Dep.	Lat.	Distance.
	79 Deg.		78¾ Deg.		78½ Deg.		78¼ Deg.		

Distance.	11 Deg.		11¼ Deg.		11½ Deg.		11¾ Deg.		Distance.
	Lat.	Dep.	Lat.	Dep.	Lat.	Dep.	Lat.	Dep.	
51	50·06	9·73	50·02	9·95	49·98	10·17	49 93	10·39	51
52	51·04	9·92	51·00	10·14	50·96	10·37	50·91	10·59	52
53	52·03	10 11	51·98	10·34	51·94	10·57	51·89	10·79	53
54	53·01	10·30	52·96	10·53	52·92	10·77	52·87	11·00	54
55	53·99	10·49	53·94	10·73	53·90	10·97	53·85	11·20	55
56	54·97	10·69	54·92	10·93	54·88	11·16	54·83	11·40	56
57	55·95	10·88	55·90	11·12	55·86	11·36	55·81	11·61	57
58	56·93	11·07	56·89	11.32	56·84	11·56	56·78	11·81	58
59	57·92	11·26	57·87	11·51	57·82	11·76	57·76	12·01	59
60	58·90	11·45	58·85	11·71	58·80	11·96	58·74	12·22	60
61	59·88	11·64	59·83	11·90	59·78	12·16	59·72	12·42	61
62	60·86	11·83	60·81	12·10	60·76	12·36	60·70	12·63	62
63	61·84	12·02	61·79	12·29	61·74	12·56	61·68	12·83	63
64	62·82	12·21	62·77	12·49	62·72	12·76	62·66	13·03	64
65	63·81	12·40	63·75	12·68	63·70	12·96	63·64	13·24	65
66	64·79	12·59	64·73	12·88	64·68	13·16	64·62	13·44	66
67	65·77	12·78	65·71	13·07	65·66	13·36	65·60	13·64	67
68	66·75	12·98	66·69	13·27	66·63	13·56	66·58	13·85	68
69	67·73	13·17	67·67	13·46	67·61	13·76	67·55	14·05	69
70	68·71	13·36	68·66	13·66	68·59	13·96	68·53	14·25	70
71	69·70	13·55	69·64	13·85	69·57	14·16	69·51	14·46	71
72	70·68	13·74	70·62	14·05	70·55	14·35	70·49	14·66	72
73	71·66	13·93	71·60	14·24	71·53	14·55	71·47	14·87	73
74	72·64	14·12	72·58	14·44	72·51	14·75	72·45	15·07	74
75	73·62	14·31	73·56	14·63	73·49	14·95	73·43	15·27	75
76	74·60	14·50	74·54	14·83	74·47	15·15	74·41	15·48	76
77	75·59	14·69	75·52	15·02	75·45	15·35	75·39	15·68	77
78	76·57	14·88	76·50	15·22	76·43	15·55	76·37	15·88	78
79	77·55	15·07	77·48	15·41	77·41	15·75	77·34	16·09	79
80	78·53	15·26	78·46	15·61	78·39	15·95	78·32	16·29	80
81	79·51	15·46	79·44	15·80	79·37	16·15	79·30	16·49	81
82	80·49	15·65	80·42	16·00	80·35	16·35	80·28	16·70	82
83	81·48	15·84	81·41	16·19	81·33	16·55	81·26	16·90	83
84	82·46	16·03	82·39	16·39	82·31	16·75	82·24	17·11	84
85	83·44	16·22	83·37	16·58	83·29	16·95	83·22	17·31	85
86	84·42	16·41	84·35	16·78	84·27	17·15	84·20	17·51	86
87	85·40	16·60	85·33	16·97	85·25	17·35	85·18	17·72	87
88	86·38	16·79	86·31	17·17	86·23	17·54	86·16	17·92	88
89	87·36	16·98	87·29	17·36	87·21	17·74	87·14	18·12	89
90	88·35	17·17	88·27	17·56	88·19	17·94	88·11	18·33	90
91	89·33	17·36	89·25	17·75	89·17	18·14	89·09	18·53	91
92	90·31	17·55	90·23	17·95	90·15	18·34	90·07	18·74	92
93	91·29	17·75	91·21	18·14	91·13	18·54	91·05	18·94	93
94	92·27	17·94	92·19	18·34	92·11	18·74	92·03	19·14	94
95	93·25	18·13	93·17	18·53	93·09	18·94	93·01	19·35	95
96	94·24	18·32	94·16	18·73	94·07	19·14	93·99	19·55	96
97	95·22	18·51	95·14	18·92	95·05	19·34	94·97	19·75	97
98	96·20	18·70	96·12	19·12	96·03	19·54	95·95	19·96	98
99	97·18	18·89	97·10	19·31	97·01	19·74	96·93	20·16	99
100	98·16	19·08	98·08	19·51	97·99	19·94	97·90	20·36	100
Distance.	Dep.	Lat.	Dep.	Lat.	Dep.	Lat.	Dep.	Lat.	Distance.
	79 Deg.		78¾ Deg.		78½ Deg.		78¼ Deg.		

Distance.	12 Deg.		12¼ Deg.		12½ Deg.		12¾ Deg.		Distance.
	Lat.	Dep.	Lat.	Dep.	Lat.	Dep.	Lat.	Dep.	
1	0·98	0·21	0·98	0·21	0·98	0·22	0·98	0·22	1
2	1·96	0·42	1·95	0·42	1·95	0·43	1·95	0·44	2
3	2·93	0·62	2·93	0·64	2·93	0·65	2·93	0·66	3
4	3·91	0·83	3·91	0·85	3·91	0·87	3·90	0·88	4
5	4·89	1·04	4·89	1·06	4·88	1·08	4·88	1·10	5
6	5·87	1·25	5·86	1·27	5·86	1·30	5·85	1·32	6
7	6·85	1·46	6·84	1·49	6·83	1·52	6·83	1·54	7
8	7·83	1·66	7·82	1·70	7·81	1·73	7·80	1·77	8
9	8·80	1·87	8·80	1·91	8·79	1·95	8·78	1·99	9
10	9·78	2·08	9·77	2·12	9·76	2·16	9·75	2·21	10
11	10·76	2·29	10·75	2·33	10·74	2·38	10·73	2·43	11
12	11·74	2·49	11·73	2·55	11·72	2·60	11·70	2·65	12
13	12·72	2·70	12·70	2·76	12·69	2·81	12·68	2·87	13
14	13·69	2·91	13·68	2·97	13·67	3·03	13·65	3·09	14
15	14·67	3·12	14·66	3·18	14·64	3·25	14·63	3·31	15
16	15·65	3·33	15·64	3·39	15·62	3·46	15·61	3·53	16
17	16·63	3·53	16·61	3·61	16·60	3·68	16·58	3·75	17
18	17·61	3·74	17·59	3·82	17·57	3·90	17·56	3·97	18
19	18·58	3·95	18·57	4·03	18·55	4·11	18·53	4·19	19
20	19·56	4·16	19·54	4·24	19·53	4·33	19·51	4·41	20
21	20·54	4·37	20·52	4·46	20·50	4·55	20·48	4·63	21
22	21·52	4·57	21·50	4·67	21·48	4·76	21·46	4·86	22
23	22·50	4·78	22·48	4·88	22·45	4·98	22·43	5·08	23
24	23·48	4·99	23·45	5·09	23·43	5·19	23·41	5·30	24
25	24·45	5·20	24·43	5·30	24·41	5·41	24·38	5·52	25
26	25·43	5·41	25·41	5·52	25·38	5·63	25·36	5·74	26
27	26·41	5·61	26·39	5·73	26·36	5·84	26·33	5·96	27
28	27·39	5·82	27·36	5·94	27·34	6·06	27·31	6·18	28
29	28·37	6·03	28·34	6·15	28·31	6·28	28·28	6·40	29
30	29·34	6·24	29·32	6·37	29·29	6·49	29·26	6·62	30
31	30·32	6·45	30·29	6·58	30·27	6·71	30·24	6·84	31
32	31·30	6·65	31·27	6·79	31·24	6·93	31·21	7·06	32
33	32·28	6·86	32·25	7·00	32·22	7·14	32·19	7·28	33
34	33·26	7·07	33·23	7·21	33·19	7·36	33·16	7·50	34
35	34·24	7·28	34·20	7·43	34·17	7·58	34·14	7·72	35
36	35·21	7·48	35·18	7·64	35·15	7·79	35·11	7·95	36
37	36·19	7·69	36·16	7·85	36·12	8·01	36·09	8·17	37
38	37·17	7·90	37·13	8·06	37·10	8·22	37·06	8·39	38
39	38·15	8·11	38·11	8·27	38·08	8·44	38·04	8·61	39
40	39·13	8·32	39·09	8·49	39·05	8·66	39·01	8·83	40
41	40·10	8·52	40·07	8·70	40·03	8·87	39·99	9·05	41
42	41·08	8·73	41·04	8·91	41·00	9·09	40·96	9·27	42
43	42·06	8·94	42·02	9·12	41·98	9·31	41·94	9·49	43
44	43·04	9·15	43·00	9·34	42·96	9·52	42·92	9·71	44
45	44·02	9·36	43·98	9·55	43·93	9·74	43.89	9·93	45
46	44·99	9·56	44·95	9·76	44·91	9·96	44·87	10·15	46
47	45·97	9·77	45·93	9·97	45·89	10·17	45·84	10·37	47
48	46·95	9·98	46·91	10·18	46·86	10·39	46·82	10·59	48
49	47·93	10·19	47·88	10·40	47·84	10·61	47·79	10·81	49
50	48·91	10·40	48·86	10·61	48·81	10·82	48·77	11·03	50
Distance.	Dep.	Lat.	Dep.	Lat.	Dep.	Lat.	Dep.	Lat.	Distance.
	78 Deg.		77¾ Deg.		77½ Deg.		77¼ Deg.		

Distance.	12 Deg.		12¼ Deg.		12½ Deg.		12¾ Deg.		Distance.
	Lat.	Dep.	Lat.	Dep.	Lat.	Dep.	Lat.	Dep.	
51	49·89	10·60	49·84	10·82	49·79	11·04	49·74	11·26	51
52	50·86	10·81	50·82	11·03	50·77	11·25	50·72	11·48	52
53	51·84	11·02	51·79	11·25	51·74	11·47	51·69	11·70	53
54	52·82	11·23	52·77	11·46	52·72	11·69	52·67	11·92	54
55	53·80	11·44	53·75	11·67	53·70	11·90	53·64	12·14	55
56	54·78	11·64	54·72	11·88	54·67	12·12	54·62	12·36	56
57	55·75	11·85	55·70	12·09	55·65	12·34	55·59	12·58	57
58	56·73	12·06	56·68	12·31	56·63	12·55	56·57	12·80	58
59	57·71	12·27	57·66	12·52	57·60	12·77	57·55	13·02	59
60	58·69	12·47	58·63	12·73	58·58	12·99	58·52	13·24	60
61	59·67	12·68	59·61	12·94	59·55	13·20	59·50	13·46	61
62	60·65	12·89	60·59	13·16	60·53	13·42	60·47	13·68	62
63	61·62	13·10	61·57	13·37	61·51	13·64	61·45	13·90	63
64	62·60	13·31	62·54	13·58	62·48	13·85	62·42	14·12	64
65	63·58	13·51	63·52	13·79	63·46	14·07	63·40	14·35	65
66	64·56	13·72	64·50	14·00	64·44	14·29	64·37	14·57	66
67	65·54	13·93	65·47	14·22	65·41	14·50	65·35	14·79	67
68	66·51	14·14	66·45	14·43	66·39	14·72	66·32	15·01	68
69	67·49	14·35	67·43	14·64	67·36	14·93	67·30	15·23	69
70	68·47	14·55	68·41	14·85	68·34	15·15	68·27	15·45	70
71	69·45	14·76	69.38	15·06	69·32	15·37	69·25	15·67	71
72	70·43	14·97	70·36	15·28	70·29	15·58	70·22	15·89	72
73	71·40	15·18	71·34	15·49	71·27	15·80	71·20	16·11	73
74	72·38	15·39	72·32	15·70	72·25	16·02	72·18	16·33	74
75	73·36	15·59	73·29	15·91	73·22	16·23	73·15	16·55	75
76	74·34	15·80	74·27	16·13	74·20	16·45	74·13	16·77	76
77	75·32	16·01	75·25	16·34	75·17	16·67	75·10	16·99	77
78	76·30	16·22	76·22	16·55	76·15	16·88	76·08	17·21	78
79	77·27	16·43	77·20	16·76	77·13	17·10	77·05	17·44	79
80	78·25	16·63	78·18	16·97	78·10	17·32	78·03	17·66	80
81	79·23	16·84	79·16	17·19	79·08	17·53	79·00	17·88	81
82	80·21	17·05	80·13	17·40	80·06	17·75	79·98	18·10	82
83	81·19	17·26	81·11	1 ·61	81·03	17·96	80·95	18·32	83
84	82·16	17·46	82·09	17·82	82·01	18·18	81·93	18·54	84
85	83·14	17·67	83·06	18·04	82·99	18·40	82·90	18·76	85
86	84·12	17·88	84·04	18·25	83·96	18·61	83·88	18·98	86
87	85·10	18·09	85·02	18·46	84·94	18·83	84·85	19·20	87
88	86·08	18·30	86·00	18·67	85·91	19·05	85·83	19·42	88
89	87·06	18·50	86·97	18·88	86·89	19·26	86·81	19·64	89
90	88·03	18·71	87·95	19·10	87·87	19·48	87·78	19·86	90
91	89·01	18·92	88·93	19·31	88·84	19·70	88·76	20·08	91
92	89·99	19·13	89·91	19·52	89·82	19·91	89·73	20·30	92
93	90·97	19·34	90·88	19·73	90·80	20·13	90·71	20·52	93
94	91·95	19·54	91·86	19·94	91·77	20·35	91·68	20·75	94
95	92·92	19·75	92·84	20·16	92·75	20·56	92·66	20·97	95
96	93·90	19·96	93·81	20·37	93·72	20·78	93·63	21·19	96
97	94·88	20·17	94·79	20·58	94·70	20·99	94·61	21·41	97
98	95·86	20·38	95·77	20·79	95·68	21·21	95·58	21·63	98
99	96·84	20·58	96·75	21·01	96·65	21·43	96·56	21·85	99
100	97·81	20·79	97·72	21·22	97·63	21·64	97·53	22·07	100
Distance.	Dep.	Lat.	Dep.	Lat.	Dep.	Lat.	Dep.	Lat.	Distance.
	78 Deg.		77¾ Deg.		77½ Deg.		77¼ Deg.		

Distance.	13 Deg.		13¼ Deg.		13½ Deg.		13¾ Deg.		Distance.
	Lat.	Dep.	Lat.	Dep.	Lat.	Dep.	Lat.	Dep.	
1	0·97	0·23	0·97	0·23	0·97	0·23	0·97	0·24	1
2	1·95	0·45	1·95	0·46	1·95	0·47	1·94	0·48	2
3	2·92	0·67	2·92	0·69	2·92	0·70	2·91	0·71	3
4	3·90	0·90	3·89	0·92	3·89	0·93	3·89	0·95	4
5	4·87	1·12	4·87	1·15	4·86	1·17	4·86	1·19	5
6	5·85	1·35	5·84	1·38	5·83	1·40	5·83	1·43	6
7	6·82	1·57	6·81	1·60	6·81	1·63	6·80	1·66	7
8	7·80	1·80	7·79	1·83	7·78	1·87	7·77	1·90	8
9	8·77	2·02	8·76	2·06	8·75	2·10	8·74	2·14	9
10	9.74	2·25	9·73	2·29	9·72	2·33	9·71	2·38	10
11	10·72	2·47	10·71	2·52	10·70	2·57	10·68	2·61	11
12	11·69	2·70	11·68	2·75	11·67	2·80	11·66	2·85	12
13	12·67	2·92	12·65	2·98	12·64	3·03	12·63	3·09	13
14	13·64	3·15	13·63	3·21	13·61	3·27	13·60	3·33	14
15	14·62	3·37	14·60	3·44	14·59	3·50	14·57	3·57	15
16	15·59	3·60	15·57	3·67	15·56	3·74	15·54	3·80	16
17	16·57	3·82	16·55	3·90	16·53	3·97	16·51	4·04	17
18	17·54	4·05	17·52	4·13	17·50	4·20	17·48	4·28	18
19	18·51	4·27	18·49	4·35	18·48	4·44	18·46	4·52	19
20	19·49	4·50	19·47	4·58	19·45	4·67	19·43	4·75	20
21	20·46	4·72	20·44	4·81	20·42	4·90	20·40	4·99	21
22	21·44	4·95	21·41	5·04	21·39	5·14	21·37	5·23	22
23	22·41	5·17	22·39	5·27	22·36	5·37	22·34	5·47	23
24	23·38	5·40	23·36	5·50	23·34	5·60	23·31	5·70	24
25	24·36	5·62	24·33	5·73	24·31	5·84	24·28	5·94	25
26	25·33	5·85	25·31	5·96	25·28	6·07	25·25	6·18	26
27	26·31	6·07	26·28	6·19	26·25	6·30	26·23	6·42	27
28	27·28	6·30	27·25	6·42	27·23	6·54	27·20	6·66	28
29	28·26	6·52	28·23	6·65	28·20	6·77	28·17	6·89	29
30	29·23	6·75	29·20	6·88	29·17	7·00	29·14	7·13	30
31	30·21	6·97	30·17	7·11	30·14	7·24	30·11	7·37	31
32	31·18	7·20	31·15	7·33	31·12	7·47	31·08	7·61	32
33	32·15	7·42	32·12	7·56	32·09	7·70	32·05	7·84	33
34	33·13	7·65	33·09	7·79	33·06	7·94	33·03	8·08	34
35	34·10	7·87	34·07	8·02	34·03	8·17	34·00	8·32	35
36	35·08	8·10	35·04	8·25	35·01	8·40	34·97	8·56	36
37	36·05	8·32	36·02	8·48	35·98	8·64	35·94	8·79	37
38	37·03	8·55	36·99	8·71	36·95	8·87	36·91	9·03	38
39	38·00	8·77	37·96	8·94	37·92	9·10	37·88	9·27	39
40	38·97	9·00	38·94	9·17	38·89	9·34	38·85	9·51	40
41	39·95	9·22	39·91	9·40	39·87	9·57	39·83	9·75	41
42	40·92	9·45	40·88	9·63	40·84	9·80	40·80	9·98	42
43	41·90	9·67	41·86	9·86	41·81	10·04	41·77	10·22	43
44	42·87	9·90	42·83	10·08	42·78	10·27	42·74	10·46	44
45	43·85	10·12	43·80	10·31	43·76	10·51	43·71	10·70	45
46	44·82	10·35	44·78	10·54	44·73	10·74	44·68	10·93	46
47	45·80	10·57	45·75	10·77	45·70	10·97	45·65	11·17	47
48	46·77	10·80	46·72	11·00	46·67	11·21	46·62	11·41	48
49	47·74	11·02	47·70	11·23	47·65	11·44	47·60	11·65	49
50	48·72	11·25	48·67	11·46	48·62	11·67	48·57	11·88	50
Distance.	Dep.	Lat.	Dep.	Lat.	Dep.	Lat.	Dep.	Lat.	Distance.
	77 Deg.		76¾ Deg.		76½ Deg.		76¼ Deg.		

Distance.	13 Deg.		13¼ Deg.		13½ Deg.		13¾ Deg.		Distance.
	Lat.	Dep.	Lat.	Dep.	Lat.	Dep.	Lat.	Dep.	
51	49.69	11·47	49·64	11·69	49·59	11·91	49·54	12·12	51
52	50·67	11·70	50·62	11·92	50·56	12·14	50·51	12·36	52
53	51·64	11·92	51·59	12·15	51·54	12·37	51·48	12·60	53
54	52·62	12·15	52·56	12·38	52·51	12·61	52·45	12·84	54
55	53·59	12·37	53·54	12·61	53·48	12·84	53·42	13·07	55
56	54·56	12·60	54·51	12·84	54·45	13·07	54·40	13·31	56
57	55·54	12·82	55·48	13·06	55·43	13·31	55·37	13·55	57
58	56·51	13·05	56·46	13·29	56·40	13·54	56·34	13·79	58
59	57·49	13·27	57·43	13·52	57·37	13·77	57·31	14·02	59
60	58·46	13·50	58·40	13·75	58·34	14·01	58·28	14·26	60
61	59·44	13·72	59·38	13·98	59·31	14·24	59·25	14·50	61
62	60·41	13·95	60·35	14·21	60·29	14·47	60·22	14·74	62
63	61·39	14·17	61·32	14·44	61·26	14·71	61·19	14·97	63
64	62·36	14·40	62·30	14·67	62·23	14·94	62·17	15·21	64
65	63·33	14·62	63·27	14·90	63·20	15·17	63·14	15·45	65
66	64·31	14·85	64·24	15·13	64·18	15·41	64·11	15·69	66
67	65·28	15·07	65·22	15·36	65·15	15·64	65·08	15·93	67
68	66·26	15·30	66·19	15·59	66·12	15·87	66·05	16·16	68
69	67·23	15·52	67·16	15·81	67·09	16·11	67·02	16·40	69
70	68·21	15·75	68·14	16·04	68·07	16·34	67·99	16·64	70
71	69·18	15·97	69·11	16·27	69·04	16·57	68·97	16·88	71
72	70·15	16·20	70·08	16·50	70·01	16·81	69·94	17·11	72
73	71·13	16·42	71·06	16·73	70·98	17·04	70·91	17·35	73
74	72·10	16·65	72·03	16·96	71·96	17·28	71·88	17·59	74
75	73·08	16·87	73·00	17·19	72·93	17·50	72·85	17·83	75
76	74·05	17·10	73·98	17·42	73·90	17·74	73·82	18·06	76
77	75·03	17·32	74·95	17·65	74·87	17·98	74·79	18·30	77
78	76·00	17·55	75·92	17·88	75·84	18·21	75·76	18·54	78
79	76·98	17·77	76·90	18·11	76·82	18·44	76·74	18·78	79
80	77·95	18·00	77·87	18·34	77·79	18·68	77·71	19·01	80
81	78·92	18·22	78·84	18·57	78·76	18·91	78·68	19·25	81
82	79·90	18·45	79·82	18·79	79·73	19·14	79·65	19·49	82
83	80·87	18·67	80·79	19·02	80·71	19·38	80·62	19·73	83
84	81·85	18·90	81·76	19·25	81·68	19·61	81·59	19·97	84
85	82·82	19·12	82·74	19·48	82·65	19·84	82·56	20·20	85
86	83·80	19·35	83·71	19·71	83·62	20·08	83·54	20·44	86
87	84·77	19·57	84·68	19·94	84·60	20·31	84·51	20·68	87
88	85·74	19·80	85·66	20·17	85·57	20·54	85·48	20·92	88
89	86·72	20·02	86·63	20·40	86·54	20·78	86·45	21·15	89
90	87·69	20·25	87·60	20·63	87·51	21·01	87·42	21·39	90
91	88·67	20·47	88·58	20·86	88·49	21·24	88·39	21·63	91
92	89·64	20·70	89·55	21·09	89·46	21·48	89·36	21·87	92
93	90·62	20·92	90·52	21·32	90·43	21·71	90·33	22·10	93
94	91·59	21·15	91·50	21·54	91·40	21·94	91·31	22·34	94
95	92·57	21·37	92·47	21·77	92·38	22·18	92·28	22·58	95
96	93·54	21·60	93·44	22·00	93·35	22·41	93·25	22·82	96
97	94·51	21·82	94·42	22·23	94·32	22·64	94·22	23·06	97
98	95·49	22·05	95·39	22·46	95·29	22·88	95·19	23·29	98
99	96·46	22·27	96·36	22·69	96·26	23·11	96·16	23·53	99
100	97·44	22·50	97·34	22·92	97·24	23·34	97·13	23·77	100
Distance.	Dep.	Lat.	Dep.	Lat.	Dep.	Lat.	Dep.	Lat.	Distance.
	77 Deg.		76¾ Deg.		76½ Deg.		76¼ Deg.		

Distance.	14 Deg.		14¼ Deg.		14½ Deg.		14¾ Deg.		Distance.
	Lat.	Dep.	Lat.	Dep.	Lat.	Dep.	Lat.	Dep.	
1	0·97	0·24	0·97	0·25	0·97	0·25	0·97	0·25	1
2	1·94	0·48	1·94	0·49	1·94	0·50	1·93	0·51	2
3	2·91	0·73	2·91	0·74	2·90	0·75	2·90	0·76	3
4	3·88	0·97	3·88	0·98	3·87	1·00	3·87	1·02	4
5	4·85	1·21	4·85	1·23	4·84	1·25	4·84	1·27	5
6	5·82	1·45	5·82	1·48	5·81	1·50	5·80	1·53	6
7	6·79	1·69	6·78	1·72	6·78	1·75	6·77	1·78	7
8	7·76	1·94	7·75	1·97	7·75	2·00	7·74	2·04	8
9	8·73	2·18	8·72	2·22	8·71	2·25	8·70	2·29	9
10	9·70	2·42	9·69	2·46	9·68	2·50	9·67	2·55	10
11	10·67	2·66	10·66	2·71	10·65	2·75	10·64	2·80	11
12	11·64	2·90	11·63	2·95	11·62	3·00	11·60	3·06	12
13	12·61	3·15	12·60	3·20	12·59	3·25	12·57	3·31	13
14	13·58	3·39	13·57	3·45	13·55	3·51	13·54	3·56	14
15	14·55	3·63	14·54	3·69	14·52	3·76	14·51	3·82	15
16	15·52	3·87	15·51	3·94	15·49	4·01	15·47	4·07	16
17	16·50	4·11	16·48	4·18	16·46	4·26	16·44	4·33	17
18	17·47	4·35	17·45	4·43	17·43	4·51	17·41	4·58	18
19	18·44	4·60	18·42	4·68	18·39	4·76	18·37	4·84	19
20	19·41	4·84	19·38	4·92	19·36	5·01	19·34	5·09	20
21	20·38	5·08	20·35	5·17	20·33	5·26	20·31	5·35	21
22	21·35	5·32	21·32	5·42	21·30	5·51	21·28	5·60	22
23	22·32	5·56	22·29	5·66	22·27	5·76	22·24	5·86	23
24	23·29	5·81	23·26	5·91	23·24	6·01	23·21	6·11	24
25	24·26	6·05	24·23	6·15	24·20	6·26	24·18	6·37	25
26	25·23	6·29	25·20	6·40	25·17	6·51	25·14	6·62	26
27	26·20	6·53	26·17	6·65	26·14	6·76	26·11	6·87	27
28	27·17	6·77	27·14	6·89	27·11	7·01	27·08	7·13	28
29	28·14	7·02	28·11	7·14	28·08	7·26	28·04	7·38	29
30	29·11	7·26	29·08	7·38	29·04	7·51	29·01	7·64	30
31	30·08	7·50	30·05	7·63	30·01	7·76	29·98	7·89	31
32	31·05	7·74	31·02	7·88	30·98	8·01	30·95	8·15	32
33	32·02	7·98	31·98	8·12	31·95	8·26	31·91	8·40	33
34	32·99	8·23	32·95	8·37	32·92	8·51	32·88	8·66	34
35	33·96	8·47	33·92	8·62	33·89	8·76	33·85	8·91	35
36	34·93	8·71	34·89	8·86	34·85	9·01	34·81	9·17	36
37	35·90	8·95	35·86	9·11	35·82	9·26	35·78	9·42	37
38	36·87	9·19	36·83	9·35	36·79	9·51	36·75	9·67	38
39	37·84	9·44	37·80	9·60	37·76	9·76	37·71	9·93	39
40	38·81	9·68	38·77	9·85	38·73	10·02	38·68	10·18	40
41	39·78	9·92	39·74	10·09	39·69	10·27	39·65	10·44	41
42	40·75	10·16	40·71	10·34	40·66	10·52	40·62	10·69	42
43	41·72	10·40	41·68	10·58	41·63	10·77	41·58	10·95	43
44	42·69	10·64	42·65	10·83	42·60	11·02	42·55	11·20	44
45	43·66	10·89	43·62	11·08	43·57	11·27	43·52	11·46	45
46	44·63	11·13	44·58	11·32	44·53	11·52	44·48	11·71	46
47	45·60	11·37	45·55	11·57	45·50	11·77	45·45	11·97	47
48	46·57	11·61	46·52	11·82	46·47	12·02	46·42	12·22	48
49	47·54	11·85	47·49	12·06	47·44	12·27	47·39	12·48	49
50	48·51	12·10	48·46	12·31	48·41	12·52	48·35	12·73	50
Distance.	Dep.	Lat.	Dep.	Lat.	Dep.	Lat.	Dep.	Lat.	Distance.
	76 Deg.		75¾ Deg.		75½ Deg.		75¼ Deg.		

Distance.	14 Deg.		14¼ Deg.		14½ Deg.		14¾ Deg.		Distance.
	Lat.	Dep.	Lat.	Dep.	Lat.	Dep.	Lat.	Dep.	
51	49·49	12·34	49·43	12·55	49·38	12·77	49·32	12·98	51
52	50·46	12·58	50·40	12·80	50·34	13·02	50·29	13·24	52
53	51·43	12·82	51·37	13·05	51·31	13·27	51·25	13·49	53
54	52·40	13·06	52·34	13·29	52·28	13·52	52·22	13·75	54
55	53·37	13·31	53·31	13·54	53·25	13·77	53·19	14·00	55
56	54·34	13·55	54·28	13·78	54·22	14·02	54·15	14·26	56
57	55·31	13·79	55·25	14·03	55·18	14·27	55·12	14·51	57
58	56·28	14·03	56·22	14·28	56·15	14·52	56·09	14·77	58
59	57·25	14·27	57·18	14·52	57·12	14·77	57·06	15·02	59
60	58·22	14·52	58·15	14·77	58·09	15·02	58·02	15·28	60
61	59·19	14·76	59·12	15·02	59·06	15·27	58·99	15·53	61
62	60·16	15·00	60·09	15·26	60·03	15·52	59·96	15·79	62
63	61·13	15·24	61·06	15·51	60·99	15·77	60·92	16·04	63
64	62·10	15·48	62·03	15·75	61·96	16·02	61·89	16·29	64
65	63·07	15·72	63·00	16·00	62·93	16·27	62·86	16·55	65
66	64·04	15·97	63·97	16·25	63·90	16·53	63·83	16·80	66
67	65·01	16·21	64·94	16·49	64·87	16·78	64·79	17·06	67
68	65·98	16·45	65·91	16·74	65·83	17·03	65·76	17·31	68
69	66·95	16·69	66·88	16·98	66·80	17·28	66·73	17·57	69
70	67·92	16·93	67·85	17·23	67·77	17·53	67·69	17·82	70
71	68·89	17·18	68·82	17·48	68·74	17·78	68·66	18·08	71
72	69·86	17·42	69·78	17·72	69·71	18·03	69·63	18·33	72
73	70·83	17·66	70·75	17·97	70·67	18·28	70·59	18·59	73
74	71·80	17·90	71·72	18·22	71·64	18·53	71·56	18·84	74
75	72·77	18·14	72·69	18·46	72·61	18·78	72·53	19·10	75
76	73·74	18·39	73·66	18·71	73·58	19·03	73·50	19·35	76
77	74·71	18·63	74·63	18·95	74·55	19·28	74·46	19·60	77
78	75·68	18·87	75·60	19·20	75·52	19·53	75·43	19·86	78
79	76·65	19·11	76·57	19·45	76·48	19·78	76·40	20·11	79
80	77·62	19·35	77·54	19·69	77·45	20·03	77·36	20·37	80
81	78·59	19·60	78·51	19·94	78·42	20·28	78·33	20·62	81
82	79·56	19·84	79·48	20·18	79·39	20·53	79·30	20·88	82
83	80·53	20·08	80·45	20·43	80·36	20·78	80·26	21·13	83
84	81·50	20·32	81·42	20·68	81·32	21·03	81·23	21·39	84
85	82·48	20·56	82·38	20·92	82·29	21·28	82·20	21·64	85
86	83·45	20·81	83·35	21·17	83·26	21·53	83·17	21·90	86
87	84·42	21·05	84·32	21·42	84·23	21·78	84·13	22·15	87
88	85·39	21·29	85·29	21·66	85·20	22·03	85·10	22·41	88
89	86·36	21·53	86·26	21·91	86·17	22·28	86·07	22·66	89
90	87·33	21·77	87·23	22·15	87·13	22·53	87·03	22·91	90
91	88·30	22·01	88·20	22·40	88·10	22·78	88·00	23·17	91
92	89·27	22·26	89·17	22·65	89·07	23·04	88·97	23·42	92
93	90·24	22·50	90·14	22·89	90·04	23·29	89·94	23·68	93
94	91·21	22·74	91·11	23·14	91·01	23·54	90·90	23·93	94
95	92·18	22·98	92·08	23·38	91·97	23·79	91·87	24·19	95
96	93·15	23·22	93·05	23·63	92·94	24·04	92·84	24·44	96
97	94·12	23·47	94·02	23·88	93·91	24·29	93·80	24·70	97
98	95·09	23·71	94·98	24·12	94·88	24·54	94·77	24·95	98
99	96·06	23·95	95·95	24·37	95·85	24·79	95·74	25·21	99
100	97·03	24·19	96·92	24·62	96·81	25·04	96·70	25·46	100
Distance.	Dep.	Lat.	Dep.	Lat.	Dep.	Lat.	Dep.	Lat.	Distance.
	76 Deg.		75¾ Deg.		75½ Deg.		75¼ Deg.		

Distance.	15 Deg.		15¼ Deg.		15½ Deg.		15¾ Deg.		Distance.
	Lat.	Dep.	Lat.	Dep.	Lat.	Dep.	Lat.	Dep.	
1	0·97	0·26	0·96	0·26	0·96	0·27	0·96	0·27	1
2	1·93	0·52	1·93	0·53	1·93	0·53	1·92	0·54	2
3	2·90	0·78	2·89	0·79	2·89	0·80	2·89	0·81	3
4	3·86	1·04	3·86	1·05	3·85	1·07	3·85	1·09	4
5	4·83	1·29	4·82	1·32	4·82	1·34	4·81	1·36	5
6	5·80	1·55	5·79	1·58	5·78	1·60	5·77	1·63	6
7	6·76	1·81	6·75	1·84	6·75	1·87	6·74	1·90	7
8	7·73	2·07	7·72	2·10	7·71	2·14	7·70	2·17	8
9	8·69	2·33	8·68	2·37	8·67	2·41	8·66	2·44	9
10	9·66	2·59	9·65	2·63	9·64	2·67	9·62	2·71	10
11	10·63	2·85	10·61	2·89	10·60	2·94	10·59	2·99	11
12	11·59	3·11	11·58	3·16	11·56	3·21	11·55	3·26	12
13	12·56	3·36	12·54	3·42	12·53	3·47	12·51	3·53	13
14	13·52	3·62	13·51	3·68	13·49	3·74	13·47	3·80	14
15	14·49	3·88	14·47	3·95	14·45	4·01	14·44	4·07	15
16	15·45	4·14	15·44	4·21	15·42	4·28	15·40	4·34	16
17	16·42	4·40	16·40	4·47	16·38	4·54	16·36	4·61	17
18	17·39	4·66	17·37	4·73	17·35	4·81	17·32	4·89	18
19	18·35	4·92	18·33	5·00	18·31	5·08	18·29	5·16	19
20	19·32	5·18	19·30	5·26	19·27	5·34	19·25	5·43	20
21	20·28	5·44	20·26	5·52	20·24	5·61	20·21	5·70	21
22	21·25	5·69	21·23	5·79	21·20	5·88	21·17	5·97	22
23	22·22	5·95	22·19	6·05	22·16	6·15	22·14	6·24	23
24	23·18	6·21	23·15	6·31	23·13	6·41	23·10	6·51	24
25	24·15	6·47	24·12	6·58	24·09	6·68	24·06	6·79	25
26	25·11	6·73	25·08	6·84	25·05	6·95	25·02	7·06	26
27	26·08	6·99	26·05	7·10	26·02	7·22	25·99	7·33	27
28	27·05	7·25	27·01	7·36	26·98	7·48	26·95	7·60	28
29	28·01	7·51	27·98	7·63	27·95	7·75	27·91	7·87	29
30	28·98	7·76	28·94	7·89	28·91	8·02	28·87	8·14	30
31	29·94	8·02	29·91	8·15	29·87	8·28	29·84	8·41	31
32	30·91	8·28	30·87	8·42	30·84	8·55	30·80	8·69	32
33	31·88	8·54	31·84	8·68	31·80	8·82	31·76	8·96	33
34	32·84	8·80	32·80	8·94	32·76	9·09	32·72	9·23	34
35	33·81	9·06	33·77	9·21	33·73	9·35	33·69	9·50	35
36	34·77	9·32	34·73	9·47	34·69	9·62	34·65	9·77	36
37	35·74	9·58	35·70	9·73	35·65	9·89	35·61	10·04	37
38	36·71	9·84	36·66	10·00	36·62	10·16	36·57	10·31	38
39	37·67	10·09	37·63	10·26	37·58	10·42	37·54	10·59	39
40	38·64	10·35	38·59	10·52	38·55	10·69	38·50	10·86	40
41	39·60	10·61	39·56	10·78	39·51	10·96	39·46	11·13	41
42	40·57	10·87	40·52	11·05	40·47	11·22	40·42	11·40	42
43	41·53	11·13	41·49	11·31	41·44	11·49	41·39	11·67	43
44	42·50	11·39	42·45	11·57	42·40	11·76	42·35	11·94	44
45	43·47	11·65	43·42	11·84	43·36	12·03	43·31	12·21	45
46	44·43	11·91	44·38	12·10	44·33	12·29	44·27	12·49	46
47	45·40	12·16	45·35	12·36	45·29	12·56	45·24	12·76	47
48	46·36	12·42	46·31	12·63	46·25	12·83	46·20	13·03	48
49	47·33	12·68	47·27	12·89	47·22	13·09	47·16	13·30	49
50	48·30	12·94	48·24	13·15	48·18	13·36	48·12	13·57	50
Distance.	Dep.	Lat.	Dep.	Lat.	Dep.	Lat.	Dep.	Lat.	Distance.
	75 Deg.		74¾ Deg.		74½ Deg.		74¼ Deg.		

Distance.	15 Deg.		15¼ Deg.		15½ Deg.		15¾ Deg.		Distance.
	Lat.	Dep.	Lat.	Dep.	Lat.	Dep.	Lat.	Dep.	
51	49·26	13·20	49·20	13·41	49·15	13·63	49·09	13·84	51
52	50·23	13·46	50·17	13·68	50·11	13·90	50·05	14·11	52
53	51·19	13·72	51·13	13·94	51·07	14·16	51·01	14·39	53
54	52·16	13·98	52·10	14·20	52·04	14·43	51·97	14·66	54
55	53·13	14·24	53·06	14·47	53·00	14·70	52·94	14·93	55
56	54·09	14·49	54·03	14·73	53·96	14·97	53·90	15·20	56
57	55·06	14·75	54·99	14·99	54·93	15·23	54·86	15·47	57
58	56·02	15·01	55·96	15·26	55·89	15·50	55·82	15·74	58
59	56·99	15·27	56·92	15·52	56·85	15·77	56·78	16·01	59
60	57·96	15·53	57·89	15·78	57·82	16·03	57·75	16·29	60
61	58·92	15·79	58·85	16·04	58·78	16·30	58·71	16·56	61
62	59·89	16·05	59·82	16·31	59·75	16·57	59·67	16·83	62
63	60·85	16·31	60·78	16·57	60·71	16·84	60·63	17·10	63
64	61·82	16·56	61·75	16·83	61·67	17·10	61·60	17·37	64
65	62·79	16·82	62·71	17·10	62·64	17·37	62·56	17·64	65
66	63·75	17·08	63·68	17·36	63·60	17·64	63·52	17·92	66
67	64·72	17·34	64·64	17·62	64·56	17·90	64·48	18·19	67
68	65·68	17·60	65·61	17·89	65·53	18·17	65·45	18·46	68
69	66·65	17·86	66·57	18·15	66·49	18·44	66·41	18·73	69
70	67·61	18·12	67·54	18·41	67·45	18·71	67·37	19·00	70
71	68·58	18·38	68·50	18·68	68·42	18·97	68·33	19·27	71
72	69·55	18·63	69·46	18·94	69·38	19·24	69·30	19·54	72
73	70·51	18·89	70·43	19·20	70·35	19·51	70·26	19·82	73
74	71·48	19·15	71·39	19·46	71·31	19·78	71·22	20·09	74
75	72·44	19·41	72·36	19·73	72·27	20·04	72·18	20·36	75
76	73·41	19·67	73·32	19·99	73·24	20·31	73·15	20·63	76
77	74·38	19·93	74·29	20·25	74·20	20·58	74·11	20·90	77
78	75·34	20·19	75·25	20·52	75·16	20·84	75·07	21·17	78
79	76·31	20·45	76·22	20·78	76·13	21·11	76·03	21·44	79
80	77·27	20·71	77·18	21·04	77·09	21·38	77·00	21·72	80
81	78·24	20·96	78·15	21·31	78·05	21·65	77·96	21·99	81
82	79·21	21·22	79·11	21·57	79·02	21·91	78·92	22·26	82
83	80·17	21·48	80·08	21·83	79·98	22·18	79·88	22·53	83
84	81·14	21·74	81·04	22·09	80·94	22·45	80·85	22·80	84
85	82·10	22·00	82·01	22·36	81·91	22·72	81·81	23·07	85
86	83·07	22·26	82·97	22·62	82·87	22·98	82·77	23·34	86
87	84·04	22·52	83·94	22·88	83·84	23·25	83·73	23·62	87
88	85·00	22·78	84·90	23·15	84·80	23·52	84·70	23·89	88
89	85·97	23·03	85·87	23·41	85·76	23·78	85·66	24·16	89
90	86·93	23·29	86·83	23·67	86·73	24·05	86·62	24·43	90
91	87·90	23·55	87·80	23·94	87·69	24·32	87·58	24·70	91
92	88·87	23·81	88·76	24·20	88·65	24·59	88·55	24·97	92
93	89·83	24·07	89·73	24·46	89·62	24·85	89·51	25·24	93
94	90·80	24·33	90·69	24·72	90·58	25·12	90·47	25·52	94
95	91·76	24·59	91·65	24·99	91·54	25·39	91·43	25·79	95
96	92·73	24·85	92·62	25·25	92·51	25·65	92·40	26·06	96
97	93·69	25·11	93·58	25·51	93·47	25·92	93·36	26·33	97
98	94·66	25·36	94·55	25·78	94·44	26·19	94·32	26·60	98
99	95·63	25·62	95·51	26·04	95·40	26·46	95·28	26·87	99
100	96·59	25·88	96·48	26·30	96·36	26·72	96·25	27·14	100
Distance.	Dep.	Lat.	Dep.	Lat.	Dep.	Lat.	Dep.	Lat.	Distance.
	75 Deg.		74¾ Deg.		74 ½ Deg.		74¼ Deg.		

Distance.	16 Deg.		16¼ Deg.		16½ Deg.		16¾ Deg.		Distance.
	Lat.	Dep.	Lat.	Dep.	Lat.	Dep.	Lat.	Dep.	
1	0·96	0·28	0·96	0·28	0·96	0·28	0·96	0·29	1
2	1·92	0·55	1·92	0·56	1·92	0·57	1·92	0·58	2
3	2·88	0·83	2·88	0·84	2·88	0·85	2·87	0·86	3
4	3·85	1·10	3·84	1·12	3·84	1·14	3·83	1·15	4
5	4·81	1·38	4·80	1·40	4·79	1·42	4·79	1·44	5
6	5·77	1·65	5·76	1·68	5·75	1·70	5·75	1·73	6
7	6·73	1·93	6·72	1·96	6·71	1·99	6·70	2·02	7
8	7·69	2·21	7·68	2·24	7·67	2·27	7·66	2·31	8
9	8·65	2·48	8·64	2·52	8·63	2·56	8·62	2·59	9
10	9·61	2·76	9·60	2·80	9·59	2·84	9·58	2·88	10
11	10·57	3·03	10·56	3·08	10·55	3·12	10·53	3·17	11
12	11·54	3·31	11·52	3·36	11·51	3·41	11·49	3·46	12
13	12·50	3·58	12·48	3·64	12·46	3·69	12·45	3·75	13
14	13·46	3·86	13·44	3·92	13·42	3·98	13·41	4·03	14
15	14·42	4·13	14·40	4·20	14·38	4·26	14·36	4·32	15
16	15·38	4·41	15·36	4·48	15·34	4·54	15·32	4·61	16
17	16·34	4·69	16·32	4·76	16·30	4·83	16·28	4·90	17
18	17·30	4·96	17·28	5·04	17·26	5·11	17·24	5·19	18
19	18·26	5·24	18·24	5·32	18·22	5·40	18·19	5·48	19
20	19·23	5·51	19·20	5·60	19·18	5·68	19·15	5·76	20
21	20·19	5·79	20·16	5·88	20·14	5·96	20·11	6·05	21
22	21·15	6·06	21·12	6·16	21·09	6·25	21·07	6·34	22
23	22·11	6·34	22·08	6·44	22·05	6·53	22·02	6·63	23
24	23·07	6·62	23·04	6·72	23·01	6·82	22·98	6·92	24
25	24·03	6·89	24·00	7·00	23·97	7·10	23·94	7·20	25
26	24·99	7·17	24·96	7·28	24·93	7·38	24·90	7·49	26
27	25·95	7·44	25·92	7·56	25·89	7·67	25·85	7·78	27
28	26·92	7·72	26·88	7·84	26·85	7·95	26·81	8·07	28
29	27·88	7·99	27·84	8·11	27·81	8·24	27·77	8·36	29
30	28·84	8·27	28·80	8·39	28·76	8·52	28·73	8·65	30
31	29·80	8·54	29·76	8·67	29·72	8·80	29·68	8·93	31
32	30·76	8·82	30·72	8·95	30·68	9·09	30·64	9·22	32
33	31·72	9·10	31·68	9·23	31·64	9·37	31·60	9·51	33
34	32·68	9·37	32·64	9·51	32·60	9·66	32·56	9·80	34
35	33·64	9·65	33·60	9·79	33·56	9·94	33·51	10·09	35
36	34·61	9·92	34·56	10·07	34·52	10·22	34·47	10·38	36
37	35·57	10·20	35·52	10·35	35·48	10·51	35·43	10·66	37
38	36·53	10·47	36·48	10·63	36·44	10·79	36·39	10·95	38
39	37·49	10·75	37·44	10·91	37·39	11·08	37·35	11·24	39
40	38·45	11·03	38·40	11·19	38·35	11·36	38·30	11·53	40
41	39·41	11·30	39·36	11·47	39·31	11·64	39·26	11·82	41
42	40·37	11·58	40·32	11·75	40·27	11·93	40·22	12·10	42
43	41·33	11·85	41·28	12·03	41·23	12·21	41·18	12·39	43
44	42·30	12·13	42·24	12·31	42·19	12·50	42·13	12·68	44
45	43·26	12·40	43·20	12·59	43·15	12·78	43·09	12·97	45
46	44·22	12·68	44·16	12·87	44·11	13·06	44·05	13·26	46
47	45·18	12·95	45·12	13·15	45·06	13·35	45·01	13·55	47
48	46·14	13·23	46·08	13·43	46·02	13·63	45·96	13·83	48
49	47·10	13·51	47·04	13·71	46·98	13·92	46·92	14·12	49
50	48·06	13·78	48·00	13·99	47·94	14·20	47·88	14·41	50
Distance.	Dep.	Lat.	Dep.	Lat.	Dep.	Lat.	Dep.	Lat.	Distance.
	74 Deg.		73¾ Deg.		73½ Deg.		73¼ Deg.		

Distance.	16 Deg.		16¼ Deg.		16½ Deg.		16¾ Deg.		Distance.
	Lat.	Dep.	Lat.	Dep.	Lat.	Dep.	Lat.	Dep.	
51	49·02	14·06	48·96	14·27	48·90	14·48	48·84	14·70	51
52	49·99	14·33	49·92	14·55	49·86	14·77	49·79	14·99	52
53	50·95	14·61	50·88	14·83	50·82	15·05	50·75	15·27	53
54	51·91	14·88	51·84	15·11	51·78	15·34	51·71	15·56	54
55	52·87	15·16	52·80	15·39	52·74	15·62	52·67	15·85	55
56	53·83	15·44	53·76	15·67	53·69	15·90	53·62	16·14	56
57	54·79	15·71	54·72	15·95	54·65	16·19	54·58	16·43	57
58	55·75	15·99	55·68	16·23	55·61	16·47	55·54	16·72	58
59	56·71	16·26	56·64	16·51	56·57	16·76	56·50	17·00	59
60	57·68	16·54	57·60	16·79	57·53	17·04	57·45	17·29	60
61	58·64	16·81	58·56	17·07	58·49	17·32	58·41	17·58	61
62	59·60	17·09	59·52	17·35	59·45	17·61	59·37	17·87	62
63	60·56	17·37	60·48	17·63	60·41	17·89	60·33	18·16	63
64	61·52	17·64	61·44	17·91	61·36	18·18	61·28	18·44	64
65	62·48	17·92	62·40	18·19	62·32	18·46	62·24	18·73	65
66	63·44	18·19	63·36	18·47	63·28	18·74	63·20	19·02	66
67	64·40	18·47	64·32	18·75	64·24	19·03	64·16	19·31	67
68	65·37	18·74	65·28	19·03	65·20	19·31	65·11	19·60	68
69	66·33	19·02	66·24	19·31	66·16	19·60	66·07	19·89	69
70	67·29	19·29	67·20	19·59	67·12	19·88	67·03	20·17	70
71	68·25	19·57	68·16	19·87	68·08	20·17	67·99	20·46	71
72	69·21	19·85	69·12	20·15	69·03	20·45	68·95	20·75	72
73	70·17	20·12	70·08	20·43	69·99	20·73	69·90	21·04	73
74	71·13	20·40	71·04	20·71	70·95	21·02	70·86	21·33	74
75	72·09	20·67	72·00	20·99	71·91	21·30	71·82	21·61	75
76	73·06	20·95	72·96	21·27	72·87	21·59	72·78	21·90	76
77	74·02	21·22	73·92	21·55	73·83	21·87	73·73	22·19	77
78	74·98	21·50	74·88	21·83	74·79	22·15	74·69	22·48	78
79	75·94	21·78	75·84	22·11	75·75	22·44	75·65	22·77	79
80	76·90	22·05	76·80	22·39	76·71	22·72	76·61	23·06	80
81	77·86	22·33	77·76	22·67	77·66	23·01	77·56	23·34	81
82	78·82	22·60	78·72	22·95	78·62	23·29	78·52	23·63	82
83	79·78	22·88	79·68	23·23	79·58	23·57	79·48	23·92	83
84	80·75	23·15	80·64	23·51	80·54	23·86	80·44	24·21	84
85	81·71	23·43	81·60	23·79	81·50	24·14	81·39	24·50	85
86	82·67	23·70	82·56	24·07	82·46	24·43	82·35	24·78	86
87	83·63	23·98	83·52	24·35	83·42	24·71	83·31	25·07	87
88	84·59	24·26	84·48	24·62	84·38	24·99	84·27	25·36	88
89	85·55	24·53	85·44	24·90	85·33	25·28	85·22	25·65	89
90	86·51	24·81	86·40	25·18	86·29	25·56	86·18	25·94	90
91	87·47	25·08	87·36	25·46	87·25	25·85	87·14	26·23	91
92	88·44	25·36	88·32	25·74	88·21	26·13	88·10	26·51	92
93	89·40	25·63	89·28	26·02	89·17	26·41	89·05	26·80	93
94	90·36	25·91	90·24	26·30	90·13	26·70	90·01	27·09	94
95	91·32	26·19	91·20	26·58	91·09	26·98	90·97	27·38	95
96	92·28	26·46	92·16	26·86	92·05	27·27	91·93	27·67	96
97	93·24	26·74	93·12	27·14	93·01	27·55	92·88	27·95	97
98	94·20	27·01	94·08	27·42	93·96	27·83	93·84	28·24	98
99	95·16	27·29	95·04	27·70	94·92	28·12	94·80	28·53	99
100	96·13	27·56	96·00	27·98	95·88	28·40	95·76	28·82	100
Distance.	Dep.	Lat.	Dep.	Lat.	Dep.	Lat.	Dep.	Lat.	Distance.
	74 Deg.		73¾ Deg.		73½ Deg.		73¼ Deg.		

Distance.	17 Deg.		17¼ Deg.		17½ Deg.		17¾ Deg.		Distance.
	Lat.	Dep.	Lat.	Dep.	Lat.	Dep.	Lat.	Dep.	
1	0·96	0·29	0·95	0·30	0·95	0·30	0·25	0·30	1
2	1·91	0·58	1·91	0·59	1·91	0·60	1·90	0·61	2
3	2·87	0·88	2·87	0·89	2·86	0·90	2·86	0·91	3
4	3·83	1·17	3·82	1·19	3·81	1·20	3·81	1·22	4
5	4·78	1·46	4·78	1·48	4·77	1·50	4·76	1·52	5
6	5·74	1·75	5·73	1·78	5·72	1·80	5·71	1·83	6
7	6·69	2·05	6·69	2·08	6·68	2·10	6·67	2·13	7
8	7·65	2·34	7·64	2·37	7·63	2·41	7·62	2·44	8
9	8·61	2·63	8·60	2·67	8·58	2·71	8·57	2·74	9
10	9·56	2·92	9·55	2·97	9·54	3·01	9·52	3·05	10
11	10·52	3·22	10·51	3·26	10·49	3·31	10·48	3·35	11
12	11·48	3·51	11·46	3·56	11·44	3·61	11·43	3·66	12
13	12·43	3·80	12·42	3·85	12·40	3·91	12·38	3·96	13
14	13·39	4·09	13·37	4·15	13·35	4·21	13·33	4·27	14
15	14·34	4·39	14·33	4·45	14·31	4·51	14·29	4·57	15
16	15·30	4·68	15·28	4·74	15·26	4·81	15·24	4·88	16
17	16·26	4·97	16·24	5·04	16·21	5·11	16·19	5·18	17
18	17·21	5·26	17·19	5·34	17·17	5·41	17·14	5·49	18
19	18·17	5·56	18·15	5·63	18·12	5·71	18·10	5·79	19
20	19·13	5·85	19·10	5·93	19·07	6·01	19·05	6·10	20
21	20·08	6·14	20·06	6·23	20·03	6·31	20·00	6·40	21
22	21·04	6·43	21·01	6·52	20·98	6·62	20·95	6·71	22
23	21·99	6·72	21·97	6·82	21·94	6·92	21·91	7·01	23
24	22·95	7·02	22·92	7·12	22·89	7·22	22·86	7·32	24
25	23·91	7·31	23·88	7·41	23·84	7·52	23·81	7·62	25
26	24·86	7·60	24·83	7·71	24·80	7·82	24·76	7·93	26
27	25·82	7·89	25·79	8·01	25·75	8·12	25·71	8·23	27
28	26·78	8·19	26·74	8·30	26·70	8·42	26·67	8·54	28
29	27·73	8·48	27·70	8·60	27·66	8·72	27·62	8·84	29
30	28·69	8·77	28·65	8·90	28·61	9·02	28·57	9·15	30
31	29·65	9·06	29·61	9·19	29·57	9·32	29·52	9·45	31
32	30·60	9·36	30·56	9·49	30·52	9·62	30·48	9·76	32
33	31·56	9·65	31·52	9·79	31·47	9·92	31·43	10·06	33
34	32·51	9·94	32·47	10·08	32·43	10·22	32·38	10·37	34
35	33·47	10·23	33·43	10·38	33·38	10·52	33·33	10·67	35
36	34·43	10·53	34·38	10·68	34·33	10·83	34·29	10·98	36
37	35·38	10·82	35·34	10·97	35·29	11·13	35·24	11·28	37
38	36·34	11·11	36·29	11·27	36·24	11·43	36·19	11·58	38
39	37·30	11·40	37·25	11·57	37·19	11·73	37·14	11·89	39
40	38·25	11·69	38·20	11·86	38·15	12·03	38·10	12·19	40
41	39·21	11·99	39·16	12·16	39·10	12·33	39·05	12·50	41
42	40·16	12·28	40·11	12·45	40·06	12·63	40·00	12·80	42
43	41·12	12·57	41·07	12·75	41·01	12·93	40·95	13·11	43
44	42·08	12·86	42·02	13·05	41·96	13·23	41·91	13·41	44
45	43·03	13·16	42·98	13·34	42·92	13·53	42·86	13·72	45
46	43·99	13·45	43·93	13·64	43·87	13·83	43·81	14·02	46
47	44·95	13·74	44·89	13·94	44·82	14·13	44·76	14·33	47
48	45·90	14·03	45·84	14·23	45·78	14·43	45·71	14·63	48
49	46·86	14·33	46·80	14·53	46·73	14·73	46·67	14·94	49
50	47·82	14·62	47·75	14·83	47·69	15·04	47·62	15·24	50
Distance.	Dep.	Lat.	Dep.	Lat.	Dep.	Lat.	Dep.	Lat.	Distance.
	73 Deg.		72¾ Deg.		72½ Deg.		72¼ Deg.		

Distance.	17 Deg.		17¼ Deg.		17½ Deg.		17¾ Deg.		Distance.
	Lat.	Dep.	Lat.	Dep.	Lat.	Dep.	Lat.	Dep.	
51	48·77	14·91	48·71	15·12	48·64	15·34	48·57	15·55	51
52	49·73	15·20	49·66	15·42	49·59	15·64	49·52	15·85	52
53	50·68	15·50	50·62	15·72	50·55	15·94	50·48	16·16	53
54	51·64	15·79	51·57	16·01	51·50	16·24	51·43	16·46	54
55	52·60	16·08	52·53	16·31	52·45	16·54	52·38	16·77	55
56	53·55	16·37	53·48	16·61	53·41	16·84	53·33	17·07	56
57	54·51	16·67	54·44	16·90	54·36	17·14	54·29	17·38	57
58	55·47	16·96	55·39	17·20	55·32	17·44	55·24	17·68	58
59	56·42	17·25	56·35	17·50	56·27	17·74	56·10	17·99	59
60	57·38	17·54	57·30	17·79	57·22	18·04	57·14	18·29	60
61	58·33	17·83	58·26	18·09	58·18	18·34	58·10	18·60	61
62	59·29	18·13	59·21	18·39	59·13	18·64	59·05	18·90	62
63	60·25	18·42	60·17	18·68	60·08	18·94	60·00	19·21	63
64	61·20	18·71	61·12	18·98	61·04	19·25	60·95	19·51	64
65	62·16	19·00	62·08	19·28	61·99	19·55	61·91	19·82	65
66	63·12	19·30	63·03	19·57	62·95	19·85	62·86	20·12	66
67	64·07	19·59	63·99	19·87	63·90	20·15	63·81	20·43	67
68	65·03	19·88	64·94	20·16	64·85	20·45	64·76	20·73	68
69	65·99	20·17	65·90	20·46	65·81	20·75	65·72	21·04	69
70	66·94	20·47	66·85	20·76	66·76	21·05	66·67	21·34	70
71	67·90	20·76	67.81	21·05	67·71	21·35	67·62	21·65	71
72	68·85	21·05	68·76	21·35	68·67	21·65	68·57	21·95	72
73	69·81	21·34	69·72	21·65	69·62	21·95	69·52	22·26	73
74	70·77	21·64	70·67	21·94	70·58	22·25	70·48	22·56	74
75	71·72	21·93	71·63	22·24	71·53	22·55	71·43	22·86	75
76	72·68	22·22	72·58	22·54	72·48	22·85	72·38	23·17	76
77	73·64	22·51	73·54	22·83	73·44	23·15	73·33	23·47	77
78	74·59	22·80	74·49	23·13	74·39	23·46	74·29	23·78	78
79	75·55	23·10	75·45	23·43	75·34	23·76	75·24	24·08	79
80	76·50	23·39	76·40	23·72	76·30	24·06	76·19	24·39	80
81	77·46	23·68	77·36	24·02	77·25	24·36	77·14	24·69	81
82	78·42	23·97	78·31	24·32	78·20	24·66	78·10	25·00	82
83	79·37	24·27	79·27	24·61	79·16	25·96	79·05	25·30	83
84	80·33	24·56	80·22	24·91	80·11	25·26	80·00	25·61	84
85	81·29	24·85	81·18	25·21	81·07	25·56	80·95	25·91	85
86	82·24	25·14	82·13	25·50	82·02	25·86	81·91	26·22	86
87	83·20	25·44	83·09	25·80	82·97	26·16	82·86	26·52	87
88	84·15	25·73	84·04	26·10	83·93	26·46	83·81	26·83	88
89	85·11	26·02	85·00	26·39	84·88	26·76	84·76	27·13	89
90	86·07	26·31	85·95	26·69	85·83	27·06	85·72	27·44	90
91	87 02	26·61	86·91	26·99	86·79	27·36	86·67	27·74	91
92	87·98	26·90	87·86	27·28	87·74	27·66	87·62	28·05	92
93	88·94	27·19	88·82	27·58	88·70	27·97	88·57	28·35	93
94	89·89	27·48	89·77	27·87	89·65	28·27	89·53	28·66	94
95	90·85	27·78	90·73	28·17	90·60	28·57	90·48	28·96	95
96	91·81	28·07	91·68	28·47	91·56	28·87	91·43	29·27	96
97	92·76	28·36	92·64	28·76	92·51	29·17	92·38	29·57	97
98	93·72	28·65	93·59	29·06	93·46	29·47	93·33	29·88	98
99	94·67	28·94	94·55	29·36	94·42	29·77	94·29	30·18	99
100	95·63	29·24	95·50	29·65	95·37	30·07	95·24	30·49	100
Distance.	Dep.	Lat.	Dep.	Lat.	Dep.	Lat.	Dep.	Lat.	Distance.
	73 Deg.		72¾ Deg.		72½ Deg.		72¼ Deg.		

Distance.	18 Deg.		18¼ Deg.		18½ Deg.		18¾ Deg.		Distance.
	Lat.	Dep.	Lat.	Dep.	Lat.	Dep.	Lat.	Dep.	
1	0·95	0·31	0·95	0·31	0·95	0·32	0·95	0·32	1
2	1·90	0·62	1·90	0·63	1·90	0·63	1·89	0·64	2
3	2·85	0·93	2·85	0·94	2·84	0·95	2·84	0·96	3
4	3·80	1·24	3·80	1·25	3·79	1·27	3·79	1·29	4
5	4·76	1·55	4·75	1·57	4·74	1·59	4·73	1·61	5
6	5·71	1·85	5·70	1·88	5·69	1·90	5·68	1·93	6
7	6·66	2·16	6·65	2·19	6·64	2·22	6·63	2·25	7
8	7·61	2·47	7·60	2·51	7·59	2·54	7·58	2·57	8
9	8·56	2·78	8·55	2·82	8·53	2·86	8·52	2·89	9
10	9.51	3·09	9·50	3·13	9·48	3·17	9·47	3·21	10
11	10·46	3·40	10·45	3·44	10·43	3·49	10·42	3·54	11
12	11·41	3·71	11·40	3·76	11·38	3·81	11·36	3·86	12
13	12·36	4·02	12·35	4·07	12·33	4·12	12·31	4·18	13
14	13·31	4·33	13·30	4·38	13·28	4·44	13·26	4·50	14
15	14·27	4·64	14·25	4·70	14·22	4·76	14·20	4·82	15
16	15·22	4·94	15·20	5·01	15·17	5·08	15·15	5·14	16
17	16·17	5·25	16·14	5·32	16·12	5·39	16·10	5·46	17
18	17·12	5·56	17·09	5·64	17·07	5·71	17·04	5·79	18
19	18·07	5·87	18·04	5·95	18·02	6·03	17·99	6·11	19
20	19·02	6·18	18·99	6·26	18·97	6·35	18·94	6·43	20
21	19·97	6·49	19·94	6·58	19·91	6·66	19·89	6·75	21
22	20·92	6·80	20·89	6·89	20·86	6·98	20·83	7·07	22
23	21·87	7·11	21·84	7·20	21·81	7·30	21·78	7·39	23
24	22·83	7·42	22·79	7·52	22·76	7·62	22·73	7·71	24
25	23·78	7·73	23·74	7·83	23·71	7·93	23·67	8·04	25
26	24·73	8·03	24·69	8·14	24·66	8·25	24·62	8·36	26
27	25·68	8·34	25·64	8·46	25·60	8·57	25·57	8·68	27
28	26·63	8·65	26·59	8·77	26·55	8·88	26·51	9·00	28
29	27·58	8·96	27·54	9·08	27·50	9·20	27·46	9·32	29
30	28·53	9·27	28·49	9·39	28·45	9·52	28·41	9·64	30
31	29·48	9·58	29·44	9·71	29·40	9·84	29·35	9·96	31
32	30·43	9·89	30·39	10·02	30·35	10·15	30·30	10·29	32
33	31·38	10·20	31·34	10·33	31·29	10·47	31·25	10·61	33
34	32·34	10·51	32·29	10·65	32·24	10·79	32·20	10·93	34
35	33·29	10·82	33·24	10·96	33·19	11·11	33·14	11·25	35
36	34·24	11·12	34·19	11·27	34·14	11·42	34·09	11·57	36
37	35·19	11·43	35·14	11·59	35·09	11·74	35·04	11·89	37
38	36·14	11·74	36·09	11·90	36·04	12·06	35·98	12·21	38
39	37·09	12·05	37·04	12·21	36·98	12·37	36·93	12·54	39
40	38·04	12·36	37·99	12·53	37·93	12·69	37·88	12·86	40
41	38·99	12·67	38·94	12·84	38·88	13·01	38·82	13·18	41
42	39·94	12·98	39·89	13·15	39·83	13·33	39·77	13·50	42
43	40·90	13·29	40·84	13·47	40·78	13·64	40·72	13·82	43
44	41·85	13·60	41·79	13·78	41·73	13·96	41·66	14·14	44
45	42·80	13·91	42·74	14·09	42·67	14·28	42·61	14·46	45
46	43·75	14·21	43·69	14·41	43·62	14·60	43·56	14·79	46
47	44·70	14·52	44·64	14·72	44·57	14·91	44·51	15·11	47
48	45·65	14·83	45·59	15·03	45·52	15·23	45·45	15·43	48
49	46·60	15·14	46·54	15·35	46·47	15·55	46·40	15·75	49
50	47·55	15·45	47·48	15·66	47·42	15·87	47·35	16·07	50
Distance.	Dep.	Lat.	Dep.	Lat.	Dep.	Lat.	Dep.	Lat.	Distance.
	72 Deg.		71¾ Deg.		71½ Deg.		71¼ Deg.		

Distance.	18 Deg.		18¼ Deg.		18½ Deg.		18¾ Deg.		Distance.
	Lat.	Dep.	Lat.	Dep.	Lat.	Dep.	Lat.	Dep.	
51	48·50	15·76	48·43	15·97	48·36	16·18	48·29	16·39	51
52	49.45	16·07	49·38	16·28	49·31	16·50	49·24	16·71	52
53	50·41	16·38	50·33	16·60	50·26	16·82	50·19	17·04	53
54	51·36	16·69	51·28	16·91	51·21	17·13	51·13	17·36	54
55	52·31	17·00	52·23	17·22	52·16	17·45	52·08	17·68	55
56	53·26	17·30	53·18	17·54	53·11	17·77	53·03	18·00	56
57	54·21	17·61	54·13	17·85	54·05	18·09	53·98	18·32	57
58	55·16	17·92	55·08	18·16	55·00	18·40	54·92	18·64	58
59	56·11	18·23	56·03	18·48	55·95	18·72	55·87	18·96	59
60	57·06	18·54	56·98	18·79	56·90	19·04	56·82	19·29	60
61	58·01	18·85	57·93	19·10	57·85	19·36	57·76	19·61	61
62	58·97	19·16	58·88	19·42	58·80	19·67	58·71	19·93	62
63	59·92	19·47	59·83	19·73	59·74	19·99	59·66	20·25	63
64	60·87	19·78	60·78	20·04	60·69	20·31	60·60	20·57	64
65	61·82	20·09	61·73	20·36	61·64	20·62	61·55	20·89	65
66	62·77	20·40	62·68	20·67	62·59	20·94	62·50	21·22	66
67	63·72	20·70	63·63	20·98	63·54	21·26	63·44	21·54	67
68	64·67	21·01	64·58	21·30	64·49	21·58	64·39	21·86	68
69	65·62	21·32	65·53	21·61	65·43	21·89	65·34	22·18	69
70	66·57	21·63	66·48	21·92	66·38	22·21	66·29	22·50	70
71	67·53	21·94	67·43	22·23	67·33	22·53	67·23	22·82	71
72	68·48	22·25	68·38	22·55	68·28	22·85	68·18	23·14	72
73	69·43	22·56	69·33	22·86	69·23	23·16	69·13	23·47	73
74	70·38	22·87	70·28	23·17	70·18	23·48	70·07	23·79	74
75	71·33	23·18	71·23	23·49	71·12	23·80	71·02	24·11	75
76	72·28	23·49	72·18	23·80	72·07	24·12	71·97	24·43	76
77	73·23	23·79	73·13	24·11	73·02	24·43	72·91	24·75	77
78	74·18	24·10	74·08	24·43	73·97	24·75	73·86	25·07	78
79	75·13	24·41	75·03	24·74	74·92	25·07	74·81	25·39	79
80	76·08	24·72	75·98	25·05	75·87	25·38	75·75	25·72	80
81	77·04	25·03	76·93	25·37	76·81	25·70	76·70	26·04	81
82	77·99	25·34	77·88	25·68	77·76	26·02	77·65	26·36	82
83	78·94	25·65	78·83	25·99	78·71	26·34	78·60	26·68	83
84	79·89	25·96	79·77	26·31	79·66	26·65	79·54	27·00	84
85	80·84	26·27	80·72	26·62	80·61	26·97	80·49	27·32	85
86	81·79	26·58	81·67	26·93	81·56	27·29	81·44	27·64	86
87	82·74	26·88	82·62	27·25	82·50	27·61	82·38	27·97	87
88	83·69	27·19	83·57	27·56	83·45	27·92	83·33	28·29	88
89	84·64	27·50	84·52	27·87	84·40	28·24	84·28	28·61	89
90	85·60	27·81	85·47	28·18	85·35	28·56	85·22	28·93	90
91	86·55	28·12	86·42	28·50	86·30	28·87	86·17	29·25	91
92	87·50	28·43	87·37	28·81	87·25	29·19	87·12	29·57	92
93	88·45	28·74	88·32	29·12	88·19	29·51	88·06	29·89	93
94	89·40	29·05	89·27	29·44	89·14	29·83	89·01	30·22	94
95	90·35	29·36	90·22	29·75	90·09	30·14	89·96	30·54	95
96	91·30	29·67	91·17	30·06	91·04	30·46	90·91	30·86	96
97	92·25	29·97	92·12	30·38	91·99	30·78	91·85	31·18	97
98	93·20	30·28	93·07	30·69	92·94	31·10	92·80	31·50	98
99	94·15	30·59	94·02	31·00	93·88	31·41	93·75	31·82	99
100	95·11	30·90	94·97	31·32	94·83	31·73	94·69	32·14	100
Distance.	Dep.	Lat.	Dep.	Lat.	Dep.	Lat.	Dep.	Lat.	Distance.
	72 Deg.		71¾ Deg.		71½ Deg.		71¼ Deg.		

Distance.	19 Deg.		19¼ Deg.		19½ Deg.		19¾ Deg.		Distance.
	Lat.	Dep.	Lat.	Dep.	Lat.	Dep.	Lat.	Dep.	
1	0·95	0·33	0·94	0·33	0·94	0·33	0·94	0·34	1
2	1·89	0·65	1·89	0·66	1·89	0·67	1·88	0·68	2
3	2·84	0·98	2·83	0·99	2·83	1·00	2·82	1·01	3
4	3·78	1·30	3·78	1·32	3·77	1·34	3·76	1·35	4
5	4·73	1·63	4·72	1·65	4·71	1·67	4·71	1·69	5
6	5·67	1·95	5·66	1·98	5·66	2·00	5·65	2·03	6
7	6·62	2·28	6·61	2·31	6·60	2·34	6·59	2·37	7
8	7·56	2·60	7·55	2·64	7·54	2·67	7·53	2·70	8
9	8·51	2·93	8·50	2·97	8·48	3·00	8·47	3·04	9
10	9·46	3·26	9·44	3·30	9·43	3·34	9·41	3·38	10
11	10·40	3·58	10·38	3·63	10·37	3·67	10·35	3·72	11
12	11·35	3·91	11·33	3·96	11·31	4·01	11·29	4·06	12
13	12·29	4·23	12·27	4·29	12·25	4·34	12·24	4·39	13
14	13·24	4·56	13·22	4·62	13·20	4·67	13·18	4·73	14
15	14·18	4·88	14·16	4·95	14·14	5·01	14·12	5·07	15
16	15·13	5·21	15·11	5·28	15·08	5·34	15·06	5·41	16
17	16·07	5·53	16·05	5·60	16·02	5·67	16·00	5·74	17
18	17·02	5·86	16·99	5·93	16·97	6·01	16·94	6·08	18
19	17·96	6·19	17·94	6·26	17·91	6·34	17·88	6·42	19
20	18·91	6·51	18·88	6·59	18·85	6·68	18·82	6·76	20
21	19·86	6·84	19·83	6·92	19·80	7·01	19·76	7·10	21
22	20·80	7·16	20·77	7·25	20·74	7·34	20·71	7·43	22
23	21·75	7·49	21·71	7·58	21·68	7·68	21·65	7·77	23
24	22·69	7·81	22·66	7·91	22·62	8·01	22·59	8·11	24
25	23·64	8·14	23·60	8·24	23·57	8·35	23·53	8·45	25
26	24·58	8·46	24·55	8·57	24·51	8·68	24·47	8·79	26
27	25·53	8·79	25·49	8·90	25·45	9·01	25·41	9·12	27
28	26·47	9·12	26·43	9·23	26·39	9·35	26·35	9·46	28
29	27·42	9·44	27·38	9·56	27·34	9·68	27·29	9·80	29
30	28·37	9·77	28·32	9·89	28·28	10·01	28·24	10·14	30
31	29·31	10·09	29·27	10·22	29·22	10·35	29·18	10·48	31
32	30·26	10·42	30·21	10·55	30·16	10·68	30·12	10·81	32
33	31·20	10·74	31·15	10·88	31·11	11·02	31·06	11·15	33
34	32·15	11·07	32·10	11·21	32·05	11·35	32·00	11·49	34
35	33·09	11·39	33·04	11·54	32·99	11·68	32·94	11·83	35
36	34·04	11·72	33·99	11·87	33·94	12·02	33·88	12·17	36
37	34·98	12·05	34·93	12·20	34·88	12·35	34·82	12·50	37
38	35·93	12·37	35·88	12·53	35·82	12·68	35·76	12·84	38
39	36·88	12·70	36·82	12·86	36·76	13·02	36·71	13·18	39
40	37·82	13·02	37·76	13·19	37·71	13·35	37·65	13·52	40
41	38·77	13·35	38·71	13·52	38·65	13·69	38·59	13·85	41
42	39·71	13·67	39·65	13·85	39·59	14·02	39·53	14·19	42
43	40·66	14·00	40·60	14·18	40·53	14·35	40·47	14·53	43
44	41·60	14·32	41·54	14·51	41·48	14·69	41·41	14·87	44
45	42·55	14·65	42·48	14·84	42·42	15·02	42·35	15·21	45
46	43·49	14·98	43·43	15·17	43·36	15·36	43·29	15·54	46
47	44·44	15·30	44·37	15·50	44·30	15·69	44·24	15·88	47
48	45·38	15·63	45·32	15·83	45·25	16·02	45·18	16·22	48
49	46·33	15·95	46·26	16·15	46·19	16·36	46·12	16·56	49
50	47·28	16·28	47·20	16·48	47·13	16·69	47·06	16·90	50
Distance.	Dep.	Lat.	Dep.	Lat.	Dep.	Lat.	Dep.	Lat.	Distance.
	71 Deg.		70¾ Deg.		70½ Deg.		70¼ Deg.		

Distance.	19 Deg.		19¼ Deg.		19½ Deg.		19¾ Deg.		Distance.
	Lat.	Dep.	Lat.	Dep.	Lat.	Dep.	Lat.	Dep.	
51	48·22	16·60	48·15	16·81	48·07	17·02	48·00	17·23	51
52	49·17	16·93	49·09	17·14	49·02	17·36	48·94	17·57	52
53	50·11	17·26	50·04	17·47	49·96	17·69	49·88	17·91	53
54	51·06	17·58	50·98	17·80	50·90	18·03	50·82	18·25	54
55	52·00	17·91	51·92	18·13	51·85	18·36	51·76	18·59	55
56	52·95	18·23	52·87	18·46	52·79	18·69	52·71	18·92	56
57	53·89	18·56	53·81	18·79	53·73	19·03	53·65	19·26	57
58	54·84	18·88	54·76	19·12	54·67	19·36	54·59	19·60	58
59	55·79	19·21	55·70	19·45	55·62	19·69	55·53	19·94	59
60	56·73	19·53	56·65	19·78	56·56	20·03	56·47	20·27	60
61	57·68	19·86	57·59	20·11	57·50	20·36	57·41	20·61	61
62	58·62	20·19	58·53	20·44	58·44	20·70	58·35	20·95	62
63	59·57	20·51	59·48	20·77	59·39	21·03	59·29	21·29	63
64	60·51	20·84	60·42	21·10	60·33	21·36	60·24	21·63	64
65	61·46	21·16	61·37	21·43	61·27	21·70	61·18	21·96	65
66	62·40	21·49	62·31	21·76	62·21	22·03	62·12	22·30	66
67	63·35	21·81	63·25	22·09	63·16	22·37	63·06	22·64	67
68	64·30	22·14	64·20	22·42	64·10	22·70	64·00	22·98	68
69	65·24	22·46	65·14	22·75	65·04	23·03	64·94	23·32	69
70	66·19	22·79	66·09	23·08	65·98	23·37	65·88	23·65	70
71	67·13	23·12	67·03	23·41	66·93	23·70	66·82	23·99	71
72	68·08	23·44	67·97	23·74	67·87	24·03	67·76	24·33	72
73	69·02	23·77	68·92	24·07	68·81	24·37	68·71	24·67	73
74	69·97	24·09	69·86	24·40	69·76	24·70	69·65	25·01	74
75	70·91	24·42	70·81	24·73	70·70	25·04	70·59	25·34	75
76	71·86	24·74	71·75	25·06	71·64	25·37	71·53	25·68	76
77	72·80	25·07	72·69	25·39	72·58	25·70	72·47	26·02	77
78	73·75	25·39	73·64	25·72	73·53	26·04	73·41	26·36	78
79	74·70	25·72	74·58	26·05	74·47	26·37	74·35	26·70	79
80	75·64	26·05	75·53	26·38	75·41	26·70	75·29	27·03	80
81	76·59	26·37	76·47	26·70	76·35	27·04	76·24	27·37	81
82	77·53	26·70	77·42	27·03	77·30	27·37	77·18	27·71	82
83	78·48	27·02	78·36	27·36	78·24	27·71	78·12	28·05	83
84	79·42	27·35	79·30	27·69	79·18	28·04	79·06	28·39	84
85	80·37	27·67	80·25	28·02	80·12	28·37	80·00	28·72	85
86	81·31	28·00	81·19	28·35	81·07	28·71	80·94	29·06	86
87	82·26	28·32	82·14	28·68	82·01	29·04	81·88	29·40	87
88	83·21	28·65	83·08	29·01	82·95	29·37	82·82	29·74	88
89	84·15	28·98	84·02	29·34	83·90	29·71	83·76	30·07	89
90	85·10	29·30	84·97	29·67	84·84	30·04	84·71	30·41	90
91	86·04	29·63	85·91	30·00	85·78	30·38	85·65	30·75	91
92	86·99	29·95	86·86	30·33	86·72	30·71	86·59	31·09	92
93	87·93	30·28	87·80	30·66	87·67	31·04	87·53	31·43	93
94	88·88	30·60	88·74	30·99	88·61	31·38	88·47	31·76	94
95	89·82	30·93	89·69	31·32	89·55	31·71	89·41	32·10	95
96	90·77	31·25	90·63	31·65	90·49	32·05	90·35	32·44	96
97	91·72	31·58	91·58	31·98	91·44	32·38	91·29	32·78	97
98	92·66	31·91	92·52	32·31	92·38	32·71	92·24	33·12	98
99	93·61	32·23	93·46	32·64	93·32	33·05	93·18	33·45	99
100	94·55	32·56	94·41	32·97	94·26	33·38	94·12	33·79	100
Distance.	Dep.	Lat.	Dep.	Lat.	Dep.	Lat.	Dep.	Lat.	Distance.
	71 Deg.		70¾ Deg.		70½ Deg.		70¼ Deg.		

Distance.	20 Deg.		20¼ Deg.		20½ Deg.		20¾ Deg.		Distance.
	Lat.	Dep.	Lat.	Dep.	Lat.	Dep.	Lat.	Dep.	
1	0·94	0·34	0·94	0·35	0·94	0·35	0·94	0·35	1
2	1·88	0·68	1·88	0·69	1·87	0·70	1·87	0·71	2
3	2·82	1·03	2·81	1·04	2·81	1·05	2·81	1·06	3
4	3·76	1·37	3·75	1·38	3·75	1·40	3·74	1·42	4
5	4·70	1·71	4·69	1·73	4·68	1·75	4·68	1·77	5
6	5·64	2·05	5·63	2·08	5·62	2·10	5·61	2·13	6
7	6·58	2·39	6·57	2·42	6·56	2·45	6·55	2·48	7
8	7·52	2·74	7·51	2·77	7·49	2·80	7·48	2·83	8
9	8·46	3·08	8·44	3·12	8·43	3·15	8·42	3·19	9
10	9·40	3·42	9·38	3·46	9·37	3·50	9·35	3·54	10
11	10·34	3·76	10·32	3·81	10·30	3·85	10·29	3·90	11
12	11·28	4·10	11·26	4·15	11·24	4·20	11·22	4·25	12
13	12·22	4·45	12·20	4·50	12·18	4·55	12·16	4·61	13
14	13·16	4·79	13·13	4·85	13·11	4·90	13·09	4·96	14
15	14·10	5·13	14·07	5·19	14·05	5·25	14·03	5·31	15
16	15·04	5·47	15·01	5·54	14·99	5·60	14·96	5·67	16
17	15·97	5·81	15·95	5·88	15·92	5·95	15·90	6·02	17
18	16·91	6·16	16·89	6·23	16·86	6·30	16·83	6·38	18
19	17·85	6·50	17·83	6·58	17·80	6·65	17·77	6·73	19
20	18·79	6·84	18·76	6·92	18·73	7·00	18·70	7·09	20
21	19·73	7·18	19·70	7·27	19·67	7·35	19·64	7·44	21
22	20·67	7·52	20·64	7·61	20·61	7·70	20·57	7·79	22
23	21·61	7·87	21·58	7·96	21·54	8·05	21·51	8·15	23
24	22·55	8·21	22·52	8·31	22·48	8·40	22·44	8·50	24
25	23·49	8·55	23·45	8·65	23·42	8·76	23·38	8·86	25
26	24·43	8·89	24·39	9·00	24·35	9·11	24·31	9·21	26
27	25·37	9·23	25·33	9·35	25·29	9·46	25·25	9·57	27
28	26·31	9·58	26·27	9·69	26·23	9·81	26·18	9·92	28
29	27·25	9·92	27·21	10·04	27·16	10·16	27·12	10·27	29
30	28·19	10·26	28·15	10·38	28·10	10·51	28·05	10·63	30
31	29·13	10·60	29·08	10·73	29·04	10·86	28·99	10·98	31
32	30·07	10·94	30·02	11·08	29·97	11·21	29·92	11·34	32
33	31·01	11·29	30·96	11·42	30·91	11·56	30·86	11·69	33
34	31·95	11·63	31·90	11·77	31·85	11·91	31·79	12·05	34
35	32·89	11·97	32·84	12·11	32·78	12·26	32·73	12·40	35
36	33·83	12·31	33·77	12·46	33·72	12·61	33·66	12·75	36
37	34·77	12·65	34·71	12·81	34·66	12·96	34·60	13·11	37
38	35·71	13·00	35·65	13·15	35·59	13·31	35·54	13·46	38
39	36·65	13·34	36·59	13·50	36·53	13·66	36·47	13·82	39
40	37·59	13·68	37·53	13·84	37·47	14·01	37·41	14·17	40
41	38·53	14·02	38·47	14·19	38·40	14·36	38·34	14·53	41
42	39·47	14·36	39·40	14·54	39·34	14·71	39·28	14·88	42
43	40·41	14·71	40·34	14·88	40·28	15·06	40·21	15·23	43
44	41·35	15·05	41·28	15·23	41·21	15·41	41·15	15·59	44
45	42·29	15·39	42·22	15·58	42·15	15·76	42·08	15·94	45
46	43·23	15·73	43·16	15·92	43·09	16·11	43.02	16·30	46
47	44·17	16·07	44·09	16·27	44·02	16·46	43·95	16·65	47
48	45·11	16·42	45·03	16·61	44·96	16·81	44·89	17·01	48
49	46·04	16·76	45·97	16·96	45·90	17·16	45·82	17·36	49
50	46·98	17·10	46·91	17·31	46·83	17·51	46·76	17·71	50
Distance.	Dep.	Lat.	Dep.	Lat.	Dep.	Lat.	Dep.	Lat.	Distance.
	70 Deg.		69¾ Deg.		69½ Deg.		69¼ Deg.		

Distance.	20 Deg.		20¼ Deg.		20½ Deg.		20¾ Deg.		Distance.
	Lat.	Dep.	Lat.	Dep.	Lat.	Dep.	Lat.	Dep.	
51	47·92	17·44	47·85	17·65	47·77	17·86	47·69	18·07	51
52	48·86	17·79	48·79	18·00	48·71	18·21	48 63	18·42	52
53	49·80	18·13	49·72	18·34	49·64	18·56	49·56	18·78	53
54	50·74	18·47	50·66	18·69	50·58	18·91	50·50	19·13	54
55	51·68	18·81	51·60	19·04	51·52	19·26	51·43	19·49	55
56	52·62	19·15	52·54	19·38	52·45	19·61	52·37	19·84	56
57	53·56	19·50	53·48	19·73	53·39	19·96	53·30	20·19	57
58	54·50	19·84	54·42	20·07	54·33	20·31	54·24	20·55	58
59	55·44	20·18	55·35	20·42	55·26	20·66	55·17	20·90	59
60	56·38	20·52	56·29	20·77	56·20	21·01	56·11	21·26	60
61	57·32	20·86	57·23	21·11	57·14	21·36	57·04	21·61	61
62	58·26	21·21	58·17	21·46	58·07	21·71	57·98	21·97	62
63	59·20	21·55	59·11	21·81	59·01	22·06	58·91	22·32	63
64	60·14	21·89	60·04	22·15	59·95	22·41	59·85	22·67	64
65	61·08	22·23	60·98	22·50	60·88	22·76	60·78	23·03	65
66	62·02	22·57	61·92	22·84	61·82	23·11	61·72	23·38	66
67	62·96	22·92	62·86	23·19	62·76	23·46	62·65	23·74	67
68	63·90	23·26	63·80	23·54	63·69	23·81	63·59	24·09	68
69	64·84	23·60	64·74	23·88	64·63	24·16	64·52	24·45	69
70	65·78	23·94	65·67	24·23	65·57	24·51	65·46	24·80	70
71	66·72	24·28	66·61	24·57	66·50	24·86	66·39	25·15	71
72	67·66	24·63	67·55	24·92	67·44	25·21	67·33	25·51	72
73	68·60	24·97	68·49	25·27	68·38	25·57	68·26	25·86	73
74	69·54	25·31	69·43	25·61	69·31	25·92	69·20	26·22	74
75	70·48	25·65	70·36	25·96	70·25	26·27	70·14	26·57	75
76	71·42	25·99	71·30	26·30	71·19	26·62	71·07	26·93	76
77	72·36	26·34	72·24	26·65	72·12	26·97	72·01	27·28	77
78	73·30	26·68	73·18	27·00	73·06	27·32	72·94	27·63	78
79	74·24	27·02	74·12	27·34	74·00	27·67	73·88	27·99	79
80	75·18	27·36	75·06	27·69	74·93	28·02	74·81	28·34	80
81	76·12	27·70	75·99	28·04	75·87	28·37	75·75	28·70	81
82	77·05	28·05	76·93	28·38	76·81	28·72	76·68	29·05	82
83	77·99	28·39	77·87	28·73	77·74	29·07	77·62	29·41	83
84	78·93	28·73	78·81	29·07	78·68	29·42	78·55	29·76	84
85	79·87	29·07	79·75	29·42	79·62	29·77	79·49	30·11	85
86	80·81	29·41	80·68	29·77	80·55	30·12	80·42	30·47	86
87	81·75	29·76	81·62	30·11	81·49	30·47	81·36	30·82	87
88	82·69	30·10	82·56	30·46	82·43	30·82	82·29	31·18	88
89	83·63	30·44	83·50	30·80	83·36	31·17	83·23	31·53	89
90	84·57	30·78	84·44	31·15	84·30	31·52	84·16	31·89	90
91	85·51	31·12	85·38	31·50	85·24	31·87	85·10	32·24	91
92	86·45	31·47	86·31	31·84	86·17	32·22	86·03	32·59	92
93	87·39	31·81	87·25	32·19	87·11	32·57	86·97	32·95	93
94	88·33	32·15	88·19	32·54	88·05	32·92	87·90	33·30	94
95	89·27	32·49	89·13	32·88	88·98	33·27	88·84	33·66	95
96	90·21	32·83	90·07	33·23	89·92	33·62	89·77	34·01	96
97	91·15	33·18	91·00	33·57	90·86	33·97	90·71	34·37	97
98	92·09	33·52	91·94	33·92	91·79	34·32	91·64	34·72	98
99	93·03	33·86	92·88	34·27	92·73	34·67	92·58	35·07	99
100	93·97	34·20	93·82	34·61	93·67	35·02	93·51	35·43	100
Distance.	Dep.	Lat.	Dep.	Lat.	Dep.	Lat.	Dep.	Lat.	Distance.
	70 Deg.		69¾ Deg.		69½ Deg.		69¼ Deg.		

Distance.	21 Deg.		21¼ Deg.		21½ Deg.		21¾ Deg.		Distance.
	Lat.	Dep.	Lat.	Dep.	Lat.	Dep.	Lat.	Dep.	
1	0·93	0·36	0·93	0·36	0·93	0·37	0·93	0·37	1
2	1·87	0·72	1·86	0·72	1·86	0·73	1·86	0·74	2
3	2·80	1·08	2·80	1·09	2·79	1·10	2·79	1·11	3
4	3·73	1·43	3·73	1·45	3·72	1·47	3·72	1·48	4
5	4·67	1·79	4·65	1·81	4·65	1·83	4·64	1·85	5
6	5·60	2·15	5·59	2·17	5·58	2·20	5·57	2·22	6
7	6·54	2·51	6·52	2·54	6·51	2·57	6·50	2·59	7
8	7·47	2·87	7·46	2·90	7·44	2·93	7·43	2·96	8
9	8·40	3·23	8·39	3·23	8·37	3·30	8·36	3·34	9
10	9·34	3·58	9·32	3·62	9·30	3·67	9·29	3·71	10
11	10·27	3·94	10·25	3·99	10·23	4·03	10·22	4·08	11
12	11·20	4·30	11·18	4·35	11·17	4·40	11·15	4·45	12
13	12·14	4·66	12·12	4·71	12·10	4·76	12·07	4·82	13
14	13·07	5·02	13·05	5·07	13·03	5·13	13·00	5·19	14
15	14·00	5·38	13·98	5·44	13·96	5·50	13·93	5·56	15
16	14·94	5·73	14·91	5·80	14·89	5·86	14·86	5·93	16
17	15·87	6·09	15·84	6·16	15·82	6·23	15·79	6·30	17
18	16·80	6·45	16·78	6·52	16·75	6·60	16·72	6·67	18
19	17·74	6·81	17·71	6·89	17·68	6·96	17·65	7·04	19
20	18·67	7·17	18·64	7·25	18·61	7·33	18·58	7·41	20
21	19·61	7·53	19·57	7·61	19·54	7·70	19·50	7·78	21
22	20·54	7·88	20·50	7·97	20·47	8·06	20·43	8·15	22
23	21·47	8·24	21·44	8·34	21·40	8·43	21·36	8·52	23
24	22·41	8·60	22·37	8·70	22·33	8·80	22·29	8·89	24
25	23·34	8·96	23·30	9·06	23·26	9·16	23·22	9·26	25
26	24·27	9·32	24·23	9·42	24·19	9·53	24·15	9·63	26
27	25·21	9·68	25·16	9·79	25·12	9·90	25·08	10·01	27
28	26·14	10·03	26·10	10·15	26·05	10·26	26·01	10·38	28
29	27·07	10·39	27·03	10·51	26·98	10·63	26·94	10·75	29
30	28·01	10·75	27·96	10·87	27·91	11·00	27·86	11·12	30
31	28·94	11·11	28·89	11·24	28·84	11·36	28·79	11·49	31
32	29·87	11·47	29·82	11·60	29·77	11·73	29·72	11·86	32
33	30·81	11·83	30·76	11·96	30·70	12·09	30·65	12·23	33
34	31·74	12·18	31·69	12·32	31·63	12·46	31·58	12·60	34
35	32·68	12·54	32·62	12·69	32·56	12·83	32·51	12·97	35
36	33·61	12·90	33·55	13·05	33·50	13·19	33·44	13·34	36
37	34·54	13·26	34·48	13·41	34·43	13·56	34·37	13·71	37
38	35·48	13·62	35·42	13·77	35·36	13·93	35·29	14·08	38
39	36·41	13·98	36·35	14·14	36·29	14·29	36·22	14·45	39
40	37·34	14·33	37·28	14·50	37·22	14·66	37·15	14·82	40
41	38·28	14·69	38·21	14·86	38·15	15·03	38·08	15·19	41
42	39·21	15·05	39·14	15·22	39·08	15·39	39·01	15·56	42
43	40·14	15·41	40·08	15·58	40·01	15·76	39·94	15·93	43
44	41·08	15·77	41·01	15·95	40·94	16·13	40·87	16·30	44
45	42·01	16·13	41·94	16·31	41·87	16·49	41·80	16·68	45
46	42·94	16·48	42·87	16·67	42·80	16·86	42·73	17·05	46
47	43·88	16·84	43·80	17·03	43·73	17·23	43·65	17·42	47
48	44·81	17·20	44·74	17·40	44·66	17·59	44·58	17·79	48
49	45·75	17·56	45·67	17·76	45·59	17·96	45·51	18·16	49
50	46·68	17·92	46·60	18·12	46·52	18·33	46·44	18·53	50
Distance.	Dep.	Lat.	Dep.	Lat.	Dep.	Lat.	Dep.	Lat.	Distance.
	69 Deg.		68¾ Deg.		68½ Deg.		68¼ Deg.		

Distance.	21 Deg.		21¼ Deg.		21½ Deg.		21¾ Deg.		Distance.
	Lat.	Dep.	Lat.	Dep.	Lat.	Dep.	Lat.	Dep.	
51	47·61	18·28	47·53	18·48	47·45	18·69	47·37	18·90	51
52	48·55	18·64	48·46	18·85	48·38	19·06	48·30	19·27	52
53	49·48	18·99	49·40	19·21	49·31	19·42	49·23	19·64	53
54	50·41	19·35	50·33	19·57	50·24	19·79	50·16	20·01	54
55	51·35	19·71	51·26	19·93	51·17	20·16	51·08	20·38	55
56	52·28	20·07	52·19	20·30	52·10	20·52	52·01	20·75	56
57	53·21	20·43	53·12	20·66	53·03	20·89	52·94	21·12	57
58	54·15	20·79	54·06	21·02	53·96	21·26	53·87	21·49	58
59	55·08	21·14	54·99	21·38	54·89	21·62	54·80	21·86	59
60	56·01	21·50	55·92	21·75	55·83	21·99	55·73	22·23	60
61	56·95	21·86	56·85	22·11	56·76	22·36	56·66	22·60	61
62	57·88	22·22	57·78	22·47	57·69	22·72	57·59	22·97	62
63	58·82	22·58	58·72	22·83	58·62	23·09	58·52	23·35	63
64	59·75	22·94	59·65	23·20	59·55	23·46	59·44	23·72	64
65	60·68	23·29	60·58	23·56	60·48	23·82	60·37	24·09	65
66	61·62	23·65	61·51	23·92	61·41	24·19	61·30	24·46	66
67	62·55	24·01	62·44	24·28	62·34	24·56	62·23	24·83	67
68	63·48	24·37	63·38	24·65	63·27	24·92	63·16	25·20	68
69	64·42	24·73	64·31	25·01	64·20	25·29	64·09	25·57	69
70	65·35	25·09	65·24	25·37	65·13	25·66	65·02	25·94	70
71	66·28	25·44	66·17	25·73	66·06	26·02	65·95	26·31	71
72	67·22	25·80	67·10	26·10	66·99	26·39	66·87	26·68	72
73	68·15	26·16	68·04	26·46	67·92	26·75	67·80	27·05	73
74	69·08	26·52	68·97	26·82	68·85	27·12	68·73	27·42	74
75	70·02	26·88	69·90	27·18	69·78	27·49	69·66	27·79	75
76	70·95	27·24	70·83	27·55	70·71	27·85	70·59	28·16	76
77	71·89	27·59	71·76	27·91	71·64	28·22	71·52	28·53	77
78	72·82	27·95	72·70	28·27	72·57	28·59	72·45	28·90	78
79	73·75	28·31	73·63	28·63	73·50	28·95	73·38	29·27	79
80	74·69	28·67	74·56	29·00	74·43	29·32	74·30	29·64	80
81	75·62	29·03	75·49	29·36	75·36	29·69	75·23	30·02	81
82	76·55	29·39	76·42	29·72	76·29	30·05	76·16	30·39	82
83	77·49	29·74	77·36	30·08	77·22	30·42	77·09	30·76	83
84	78·42	30·10	78·29	30·44	78·16	30·79	78·02	31·13	84
85	79·35	30·46	79·22	30·81	79·09	31·15	78·95	31·50	85
86	80·29	30·82	80·15	31·17	80·02	31·52	79·88	31·87	86
87	81·22	31·18	81·08	31·53	80·95	31·89	80·81	32·24	87
88	82·16	31·54	82·02	31·89	81·88	32·25	81·74	32·61	88
89	83·09	31·89	82·95	32·26	82·81	32·62	82·66	32·98	89
90	84·02	32·25	83·88	32·62	83·74	32·99	83·59	33·35	90
91	84·96	32·61	84·81	32·98	84·67	33·35	84·52	33·72	91
92	85·89	32·97	85·74	33·34	85·60	33·72	85·45	34·09	92
93	86·82	33·33	86·68	33·71	86·53	34·08	86·38	34·46	93
94	87·76	33·69	87·61	34·07	87·46	34·45	87·31	34·83	94
95	88·69	34·04	88·54	34·43	88·39	34·82	88·24	35·20	95
96	89·62	34·40	89·47	34·79	89·32	35·18	89·17	35·57	96
97	90·56	34·76	90·40	35·16	90·25	35·55	90·09	35·94	97
98	91·49	35·12	91·34	35·52	91·18	35·92	91·02	36·31	98
99	92·42	35·48	92·27	35·88	92·11	36·28	91·95	36·69	99
100	93·36	35·84	93·20	36·24	93·04	36·65	92·88	37·06	100
Distance.	Dep.	Lat.	Dep.	Lat.	Dep.	Lat.	Dep.	Lat.	Distance.
	69 Deg.		68¾ Deg.		68 ½ Deg.		68¼ Deg.		

Distance.	22 Deg.		22¼ Deg.		22½ Deg.		22¾ Deg.		Distance.
	Lat.	Dep.	Lat.	Dep.	Lat.	Dep.	Lat.	Dep.	
1	0·93	0·37	0·93	0·38	0·92	0·38	0·92	0·39	1
2	1·85	0·75	1·85	0·76	1·85	0·77	1·84	0·77	2
3	2·78	1·12	2·78	1·14	2·77	1·15	2·77	1·16	3
4	3·71	1·50	3·70	1·51	3·70	1·53	3·69	1·55	4
5	4·64	1·87	4·63	1·89	4·62	1·91	4·61	1·93	5
6	5·56	2·25	5·55	2·27	5·54	2·30	5·53	2·32	6
7	6·49	2·62	6·48	2·65	6·47	2·68	6·46	2·71	7
8	7·42	3·00	7·40	3·03	7·39	3·06	7·38	3·09	8
9	8·34	3·37	8·33	3·41	8·31	3·44	8·30	3·48	9
10	9.27	3·75	9·26	3·79	9·24	3·83	9·22	3·87	10
11	10·20	4·12	10·18	4·17	10·16	4·21	10·14	4·25	11
12	11·13	4·50	11·11	4·54	11·09	4·59	11·07	4·64	12
13	12·05	4·87	12·03	4·92	12·01	4·97	11·99	5·03	13
14	12·98	5·24	12·96	5·30	12·93	5·36	12·91	5·41	14
15	13·91	5·62	13·88	5·68	13·86	5·74	13·83	5·80	15
16	14·83	5·99	14·81	6·06	14·78	6·12	14·76	6·19	16
17	15·76	6·37	15·73	6·44	15·71	6·51	15·68	6·57	17
18	16·69	6·74	16·66	6·82	16·63	6·89	16·60	6·96	18
19	17·62	7·12	17·59	7·19	17·55	7·27	17·52	7·35	19
20	18·54	7·49	18·51	7·57	18·48	7·65	18·44	7·73	20
21	19·47	7·87	19·44	7·95	19·40	8·04	19·37	8·12	21
22	20·40	8·24	20·36	8·33	20·33	8·42	20·29	8·51	22
23	21·33	8·62	21·29	8·71	21·25	8·80	21·21	8·89	23
24	22·25	8·99	22·21	9·09	22·17	9·18	22·13	9·28	24
25	23·18	9·37	23·14	9·47	23·10	9·57	23·05	9·67	25
26	24·11	9·74	24·06	9·84	24·02	9·95	23·98	10·05	26
27	25·03	10·11	24·99	10·22	24·94	10·33	24·90	10·44	27
28	25·96	10·49	25·92	10·60	25·87	10·72	25·82	10·83	28
29	26·89	10·86	26·84	10·98	26·79	11·10	26·74	11·21	29
30	27·82	11·24	27·77	11·36	27·72	11·48	27·67	11·60	30
31	28·74	11·61	28·69	11·74	28·64	11·86	28·59	11·99	31
32	29·67	11·99	29·62	12·12	29·56	12·25	29·51	12·37	32
33	30·60	12·36	30·54	12·50	30·49	12·63	30·43	12·76	33
34	31·52	12·74	31·47	12·87	31·41	13·01	31·35	13·15	34
35	32·45	13·11	32·39	13·25	32·34	13·39	32·28	13·53	35
36	33·38	13·49	33·32	13·63	33·26	13·78	33·20	13·92	36
37	34·31	13·86	34·24	14·01	34·18	14·16	34·12	14·31	37
38	35·23	14·24	35·17	14·39	35·11	14·54	35·04	14·70	38
39	36·16	14·61	36·10	14·77	36·03	14·92	35·97	15·08	39
40	37·09	14·98	37·02	15·15	36·96	15·31	36·89	15·47	40
41	38·01	15·36	37·95	15·52	37·88	15·69	37·81	15·86	41
42	38·94	15·73	38·87	15·90	38·80	16·07	38·73	16·24	42
43	39·87	16·11	39·80	16·28	39·73	16·46	39·65	16·63	43
44	40·80	16·48	40·72	16·66	40·65	16·84	40·58	17·02	44
45	41·72	16·86	41·65	17·04	41·57	17·22	41·50	17·40	45
46	42·65	17·23	42·57	17·42	42·50	17·60	42·42	17·79	46
47	43·58	17·61	43·50	17·80	43·42	17·99	43·34	18·18	47
48	44·50	17·98	44·43	18·18	44·35	18·37	44·27	18·56	48
49	45·43	18·36	45·35	18·55	45·27	18·75	45·19	18·95	49
50	46·36	18·73	46·28	18·93	46·19	19·13	46·11	19·34	50
Distance.	Dep.	Lat.	Dep.	Lat.	Dep.	Lat.	Dep.	Lat.	Distance.
	68 Deg.		67¾ Deg.		67½ Deg.		67¼ Deg.		

Distance.	22 Deg.		22¼ Deg.		22½ Deg.		22¾ Deg.		Distance.
	Lat.	Dep.	Lat.	Dep.	Lat.	Dep.	Lat.	Dep.	
51	47·29	19·10	47·20	19·31	47·12	19·52	47·03	19·72	51
52	48·21	19·48	48·13	19·69	48·04	19·90	47·95	20·11	52
53	49·14	19·85	49·05	20·07	48·97	20·28	48·88	20·50	53
54	50·07	20·23	49·98	20·45	49·89	20·66	49·80	20·88	54
55	51·00	20·60	50·90	20·83	50·81	21·05	50·72	21·27	55
56	51·92	20·98	51·83	21·20	51·74	21·43	51·64	21·66	56
57	52·85	21·35	52·76	21·58	52·66	21·81	52·57	22·04	57
58	53·78	21·73	53·68	21·96	53·59	22·20	53·49	22·43	58
59	54·70	22·10	54·61	22·34	54·51	22·58	54·41	22·82	59
60	55·63	22·48	55·53	22·72	55·43	22·96	55·33	23·20	60
61	56·56	22·85	56·47	23·10	56·36	23·34	56·25	23·59	61
62	57·49	23·23	57·38	23·48	57·28	23·73	57·18	23·98	62
63	58·41	23·60	58·31	23·85	58·20	24·11	58·10	24·36	63
64	59·34	23·97	59·23	24·23	59·13	24·49	59·02	24·75	64
65	60·27	24·35	60·16	24·61	60·05	24·87	59·94	25·14	65
66	61·19	24·72	61·09	24·99	60·98	25·26	60·87	25·52	66
67	62·12	25·10	62·01	25·37	61·90	25·64	61·79	25·91	67
68	63·05	25·47	62·94	25·75	62·82	26·02	62·71	26·30	68
69	63·98	25·85	63·86	26·13	63·75	26·41	63·63	26·68	69
70	64·90	26·22	64·79	26·51	64·67	26·79	64·55	27·07	70
71	65·83	26·60	65·71	26·88	65·60	27·17	65·48	27·46	71
72	66·76	26·97	66·64	27·26	66·52	27·55	66·40	27·84	72
73	67·68	27·35	67.56	27·64	67·44	27·94	67·32	28·23	73
74	68·61	27·72	68·49	28·02	68·37	28·32	68·24	28·62	74
75	69·54	28·10	69·42	28·40	69·29	28·70	69·17	29·00	75
76	70·47	28·47	70·34	28·78	70·21	29·08	70·09	29·39	76
77	71·39	28·84	71·27	29·16	71·14	29·47	71·01	29·78	77
78	72·32	29·22	72·19	29·53	72·06	29·85	71·93	30·16	78
79	73·25	29·59	73·12	29·91	72·99	30·23	72·85	30·55	79
80	74·17	29·97	74·04	30·29	73·91	30·61	73·78	30·94	80
81	75·10	30·34	74·97	30·67	74·83	31·00	74·70	31·32	81
82	76·03	30·72	75·89	31·05	75·76	31·38	75·62	31·71	82
83	76·96	31·09	76·82	31·43	76·68	31·76	76·54	32·10	83
84	77·88	31·47	77·75	31·81	77·61	32·15	77·46	32·48	84
85	78·81	31·84	78·67	32·19	78·53	32·53	78·39	32·87	85
86	79·74	32·22	79·60	32·56	79·45	32·91	79·31	33·26	86
87	80·66	32·59	80·52	32·94	80·38	33·29	80·23	33·64	87
88	81·59	32·97	81·45	33·32	81·30	33·68	81·15	34·03	88
89	82·52	33·34	82·37	33·70	82·23	34·06	82·08	34·42	89
90	83·45	33·71	83·30	34·08	83·15	34·44	83·00	34·80	90
91	84·37	34·09	84·22	34·46	84·07	34·82	83·92	35·19	91
92	85·30	34·46	85·15	34·84	85·00	35·21	84·84	35·58	92
93	86·23	34·84	86·08	35·21	85·92	35·59	85·76	35·96	93
94	87 16	35·21	87·00	35·59	86·84	35·97	86·69	36·35	94
95	88·08	35·59	87·93	35·97	87·77	36·35	87·61	36·74	95
96	89·01	35·96	88·85	36·35	88·69	36·74	88·53	37·12	96
97	89·94	36·34	89·78	36·73	89·62	37·12	89·45	37·51	97
98	90·86	36·71	90·70	37·11	90·54	37·50	90·38	37·90	98
99	91·79	37·09	91·63	37·49	91·46	37·89	91·30	38·28	99
100	92·72	37·46	92·55	37·86	92·39	38·27	92·22	38·67	100
Distance.	Dep.	Lat.	Dep.	Lat.	Dep.	Lat.	Dep.	Lat.	Distance.
	68 Deg.		67¾ Deg.		67½ Deg.		67¼ Deg.		

Distance.	23 Deg.		23¼ Deg.		23½ Deg.		23¾ Deg.		Distance.
	Lat.	Dep.	Lat.	Dep.	Lat.	Dep.	Lat.	Dep.	
1	0·92	0·39	0·92	0·39	0·92	0·40	0·92	0·40	1
2	1·84	0·78	1·84	0·79	1·83	0·80	1·83	0·81	2
3	2·76	1·17	2·76	1·18	2·75	1·20	2·75	1·21	3
4	3·68	1·56	3·68	1·58	3·67	1·59	3·66	1·61	4
5	4·60	1·95	4·59	1·97	4·59	1·99	4·58	2·01	5
6	5·52	2·34	5·51	2·37	5·50	2·39	5·49	2·42	6
7	6·44	2·74	6·43	2·76	6·42	2·79	6·41	2·82	7
8	7·36	3·13	7·35	3·16	7·34	3·19	7·32	3·22	8
9	8·28	3·52	8·27	3·55	8·25	3·59	8·24	3·62	9
10	9·20	3·91	9·19	3·95	9·17	3·99	9·15	4·03	10
11	10·13	4·30	10·11	4·34	10·09	4·39	10·07	4·43	11
12	11·05	4·69	11·03	4·74	11·00	4·78	10·98	4·83	12
13	11·97	5·08	11·94	5·13	11·92	5·18	11·90	5·24	13
14	12·89	5·47	12·86	5·53	12·84	5·58	12·81	5·64	14
15	13·81	5·86	13·78	5·92	13·76	5·98	13·73	6·04	15
16	14·73	6·25	14·70	6·32	14·67	6·38	14·64	6·44	16
17	15·65	6·64	15·62	6·71	15·59	6·78	15·56	6·85	17
18	16·57	7·03	16·54	7·11	16·51	7·18	16·48	7·25	18
19	17·49	7·42	17·46	7·50	17·42	7·58	17·39	7·65	19
20	18·41	7·81	18·38	7·89	18·34	7·97	18·31	8·05	20
21	19·33	8·21	19·29	8·29	19·26	8·37	19·22	8·46	21
22	20·25	8·60	20·21	8·68	20·18	8·77	20·14	8·86	22
23	21·17	8·99	21·13	9·08	21·09	9·17	21·05	9·26	23
24	22·09	9·38	22·05	9·47	22·01	9·57	21·97	9·67	24
25	23·01	9·77	22·97	9·87	22·93	9·97	22·88	10·07	25
26	23·93	10·16	23·89	10·26	23·84	10·37	23·80	10·47	26
27	24·85	10·55	24·81	10·66	24·76	10·77	24·71	10·87	27
28	25·77	10·94	25·73	11·05	25·68	11·16	25·63	11·28	28
29	26·69	11·33	26·64	11·45	26·59	11·56	26·54	11·68	29
30	27·62	11·72	27·56	11·84	27·51	11·96	27·46	12·08	30
31	28·54	12·11	28·48	12·24	28·43	12·36	28·37	12·49	31
32	29·46	12·50	29·40	12·63	29·35	12·76	29·29	12·89	32
33	30·38	12·89	30·32	13·03	30·26	13·16	30·21	13·29	33
34	31·30	13·28	31·24	13·42	31·18	13·56	31·12	13·69	34
35	32·22	13·68	32·16	13·82	32·10	13·96	32·04	14·10	35
36	33·14	14·07	33·08	14·21	33·01	14·35	32·95	14·50	36
37	34·06	14·46	34·00	14·61	33·93	14·75	33·87	14·90	37
38	34·98	14·85	34·91	15·00	34·85	15·15	34·78	15·30	38
39	35·90	15·24	35·83	15·39	35·77	15·55	35·70	15·71	39
40	36·82	15·63	36·75	15·79	36·68	15·95	36·61	16.11	40
41	37·74	16·02	37·67	16·18	37·60	16·35	37·53	16·51	41
42	38·66	16·41	38·59	16·58	38·52	16·75	38·44	16·92	42
43	39·58	16·80	39·51	16·97	39·43	17·15	39·36	17·32	43
44	40·50	17·19	40·43	17·37	40·35	17·54	40·27	17·72	44
45	41·42	17·58	41·35	17·76	41·27	17·94	41·19	18·12	45
46	42·34	17·97	42·26	18·16	42·18	18·34	42·10	18·53	46
47	43·26	18·36	43·18	18·55	43·10	18·74	43.02	18·93	47
48	44·18	18·76	44·10	18·95	44·02	19·14	43·93	19·33	48
49	45·10	19·15	45·02	19·34	44·94	19·54	44·85	19·73	49
50	46·03	19·54	45·94	19·74	45·85	19·94	45·77	20·14	50
Distance.	Dep.	Lat.	Dep.	Lat.	Dep.	Lat.	Dep.	Lat.	Distance.
	67 Deg.		66¾ Deg.		66½ Deg.		66¼ Deg.		

Distance.	23 Deg.		23¼ Deg.		23½ Deg.		23¾ Deg.		Distance.
	Lat.	Dep.	Lat.	Dep.	Lat.	Dep.	Lat.	Dep.	
51	46·95	19·93	46·86	20·13	46·77	20·34	46·68	20·54	51
52	47·87	20·32	47·78	20·53	47·69	20·73	47·60	20·94	52
53	48·79	20·71	48·70	20·92	48·60	21·13	48·51	21·35	53
54	49·71	21·10	49·61	21·32	49·52	21·53	49·43	21·75	54
55	50·63	21·49	50·53	21·71	50·44	21·93	50·34	22·15	55
56	51·55	21·88	51·45	22·11	51·36	22·33	51·26	22·55	56
57	52·47	22·27	52·37	22·50	52·27	22·73	52·17	22·96	57
58	53·39	22·66	53·29	22·90	53·19	23·13	53·09	23·36	58
59	54·31	23·05	54·21	23·29	54·11	23·53	54·00	23·76	59
60	55·23	23·44	55·13	23·68	55·02	23·92	54·92	24·16	60
61	56·15	23·83	56·05	24·08	55·94	24·32	55·83	24·57	61
62	57·07	24·23	56·97	24·47	56·86	24·72	56·75	24·97	62
63	57·99	24·62	57·88	24·87	57·77	25·12	57·66	25·37	63
64	58·91	25·01	58·80	25·26	58·69	25·52	58·58	25·78	64
65	59·83	25·40	59·72	25·66	59·61	25·92	59·50	26·18	65
66	60·75	25·79	60·64	26·05	60·53	26·32	60·41	26·58	66
67	61·67	26·18	61·56	26·45	61·44	26·72	61·33	26·98	67
68	62·59	26·57	62·48	26·84	62·36	27·11	62·24	27·39	68
69	63·51	26·96	63·40	27·24	63·28	27·51	63·16	27·79	69
70	64·44	27·35	64·32	27·63	64·19	27·91	64·07	28·19	70
71	65·36	27·74	65·23	28·03	65·11	28·31	64·99	28·59	71
72	66·28	28·13	66·15	28·42	66·03	28·71	65·90	29·00	72
73	67·20	28·52	67·07	28·82	66·95	29·11	66·82	29·40	73
74	68·12	28·91	67·99	29·21	67·86	29·51	67·73	29·80	74
75	69·04	29·30	68·91	29·61	68·78	29·91	68·65	30·21	75
76	69·96	29·70	69·83	30·00	69·70	30·30	69·56	30·61	76
77	70·88	30·09	70·75	30·40	70·61	30·70	70·48	31·01	77
78	71·80	30·48	71·67	30·79	71·53	31·10	71·39	31·41	78
79	72·72	30·87	72·58	31·18	72·45	31·50	72·31	31·82	79
80	73·64	31·26	73·50	31·58	73·36	31·90	73·22	32·22	80
81	74·56	31·65	74·42	31·97	74·28	32·30	74·14	32·62	81
82	75·48	32·04	75·34	32·37	75·20	32·70	75·06	33·03	82
83	76·40	32·43	76·26	32·76	76·12	33·10	75·97	33·43	83
84	77·32	32·82	77·18	33·16	77·03	33·49	76·89	33·83	84
85	78·24	33·21	78·10	33·55	77·95	33·89	77·80	34·23	85
86	79·16	33·60	79·02	33·95	78·87	34·29	78·72	34·64	86
87	80·08	23·99	79·93	34·34	79·78	34·69	79·63	35·04	87
88	81·00	34·38	80·85	34·74	80·70	35·09	80·55	35·44	88
89	81·92	34·78	81·77	35·13	81·62	35·49	81·46	35·84	89
90	82·85	35·17	82·69	35·53	82·54	35·89	82·38	36·25	90
91	83·77	35·56	83·61	35·92	83·45	36·29	83·29	36·65	91
92	84·69	35·95	84·53	36·32	84·37	36·68	84·21	37·05	92
93	85·61	36·34	85·45	36·71	85·29	37·08	85·12	37·46	93
94	86·53	36·73	86·37	37·11	86·20	37·48	86·04	37·86	94
95	87·45	37·12	87·29	37·50	87·12	37·88	86·95	38·26	95
96	88·37	37·51	88·20	37·90	88·04	38·28	87·87	38·66	96
97	89·29	37·90	89·12	38·29	88·95	38·68	88·79	39·07	97
98	90·21	38·29	90·04	38·68	89·87	39·08	89·70	39·47	98
99	91·13	38·68	90·96	39·08	90·79	39·48	90·62	39·87	99
100	92·05	39·07	91·88	39·47	91·71	39·87	91·53	40·27	100
Distance.	Dep.	Lat.	Dep.	Lat.	Dep.	Lat.	Dep.	Lat.	Distance.
	67 Deg.		66¾ Deg.		66½ Deg.		66¼ Deg.		

Distance.	24 Deg.		24¼ Deg.		24½ Deg.		24¾ Deg.		Distance.
	Lat.	Dep.	Lat.	Dep.	Lat.	Dep.	Lat.	Dep.	
1	0·91	0·41	0·91	0·41	0·91	0·41	0·91	0·42	1
2	1·83	0·81	1·82	0·82	1·82	0·83	1·82	0·84	2
3	2·74	1·22	2·74	1·23	2·73	1·24	2·72	1·26	3
4	3·65	1·63	3·65	1·64	3·64	1·66	3·63	1·67	4
5	4·57	2·03	4·56	2·05	4·55	2·07	4·54	2·09	5
6	5·48	2·44	5·47	2·46	5·46	2·49	5·45	2·51	6
7	6·39	2·85	6·38	2·87	6·37	2·90	6·36	2·93	7
8	7·31	3·25	7·29	3·29	7·28	3·32	7·27	3·35	8
9	8·22	3·66	8·21	3·70	8·19	3·73	8·17	3·77	9
10	9·14	4·07	9·12	4·11	9·10	4·15	9·08	4·19	10
11	10·05	4·47	10·03	4·52	10·01	4·56	9·99	4·61	11
12	10·96	4·88	10·94	4·93	10·92	4·98	10·90	5·02	12
13	11·88	5·29	11·85	5·34	11·83	5·39	11·81	5·44	13
14	12·79	5·69	12·76	5·75	12·74	5·81	12·71	5·86	14
15	13·70	6·10	13·68	6·16	13·65	6·22	13·62	6·28	15
16	14·62	6·51	14·59	6·57	14·56	6·64	14·53	6·70	16
17	15·53	6·92	15·50	6·98	15·47	7·05	15·44	7·12	17
18	16·44	7·32	16·41	7·39	16·38	7·46	16·35	7·54	18
19	17·36	7·73	17·32	7·80	17·29	7·88	17·25	7·95	19
20	18·27	8·13	18·24	8·21	18·20	8·29	18·16	8·37	20
21	19·18	8·54	19·15	8·63	19·11	8·71	19·07	8·79	21
22	20·10	8·95	20·06	9·04	20·02	9·12	19·98	9·21	22
23	21·01	9·35	20·97	9·45	20·93	9·54	20·89	9·63	23
24	21·93	9·76	21·88	9·86	21·84	9·95	21·80	10·05	24
25	22·84	10·17	22·79	10·27	22·75	10·37	22·70	10·47	25
26	23·75	10·58	23·71	10·68	23·66	10·78	23·61	10·89	26
27	24·67	10·98	24·62	11·09	24·57	11·20	24·52	11·30	27
28	25·58	11·39	25·53	11·50	25·48	11·61	25·43	11·72	28
29	26·49	11·80	26·44	11·91	26·39	12·03	26·34	12·14	29
30	27·41	12·20	27·35	12·32	27·30	12·44	27·24	12·56	30
31	28·32	12·61	28·26	12·73	28·21	12·86	28·15	12·98	31
32	29·23	13·02	29·18	13·14	29·12	13·27	29·06	13·40	32
33	30·15	13·42	30·09	13·55	30·03	13·68	29·97	13·82	33
34	31·06	13·83	31·00	13·96	30·94	14·10	30·88	14·23	34
35	31·97	14·24	31·91	14·38	31·85	14·51	31·78	14·65	35
36	32·89	14·64	32·82	14·79	32·76	14·93	32·69	15·07	36
37	33·80	15·05	33·74	15·20	33·67	15·34	33·60	15·49	37
38	34·71	15·46	34·65	15·61	34·58	15·76	34·51	15·91	38
39	35·63	15·86	35·56	16·02	35·49	16·17	35·42	16·33	39
40	36·54	16·27	36·47	16·43	36·40	16·59	36·33	16·75	40
41	37·46	16·68	37·38	16·84	37·31	17·00	37·23	17·16	41
42	38·37	17·08	38·29	17·25	38·22	17·42	38·14	17·58	42
43	39·28	17·49	39·21	17·66	39·13	17·83	39·05	18·00	43
44	40·20	17·90	40·12	18·07	40·04	18·25	39·96	18·42	44
45	41·11	18·30	41·03	18·48	40·95	18·66	40·87	18·84	45
46	42·02	18·71	41·94	18·89	41·86	19·08	41·77	19·26	46
47	42·94	19·12	42·85	19·30	42·77	19·49	42·68	19·68	47
48	43·85	19·52	43·76	19·71	43·68	19·91	43·59	20·10	48
49	44·76	19·93	44·68	20·13	44·59	20·32	44·50	20·51	49
50	45·68	20·34	45·59	20·54	45·50	20·73	45·41	20·93	50
Distance.	Dep.	Lat.	Dep.	Lat.	Dep.	Lat.	Dep.	Lat.	Distance.
	66 Deg.		65¾ Deg.		65½ Deg.		65¼ Deg.		

Distance.	24 Deg.		24¼ Deg.		24½ Deg.		24¾ Deg.		Distance.
	Lat.	Dep.	Lat.	Dep.	Lat.	Dep.	Lat.	Dep.	
51	46·59	20·74	46·50	20·95	46·41	21·15	46·32	21·35	51
52	47·50	21·15	47·41	21·36	47·32	21·56	47·22	21·77	52
53	48·42	21·56	48·32	21·77	48·23	21·98	48·13	22·19	53
54	49·33	21·96	49·24	22·18	49·14	22·39	49·04	22·61	54
55	50·24	22·37	50·15	22·59	50·05	22·81	49·95	23·03	55
56	51·16	22·78	51·06	23·00	50·96	23·22	50·86	23·44	56
57	52·07	23·18	51·97	23·41	51·87	23·64	51·76	23·86	57
58	52·99	23·59	52·88	23·82	52·78	24·05	52·67	24·28	58
59	53·90	24·00	53·79	24·23	53·69	24·47	53·58	24·70	59
60	54·81	24·40	54·71	24·64	54·60	24·88	54·49	25·12	60
61	55·73	24·81	55·62	25·05	55·51	25·30	55·40	25·54	61
62	56·64	25·22	56·53	25·46	56·42	25·71	56·30	25·96	62
63	57·55	25·62	57·44	25·88	57·33	26·13	57·21	26·38	63
64	58·47	26·03	58·35	26·29	58·24	26·54	58·12	26·79	64
65	59·38	26·44	59·26	26·70	59·15	26·96	59·03	27·21	65
66	60·29	26·84	60·18	27·11	60·06	27·37	59·94	27·63	66
67	61·21	27·25	61·09	27·52	60·97	27·78	60·85	28·05	67
68	62·12	27·66	62·00	27·93	61·88	28·20	61·75	28·47	68
69	63·03	28·06	62·91	28·34	62·79	28·61	62·66	28·89	69
70	63·95	28·47	63·82	28·75	63·70	29·03	63·57	29·31	70
71	64·86	28·88	64·74	29·16	64·61	29·44	64·48	29·72	71
72	65·78	29·28	65·65	29·57	65·52	29·86	65·39	30·14	72
73	66·69	29·69	66·56	29·98	66·43	30·27	66·29	30·56	73
74	67·60	30·10	67·47	30·39	67·34	30·69	67·20	30·98	74
75	68·52	30·51	68·38	30·80	68·25	31·10	68·11	31·40	75
76	69·43	30·91	69·29	31·21	69·16	31·52	69·02	31·82	76
77	70·34	31·32	70·21	31·63	70·07	31·93	69·93	32·24	77
78	71·26	31·73	71·12	32·04	70·98	32·35	70·84	32·66	78
79	72·17	32·13	72·03	32·45	71·89	32·76	71·74	33·07	79
80	73·08	32·54	72·94	32·86	72·80	33·18	72·65	33·49	80
81	74·00	32·95	73·85	33·27	73·71	33·59	73·56	33·91	81
82	74·91	33·35	74·76	33·68	74·62	34·00	74·47	34·33	82
83	75·82	33·76	75·68	34·09	75·53	34·42	75·38	34·75	83
84	76·74	34·17	76·59	34·50	76·44	34·83	76·28	35·17	84
85	77·65	34·57	77·50	34·91	77·35	35·25	77·19	35·59	85
86	78·56	34·98	78·41	35·32	78·26	35·66	78·10	36·00	86
87	79·48	35·39	79·32	35·73	79·17	36·08	79·01	36·42	87
88	80·39	35·79	80·24	36·14	80·08	36·49	79·92	36·84	88
89	81·31	36·20	81·15	36·55	80·99	36·91	80·82	37·26	89
90	82·22	36·61	82·06	36·96	81·90	37·32	81·73	37·68	90
91	83·13	37·01	82·97	37·38	82·81	37·74	82·64	38·10	91
92	84·05	37·42	83·88	37·79	83·72	38·15	83·55	38·52	92
93	84·96	37·83	84·79	38·20	84·63	38·57	84·46	38·94	93
94	85·87	38·23	85·71	38·61	85·54	38·98	85·37	39·35	94
95	86·79	38·64	86·62	39·02	86·45	39·40	86·27	39·77	95
96	87·70	39·05	87·53	39·43	87·36	39·81	87·18	40·19	96
97	88·61	39·45	88·44	39·84	88·27	40·23	88·09	40·61	97
98	89·53	39·86	89·35	40·25	89·18	40·64	89·00	41·03	98
99	90·44	40·27	90·26	40·66	90·09	41·05	89·91	41·45	99
100	91·35	40·67	91·18	41·07	91·00	41·47	90·81	41·87	100
Distance.	Dep.	Lat.	Dep.	Lat.	Dep.	Lat.	Dep.	Lat.	Distance.
	66 Deg.		65¾ Deg.		65½ Deg.		65¼ Deg.		

Distance.	25 Deg.		25¼ Deg.		25½ Deg.		25¾ Deg.		Distance.
	Lat.	Dep.	Lat.	Dep.	Lat.	Dep.	Lat.	Dep.	
1	0·91	0·42	0·90	0·43	0·90	0·43	0·90	0·43	1
2	1·81	0·85	1·81	0·85	1·81	0·86	1·80	0·87	2
3	2·72	1·27	2·71	1·28	2·71	1·29	2·70	1·30	3
4	3·63	1·69	3·62	1·71	3·61	1·72	3·60	1·74	4
5	4·53	2·11	4·52	2·13	4·51	2·15	4·50	2·17	5
6	5·44	2·54	5·43	2·56	5·42	2·58	5·40	2·61	6
7	6·34	2·96	6·33	2·99	6·32	3·01	6·30	3·04	7
8	7·25	3·38	7·24	3·41	7·22	3·44	7·21	3·48	8
9	8·16	3·80	8·14	3·84	8·12	3·87	8·11	3·91	9
10	9·06	4·23	9·04	4·27	9·03	4·31	9·01	4·34	10
11	9·97	4·65	9·95	4·69	9·93	4·74	9·91	4·78	11
12	10·88	5·07	10·85	5·12	10·83	5·17	10·81	5·21	12
13	11·78	5·49	11·76	5·55	11·73	5·60	11·71	5·65	13
14	12·69	5·92	12·66	5·97	12·64	6·03	12·61	6·08	14
15	13·59	6·34	13·57	6·40	13·54	6·46	13·51	6·52	15
16	14·50	6·76	14·47	6·83	14·44	6·89	14·41	6·95	16
17	15·41	7·18	15·38	7·25	15·34	7·32	15·31	7·39	17
18	16·31	7·61	16·28	7·68	16·25	7·75	16·21	7·82	18
19	17·22	8·03	17·18	8·10	17·15	8·18	17·11	8·25	19
20	18·13	8·45	18·09	8·53	18·05	8·61	18·01	8·69	20
21	19·03	8·87	18·99	8·96	18·95	9·04	18·91	9·12	21
22	19·94	9·30	19·90	9·38	19·86	9·47	19·82	9·56	22
23	20·85	9·72	20·80	9·81	20·76	9·90	20·72	9·99	23
24	21·75	10·14	21·71	10·24	21·66	10·33	21·62	10·43	24
25	22·66	10·57	22·61	10·66	22·56	10·76	22·52	10·86	25
26	23·56	10·99	23·52	11·09	23·47	11·19	23·42	11·30	26
27	24·47	11·41	24·42	11·52	24·37	11·62	24·32	11·73	27
28	25·38	11·83	25·32	11·94	25·27	12·05	25·22	12·16	28
29	26·28	12·26	26·23	12·37	26·17	12·48	26·12	12·60	29
30	27·19	12·68	27·13	12·80	27·08	12·92	27·02	13·03	30
31	28·10	13·10	28·04	13·22	27·98	13·35	27·92	13·47	31
32	29·00	13·52	28·94	13·65	28·88	13·78	28·82	13·90	32
33	29·91	13·95	29·85	14·08	29·79	14·21	29·72	14·34	33
34	30·81	14·37	30·75	14·50	30·69	14·64	30·62	14·77	34
35	31·72	14·79	31·66	14·93	31·59	15·07	31·52	15·21	35
36	32·63	15·21	32·56	15·36	32·49	15·50	32·43	15·64	36
37	33·53	15·64	33·46	15·78	33·40	15·93	33·33	16·07	37
38	34·44	16·06	34·37	16·21	34·30	16·36	34·23	16·51	38
39	35·35	16·48	35·27	16·64	35·20	16·79	35·13	16·94	39
40	36·25	16·90	36·18	17·06	36·10	17·22	36·03	17·38	40
41	37·16	17·33	37·08	17·49	37·01	17·65	36·93	17·81	41
42	38·06	17·75	37·99	17·92	37·91	18·08	37·83	18·25	42
43	38·97	18·17	38·89	18·34	38·81	18·51	38·73	18·68	43
44	39·88	18·60	39·80	18·77	39·71	18·94	39·63	19·12	44
45	40·78	19·02	40·70	19·20	40·62	19·37	40·53	19·55	45
46	41·69	19·44	41·60	19·62	41·52	19·80	41·43	19·98	46
47	42·60	19·86	42·51	20·05	42·42	20·23	42·33	20·42	47
48	43·50	20·29	43·41	20·48	43·32	20·66	43·23	20·85	48
49	44·41	20·71	44·32	20·90	44·23	21·10	44·13	21·29	49
50	45·32	21·13	45·22	21·33	45·13	21·53	45·03	21·72	50
Distance.	Dep.	Lat.	Dep.	Lat.	Dep.	Lat.	Dep.	Lat.	Distance.
	65 Deg.		64¾ Deg.		64½ Deg.		64¼ Deg.		

Distance.	25 Deg.		25¼ Deg.		25½ Deg.		25¾ Deg.		Distance.
	Lat.	Dep.	Lat.	Dep.	Lat.	Dep.	Lat.	Dep.	
51	46·22	21·55	46·13	21·75	46·03	21·96	45·94	22·16	51
52	47·13	21·98	47·03	22·18	46·93	22·39	46·84	22·59	52
53	48·03	22·40	47·94	22·61	47·84	22·82	47·74	23·03	53
54	48·94	22·82	48·84	23·03	48·74	23·25	48 64	23·46	54
55	49·85	23·24	49·74	23·46	49·64	23·68	49·54	23·89	55
56	50·75	23·67	50·65	23·89	50·54	24·11	50·44	24·33	56
57	51·66	24·09	51·55	24·31	51·45	24·54	51·34	24·76	57
58	52·57	24·51	52·46	24·74	52·35	24·97	52·24	25·20	58
59	53·47	24·93	53·36	25·17	53·25	25·40	53·14	25·63	59
60	54·38	25·36	54·27	25·59	54·16	25·83	54·04	26·07	60
61	55·28	25·78	55·17	26·02	55·06	26·26	54·94	26·50	61
62	56·19	26·20	56·08	26·45	55·96	26·69	55·84	26·94	62
63	57·10	26·62	56·98	26·87	56·86	27·12	56·74	27·37	63
64	58·00	27·05	57·89	27·30	57·77	27·55	57·64	27·80	64
65	58·91	27·47	58·79	27·73	58·67	27·98	58.55	28·24	65
66	59·82	27·89	59·69	28·15	59·57	28·41	59·45	28·67	66
67	60·72	28·32	60·60	28·58	60·47	28·84	60·35	29·11	67
68	61.63	28·74	61·50	29·01	61·38	29·27	61·25	29·54	68
69	62.54	29·16	62·41	29·43	62·28	29·71	62·15	29·98	69
70	63.44	29·58	63·31	29·86	63·18	30·14	63·05	30·41	70
71	64·35	30·01	64·22	30·29	64·08	30·57	63·95	30·85	71
72	65·25	30·43	65·12	30·71	64·99	31·00	64·85	31·28	72
73	66·16	30·85	66·03	31·14	65·89	31·43	65·75	31·71	73
74	67·07	31·27	66·93	31·57	66·79	31·86	66·65	32·15	74
75	67·97	31·70	67·83	31·99	67·69	32·29	67·55	32·58	75
76	68·88	32·12	68·74	32·42	68·60	32·72	68·45	33·02	76
77	69·79	32·54	69·64	32·85	69·50	33·15	69·35	33·45	77
78	70·69	32·96	70·55	33·27	70·40	33·58	70·25	33·89	78
79	71·60	33·39	71·45	33·70	71·30	34·01	71·16	34·32	79
80	72·50	33·81	72·36	34·13	72·21	34·44	72·06	34·76	80
81	73·41	34·23	73·26	34·55	73·11	34·87	72·96	35·19	81
82	74·32	34·65	74·17	34·98	74·01	35·30	73·86	35·62	82
83	75·22	35·08	75·07	35·41	74·91	35·73	74·76	36·06	83
84	76·13	35·50	75·97	35·83	75·82	36·16	75·66	36·49	84
85	77·04	35·92	76·88	36·26	76·72	36·59	76·56	36·93	85
86	77·94	36·35	77·78	36·68	77·62	37·02	77·46	37·36	86
87	78·85	36·77	78·69	37·11	78·52	37·45	78·36	37·80	87
88	79·76	37·19	79·59	37·54	79·43	37·88	79·26	38·23	88
89	80·66	37·61	80·50	37·96	80·33	38·32	80·16	38·67	89
90	81·57	38·04	81·40	38·39	81·23	38·75	81·06	39·10	90
91	82·47	38·46	82·31	38·82	82·14	39·18	81·96	39·53	91
92	83·38	38·88	83·21	39·24	83·04	39·61	82·86	39·97	92
93	84·29	39·30	84·11	39·67	83·94	40·04	83·76	40·40	93
94	85·19	39·73	85·02	40·10	84·84	40·47	84·67	40·84	94
95	86·10	40·15	85·92	40·52	85·75	40·90	85·57	41·27	95
96	87·01	40·57	86·83	40·95	86·65	41·33	86·47	41·71	96
97	87·91	40·99	87·73	41·38	87·55	41·76	87·37	42·14	97
98	88·82	41·42	88·64	41·80	88·45	42·19	88·27	42·58	98
99	89·72	41·84	89·54	42·23	89·36	42·62	89·17	43·01	99
100	90·63	42·26	90·45	42·66	90·26	43·05	90·07	43·44	100
Distance.	Dep.	Lat.	Dep.	Lat.	Dep.	Lat.	Dep.	Lat.	Distance.
	65 Deg.		64¾ Deg.		64½ Deg.		64¼ Deg.		

Distance.	26 Deg.		26¼ Deg.		26½ Deg.		26¾ Deg.		Distance.
	Lat.	Dep.	Lat.	Dep.	Lat.	Dep.	Lat.	Dep.	
1	0·90	0·44	0·90	0·44	0·89	0·45	0·89	0·45	1
2	1·80	0·88	1·79	0·88	1·79	0·89	1·79	0·90	2
3	2·70	1·32	2·69	1·33	2·68	1·34	2·68	1·35	3
4	3·60	1·75	3·59	1·77	3·58	1·78	3·57	1·80	4
5	4·49	2·19	4·48	2·21	4·47	2·23	4·46	2·25	5
6	5·39	2·63	5·38	2·65	5·37	2·68	5·36	2·70	6
7	6·29	3·07	6·28	3·10	6·26	3·12	6·25	3·15	7
8	7·19	3·51	7·17	3·54	7·16	3·57	7·14	3·60	8
9	8·09	3·95	8·07	3·98	8·05	4·02	8·04	4·05	9
10	8·99	4·38	8·97	4·42	8·95	4·46	8·93	4·50	10
11	9·89	4·82	9·87	4·87	9·84	4·91	9·82	4·95	11
12	10·79	5·26	10·76	5·31	10·74	5·35	10·72	5·40	12
13	11·68	5·70	11·66	5·75	11·63	5·80	11·61	5·85	13
14	12·58	6·14	12·56	6·19	12·53	6·25	12·50	6·30	14
15	13·48	6·58	13·45	6·63	13·42	6·69	13·39	6·75	15
16	14·38	7·01	14·35	7·08	14·32	7·14	14·29	7·20	16
17	15·28	7·45	15·25	7·52	15·21	7·59	15·18	7·65	17
18	16·18	7·89	16·14	7·96	16·11	8·03	16·07	8·10	18
19	17·08	8·33	17·04	8·40	17·00	8·48	16·97	8·55	19
20	17·98	8·77	17·94	8·85	17·90	8·92	17·86	9·00	20
21	18·87	9·21	18·83	9·29	18·79	9·37	18·75	9·45	21
22	19·77	9·64	19·73	9·73	19·69	9·82	19·65	9·90	22
23	20·67	10·08	20·63	10·17	20·58	10·26	20·54	10·35	23
24	21·57	10·52	21·52	10·61	21·48	10·71	21·43	10·80	24
25	22·47	10·96	22·42	11·06	22·37	11·15	22·32	11·25	25
26	23·37	11·40	23·32	11·50	23·27	11·60	23·22	11·70	26
27	24·27	11·84	24·22	11·94	24·16	12·05	24·11	12·15	27
28	25·17	12·27	25·11	12·38	25·06	12·49	25·00	12·60	28
29	26·06	12·71	26·01	12·83	25·95	12·94	25·90	13·05	29
30	26·96	13·15	26·91	13·27	26·85	13·39	26·79	13·50	30
31	27·86	13·59	27·80	13·71	27·74	13·83	27·68	13·95	31
32	28·76	14·03	28·70	14·15	28·64	14·28	28·58	14·40	32
33	29·66	14·47	29·60	14·60	29·53	14·72	29·47	14·85	33
34	30·56	14·90	30·49	15·04	30·43	15·17	30·36	15·30	34
35	31·46	15·34	31·39	15·48	31·32	15·62	31·25	15·75	35
36	32·36	15·78	32·29	15·92	32·22	16·06	32·15	16·20	36
37	33·26	16·22	33·18	16·36	33·11	16·51	33·04	16·65	37
38	34·15	16·66	34·08	16·81	34·01	16·96	33·93	17·10	38
39	35·05	17·10	34·98	17·25	34·90	17·40	34·83	17·55	39
40	35·95	17·53	35·87	17·69	35·80	17·85	35·72	18·00	40
41	36·85	17·97	36·77	18·13	36·69	18·29	36·61	18·45	41
42	37·75	18·41	37·67	18·58	37·59	18·74	37·51	18·90	42
43	38·65	18·85	38·57	19·02	38·48	19·19	38·40	19·35	43
44	39·55	19·29	39·46	19·46	39·38	19·63	39·29	19·80	44
45	40·45	19·73	40·36	19·90	40·27	20·08	40·18	20·25	45
46	41·34	20·17	41·26	20·35	41·17	20·53	41·08	20·70	46
47	42·24	20·60	42·15	20·79	42·06	20·97	41·97	21·15	47
48	43·14	21·04	43·05	21·23	42·96	21·42	42·86	21·60	48
49	44·04	21·48	43·95	21·67	43·85	21·86	43·76	22·05	49
50	44·94	21·92	44·84	22·11	44·75	22·31	44·65	22·50	50
Distance.	Dep.	Lat.	Dep.	Lat.	Dep.	Lat.	Dep.	Lat.	Distance.
	64 Deg.		63¾ Deg.		63½ Deg.		63¼ Deg.		

Distance.	26 Deg.		26¼ Deg.		26½ Deg.		26¾ Deg.		Distance.
	Lat.	Dep.	Lat.	Dep.	Lat.	Dep.	Lat.	Dep.	
51	45·84	22·36	45·74	22·56	45·64	22·76	45·54	22·96	51
52	46·74	22·80	46·64	23·00	46·54	23·20	46·43	23·41	52
53	47·64	23·23	47·53	23·44	47·43	23·65	47·33	23·86	53
54	48·53	23·67	48·43	23·88	48·33	24·09	48·22	24·31	54
55	49·43	24·11	49·33	24·33	49·22	24·54	49·11	24·76	55
56	50·33	24·55	50·22	24·77	50·12	24·99	50·01	25·21	56
57	51·23	24·99	51·12	25·21	51·01	25·43	50·00	25·66	57
58	52·13	25·43	52·02	25·65	51·91	25·88	51·79	26·11	58
59	53·03	25·86	52·92	26·09	52·80	26·33	52·69	26·56	59
60	53·93	26·30	53·81	26·54	53·70	26·77	53·58	27·01	60
61	54·83	26·74	54·71	26·98	54·59	27·22	54·47	27·46	61
62	55·73	27·18	55·61	27·42	55·49	27·66	55·36	27·91	62
63	56·62	27·62	56·50	27·86	56·38	28·11	56·26	28·36	63
64	57·52	28·06	57·40	28·31	57·28	28·56	57·15	28·81	64
65	58·42	28·49	58·30	28·75	58·17	29·00	58·04	29·26	65
66	59·32	28·93	59·19	29·19	59·07	29·45	58·94	29·71	66
67	60·22	29·37	60·09	29·63	59·96	29·90	59·83	30·16	67
68	61·12	29·81	60·99	30·08	60·86	30·34	60·72	30·61	68
69	62·02	30·25	61·88	30·52	61·75	30·79	61·62	31·06	69
70	62·92	30·69	62·78	30·96	62·65	31·23	62·51	31·51	70
71	63·81	31·12	63·68	31·40	63·54	31·68	63·40	31·96	71
72	64·71	31·56	64·57	31·84	64·44	32·13	64·29	32·41	72
73	65·61	32·00	65·47	32·29	65·33	32·57	65·19	32·86	73
74	66·51	32·44	66·37	32·73	66·23	33·02	66·08	33·31	74
75	67·41	32·88	67·27	33·17	67·12	33·46	66·97	33·76	75
76	68·31	33·32	68·16	33·61	68·01	33·91	67·87	34·21	76
77	69·21	33·75	69·06	34·06	68·91	34·36	68·76	34·66	77
78	70·11	34·19	69·96	34·50	69·80	34·80	69·65	35·11	78
79	71·00	34·63	70·85	34·94	70·70	35·25	70·55	35·56	79
80	71·90	35·07	71·75	35·38	71·59	35·70	71·44	36·01	80
81	72·80	35·51	72·65	35·83	72·49	36·14	72·33	36·46	81
82	73·70	35·95	73·54	36·27	73·38	36·59	73·22	36·91	82
83	74·60	36·38	74·44	36·71	74·28	37·03	74·12	37·36	83
84	75·50	36·82	75·34	37·15	75·17	37·48	75·01	37·81	84
85	76·40	37·26	76·23	37·59	76·07	37·93	75·90	38·26	85
86	77·30	37·70	77·13	38·04	76·96	38·37	76·80	38·71	86
87	78·20	38·14	78·03	38·48	77·86	38·82	77·69	39·16	87
88	79·09	38·58	78·92	38·92	78·75	39·27	78·58	39·61	88
89	79·99	39·01	79·82	39·36	79·65	39·71	79·48	40·06	89
90	80·89	39·45	80·72	39·81	80·54	40·16	80·37	40·51	90
91	81·79	39·89	81·62	40·25	81·44	40·60	81·26	40·96	91
92	82·69	40·33	82·51	40·69	82·33	41·05	82·15	41·41	92
93	83·59	40·77	83·41	41·13	83·23	41·50	83·05	41·86	93
94	84·49	41·21	84·31	41·58	84·12	41·94	83·94	42·31	94
95	85·39	41·65	85·20	42·02	85·02	42·39	84·83	42·76	95
96	86·28	42·08	86·10	42·46	85·91	42·83	85·73	43·21	96
97	87·18	42·52	87·00	42·90	86·81	43·28	86·62	43·66	97
98	88·08	42·96	87·89	43·34	87·70	43·73	87·51	44.11	98
99	88·98	43·40	88·79	43·79	88·60	44·17	88·40	44·56	99
100	89·88	43·84	89·69	44·23	89·49	44·62	89·30	45·01	100
Distance.	Dep.	Lat.	Dep.	Lat.	Dep.	Lat.	Dep.	Lat.	Distance.
	64 Deg.		63¾ Deg.		63½ Deg.		63¼ Deg.		

Distance.	27 Deg.		27¼ Deg.		27½ Deg.		27¾ Deg.		Distance.
	Lat.	Dep.	Lat.	Dep.	Lat.	Dep.	Lat.	Dep.	
1	0·89	0·45	0·89	0·46	0·89	0·46	0·88	0·47	1
2	1·78	0·91	1·78	0·92	1·77	0·92	1·77	0·93	2
3	2·67	1·36	2·67	1·37	2·66	1·39	2·65	1·40	3
4	3·56	1·82	3·56	1·83	3·55	1·85	3·54	1·86	4
5	4·45	2·27	4·45	2·29	4·44	2·31	4·42	2·33	5
6	5·35	2·72	5·33	2·75	5·32	2·77	5·31	2·79	6
7	6·24	3·18	6·22	3·21	6·21	3·23	6·19	3·26	7
8	7·13	3·63	7·11	3·66	7·10	3·69	7·08	3·72	8
9	8·02	4·09	8·00	4·12	7·98	4·16	7·96	4·19	9
10	8·91	4·54	8·89	4·58	8·87	4·62	8·85	4·66	10
11	9·80	4·99	9·78	5·04	9·76	5·08	9·73	5·12	11
12	10·69	5·45	10·67	5·49	10·64	5·54	10·62	5·59	12
13	11·58	5·90	11·56	5·95	11·53	6·00	11·50	6·05	13
14	12·47	6·36	12·45	6·41	12·42	6·46	12·39	6·52	14
15	13·37	6·81	13·34	6·87	13·31	6·93	13·27	6·98	15
16	14·26	7·26	14·22	7·33	14·19	7·39	14·16	7·45	16
17	15·15	7·72	15·11	7·78	15·08	7·85	15·04	7·92	17
18	16·04	8·17	16·00	8·24	15·97	8·31	15·93	8·38	18
19	16·93	8·63	16·89	8·70	16·85	8·77	16·81	8·85	19
20	17·82	9·08	17·78	9·16	17·74	9·23	17·70	9·31	20
21	18·71	9·53	18·67	9·62	18·63	9·70	18·58	9·78	21
22	19·60	9·99	19·56	10·07	19·51	10·16	19·47	10·24	22
23	20·49	10·44	20·45	10·53	20·40	10·62	20·35	10·71	23
24	21·38	10·90	21·34	10·99	21·29	11·08	21·24	11·17	24
25	22·28	11·35	22·23	11·45	22·18	11·54	22·12	11·64	25
26	23·17	11·80	23·11	11·90	23·06	12·01	23·01	12·11	26
27	24·06	12·26	24·00	12·36	23·95	12·47	23·89	12·57	27
28	24·95	12·71	24·89	12·82	24·84	12·93	24·78	13·04	28
29	25·84	13·17	25·78	13·28	25·72	13·39	25·66	13·50	29
30	26·73	13·62	26·67	13·74	26·61	13·85	26·55	13·97	30
31	27·62	14·07	27·56	14·19	27·50	14·31	27·43	14·43	31
32	28·51	14·53	28·45	14·65	28·38	14·78	28·32	14·90	32
33	29·40	14·98	29·34	15·11	29·27	15·24	29·20	15·37	33
34	30·29	15·44	30·23	15·57	30·16	15·70	30·09	15·83	34
35	31·19	15·89	31·12	16·03	31·05	16·16	30·97	16·30	35
36	32·08	16·34	32·20	16·48	31·93	16·62	31·86	16·76	36
37	32·97	16·80	32·89	16·94	32·82	17·08	32·74	17·23	37
38	33·86	17·25	33·78	17·40	33·71	17·55	33·63	17·69	38
39	34·75	17·71	34·67	17·86	34·59	18·01	34·51	18·16	39
40	35·64	18·16	35·56	18·31	35·48	18·47	35·40	18.62	40
41	36·53	18·61	36·45	18·77	36·37	18·93	36·28	19·09	41
42	37·42	19·07	37·34	19·23	37·25	19·39	37·17	19·56	42
43	38·31	19·52	38·23	19·69	38·14	19·86	38·05	20·02	43
44	39·20	19·98	39·12	20·15	39·03	20·32	38·94	20·49	44
45	40·10	20·43	40·01	20·60	39·92	20·78	39·82	20·95	45
46	40·99	20·88	40·89	21·06	40·80	21·24	40·71	21·42	46
47	41·88	21·34	41·78	21·52	41·69	21·70	41.59	21·88	47
48	42·77	21·79	42·67	21·98	42·58	22·16	42·48	22·35	48
49	43·66	22·25	43·56	22·44	43·46	22·63	43·36	22·82	49
50	44·55	22·70	44·45	22·89	44·35	23·09	44·25	23·28	50
Distance.	Dep.	Lat.	Dep.	Lat.	Dep.	Lat.	Dep.	Lat.	Distance.
	63 Deg.		62¾ Deg.		62½ Deg.		62¼ Deg.		

Distance.	27 Deg.		27¼ Deg.		27½ Deg.		27¾ Deg.		Distance.
	Lat.	Dep.	Lat.	Dep.	Lat.	Dep.	Lat.	Dep.	
51	45·44	23·15	45·34	23·35	45·24	23·55	45·13	23·75	51
52	46·33	23·61	46·23	23·81	46·12	24 01	46·02	24·21	52
53	47·22	24·06	47·12	24·27	47·01	24·47	46·90	24·68	53
54	48·11	24·52	48·01	24·73	47·90	24·93	47·79	25·14	54
55	49·01	24·97	48·90	25·18	48·79	25·40	48·67	25 61	55
56	49·90	25·42	49·78	25·64	49·67	25·86	49·56	26·07	56
57	50·79	25·88	50·67	26·10	50·56	26·32	50·44	26·54	57
58	51·68	26·33	51·56	26·56	51·45	26·78	51·33	27·01	58
59	52·57	26·79	52·45	27 01	52·33	27·24	52·21	27·47	59
60	53·46	27·24	53·34	27·47	53·22	27·70	53·10	27·94	60
61	54·35	27·69	54·23	27·93	54·11	28·17	53·98	28·40	61
62	55·24	28·15	55·12	28·39	54·99	28·63	54·87	28·87	62
63	56·13	28·60	56·01	28·85	55·88	29·09	55 75	29·33	63
64	57·02	29·06	56·90	29·30	56·77	29·55	56·64	29·80	64
65	57·92	29·51	57·79	29·76	57·66	30·01	57·52	30 26	65
66	58·81	29·96	58·68	30·22	58·54	30·48	58·41	30·73	66
67	59·70	30·42	59·56	30·68	59·43	30·94	59·29	31·20	67
68	60·59	30·87	60·45	31·14	60·32	31·40	60·18	31·66	68
69	61·48	31·33	61·34	31·59	61·20	31·86	61·06	32·13	69
70	62·37	31·78	62·23	32·05	62·09	32·32	61·95	32·59	70
71	63·26	32·23	63·12	32·51	62·98	32·78	62·83	33·06	71
72	64·15	32·69	64·01	32·97	63·86	33·25	63·72	33·52	72
73	65·04	33·14	64·90	33·42	64·75	33·71	64·60	33·99	73
74	65·93	33·60	65·79	33·88	65·64	34·17	65·49	34·46	74
75	66·83	34·05	66·68	34·34	66·53	34·63	66·37	34·92	75
76	67·72	34·50	67·57	34·80	67·41	35·09	67·26	35·39	76
77	68·61	34·96	68·45	35·26	68·30	35·55	68·14	35·85	77
78	69·50	35·41	69·34	35·71	69·19	36·02	69·03	36·32	78
79	70·39	35·87	70·23	36·17	70·07	36·48	69·91	36·78	79
80	71·28	36·32	71·12	36·63	70·96	36·94	70·80	37·25	80
81	72·17	36·77	72·01	37·09	71·85	37·40	71·68	37·71	81
82	73·06	37·23	72·90	37·55	72·73	37·86	72·57	38·18	82
83	73·95	37·68	73·79	38·00	73·62	38·33	73·45	38·65	83
84	74·84	38·14	74·68	38·46	74·51	38·79	74·34	39·11	84
85	75·74	38·59	75·57	38·92	75·40	39·25	75·22	39·58	85
86	76·63	39·04	76·46	39·38	76·28	39·71	76·11	40·04	86
87	77·52	39·50	77·34	39·83	77·17	40·17	76·99	40·51	87
88	78·41	39·95	78·23	40·29	78·06	40·63	77·88	40·97	88
89	79·30	40·41	79·12	40·75	78·94	41·10	78·76	41·44	89
90	80·19	40·86	80·01	41·21	79·83	41·56	79·65	41·91	90
91	81·08	41·31	80·90	41·67	80·72	42·02	80·53	42·37	91
92	81·97	41·77	81·79	42·12	81·60	42·48	81·42	42·84	92
93	82·86	42·22	82·68	42·58	82·49	42·94	82·30	43·30	93
94	83·75	42·68	83·57	43·04	83·38	43·40	83·19	43·77	94
95	84·65	43·13	84·46	43·50	84·27	43·87	84·07	44·23	95
96	85·54	43·58	85·35	43·96	85·15	44·33	84·96	44·70	96
97	86·43	44·04	86·23	44·41	86·04	44·79	85·84	45·16	97
98	87·32	44·49	87·12	44·87	86·93	45·25	86·73	45·63	98
99	88·21	44·95	88·01	45·33	87·81	45·71	87·61	46·10	99
100	89·10	45·40	88·90	45·79	88·70	46·17	88·50	46·56	100
Distance.	Dep.	Lat.	Dep.	Lat.	Dep.	Lat.	Dep.	Lat.	Distance.
	63 Deg.		62¾ Deg.		62½ Deg.		62¼ Deg.		

Distance.	28 Deg.		28¼ Deg.		28½ Deg.		28¾ Deg.		Distance.
	Lat.	Dep.	Lat.	Dep.	Lat.	Dep.	Lat.	Dep.	
1	0·88	0·47	0·88	0·47	0·88	0·48	0·88	0·48	1
2	1·77	0·94	1·76	0·95	1·76	0·95	1·75	0·96	2
3	2·65	1·41	2·64	1·42	2·64	1·43	2·63	1·44	3
4	3·53	1·88	3·52	1·89	3·52	1·91	3·51	1·92	4
5	4·41	2·35	4·40	2·37	4·39	2·39	4·38	2·40	5
6	5·30	2·82	5·29	2·84	5·27	2·86	5·26	2·89	6
7	6·18	3·29	6·17	3·31	6·15	3·34	6·14	3·37	7
8	7·06	3·76	7·05	3·79	7·03	3·82	7·01	3·85	8
9	7·95	4·23	7·93	4·26	7·91	4·29	7·89	4·33	9
10	8.83	4·69	8·81	4·73	8·79	4·77	8·77	4·81	10
11	9·71	5·16	9·69	5·21	9·67	5·25	9·64	5·29	11
12	10·60	5·63	10·57	5·68	10·55	5·73	10·52	5·77	12
13	11·48	6·10	11·45	6·15	11·42	6·20	11·40	6·25	13
14	12·36	6·57	12·33	6·63	12·30	6·68	12·27	6·73	14
15	13·24	7·04	13·21	7·10	13·18	7·16	13·15	7·21	15
16	14·13	7·51	14·09	7·57	14·06	7·63	14·03	7·70	16
17	15·01	7·98	14·98	8·05	14·94	8·11	14·90	8·18	17
18	15·89	8·45	15·86	8·52	15·82	8·59	15·78	8·66	18
19	16·78	8·92	16·74	8·99	16·70	9·07	16·66	9·14	19
20	17·66	9·39	17·62	9·47	17·58	9·54	17·53	9·62	20
21	18·54	9·86	18·50	9·94	18·46	10·02	18·41	10·10	21
22	19·42	10·33	19·38	10·41	19·33	10·50	19·29	10·58	22
23	20·31	10·80	20·26	10·89	20·21	10·97	20·16	11·06	23
24	21·19	11·27	21·14	11·36	21·09	11·45	21·04	11·54	24
25	22·07	11·74	22·02	11·83	21·97	11·93	21·92	12·02	25
26	22·96	12·21	22·90	12·31	22·85	12·41	22·79	12·51	26
27	23·84	12·68	23·78	12.78	23·73	12·88	23·67	12·99	27
28	24·72	13·15	24·66	13·25	24·61	13·36	24·55	13·47	28
29	25·61	13·61	25·55	13·73	25·49	13·84	25·43	13·95	29
30	26·49	14·08	26·43	14·20	26·36	14·31	26·30	14·43	30
31	27·37	14·55	27·31	14·67	27·24	14·79	27·18	14·91	31
32	28·25	15·02	28·19	15·15	28·12	15·27	28·06	15·39	32
33	29·14	15·49	29·07	15·62	29·00	15·75	28·93	15·87	33
34	30·02	15·96	29·95	16·09	29·88	16·22	29·81	16·35	34
35	30·90	16·43	30·83	16·57	30·76	16·70	30·69	16·83	35
36	31·79	16·90	31·71	17·04	31·64	17·18	31·56	17·32	36
37	32·67	17·37	32·59	17·51	32·52	17·65	32·44	17·80	37
38	33·55	17·84	33·47	17·99	33·39	18·13	33·32	18·28	38
39	34·43	18·31	34·35	18·46	34·27	18·61	34·19	18·76	39
40	35·32	18·78	35·24	18·93	35·15	19·09	35·07	19·24	40
41	36·20	19·25	36·12	19·41	36·03	19·56	35·95	19·72	41
42	37·08	19·72	37·00	19·88	36·91	20·04	36·82	20·20	42
43	37·97	20·19	37·88	20·35	37·79	20·52	37·70	20·68	43
44	38·85	20·66	38·76	20·83	38·67	20·99	38·58	21·16	44
45	39·73	21·13	39·64	21·30	39·55	21·47	39·45	21·64	45
46	40·62	21·60	40·52	21·77	40·43	21·95	40·33	22·13	46
47	41·50	22·07	41·40	22·25	41·30	22·43	41·21	22·61	47
48	42·38	22·53	42·28	22·72	42·18	22·90	42·08	23·09	48
49	43·26	23·00	43·16	23·19	43·06	23·38	42·96	23·57	49
50	44·15	23·47	44·04	23·67	43·94	23·86	43·84	24·05	50
Distance.	Dep.	Lat.	Dep.	Lat.	Dep.	Lat.	Dep.	Lat.	Distance.
	62 Deg.		61¾ Deg.		61½ Deg.		61¼ Deg.		

Distance.	28 Deg.		28¼ Deg.		28½ Deg.		28¾ Deg.		Distance.
	Lat.	Dep.	Lat.	Dep.	Lat.	Dep.	Lat.	Dep.	
51	45·03	23·94	44·93	24·14	44·82	24·34	44·71	24·53	51
52	45·91	24·41	45·81	24·61	45·70	24·81	45·59	25·01	52
53	46·80	24·88	46·69	25·09	46·58	25·29	46·47	25·49	53
54	47·68	25·35	47·57	25·56	47·46	25·77	47·34	25·97	54
55	48·56	25·82	48·45	26·03	48·33	26·24	48·22	26·45	55
56	49·45	26·29	49·33	26·51	49·21	26·72	49·10	26·94	56
57	50·33	26·76	50·21	26·98	50·09	27·20	49·97	27·42	57
58	51·21	27·23	51·09	27·45	50·97	27·68	50·85	27·90	58
59	52·09	27·70	51·97	27·93	51·85	28·15	51·73	28·38	59
60	52·98	28·17	52·85	28·40	52·73	28·63	52·60	28·86	60
61	53·86	28·64	53·73	28·87	53·61	29·11	53·48	29·34	61
62	54·74	29·11	54·62	29·35	54·49	29·58	54·36	29·82	62
63	55·63	29·58	55·50	29·82	55·37	30·06	55·23	30·30	63
64	56·51	30·05	56·38	30·29	56·24	30·54	56·11	30·78	64
65	57·39	30·52	57·26	30·77	57·12	31·02	56·99	31·26	65
66	58·27	30·99	58·14	31·24	58·00	31·49	57·86	31·75	66
67	59·16	31·45	59·02	31·71	58·88	31·97	58·74	32·23	67
68	60·04	31·92	59·90	32·19	59·76	32·45	59·62	32·71	68
69	60·92	32.39	60·78	32·66	60·64	32·92	60·49	33·19	69
70	61·81	32·86	61·66	33·13	61·52	33·40	61·37	33·67	70
71	62·69	33·33	62·54	33·61	62·40	33·88	62·25	34·15	71
72	63·57	33·80	63·42	34·08	63·27	34·36	63·12	34·63	72
73	64·46	34·27	64·30	34·55	64·15	34·83	64·00	35·11	73
74	65·34	34·74	65·19	35·03	65·03	35·31	64·88	35·59	74
75	66·22	35·21	66·07	35·50	65·91	35·79	65·75	36·07	75
76	67·10	35·68	66·95	35·97	66·79	36·26	66·63	36·56	76
77	67·99	36·15	67.83	36·45	67·67	36·74	67·51	37·04	77
78	68·87	36·62	68·71	36·92	68·55	37·22	68·38	37·52	78
79	69·75	37·09	69·59	37·39	69·43	37·70	69·26	38·00	79
80	70·64	37·56	70·47	37·87	70·31	38·17	70·14	38·48	80
81	71·52	38·03	71·35	38·34	71·18	38·65	71·01	38·96	81
82	72·40	38·50	72·23	38·81	72·06	39·13	71·89	39·44	82
83	73·28	38·97	73·11	39·29	72·94	39·60	72·77	39·92	83
84	74·17	39·44	73·99	39·76	73·82	40·08	73·64	40·40	84
85	75·05	39·91	74·88	40·23	74·70	40·56	74·52	40·88	85
86	75·93	40·37	75·76	40·71	75·58	41·04	75·40	41·36	86
87	76·82	40·84	76·64	41·18	76·46	41·51	76·28	41·85	87
88	77·70	41·31	77·52	41·65	77·34	41·99	77·15	42·33	88
89	78·58	41·78	78·40	42·13	78·21	42·47	78·03	42·81	89
90	79·47	42·25	79·28	42·60	79·09	42·94	78·91	43·29	90
91	80·35	42·72	80·16	43·07	79·97	43·42	79·78	43·77	91
92	81·23	43·19	81·04	43·55	80·85	43·90	80·66	44·25	92
93	82·11	43·66	81·92	44·02	81·73	44·38	81·54	44·73	93
94	83·00	44.13	82·80	44·49	82·61	44·85	82·41	45·21	94
95	83·88	44·60	83·68	44·97	83·49	45·33	83·29	45·69	95
96	84·76	45·07	84·57	45·44	84·37	45·81	84·17	46·17	96
97	85·65	45·54	85·45	45·91	85·25	46·28	85·04	46·66	97
98	86·53	46·01	86·33	46·39	86·12	46·76	85·92	47·14	98
99	87 41	46·48	87·21	46·86	87·00	47·24	86·80	47·62	99
100	88·29	46·95	88.09	47·33	87·88	47·72	87·67	48·10	100
Distance.	Dep.	Lat.	Dep.	Lat.	Dep.	Lat.	Dep.	Lat.	Distance.
	62 Deg.		61¾ Deg.		61½ Deg.		61¼ Deg.		

Distance.	29 Deg.		29¼ Deg.		29½ Deg.		29¾ Deg.		Distance.
	Lat.	Dep.	Lat.	Dep.	Lat.	Dep.	Lat.	Dep.	
1	0·87	0·48	0·87	0·49	0·87	0·49	0·87	0·50	1
2	1·75	0·97	1·74	0·98	1·74	0·98	1·74	0·99	2
3	2·62	1·45	2·62	1·47	2·61	1·48	2·60	1·49	3
4	3·50	1·94	3·49	1·95	3·48	1·97	3·47	1·98	4
5	4·37	2·42	4·36	2·44	4·35	2·46	4·34	2·48	5
6	5·25	2·91	5·23	2·93	5·22	2·95	5·21	2·98	6
7	6·12	3·39	6·11	3·42	6·09	3·45	6·08	3·47	7
8	7·00	3·88	6·98	3·91	6·96	3·94	6·95	3·97	8
9	7·87	4·36	7·85	4·40	7·83	4·43	7·81	4·47	9
10	8·75	4·85	8·72	4·89	8·70	4·92	8·68	4·96	10
11	9·62	5·33	9·60	5·37	9·57	5·42	9·55	5·46	11
12	10·50	5·82	10·47	5·86	10·44	5·91	10·42	5·95	12
13	11·37	6·30	11·34	6·35	11·31	6·40	11·29	6·45	13
14	12·24	6·79	12·21	6·84	12·18	6·89	12·15	6·95	14
15	13·12	7·27	13·09	7·33	13·06	7·39	13·02	7·44	15
16	13·99	7·76	13·96	7·82	13·93	7·88	13·89	7·94	16
17	14·87	8·24	14·83	8·31	14·80	8·37	14·76	8·44	17
18	15·74	8·73	15·70	8·80	15·67	8·86	15·63	8·93	18
19	16·62	9·21	16·58	9·28	16·54	9·36	16·50	9·43	19
20	17·49	9·70	17·45	9·77	17·41	9·85	17·36	9·92	20
21	18·37	10·18	18·32	10·26	18·28	10·34	18·23	10·42	21
22	19·24	10·67	19·19	10·75	19·15	10·83	19·10	10·92	22
23	20·12	11·15	20·07	11·24	20·02	11·33	19·97	11·41	23
24	20·99	11·64	20·94	11·73	20·89	11·82	20·84	11·91	24
25	21·87	12·12	21·81	12·22	21·76	12·31	21·70	12·41	25
26	22·74	12·60	22·68	12·70	22·63	12·80	22·57	12·90	26
27	23·61	13·09	23·56	13·19	23·50	13·30	23·44	13·40	27
28	24·49	13·57	24·43	13·68	24·37	13·79	24·31	13·89	28
29	25·36	14·06	25·30	14·17	25·24	14·28	25·18	14·39	29
30	26·24	14·54	26·17	14·66	26·11	14·77	26·05	14·89	30
31	27·11	15·03	27·05	15·15	26·98	15·27	26·91	15·38	31
32	27·99	15·51	27·92	15·64	27·85	15·76	27·78	15·88	32
33	28·86	16·00	28·79	16·12	28·72	16·25	28·65	16·38	33
34	29·74	16·48	29·66	16·61	29·59	16·74	29·52	16·87	34
35	30·61	16·97	30·54	17·10	30·46	17·23	30·39	17·37	35
36	31·49	17·45	31·41	17·59	31·33	17·73	31·26	17·86	36
37	32·36	17·94	32·28	18·08	32·20	18·22	32·12	18·36	37
38	33·24	18·42	33·15	18·57	33·07	18·71	32·99	18·86	38
39	34·11	18·91	34·03	19·06	33·94	19·20	33·86	19·35	39
40	34·98	19·39	34·90	19·54	34·81	19·70	34·73	19·85	40
41	35·86	19·88	35·77	20·03	35·68	20·19	35·60	20·34	41
42	36·73	20·36	36·64	20·52	36·55	20·68	36·46	20·84	42
43	37·61	20·85	37·52	21·01	37·43	21·17	37·33	21·34	43
44	38·48	21·33	38·39	21·50	38·30	21·67	38·20	21·83	44
45	39·36	21·82	39·26	21·99	39·17	22·16	39·07	22·33	45
46	40·23	22·30	40·13	22·48	40·04	22·65	39·94	22·83	46
47	41·11	22·79	41·01	22·97	40·91	23·14	40·81	23·32	47
48	41·98	23·27	41·88	23·45	41·78	23·63	41·67	23·82	48
49	42·86	23·76	42·75	23·94	42·65	24·13	42·54	24·31	49
50	43·73	24·24	43·62	24·43	43·52	24·62	43·41	24·81	50
Distance.	Dep.	Lat.	Dep.	Lat.	Dep.	Lat.	Dep.	Lat.	Distance.
	61 Deg.		60¾ Deg.		60½ Deg.		60¼ Deg.		

Distance.	29 Deg.		29¼ Deg.		29½ Deg.		29¾ Deg.		Distance.
	Lat.	Dep.	Lat.	Dep.	Lat.	Dep.	Lat.	Dep.	
51	44·61	24·73	44·50	24·92	44·39	25·11	44·28	25·31	51
52	45·48	25·21	45·37	25·41	45·26	25·61	45·15	25·80	52
53	46·35	25·69	46·24	25·90	46·13	26·10	46·01	26·30	53
54	47·23	26·18	47·11	26·39	47·00	26·59	46·88	26·80	54
55	48·10	26·66	47·99	26·87	47·87	27·08	47·75	27·29	55
56	48·98	27·15	48·86	27·36	48·74	27·58	48·62	27·79	56
57	49·85	27·63	49·73	27·85	49·61	28·07	49·49	28·28	57
58	50·73	28·12	50·60	28·34	50·48	28·56	50·36	28·78	58
59	51·60	28·60	51·48	28·83	51·35	29·05	51·22	29·28	59
60	52·48	29·09	52·35	29·32	52·22	29·55	52·09	29·77	60
61	53·35	29·57	53·22	29·81	53·09	30·04	52·96	30·27	61
62	54·23	30·06	54·09	30·29	53·96	30·53	53·83	30·77	62
63	55·10	30·54	54·97	30·78	54·83	31·02	54·70	31·26	63
64	55·98	31·03	55·84	31·27	55·70	31·52	55·56	31·76	64
65	56·85	31·51	56·71	31·76	56·57	32·01	56·43	32·25	65
66	57·72	32·00	57·58	32·25	57·44	32·50	57·30	32·75	66
67	58·60	32·48	58·46	32·74	58·31	32·99	58·17	33·25	67
68	59·47	32·97	59·33	33·23	59·18	33·48	59·04	33·74	68
69	60·35	33·45	60·20	33·71	60·05	33·98	59·91	34·24	69
70	61·22	33·94	61·07	34·20	60·92	34·47	60·77	34·74	70
71	62·10	34·42	61·95	34·69	61·80	34·96	61·64	35·23	71
72	62·97	34·91	62·82	35·18	62·67	35·45	62·51	35·73	72
73	63·85	35·39	63·69	35·67	63·54	35·95	63·38	36·22	73
74	64·72	35·88	64·56	36·16	64·41	36·44	64·25	36·72	74
75	65·60	36·36	65·44	36·65	65·28	36·93	65·11	37·22	75
76	66·47	36·85	66·31	37·14	66·15	37·42	65·98	37·71	76
77	67·35	37·33	67·18	37·62	67·02	37·92	66·85	38·21	77
78	68·22	37·82	68·05	38·11	67·89	38·41	67·72	38·70	78
79	69·09	38·30	68·93	38·60	68·76	38·90	68·59	39·20	79
80	69·97	38·78	69·80	39·09	69·63	39·39	69·46	39·70	80
81	70·84	39·27	79·67	39·58	70·50	39·89	70·32	40·19	81
82	71·72	39·75	71·54	40·07	71·37	40·38	71·19	40·69	82
83	72·59	40·24	72·42	40·56	72·24	40·87	72·06	41·19	83
84	73·47	40·72	73·29	41.04	73·11	41·36	72·93	41.68	84
85	74·34	41·21	74·16	41·53	73·98	41·86	73·80	42·18	85
86	75·22	41·69	75·03	42·02	74·85	42·35	74·67	42·67	86
87	76·09	42·18	75·91	42·51	75·72	42·84	75·53	43·17	87
88	76·97	42·66	76·78	43·00	76·59	43·33	76·40	43·67	88
89	77·84	43·15	77·65	43·49	77·46	43·83	77·27	44·16	89
90	78·72	43·63	78·52	43·98	78·33	44·32	78·14	44·66	90
91	79·59	44·12	79·40	44·46	79·20	44·81	79·01	45·16	91
92	80·46	44·60	80·27	44·95	80·07	45·30	79·87	45·65	92
93	81·34	45·09	81·14	45·44	80·94	45·80	80·74	46·15	93
94	82·21	45·57	82·01	45·93	81·81	46·29	81·61	46·64	94
95	83·09	46·06	82·89	46·42	82·68	46·78	82·48	47·14	95
96	83·96	46·54	83·76	46·91	83·55	47·27	83·35	47·64	96
97	84·84	47·03	84·63	47·40	84·42	47·77	84·22	48·13	97
98	85·71	47·51	85·50	47·88	85·20	48·26	85·08	48·63	98
99	86·59	48·00	86·38	48·37	86·17	48·75	85·95	49·13	99
100	87·46	48·48	87·25	48·86	87·04	49·24	86·82	49·62	100
Distance.	Dep.	Lat.	Dep.	Lat.	Dep.	Lat.	Dep.	Lat.	Distance.
	61 Deg.		60¾ Deg.		60½ Deg.		60¼ Deg.		

Distance.	30 Deg.		30¼ Deg.		30½ Deg.		30¾ Deg.		Distance.
	Lat.	Dep.	Lat.	Dep.	Lat.	Dep.	Lat.	Dep.	
1	0·87	0·50	0·86	0·50	0·86	0·51	0·86	0·51	1
2	1·73	1·00	1·73	1·01	1·72	1·02	1·72	1·02	2
3	2·60	1·50	2·59	1·51	2·58	1·52	2·58	1·53	3
4	3·46	2·00	3·46	2·02	3·45	2·03	3·44	2·05	4
5	4·33	2·50	4·32	2·52	4·31	2·54	4·30	2·56	5
6	5·20	3·00	5·18	3·02	5·17	3·05	5·16	3·07	6
7	6·06	3·50	6·05	3·53	6·03	3·55	6·02	3·58	7
8	6·93	4·00	6·91	4·03	6·89	4·06	6·88	4·09	8
9	7·79	4·50	7·77	4·53	7·75	4·57	7·73	4·60	9
10	8·66	5·00	8·64	5·04	8·62	5·08	8·59	5·11	10
11	9·53	5·50	9·50	5·54	9·48	5·58	9·45	5·62	11
12	10·39	6·00	10·37	6·05	10·34	6·09	10·31	6·14	12
13	11·26	6·50	11·23	6·55	11·20	6·60	11·17	6·65	13
14	12·12	7·00	12·09	7·05	12·06	7·11	12·03	7·16	14
15	12·99	7·50	12·96	7·56	12·92	7·61	12·89	7·67	15
16	13·86	8·00	13·82	8·06	13·79	8·12	13·75	8·18	16
17	14·72	8·50	14·69	8·56	14·65	8·63	14·61	8·69	17
18	15·59	9·00	15·55	9·07	15·51	9·14	15·47	9·20	18
19	16·45	9·50	16·41	9·57	16·37	9·64	16·33	9·71	19
20	17·32	10·00	17·28	10·08	17·23	10·15	17·19	10·23	20
21	18·19	10·50	18·14	10·58	18·09	10·66	18·05	10·74	21
22	19·05	11·00	19·00	11·08	18·96	11·17	18·91	11·25	22
23	19·92	11·50	19·87	11·59	19·82	11·67	19·77	11·76	23
24	20·78	12·00	20·73	12·09	20·68	12·18	20·63	12·27	24
25	21·65	12·50	21·60	12·59	21·54	12·69	21·49	12·78	25
26	22·52	13·00	22·46	13·10	22·40	13·20	22·34	13·29	26
27	23·38	13·50	23·32	13·60	23·26	13·70	23·20	13·80	27
28	24·25	14·00	24·19	14·11	24·13	14·21	24·06	14·32	28
29	25·11	14·50	25·05	14·61	24·99	14·72	24·92	14·83	29
30	25·98	15·00	25·92	15·11	25·85	15·23	25·78	15·34	30
31	26·85	15·50	26·78	15·62	26·71	15·73	26·64	15·85	31
32	27·71	16·00	27·64	16·12	27·57	16·24	27·50	16·36	32
33	28·58	16·50	28·51	16·62	28·43	16·75	28·36	16·87	33
34	29·44	17·00	29·37	17·13	29·30	17·26	29·22	17·38	34
35	30·31	17·50	30·23	17·63	30·16	17·76	30·08	17·90	35
36	31·18	18·00	31·10	18·14	31·02	18·27	30·94	18·41	36
37	32·04	18·50	31·96	18·64	31·88	18·78	31·80	18·92	37
38	32·91	19·00	32·83	19·14	32·74	19·29	32·66	19·43	38
39	33·77	19·50	33·69	19·65	33·60	19·79	33·52	19·94	39
40	34·64	20·00	34·55	20·15	34·47	20·30	34·38	20·45	40
41	35·51	20·50	35·42	20·65	35·33	20·81	35·24	20·96	41
42	36·37	21·00	36·28	21·16	36·19	21·32	36·10	21·47	42
43	37·24	21·50	37·14	21·66	37·05	21·82	36·95	21·99	43
44	38·11	22·00	38·01	22·17	37·91	22·33	37·81	22·50	44
45	38·97	22·50	38·87	22·67	38·77	22·84	38·67	23·01	45
46	39·84	23·00	39·74	23·17	39·63	23·35	39·53	23·52	46
47	40·70	23·50	40·60	23·68	40·50	23·85	40·39	24·03	47
48	41·57	24·00	41·46	24·18	41·36	24·36	41·25	24·54	48
49	42·44	24·50	42·33	24·68	42·22	24·87	42·11	25·05	49
50	43·30	25·00	43·19	25·19	43·08	25·38	42·97	25·56	50
Distance.	Dep.	Lat.	Dep.	Lat.	Dep.	Lat.	Dep.	Lat.	Distance.
	60 Deg.		59¾ Deg.		59½ Deg.		59¼ Deg.		

Distance.	30 Deg.		30¼ Deg.		30½ Deg.		30¾ Deg.		Distance.
	Lat.	Dep.	Lat.	Dep.	Lat.	Dep.	Lat.	Dep.	
51	44·17	25·50	44·06	25·69	43·94	25·88	43·83	26·08	51
52	45·03	26·00	44·92	26·20	44·80	26·39	44·69	26·59	52
53	45·90	26·50	45·78	26·70	45·67	26·90	45·55	27·10	53
54	46·77	27·00	46·65	27·20	46·53	27·41	46·41	27·61	54
55	47·63	27·50	47·51	27·71	47·39	27·91	47·27	28·12	55
56	48·50	28·00	48·37	28·21	48·25	28·42	48 13	28·63	56
57	49·36	28·50	49·24	28·72	49·11	28·93	48·99	29·14	57
58	50·23	29·00	50·10	29·22	49·97	29·44	49·85	29·65	58
59	51·10	29·50	50·97	29·72	50·84	29·94	50·70	30·17	59
60	51·96	30·00	51·83	30·23	51·70	30·45	51·56	30·68	60
61	52·83	30·50	52·69	30·73	52·56	30·96	52·42	31·19	61
62	53·69	31·00	53·56	31·23	53·42	31·47	53·28	31·70	62
63	54·56	31·50	54·42	31·74	54·28	31·97	54·14	32·21	63
64	55·43	32·00	55·29	32·24	55·14	32·48	55·00	32·72	64
65	56·29	32·50	56·15	32·75	56·01	32·99	55·86	33·23	65
66	57·16	33·00	57·01	33·25	56·87	33·50	56·72	33·75	66
67	58·02	33·50	57·88	33·75	57·73	34·01	57·58	34·26	67
68	58·89	34·00	58·74	34·26	58·59	34·51	58·44	34·77	68
69	59·76	34·50	59·60	34·76	59·45	35·02	59·30	35·28	69
70	60·62	35·00	60·47	35·26	60·31	35·53	60·16	35·79	70
71	61.49	35·50	61·33	35·77	61·18	36·04	61·02	36·30	71
72	62·35	36·00	62·20	36·27	62·04	36·54	61·88	36·81	72
73	63·22	36·50	63·06	36·78	62·90	37·05	62·74	37·32	73
74	64·09	37·00	63·92	37·28	63·76	37·56	63·60	37·84	74
75	64·95	37·50	64·79	37·78	64·62	38·07	64·46	38·35	75
76	65·82	38·00	65·65	38·29	65·48	38·57	65·31	38·86	76
77	66·68	38·50	66·52	38·79	66·35	39·08	66·17	39·37	77
78	67·55	39·00	67·38	39·29	67·21	39·59	67·03	39·88	78
79	68·42	39·50	68·24	39·80	68·07	40·10	67·89	40·39	79
80	69·28	40·00	69·11	40·30	68·93	40·60	68·75	40·90	80
81	70·15	40·50	69·97	40·81	69·79	41·11	69·61	41·41	81
82	71·01	41·00	70·83	41·31	70·65	41·62	70·47	41·93	82
83	71·88	41·50	71·70	41·81	71·52	42·13	71·33	42·44	83
84	72·75	42·00	72·56	42·32	72·38	42·63	72·19	42·95	84
85	73·61	42·50	73·43	42·82	73·24	43·14	73·05	43·46	85
86	74·48	43·00	74·29	43·32	74·10	43·65	73·91	43·97	86
87	75·34	43·50	75·15	43·85	74·96	44·16	74·77	44·48	87
88	76·21	44·00	76·02	44·33	75·82	44·66	75·63	44·99	88
89	77·08	44·50	76·88	44·84	76·68	45·17	76·49	45·51	89
90	77·94	45·00	77·75	45·34	77·55	45·68	77·35	46·02	90
91	78·81	45·50	78·61	45·84	78·41	46·19	78·21	46·53	91
92	79·67	46·00	79·47	46·35	79·27	46·69	79·07	47·04	92
93	80·54	46·50	80·34	46·85	80·13	47·20	79·92	47·55	93
94	81·41	47·00	81·20	47·35	80·99	47·71	80·78	48·06	94
95	82·27	47·50	82·06	47·86	81·85	48·22	81·64	48·57	95
96	83·14	48·00	82·93	48·36	82·72	48·72	82·50	49·08	96
97	84·00	48·50	83·79	48·87	83·58	49·23	83·36	49·60	97
98	84·87	49·00	84·66	49·37	84·44	49·74	84·22	50·11	98
99	85·74	49·50	85·52	49·87	85·30	50·25	85·08	50·62	99
100	86·60	50·00	86·38	50·38	86·16	50·75	85·94	51·13	100
Distance.	Dep.	Lat.	Dep.	Lat.	Dep.	Lat.	Dep.	Lat.	Distance.
	60 Deg.		59¾ Deg.		59½ Deg.		59¼ Deg.		

Distance.	31 Deg.		31¼ Deg.		31½ Deg.		31¾ Deg.		Distance.
	Lat.	Dep.	Lat.	Dep.	Lat.	Dep.	Lat.	Dep.	
1	0·86	0·51	0·85	0·52	0·85	0·52	0·85	0·53	1
2	1·71	1·03	1·71	1·04	1·71	1·04	1·70	1·05	2
3	2·57	1·55	2·56	1·56	2·56	1·57	2·55	1·58	3
4	3·43	2·06	3·42	2·08	3·41	2·09	3·40	2·10	4
5	4·29	2·58	4·27	2·59	4·26	2·61	4·25	2·63	5
6	5·14	3·09	5·13	3·11	5·12	3·13	5·10	3·16	6
7	6·00	3·61	5·98	3·63	5·97	3·66	5·95	3·68	7
8	6·86	4·12	6·84	4·15	6·82	4·18	6·80	4·21	8
9	7·71	4·64	7·69	4·67	7·67	4·70	7·65	4·74	9
10	8·57	5·15	8·55	5·19	8·53	5·22	8·50	5·26	10
11	9·43	5·67	9·40	5·71	9·38	5·75	9·35	5·79	11
12	10·29	6·18	10·26	6·23	10·23	6·27	10·20	6·31	12
13	11·14	6·70	11·11	6·74	11·08	6·79	11·05	6·84	13
14	12·00	7·21	11·97	7·26	11·94	7·31	11·90	7·37	14
15	12·86	7·73	12·82	7·78	12·79	7·84	12·76	7·89	15
16	13·71	8·24	13·68	8·30	13·64	8·36	13·61	8·42	16
17	14·57	8·76	14·53	8·82	14·49	8·88	14·46	8·95	17
18	15·43	9·27	15·39	9·34	15·35	9·40	15·31	9·47	18
19	16·29	9·79	16·24	9·86	16·20	9·93	16·16	10·00	19
20	17·14	10·30	17·10	10·38	17·05	10·45	17·01	10·52	20
21	18·00	10·82	17·95	10·89	17·91	10·97	17·86	11·05	21
22	18·86	11·33	18·81	11·41	18·76	11·49	18·71	11·58	22
23	19·71	11·85	19·66	11·93	19·61	12·02	19·56	12·10	23
24	20·57	12·36	20·52	12·45	20·46	12·54	20·41	12·63	24
25	21·43	12·88	21·37	12·97	21·32	13·06	21·26	13·16	25
26	22·29	13·39	22·23	13·49	22·17	13·58	22·11	13·68	26
27	23·14	13·91	23·08	14·01	23·02	14·11	22·96	14·21	27
28	24·00	14·42	23·94	14·53	23·87	14·63	23·81	14·73	28
29	24·86	14·94	24·79	15·04	24·73	15·15	24·66	15·26	29
30	25·71	15·45	25·65	15·56	25·58	15·67	25·51	15·79	30
31	26·57	15·97	26·50	16·08	26·43	16·20	26·36	16·31	31
32	27·43	16·48	27·36	16·60	27·28	16·72	27·21	16·84	32
33	28·29	17·00	28·21	17·12	28·14	17·24	28·06	17·37	33
34	29·14	17·51	29·07	17·64	28·99	17·76	28·91	17·89	34
35	30·00	18·03	29·92	18·16	29·84	18·29	29·76	18·42	35
36	30·86	18·54	30·78	18·68	30·70	18·81	30·61	18·94	36
37	31·72	19·06	31·63	19·19	31·55	19·33	31·46	19·47	37
38	32·57	19·57	32·49	19·71	32·40	19·85	32·31	20·00	38
39	33·43	20·09	33·34	20·23	33·25	20·38	33·16	20·52	39
40	34·29	20·60	34·20	20·75	34·11	20·90	34·01	21·05	40
41	35·14	21·12	35·05	21·27	34·96	21·42	34·86	21·57	41
42	36·00	21·63	35·91	21·79	35·81	21·94	35·71	22·10	42
43	36·86	22·15	36·76	22·31	36·66	22·47	36·57	22·63	43
44	37·72	22·66	37·62	22·83	37·52	22·99	37·42	23·15	44
45	38·57	23·18	38·47	23·34	38·37	23·51	38·27	23·68	45
46	39·43	23·69	39·33	23·86	39·22	24·03	39·12	24·21	46
47	40·29	24·21	40·18	24·38	40·07	24·56	39·97	24·73	47
48	41·14	24·72	41·04	24·90	40·93	25·08	40·82	25·26	48
49	42·00	25·24	41·89	25·42	41·78	25·60	41·67	25·78	49
50	42·86	25·75	42·75	25·94	42·63	26·12	42·52	26·31	50
Distance.	Dep.	Lat.	Dep.	Lat.	Dep.	Lat.	Dep.	Lat.	Distance.
	59 Deg.		58¾ Deg.		58½ Deg.		58¼ Deg.		

Distance.	31 Deg.		31¼ Deg.		31½ Deg.		31¾ Deg.		Distance.
	Lat.	Dep.	Lat.	Dep.	Lat.	Dep.	Lat.	Dep.	
51	43·72	26·27	43·60	26·46	43·48	26·65	43·37	26·84	51
52	44·57	26·78	44·46	26·98	44·34	27·17	44·22	27·36	52
53	45·43	27·30	45·31	27·49	45·19	27·69	45·07	27·89	53
54	46·29	27·81	46·17	28·01	46·04	28·21	45·92	28·42	54
55	47·14	28·33	47·02	28·53	46·90	28·74	46·77	28·94	55
56	48·00	28·84	47·88	29·05	47·75	29·26	47·62	29·47	56
57	48·86	29·36	48·73	29·57	48·60	29·78	48·47	29·99	57
58	49·72	29·87	49·58	30·09	49·45	30·30	49·32	30·52	58
59	50·57	30·39	50·44	30·61	50·31	30·83	50·17	31·05	59
60	51·43	30·90	51·29	31·13	51·16	31·35	51·02	31·57	60
61	52·29	31·42	52·15	31·65	52·01	31·87	51·87	32·10	61
62	53·14	31·93	53·00	32·16	52·86	32·39	52·72	32·63	62
63	54·00	32·45	53·86	32·68	53·72	32·92	53·57	33·15	63
64	54·86	32·96	54·71	33·20	54·57	33·44	54·42	33·68	64
65	55·72	33·48	55·57	33·72	55·42	33·96	55·27	34·20	65
66	56·57	33·99	56·42	34·24	56·27	34·48	56·12	34·73	66
67	57·43	34·51	57·28	34·76	57·13	35·01	56·98	35·26	67
68	58·29	35·02	58·13	35·28	57·98	35·53	57·82	35·78	68
69	59·14	35·54	58·99	35·80	58·83	36·05	58·67	36·31	69
70	60·00	36·05	59·84	36·31	59·68	36·57	59·52	36·83	70
71	60·86	36·57	60·70	36·83	60·54	37·10	60·37	37·36	71
72	61·72	37·08	61·55	37·35	61·39	37·62	61·23	37·89	72
73	62·57	37·60	62·41	37·87	62·24	38·14	62·08	38·41	73
74	63·43	38·11	63·26	38·39	63·10	38·66	62·93	38·94	74
75	64·29	38·63	64·12	38·91	63·95	39·19	63·78	39·47	75
76	65·14	39·14	64·97	39·43	64·80	39·71	64·63	39·99	76
77	66·00	39·66	65·83	39·95	65·65	40·23	65·48	40·52	77
78	66·86	40·17	66·68	40·46	66·51	40·75	66·33	41·04	78
79	67·72	40·69	67·54	40·98	67·36	41·28	67·18	41·57	79
80	68·57	41·20	68·39	41·50	68·21	41·80	68·03	42·10	80
81	69·43	41·72	69·25	42·02	69·06	42·32	68·88	42·62	81
82	70·29	42·23	70·10	42·54	69·92	42·84	69·73	43·15	82
83	71·14	42·75	70·96	43·06	70·77	43·37	70·58	43·68	83
84	72·00	43·26	71·81	43·58	71·62	43·89	71·43	44·20	84
85	72·86	43·78	72·67	44·10	72·47	44·41	72·28	44·73	85
86	73·72	44·29	73·52	44·61	73·33	44·93	73·13	45·25	86
87	74·57	44·81	74·38	45·13	74·18	45·46	73·98	45·78	87
88	75·43	45·32	75·23	45·65	75·03	45·98	74·83	46·31	88
89	76·29	45·84	76·09	46·17	75·88	46·50	75·68	46·83	89
90	77·15	46·35	76·94	46·69	76·74	47·02	76·53	47·36	90
91	78·00	46·87	77·80	47·21	77·59	47·55	77·38	47·89	91
92	78·86	47·38	78·65	47·73	78·44	48·07	78·23	48·41	92
93	79·72	47·90	79·51	48·25	79·30	48·59	79·08	48·94	93
94	80·57	48·41	80·36	48·76	80·15	49·11	79·93	49·47	94
95	81·43	48·93	81·22	49·28	81·00	49·64	80·78	49·99	95
96	82·29	49·44	82·07	49·80	81·85	50·16	81·63	50·52	96
97	83·15	49·96	82·93	50·32	82·71	50·68	82·48	51·04	97
98	84·00	50·47	83·78	50·84	83·56	51·20	83·33	51·57	98
99	84·86	50·99	84·64	51·36	84·41	51·73	84·18	52·10	99
100	85·72	51·50	85·49	51·88	85·26	52·25	85·04	52·62	100
Distance.	Dep.	Lat.	Dep.	Lat.	Dep.	Lat.	Dep.	Lat.	Distance.
	59 Deg.		58¾ Deg.		58½ Deg.		58¼ Deg.		

Distance.	32 Deg.		32¼ Deg.		32½ Deg.		32¾ Deg.		Distance.
	Lat.	Dep.	Lat.	Dep.	Lat.	Dep.	Lat.	Dep.	
1	0·85	0·53	0·85	0·53	0·84	0·54	0·84	0·54	1
2	1·70	1·06	1·69	1·07	1·69	1·07	1·68	1·08	2
3	2·54	1·59	2·54	1·60	2·53	1·61	2·52	1·62	3
4	3·39	2·12	3·38	2·13	3·37	2·15	3·36	2·16	4
5	4·24	2·65	4·23	2·67	4·22	2·69	4·21	2·70	5
6	5·09	3·18	5·07	3·20	5·06	3·22	5·05	3·25	6
7	5·94	3·71	5·92	3·74	5·90	3·76	5·89	3·79	7
8	6·78	4·24	6·77	4·27	6·75	4·30	6·73	4·33	8
9	7·63	4·77	7·61	4·80	7·59	4·84	7·57	4·87	9
10	8·48	5·30	8·46	5·34	8·43	5·37	8·41	5·41	10
11	9·33	5·83	9·30	5·87	9·28	5·91	9·25	5·95	11
12	10·18	6·36	10·15	6·40	10·12	6·45	10·09	6·49	12
13	11·02	6·89	10·99	6·94	10·96	6·98	10·93	7·03	13
14	11·87	7·42	11·84	7·47	11·81	7·52	11·77	7·57	14
15	12·72	7·95	12·69	8·00	12·65	8·06	12·62	8·11	15
16	13·57	8·48	15·53	8·54	13·49	8·60	13·46	8·66	16
17	14·42	9·01	14·38	9·07	14·34	9·13	14·30	9·20	17
18	15·26	9·54	15·22	9·61	15·18	9·67	15·14	9·74	18
19	16·11	10·07	16·07	10·14	16·02	10·21	15·98	10·28	19
20	16·96	10·60	16·91	10·67	16·87	10·75	16·82	10·82	20
21	17·81	11·13	17·76	11·21	17·71	11·28	17·66	11·36	21
22	18·66	11·66	18·61	11·74	18·55	11·82	18·50	11·90	22
23	19·51	12·19	19·45	12·27	19·40	12·36	19·34	12·44	23
24	20·35	12·72	20·30	12·81	20·24	12·90	20·18	12·98	24
25	21·20	13·25	21·14	13·34	21·08	13·43	21·03	13·52	25
26	22·05	13·78	21·99	13·87	21·93	13·97	21·87	14·07	26
27	22·90	14·31	22·83	14·41	22·77	14·51	22·71	14·61	27
28	23·75	14·84	23·68	14·94	23·61	15·04	23·55	15·15	28
29	24·59	15·37	24·53	15·47	24·46	15·58	24·39	15·69	29
30	25·44	15·90	25·37	16·01	25·30	16·12	25·23	16·23	30
31	26·29	16·43	26·22	16·54	26·15	16·66	26·07	16·77	31
32	27·14	16·96	27·06	17·08	26·99	17·19	26·91	17·31	32
33	27·99	17·49	27·91	17·61	27·83	17·73	27·75	17·85	33
34	28·83	18·02	28·75	18·14	28·68	18·27	28·60	18·39	34
35	29·68	18·55	29·60	18·68	29·52	18·81	29·44	18·93	35
36	30·53	19·08	30·45	19·21	30·36	19·34	30·28	19·48	36
37	31·38	19·61	31·29	19·74	31·21	19·88	31·12	20·02	37
38	32·23	20·14	32·14	20·28	32·05	20·42	31·96	20·56	38
39	33·07	20·67	32·98	20·81	32·89	20·95	32·80	21·10	39
40	33·92	21·20	33·83	21·34	33·74	21·49	33·64	21·64	40
41	34·77	21·73	34·67	21·88	34·58	22·03	34·48	22·18	41
42	35·62	22·26	35·52	22·41	35·42	22·57	35·32	22·72	42
43	36·47	22·79	36·37	22·95	36·27	23·10	36·16	23·26	43
44	37·31	23·32	37·21	23·48	37·11	23·64	37·01	23·80	44
45	38·16	23·85	38·06	24·01	37·95	24·18	37·85	24·34	45
46	39·01	24·38	38·90	24·55	38·80	24·72	38·69	24·88	46
47	39·86	24·91	39·75	25·08	39·64	25·25	39·53	25·43	47
48	40·71	25·44	40·59	25·61	40·48	25·79	40·37	25·97	48
49	41·55	25·97	41·44	26·15	41·33	26·33	41·21	26·51	49
50	42·40	26·50	42·29	26·68	42·17	26·86	42·05	27·05	50
Distance.	Dep.	Lat.	Dep.	Lat.	Dep.	Lat.	Dep.	Lat.	Distance.
	58 Deg.		57¾ Deg.		57½ Deg.		57¼ Deg.		

Distance.	32 Deg.		32¼ Deg.		32½ Deg.		32¾ Deg.		Distance.
	Lat.	Dep.	Lat.	Dep.	Lat.	Dep.	Lat.	Dep.	
51	43.25	27·03	43·13	27·21	43·01	27·40	42·89	27·59	51
52	44.10	27·56	43·98	27·75	43·86	27·94	43·73	28·13	52
53	44·95	28·09	44·82	28·28	44·70	28·48	44·58	28·67	53
54	45·79	28·62	45·67	28·82	45·54	29·01	45·42	29·21	54
55	46·64	29·15	46·51	29·35	46·39	29·55	46·26	29·75	55
56	47·49	29·68	47·36	29·88	47·23	30·09	47·10	30·29	56
57	48·34	30·21	48·21	30·42	48·07	30·63	47·94	30·84	57
58	49·19	30·74	49·05	30·95	48·92	31·16	48·78	31·38	58
59	50·03	31·27	49·90	31·48	49·76	31·70	49·62	31·92	59
60	50·88	31·80	50·74	32·02	50·60	32·24	50·46	32·46	60
61	51·73	32·33	51·59	32·55	51·45	32·78	51·30	33·00	61
62	52·58	32·85	52·44	33·08	52·29	33·31	52·14	33·54	62
63	53·43	33·38	53·28	33·62	53·13	33·85	52·99	34·08	63
64	54·28	33·91	54·13	34·15	53·98	34·39	53·83	34·62	64
65	55·12	34·44	54·97	34·68	54·82	34·92	54·67	35·16	65
66	55·97	34·97	55·82	35·22	55·66	35·46	55 51	35·70	66
67	56·82	35·50	56·66	35·75	56·51	36·00	56·35	36·25	67
68	57·67	36·03	57·51	36·29	57·35	36·54	57·19	36·79	68
69	58·52	36·56	58·36	36·82	58·19	37·07	58·03	37·33	69
70	59·36	37·09	59·20	37·35	59·04	37·61	58·87	37·87	70
71	60·21	37·62	60·05	37·89	59·88	38·15	59·71	38·41	71
72	61·06	38·15	60·89	38·42	60·72	38·69	60·55	38·95	72
73	61·91	38·68	61·74	38·95	61·57	39·22	61·40	39·49	73
74	62·76	39·21	62·58	39·49	62·41	39·76	62·24	40·03	74
75	63·60	39·74	63·43	40·02	63·25	40·30	63·08	40·57	75
76	64·45	40·27	64·28	40·55	64·10	40·83	63·92	41·11	76
77	65·30	40·80	65·12	41·09	64·94	41·37	64·76	41·65	77
78	66·15	41·33	65·97	41·62	65·78	41·91	65·60	42·20	78
79	67·00	41·86	66·81	42·16	66·63	42·45	66·44	42·74	79
80	67·84	42·39	67·66	42·69	67·47	42·98	67·28	43·28	80
81	68·69	42·92	68·50	43·22	68·31	43·52	68·12	43·82	81
82	69·54	43·45	69·35	43·76	69·16	44·06	68·97	44·36	82
83	70·39	43·98	70·20	44·29	70·00	44·60	69·81	44·90	83
84	71·24	44·51	71·04	44·82	70·84	45 13	70·65	45·44	84
85	72·08	45·04	71·89	45·36	71·69	45·67	71·49	45·98	85
86	72·93	45·57	72·73	45·89	72·53	46·21	72·33	46·52	86
87	73·78	46·10	73·58	46·42	73·38	46·75	73·17	47·06	87
88	74·63	46·63	74·42	46·96	74·22	47·28	74·01	47·61	88
89	75·48	47·16	75·27	47·49	75·06	47·82	74·85	48·15	89
90	76·32	47·69	76·12	48·03	75·91	48·36	75·69	48·69	90
91	77·17	48·22	76·96	48·56	76·75	48·89	76·53	49·23	91
92	78·02	48·75	77·81	49·09	77·59	49·43	77·38	49·77	92
93	78·87	49·28	78·65	49.63	78·44	49·97	78·22	50·31	93
94	79·72	49·81	79·50	50.16	79·28	50·51	79·06	50·85	94
95	80·56	50·34	80·34	50.69	80·12	51·04	79·90	51·39	95
96	81·41	50·87	81·19	51.23	80·97	51·58	80·74	51·93	96
97	82·26	51·40	82·04	51.76	81·81	52·12	81·58	52·47	97
98	83.11	51.93	82·88	52·29	82·65	52·66	82·42	53·02	98
99	83·96	52.46	83·73	52·83	83·50	53·19	83·26	53·56	99
100	84·80	52.99	84·57	53·36	84·34	53·73	84·10	54·10	100
Distance.	Dep.	Lat.	Dep.	Lat.	Dep.	Lat.	Dep.	Lat.	Distance.
	58 Deg.		57¾ Deg.		57½ Deg.		57¼ Deg.		

Distance.	33 Deg.		33¼ Deg.		33½ Deg.		33¾ Deg.		Distance.
	Lat.	Dep.	Lat.	Dep.	Lat.	Dep.	Lat.	Dep.	
1	0·84	0·54	0·84	0·55	0·83	0·55	0·83	0·56	1
2	1·68	1·09	1·67	1·10	1·67	1·10	1·66	1·11	2
3	2·52	1·63	2·51	1·64	2·50	1·66	2·49	1·67	3
4	3·35	2·18	3·35	2·19	3·34	2·21	3·33	2·22	4
5	4·19	2·72	4·18	2·74	4·17	2·76	4·16	2·78	5
6	5·03	3·27	5·02	3·29	5·00	3·31	4·99	3·33	6
7	5·87	3·81	5·85	3·84	5·84	3·86	5·82	3·89	7
8	6·71	4·36	6·69	4·39	6·67	4·42	6·65	4·44	8
9	7·55	4·90	7·53	4·93	7·50	4·97	7·48	5·00	9
10	8·39	5·45	8·36	5·48	8·34	5·52	8·31	5·56	10
11	9·23	5·99	9·20	6·03	9·17	6·07	9·15	6·11	11
12	10·06	6·54	10·04	6·58	10·01	6·62	9·98	6·67	12
13	10·90	7·08	10·87	7·13	10·84	7·18	10·81	7·22	13
14	11·74	7·62	11·71	7·68	11·67	7·73	11·64	7·78	14
15	12·58	8·17	12·54	8·22	12·51	8·28	12·47	8·33	15
16	13·42	8·71	13·38	8·77	13·34	8·83	13·30	8·89	16
17	14·26	9·26	14·22	9·32	14·18	9·38	14·13	9·44	17
18	15·10	9·80	15·05	9·87	15·01	9·93	14·97	10·00	18
19	15·93	10·35	15·89	10·42	15·84	10·49	15·80	10·56	19
20	16·77	10·89	16·73	10·97	16·68	11·04	16·63	11·11	20
21	17·61	11·44	17·56	11·51	17·51	11·59	17·46	11·67	21
22	18·45	11·98	18·40	12·06	18·35	12·14	18·29	12·22	22
23	19·29	12·53	19·23	12·61	19·18	12·69	19·12	12·78	23
24	20·13	13·07	20·07	13·16	20·01	13·25	19·96	13·33	24
25	20·97	13·62	20·91	13·71	20·85	13·80	20·79	13·89	25
26	21·81	14·16	21·74	14·26	21·68	14·35	21·62	14·44	26
27	22·64	14·71	22·58	14·80	22·51	14·90	22·45	15·00	27
28	23·48	15·25	23·42	15·35	23·35	15·45	23·28	15·56	28
29	24·32	15·79	24·25	15·90	24·18	16·01	24·11	16·11	29
30	25·16	16·34	25·09	16·45	25·02	16·56	24·94	16·67	30
31	26·00	16·88	25·92	17·00	25·85	17·11	25·78	17·22	31
32	26·84	17·43	26·76	17·55	26·68	17·66	26·61	17·78	32
33	27·68	17·97	27·60	18·09	27·52	18·21	27·44	18·33	33
34	28·51	18·52	28·43	18·64	28·35	18·77	28·27	18·89	34
35	29·35	19·06	29·27	19·19	29·19	19·32	29·10	19·44	35
36	30·19	19·61	30·11	19·74	30·02	19·87	29·93	20·00	36
37	31·03	20·15	30·94	20·29	30·85	20·42	30·76	20·56	37
38	31·87	20·70	31·78	20·84	31·69	20·97	31·60	21·11	38
39	32·71	21·24	32·62	21·38	32·52	21·53	32·43	21·67	39
40	33·55	21·79	33·45	21·93	33·36	22·08	33·26	22·22	40
41	34·39	22·33	34·29	22·48	34·19	22·63	34·09	22·78	41
42	35·22	22·87	35·12	23·03	35·02	23·18	34·92	23·33	42
43	36·06	23·42	35·96	23·58	35·86	23·73	35·75	23·89	43
44	36·90	23·96	36·80	24·12	36·69	24·29	36·58	24·45	44
45	37·74	24·51	37·63	24·67	37·52	24·84	37·42	25·00	45
46	38·58	25·05	38·47	25·22	38·36	25·39	38·25	25·56	46
47	39·42	25·60	39·31	25·77	39·19	25·94	39·08	26·11	47
48	40·26	26·14	40·14	26·32	40·03	26·49	39·91	26·67	48
49	41·09	26·69	40·98	26·87	40·86	27·04	40·74	27·22	49
50	41·93	27·23	41·81	27·41	41·69	27·60	41·57	27·78	50
Distance.	Dep.	Lat.	Dep.	Lat.	Dep.	Lat.	Dep.	Lat.	Distance.
	57 Deg.		56¾ Deg.		56½ Deg.		56¼ Deg.		

Distance.	33 Deg.		33¼ Deg.		33½ Deg.		33¾ Deg.		Distance.
	Lat.	Dep.	Lat.	Dep.	Lat.	Dep.	Lat.	Dep.	
51	42·77	27·78	42·65	27·96	42·53	28·15	42·40	28·33	51
52	43·61	28·32	43·49	28·51	43·36	28·70	43·24	28·89	52
53	44·45	28·87	44·32	29·06	44·20	29·25	44·07	29·45	53
54	45·29	29·41	45·16	29·61	45·03	29·80	44·90	30·00	54
55	46·13	29·96	46·00	30·16	45·86	30·36	45·73	30·56	55
56	46·97	30·50	46·83	30·70	46·70	30·91	46·56	31·11	56
57	47·80	31·04	47·67	31·25	47·53	31·46	47·39	31·67	57
58	48·64	31·59	48·50	31·80	48·37	32·01	48·23	32·22	58
59	49·48	32.13	49·34	32·35	49·20	32·56	49·06	32·78	59
60	50·32	32·68	50·18	32·90	50·03	33·12	49·89	33·33	60
61	51·16	33·22	51·01	33·45	50·87	33·67	50·72	33·89	61
62	52·00	33·77	51·85	33·99	51·70	34·22	51·55	34·45	62
63	52·84	34·31	52·69	34·54	52·53	34·77	52·38	35·00	63
64	53·67	34·86	53·52	35·09	53·37	35·32	53·21	35·56	64
65	54·51	35·40	54·36	35·64	54·20	35·88	54·05	36·11	65
66	55·35	35·95	55·19	36·19	55·04	36·43	54·88	36·67	66
67	56·19	36·49	56·03	36·74	55·87	36·98	55·71	37·22	67
68	57·03	37·04	56·87	37·28	56·70	37·53	56·54	37·78	68
69	57·87	37·58	57·70	37·83	57·54	38·08	57·37	38·33	69
70	58·71	38·12	58·54	38·38	58·37	38·64	58·20	38·89	70
71	59·55	38·67	59·38	38·93	59·21	39·19	59·03	39·45	71
72	60·38	39·21	60·21	39·48	60·04	39·74	59·87	40·00	72
73	61·22	39·76	61·05	40·03	60·87	40·29	60·70	40·56	73
74	62·06	40·30	61·89	40·57	61·71	40·84	61·53	41·11	74
75	62·90	40·85	62·72	41·12	62·54	41·40	62·36	41·67	75
76	63·74	41·39	63·56	41·67	63·38	41·95	63·19	42·22	76
77	64·58	41·94	64·39	42·22	64·21	42·50	64·02	42·78	77
78	65·42	42·48	65·23	42·77	65·04	43·05	64·85	43·33	78
79	66·25	43·03	66·07	43·32	65·88	43·60	65·69	43·89	79
80	67·09	43·57	66·90	43·86	66·71	44·15	66·52	44·45	80
81	67·93	44·12	67·74	44·41	67·54	44·71	67·35	45·00	81
82	68·77	44·66	68·58	44·96	68·38	45·26	68·18	45·56	82
83	69·61	45·20	69·41	45·51	69·21	45·81	69·01	46·11	83
84	70·45	45·75	70·25	46·06	70·05	46·36	69·84	46·67	84
85	71·29	46·29	71·08	46·60	70·88	46·91	70·67	47·22	85
86	72·13	46·84	71·92	47·15	71·71	47·47	71·51	47·78	86
87	72·96	47·38	72·76	47·70	72·55	48·02	72·34	48·33	87
88	73·80	47·93	73·59	48·25	73·38	48·57	73·17	48·89	88
89	74·64	48·47	74·43	48·80	74·22	49·12	74·00	49·45	89
90	75·48	49·02	75·27	49·35	75·05	49·67	74·83	50·00	90
91	76·32	49·56	76·10	49·89	75·88	50·23	75·66	50·56	91
92	77·16	50·11	76·94	50·44	76·72	50·78	76·50	51·11	92
93	78·00	50·65	77·77	50·99	77·55	51·33	77·33	51·67	93
94	78 83	51·20	78·61	51·54	78·39	51·88	78·16	52·22	94
95	79·67	51·74	79·45	52·09	79·22	52·43	78·99	52·78	95
96	80·51	52·29	80·28	52·64	80·05	52·99	79·82	53·33	96
97	81·35	52·83	81·12	53·18	80·89	53·54	80·65	53·89	97
98	82·19	53·37	81·96	53·73	81·72	54·09	81·48	54·45	98
99	83·03	53·92	82·79	54·28	82·55	54·64	82·32	55·00	99
100	83·87	54·46	83·63	54·83	83·39	55·19	83·15	55·56	100
Distance.	Dep.	Lat.	Dep.	Lat.	Dep.	Lat.	Dep.	Lat.	Distance.
	57 Deg.		56¾ Deg.		56½ Deg.		56¼ Deg.		

Distance.	34 Deg.		34¼ Deg.		34½ Deg.		34¾ Deg.		Distance.
	Lat.	Dep.	Lat.	Dep.	Lat.	Dep.	Lat.	Dep.	
1	0·83	0·56	0·83	0·56	0·82	0·57	0·82	0·57	1
2	1·66	1·12	1·65	1·13	1·65	1·13	1·64	1·14	2
3	2·49	1·68	2·48	1·69	2·47	1·70	2·46	1·71	3
4	3·32	2·24	3·31	2·25	3·30	2·27	3·29	2·28	4
5	4·15	2·80	4·13	2·81	4·12	2·83	4·11	2·85	5
6	4·97	3·36	4·96	3·38	4·94	3·40	4.93	3·42	6
7	5·80	3·91	5·79	3·94	5·77	3·96	5·75	3·99	7
8	6·63	4·47	6·61	4·50	6·59	4·53	6·57	4·56	8
9	7·46	5·03	7·44	5·07	7·42	5·10	7·39	5·13	9
10	8·29	5·59	8·27	5·63	8·24	5·66	8·22	5·70	10
11	9·12	6·15	9·09	6·19	9·07	6·23	9·04	6·27	11
12	9·95	6·71	9·92	6·75	9·89	6·80	9·86	6·84	12
13	10·78	7·27	10·75	7·32	10·71	7·36	10·68	7·41	13
14	11·61	7·83	11·57	7·88	11·54	7·93	11·50	7·98	14
15	12·44	8·39	12·40	8·44	12·36	8·50	12·32	8·55	15
16	13·26	8·95	13·23	9·00	13·19	9·06	13·15	9·12	16
17	14·09	9·51	14.05	9·57	14·01	9·63	13·97	9·69	17
18	14·92	10·07	14·88	10·13	14·83	10·20	14·79	10·26	18
19	15·75	10·62	15·71	10·69	15·66	10·76	15·61	10·83	19
20	16·58	11·18	16·53	11·26	16·48	11·33	16·43	11·40	20
21	17·41	11·74	17·36	11·82	17·31	11·89	17·25	11·97	21
22	18·24	12·30	18·18	12·38	18·13	12·46	18·08	12·54	22
23	19·07	12·86	19·01	12·94	18·95	13·03	18·90	13·11	23
24	19·90	13·42	19·84	13·51	19·78	13·59	19·72	13·68	24
25	20·73	13·98	20·66	14·07	20·60	14·16	20·54	14·25	25
26	21·55	14·54	21·49	14·63	21·43	14·73	21·36	14·82	26
27	22·38	15·10	22·32	15·20	22·25	15·29	22·18	15·39	27
28	23·21	15·66	23·14	15·76	23·08	15·86	23·01	15·96	28
29	24·04	16·22	23·97	16·32	23·90	16·43	23·83	16·53	29
30	24·87	16·78	24·80	16·88	24·72	16·99	24·65	17·10	30
31	25·70	17·33	25·62	17·45	25·55	17·56	25·47	17·67	31
32	26·53	17.89	26·45	18·01	26·37	18·12	26·29	18·24	32
33	27·36	18·45	27·28	18·57	27·20	18·69	27·11	18·81	33
34	28·19	19·01	28·10	19·14	28·02	19·26	27·94	19·38	34
35	29·02	19·57	28·93	19·70	28·84	19·82	28·76	19·95	35
36	29·85	20·13	29·76	20·26	29·67	20·39	29·58	20·52	36
37	30·67	20·69	30·58	20·82	30·49	20·96	30·40	21·09	37
38	31·50	21·25	31·41	21·39	31·32	21·52	31·22	21·66	38
39	32·33	21·81	32·24	21·95	32·14	22·09	32·04	22·23	39
40	33·16	22·37	33·06	22·51	32·97	22·66	32·87	22·80	40
41	33·99	22·93	33·89	23·07	33·79	23·22	33·69	23·37	41
42	34·82	23·49	34·72	23·64	34·61	23·79	34·51	23·94	42
43	35·65	24·05	35·54	24·20	35·44	24·36	35·33	24·51	43
44	36·48	24·60	36·37	24·76	36·26	24·92	36·15	25·08	44
45	37·31	25·16	37·20	25·33	37·09	25·49	36·97	25·65	45
46	38·14	25·72	38·02	25·89	37·91	26·05	37·80	26·22	46
47	38·96	26·28	38·85	26·45	38·73	26·62	38·62	26·79	47
48	39·79	26·84	39·68	27·01	39·56	27·19	39·44	27·36	48
49	40·62	27·40	40·50	27·58	40·38	27·75	40·26	27·93	49
50	41·45	27·96	41·33	28·14	41·21	28·32	41·08	28·50	50
Distance.	Dep.	Lat.	Dep.	Lat.	Dep.	Lat.	Dep.	Lat.	Distance.
	56 Deg.		55¾ Deg.		55½ Deg.		55¼ Deg.		

Distance.	34 Deg.		34¼ Deg.		34½ Deg.		34¾ Deg.		Distance.
	Lat.	Dep.	Lat.	Dep.	Lat.	Dep.	Lat.	Dep.	
51	42·28	28·52	42·16	28·70	42·03	28·89	41·90	29·07	51
52	43·11	29·08	42·98	29·27	42·85	29·45	42·73	29·64	52
53	43·94	29·64	43·81	29·83	43·68	30·02	43·55	30·21	53
54	44·77	30·20	44·64	30·39	44·50	30·59	44·37	30·78	54
55	45·60	30·76	45·46	30·95	45·33	31·15	45·19	31·35	55
56	46·43	31·31	46·29	31·52	46·15	31·72	46 01	31·92	56
57	47·26	31·87	47·12	32·08	46·98	32·29	46·83	32·49	57
58	48·08	32·43	47·94	32·64	47·80	32·85	47·66	33·06	58
59	48·91	32·99	48·77	33·21	48·62	33·42	48·48	33·63	59
60	49·74	33·55	49·60	33·77	49·45	33·98	49·30	34·20	60
61	50·57	34·11	50·42	34·33	50·27	34·55	50·12	34·77	61
62	51·40	34·67	51·25	34·89	51·10	35·12	50·94	35·34	62
63	52·23	35·23	52·08	35·46	51·92	35·68	51·76	35·91	63
64	53·06	35·79	52·90	36·02	52·74	36·25	52·59	36·48	64
65	53·89	36·35	53·73	36·58	53·57	36·82	53·41	37·05	65
66	54·72	36·91	54·55	37·15	54·39	37·38	54·23	37·62	66
67	55·55	37·46	55·38	37·71	55·22	37·95	55·05	38·19	67
68	56·37	38·03	56·21	38·27	56·04	38·52	55·87	38·76	68
69	57·20	38·58	57·03	38·83	56·86	39·08	56·69	39·33	69
70	58·03	39·14	57·86	39·40	57·69	39·65	57·52	39·90	70
71	58.86	39·70	58·69	39·96	58·51	40·21	58·34	40·47	71
72	59·69	40·26	59·51	40·52	59·34	40·78	59·16	41·04	72
73	60·52	40·82	60·34	41·08	60·16	41·35	59·98	41·61	73
74	61·35	41·38	61·17	41·65	60·99	41·91	60·80	42·18	74
75	62·18	41·94	61·99	42·21	61·81	42·48	61·62	42·75	75
76	63·01	42·50	62·82	42·77	62·63	43·05	62·45	43·32	76
77	63·84	43·06	63·65	43·34	63·46	43·61	63·27	43·89	77
78	64·66	43·62	64·47	43·90	64·28	44·18	64·09	44·46	78
79	65·49	44·18	65·30	44·46	65·11	44·75	64·91	45·03	79
80	66·32	44·74	66·13	45·02	65·93	45·31	65·73	45·60	80
81	67·15	45·29	66·95	45·59	66·75	45·88	66·55	46·17	81
82	67·98	45·85	67·78	46·15	67·58	46·45	67·37	46·74	82
83	68·81	46·41	68·61	46·71	68·40	47·01	68·20	47·31	83
84	69·64	46·97	69·43	47·28	69·23	47·58	69·02	47·88	84
85	70·47	47·53	70·26	47·84	70·05	48·14	69·84	48·45	85
86	71·30	48·09	71·09	48·40	70·87	48·71	70·66	49·02	86
87	72·13	48·65	71·91	48·96	71·70	49·28	71·48	49·59	87
88	72·96	49·21	72·74	49·53	72·52	49·84	72·30	50·16	88
89	73·78	49·77	73·57	50·09	73·35	50·41	73·13	50·73	89
90	74·61	50·33	74·39	50·65	74·17	50·98	73·95	51·30	90
91	75·44	50·89	75·22	51·22	75·00	51·54	74·77	51·87	91
92	76·27	51·45	76·05	51·78	75·82	52·11	75·59	52·44	92
93	77·10	52·00	76·87	52·34	76·64	52·68	76·41	53·01	93
94	77·93	52·56	77·70	52·90	77·47	53·24	77·23	53·58	94
95	78·76	53·12	78·53	53·47	78·29	53·81	78·06	54·15	95
96	79·59	53·68	79·35	54·03	79·12	54·37	78·88	54·72	96
97	80·42	54·24	80·18	54·59	79·94	54·94	79·70	55·29	97
98	81·25	54·80	81·01	55·15	80·76	55·51	80·52	55·86	98
99	82·07	55·36	81·83	55·72	81·59	56·07	81·34	56·43	99
100	82·90	55·92	82·66	56·28	82·41	56·64	82·16	57·00	100
Distance.	Dep.	Lat.	Dep.	Lat.	Dep.	Lat.	Dep.	Lat.	Distance.
	56 Deg.		55¾ Deg.		55½ Deg.		55¼ Deg.		

Distance.	35 Deg.		35¼ Deg.		35½ Deg.		35¾ Deg.		Distance.
	Lat.	Dep.	Lat.	Dep.	Lat.	Dep.	Lat.	Dep.	
1	0·82	0·57	0·82	0·58	0·81	0·58	0·81	0·58	1
2	1·64	1·15	1·63	1·15	1·63	1·16	1·62	1·17	2
3	2·46	1·72	2·45	1·73	2·44	1·74	2·43	1·75	3
4	3·28	2·29	3·27	2·31	3·26	2·32	3·25	2·34	4
5	4·10	2·87	4·08	2·89	4·07	2·90	4·06	2·92	5
6	4·91	3·44	4·90	3·46	4·88	3·48	4·87	3·51	6
7	5·73	4·01	5·72	4·04	5·70	4·06	5·68	4·09	7
8	6·55	4·59	6·53	4·62	6·51	4·65	6·49	4·67	8
9	7·37	5·16	7·35	5·19	7·33	5·23	7·30	5·26	9
10	8·19	5·74	8·17	5·77	8·14	5·81	8·12	5·84	10
11	9·01	6·31	8·98	6·35	8·96	6·39	8·93	6·43	11
12	9·83	6·88	9·80	6·93	9·77	6·97	9·74	7·01	12
13	10·65	7·46	10·62	7·50	10·58	7·55	10·55	7·60	13
14	11·47	8·03	11·43	8·08	11·40	8·13	11·36	8·18	14
15	12·29	8·60	12·25	8·66	12·21	8·71	12·17	8·76	15
16	13·11	9·18	13·07	9·23	13·03	9·29	12·99	9·35	16
17	13·93	9·75	13·88	9·81	13·84	9·87	13·80	9·93	17
18	14·74	10·32	14·70	10·39	14·65	10·45	14·61	10·52	18
19	15·56	10·90	15·52	10·97	15·47	11·03	15·42	11·10	19
20	16·38	11·47	16·33	11·54	16·28	11·61	16·23	11·68	20
21	17·20	12·05	17·15	12·12	17·10	12·19	17·04	12·27	21
22	18·02	12·62	17·97	12·70	17·01	12·78	17·85	12·85	22
23	18·84	13·19	18·78	13·27	18·72	13·36	18·67	13·44	23
24	19·66	13·77	19·60	13·85	19·54	13·94	19·48	14·02	24
25	20·48	14·34	20·42	14·43	20·35	14·52	20·29	14·61	25
26	21·30	14·91	21·23	15·01	21·17	15·10	21·10	15·19	26
27	22·12	15·49	22·05	15·58	21·98	15·68	21·91	15·77	27
28	22·94	16·06	22·87	16·16	22·80	16·26	22·72	16·36	28
29	23·76	16·63	23·68	16·74	23·61	16·84	23·54	16·94	29
30	24·57	17·21	24·50	17·31	24·42	17·42	24·35	17·53	30
31	25·39	17·78	25·32	17·89	25·24	18·00	25·16	18·11	31
32	26·21	18·35	26·13	18·47	26·05	18·58	25·97	18·70	32
33	27·03	18·93	26·95	19·05	26·87	19·16	26·78	19·28	33
34	27·85	19·50	27·77	19.62	27·68	19·74	27·59	19·86	34
35	28·67	20·08	28·58	20·20	28·49	20·32	28·41	20·45	35
36	29·49	20·65	29·40	20·78	29·31	20·91	29·22	21·03	36
37	30·31	21·22	30·22	21·35	30·12	21·49	30·03	21·62	37
38	31·13	21·80	31·03	21·93	30·94	22·07	30·84	22·20	38
39	31·95	22·37	31·85	22·51	31·75	22·65	31·65	22·79	39
40	32·77	22·94	32·67	23·09	32·56	23·23	32·46	23·37	40
41	33·59	23·52	33·48	23·66	33·38	23·81	33·27	23·95	41
42	34·40	24·09	34·30	24·24	34·19	24·39	34·09	24·54	42
43	35·22	24·66	35·12	24·82	35·01	24·97	34·90	25·12	43
44	36·04	25·24	35·93	25·39	35·82	25·55	35·71	25.71	44
45	36·86	25·81	36·75	25·97	36·64	26·13	36·52	26·29	45
46	37·68	26·38	37·57	26·55	37·45	26·71	37·33	26·88	46
47	38·50	26·96	38·38	27·13	38·26	27·29	38·14	27·46	47
48	39·32	27·53	39·20	27·70	39·08	27·87	38·96	28·04	48
49	40·14	28·11	40·02	28·28	39·89	28·45	39·77	28·63	49
50	40·96	28·68	40·83	28·86	40·71	29·04	40·58	29·21	50
Distance.	Dep.	Lat.	Dep.	Lat.	Dep.	Lat.	Dep.	Lat.	Distance.
	55 Deg.		54¾ Deg.		54½ Deg.		54¼ Deg.		

Distance.	35 Deg.		35¼ Deg.		35½ Deg.		35¾ Deg.		Distance.
	Lat.	Dep.	Lat.	Dep.	Lat.	Dep.	Lat.	Dep.	
51	41·78	29·25	41·65	29·43	41·52	29·62	41·39	29·80	51
52	42·60	29·83	42·47	30·01	42·33	30·20	42·20	30·38	52
53	43·42	30·40	43·28	30·59	43·15	30·78	43·01	30·97	53
54	44·23	30·97	44·10	31·17	43·96	31·36	43·82	31·55	54
55	45·05	31·55	44·92	31·74	44·78	31·94	44·64	32·13	55
56	45·87	32·12	45·73	32·32	45·59	32·52	45·45	32·72	56
57	46·69	32·69	46·55	32·90	46·40	33·10	46·26	33·30	57
58	47·51	33·27	47·37	33·47	47·22	33·68	47·07	33·89	58
59	48·33	33·84	48·18	34·05	48·03	34·26	47·88	34·47	59
60	49·15	34·41	49·00	34·63	48·85	34·84	48·69	35·05	60
61	49·97	34·99	49·82	35·21	49·66	35·42	49·51	35·64	61
62	50·79	35·56	50·63	35·78	50·48	36·00	50·32	36·22	62
63	51·61	36·14	51·45	36·36	51·29	36·58	51·13	36·81	63
64	52·43	36·71	52·27	36·94	52·10	37·16	51·94	37·39	64
65	53·24	37·28	53·08	37·51	52·92	37·75	52·75	37·98	65
66	54·06	37·86	53·90	38·09	53·73	38·33	53·56	38·56	66
67	54·88	38·43	54·71	38·67	54·55	38·91	54·38	39·14	67
68	55·70	39·00	55·53	39·25	55·36	39·49	55·19	39·73	68
69	56·52	39·58	56·35	39·82	56·17	40·07	56·00	40·31	69
70	57·34	40·15	57·16	40·40	56·99	40·65	56·81	40·90	70
71	58·16	40·72	57·98	40·98	57·80	41·23	57·62	41·48	71
72	58·98	41·30	58·80	41·55	58·62	41·81	58·43	42·07	72
73	59·80	41·87	59·61	42·13	59·43	42·39	59·24	42·65	73
74	60·62	42·44	60·43	42·71	60·24	42·97	60·06	43·23	74
75	61·44	43·02	61·25	43·29	61·06	43·55	60·87	43·82	75
76	62·26	43·59	62·06	43·86	61·87	44·13	61·68	44·40	76
77	63·07	44·17	62·88	44·44	62·69	44·71	62·49	44·99	77
78	63·89	44·74	63·70	45·02	63·50	45·29	63·30	45·57	78
79	64·71	45·31	64·51	45·59	64·32	45·88	64·11	46·16	79
80	65·53	45·89	65·33	46·17	65·13	46·46	64·93	46·74	80
81	66·35	46·46	66·15	46·75	65·94	47·04	65·74	47·32	81
82	67·17	47·03	66·96	47·33	66·76	47·62	66·55	47·91	82
83	67·99	47·61	67·78	47·90	67·57	48·20	67·36	48·49	83
84	68·81	48·18	68·60	48·48	68·39	48·78	68·17	49·08	84
85	69·63	48·75	69·41	49·06	69·20	49·36	68·98	49·66	85
86	70·45	49·33	70·23	49·63	70·01	49·94	69·80	50·25	86
87	71·27	49·90	71·05	50·21	70·83	50·52	70·61	50·83	87
88	72·09	50·47	71·86	50·79	71·64	51·10	71·42	51·41	88
89	72·90	51·05	72·68	51·37	72·46	51·68	72·23	52·00	89
90	73·72	51·62	73·50	51·94	73·27	52·26	73·04	52·58	90
91	74·54	52·20	74·31	52·52	74·08	52·84	73·85	53·17	91
92	75·36	52·77	75·13	53·10	74·90	53.42	74·66	53·75	92
93	76·18	53·34	75·95	53·67	75·71	54·01	75·48	54·34	93
94	77·00	53·92	76·76	54·25	76·53	54·59	76·29	54·92	94
95	77·82	54·49	77·58	54·83	77·34	55·17	77·10	55·50	95
96	78·64	55·06	78·40	55·41	78·16	55·75	77·91	56·09	96
97	79·46	55·64	79·21	55·98	78·97	56·33	78·72	56·67	97
98	80·28	56·21	80·03	56·56	79·78	56·91	79·53	57·26	98
99	81·10	56·78	80·85	57·14	80·60	57·49	80·35	57·84	99
100	81·92	57·36	81·66	57·71	81·41	58·07	81·16	58·42	100
Distance.	Dep.	Lat.	Dep.	Lat.	Dep.	Lat.	Dep.	Lat.	Distance.
	55 Deg.		54¼ Deg.		54½ Deg.		54¼ Deg.		

Distance.	36 Deg.		36¼ Deg.		36½ Deg.		36¾ Deg.		Distance.
	Lat.	Dep.	Lat.	Dep.	Lat.	Dep.	Lat.	Dep.	
1	0·81	0·59	0·81	0·59	0·80	0·59	0·80	0·60	1
2	1·62	1·18	1·61	1·18	1·61	1·19	1·60	1·20	2
3	2·43	1·76	2·42	1·77	2·41	1·78	2·40	1·79	3
4	3·24	2·35	3·23	2·37	3·22	2·38	3·20	2·39	4
5	4·05	2·94	4·03	2·96	4·02	2·97	4·01	2·99	5
6	4·85	3·53	4·84	3·55	4·82	3·57	4·81	3·59	6
7	5·66	4·11	5·65	4·14	5·63	4·16	5·61	4·19	7
8	6·47	4·70	6·45	4·73	6·43	4·76	6·41	4·79	8
9	7·28	5·29	7·26	5·32	7·23	5·35	7·21	5·38	9
10	8·09	5·88	8·06	5·91	8·04	5·95	8·01	5·98	10
11	8·90	6·47	8·87	6·50	8·84	6·54	8·81	6·58	11
12	9·71	7·05	9·68	7·10	9·65	7·14	9·61	7·18	12
13	10·52	7·64	10·48	7·69	10·45	7·73	10·42	7·78	13
14	11·33	8·23	11·29	8·28	11·25	8·33	11·22	8·38	14
15	12·14	8·82	12·10	8·87	12·06	8·92	12·02	8·97	15
16	12·94	9·40	12·90	9·46	12·86	9·52	12·82	9·57	16
17	13·75	9·99	13·71	10·05	13·67	10·11	13·62	10·17	17
18	14·56	10·58	14·52	10·64	14·47	10·71	14·42	10·77	18
19	15·37	11·17	15·32	11·23	15·27	11·30	15·22	11·37	19
20	16·18	11·76	16·13	11·83	16·08	11·90	16·03	11·97	20
21	16·99	12·34	16·94	12·42	16·88	12·49	16·83	12·56	21
22	17·80	12·93	17·74	13·01	17·68	13·09	17·63	13·16	22
23	18·61	13·52	18·55	13·60	18·49	13·68	18·43	13·76	23
24	19·42	14·11	19·35	14·19	19·29	14·28	19·23	14·36	24
25	20·23	14·69	20·16	14·78	20·10	14·87	20·03	14·96	25
26	21·03	15·28	20·97	15·37	20·90	15·47	20·83	15·56	26
27	21·84	15·87	21·77	15·97	21·70	16·06	21·63	16·15	27
28	22·65	16·46	22·58	16·56	22·51	16·65	22·44	16·75	28
29	23·46	17·05	23·39	17·15	23·31	17·25	23·24	17·35	29
30	24·27	17·63	24·19	17·74	24·12	17·84	24·04	17·95	30
31	25·08	18·22	25·00	18·33	24·92	18·44	24·84	18·55	31
32	25·89	18·81	25·81	18·92	25·72	19·03	25·64	19·15	32
33	26·70	19·40	26·61	19·51	26·53	19·63	26·44	19·74	33
34	27·51	19·98	27·42	20·10	27·33	20·22	27·24	20·34	34
35	28·32	20·57	28·23	20·70	28·13	20·82	28·04	20·94	35
36	29·12	21·16	29·03	21·29	28·94	21·41	28·85	21·54	36
37	29·93	21·75	29·84	21·88	29·74	22·01	29·65	22·14	37
38	30·74	22·34	30·64	22·47	30·55	22·60	30·45	22·74	38
39	31·55	22·92	31·45	23·06	31·35	23·20	31·25	23·33	39
40	32·36	23·51	32·26	23·65	32·15	23.79	32·05	23·93	40
41	33·17	24·10	33·06	24·24	32·96	24·39	32·85	24·53	41
42	33·98	24·69	33·87	24·83	33·76	24·98	33·65	25·13	42
43	34·79	25·27	34·68	25·43	34·57	25·58	34·45	25·73	43
44	35·60	25·86	35·48	26·02	35·37	26·17	35·26	26·33	44
45	36·41	26·45	36·29	26·61	36·17	26·77	36.06	26·92	45
46	37·21	27·04	37·10	27·20	36·98	27·36	36·86	27·52	46
47	38·02	27·63	37·90	27·79	37·78	27·96	37·66	28·12	47
48	38·83	28·21	38·71	28·38	38·59	28·55	38·46	28·72	48
49	39·64	28·80	39·52	28·97	39·39	29·15	39·26	29·32	49
50	40·45	29·39	40·32	29·57	40·19	29·74	40·06	29·92	50
Distance.	Dep.	Lat.	Dep.	Lat.	Dep.	Lat.	Dep.	Lat.	Distance.
	54 Deg.		53¾ Deg.		53½ Deg.		53¼ Deg.		

Distance.	36 Deg.		36¼ Deg.		36½ Deg.		36¾ Deg.		Distance.
	Lat.	Dep.	Lat.	Dep.	Lat.	Dep.	Lat.	Dep.	
51	41.26	29·98	41·13	30·16	41·00	30·34	40·86	30·51	51
52	42.07	30·56	41·94	30·75	41·80	30·93	41·67	31·11	52
53	42·88	31·15	42·74	31·34	42·60	31·53	42·47	31·71	53
54	43·69	31·74	43·55	31·93	43·41	32·12	43·27	32 31	54
55	44·50	32·33	44·35	32·52	44·21	32·72	44·07	32·91	55
56	45·30	32·92	45·16	33·11	45·02	33·31	44·87	33·51	56
57	46·11	33·50	45·97	33·70	45·82	33·90	45·67	34·10	57
58	46·92	34·09	46·77	34·30	46·62	34·50	46·47	34·70	58
59	47·73	34·68	47·58	34·89	47·43	35·09	47·27	35·30	59
60	48·54	35·27	48·39	35·48	48·23	35·69	48·08	35·90	60
61	49·35	35·85	49·19	36·07	49·04	36·28	48·88	36·50	61
62	50·16	36·44	50·00	36·66	49·84	36·88	49·68	37·10	62
63	50·97	37·03	50·81	37·25	50·64	37·47	50·48	37·69	63
64	51·78	37·62	51·61	37·84	51·45	38·07	51·28	38·29	64
65	52·59	38·21	52·42	38·44	52·25	38·66	52·08	38·89	65
66	53·40	38·79	53·23	39·03	53·05	39·26	52·88	39·49	66
67	54·20	39·38	54·03	39·62	53·86	39·85	53·68	40·09	67
68	55·01	39·97	54·84	40·21	54·66	40·45	54·49	40·69	68
69	55·82	40·56	55·64	40·80	55·47	41·04	55·29	41·28	69
70	56·63	41·14	56·45	41·39	56·27	41·64	56·09	41·88	70
71	57·44	41·73	57·26	41·98	57·07	42·23	56·89	42·48	71
72	58·25	42·32	58·06	42·57	57·88	42·83	57·69	43·08	72
73	59·06	42·91	58·87	43·17	58·68	43·42	58·49	43·68	73
74	59·87	43·50	59·68	43·76	59·49	44·02	59·29	44·28	74
75	60·68	44·08	60·48	44·35	60·29	44·61	60·09	44·87	75
76	61·49	44·67	61·29	44·94	61·09	45·21	60·90	45·47	76
77	62·29	45·26	62·10	45·53	61·90	45·80	61·70	46·07	77
78	63·10	45·85	62·90	46·12	62·70	46·40	62·50	46·67	78
79	63·91	46·43	63·71	46·71	63·50	46·99	63·30	47·27	79
80	64·72	47·02	64·52	47·30	64·31	47·59	64·10	47·87	80
81	65·53	47·61	65·32	47·90	65·11	48·18	64·90	48·46	81
82	66·34	48·20	66·13	48·49	65·92	48·78	65·70	49·06	82
83	67·15	48·79	66·93	49·08	66·72	49·37	66·50	49·66	83
84	67·96	49·37	67·74	49·67	67·52	49 97	67·31	50·26	84
85	68·77	49·96	68·55	50·26	68·33	50·56	68·11	50·86	85
86	69·58	50·55	69·35	50·85	69·13	51·15	68·91	51·46	86
87	70·38	51·14	70·16	51·44	69·94	51·75	69·71	52·05	87
88	71·19	51·73	70·97	52·04	70·74	52·34	70·51	52·65	88
89	72·00	52·31	71·77	52·63	71·54	52·94	71·31	53·25	89
90	72·81	52·90	72·58	53·22	72·35	53·53	72·11	53·85	90
91	73·62	53·49	73·39	53·81	73·15	54·13	72·91	54·45	91
92	74·43	54·08	74·19	54·40	73·95	54·72	73·72	55·05	92
93	75·24	54·66	75·00	54.99	74·76	55·32	74·52	55·64	93
94	76·05	55·25	75·81	55.58	75·56	55·91	75·32	56·24	94
95	76·86	55·84	76·61	56.17	76·37	56·51	76·12	56·84	95
96	77·67	56·43	77·42	56.77	77·17	57·10	76·92	57·44	96
97	78·47	57·02	78·23	57.36	77·97	57·70	77·72	58·04	97
98	79.28	57·60	79·03	57·95	78·78	58·29	78·52	58·64	98
99	80·09	58·19	79·84	58·54	79·58	58·89	79·32	59·23	99
100	80·90	58·78	80·64	59·13	80·39	59·48	80·13	59·83	100
Distance.	Dep.	Lat.	Dep.	Lat.	Dep.	Lat.	Dep.	Lat.	Distance.
	54 Deg.		53¾ Deg.		53½ Deg.		53¼ Deg.		

Distance.	37 Deg.		37¼ Deg.		37½ Deg.		37¾ Deg.		Distance.
	Lat.	Dep.	Lat.	Dep.	Lat.	Dep.	Lat.	Dep.	
1	0·80	0·60	0·80	0·61	0·79	0·61	0·79	0·61	1
2	1·60	1·20	1·59	1·21	1·59	1·22	1·58	1·22	2
3	2·40	1·81	2·39	1·82	2·38	1·83	2·37	1·84	3
4	3·19	2·41	3·18	2·42	3·17	2·43	3·16	2·45	4
5	3·99	3·01	3·98	3·03	3·97	3·04	3·95	3·06	5
6	4·79	3·61	4·78	3·63	4·76	3·65	4·74	3·67	6
7	5·59	4·21	5·57	4·24	5·55	4·26	5·53	4·29	7
8	6·39	4·81	6·37	4·84	6·35	4·87	6·33	4·90	8
9	7·19	5·42	7·16	5·45	7·14	5·48	7·12	5·51	9
10	7·99	6·02	7·96	6·05	7·93	6·09	7·91	6·12	10
11	8·78	6·62	8·76	6·66	8·73	6·70	8·70	6·73	11
12	9·58	7·22	9·55	7·26	9·52	7·31	9·49	7·35	12
13	10·38	7·82	10·35	7·87	10·31	7·91	10·28	7·96	13
14	11·18	8·43	11·14	8·47	11·11	8·52	11·07	8·57	14
15	11·98	9·03	11·94	9·08	11·90	9·13	11·86	9·18	15
16	12·78	9·63	12·74	9·68	12·69	9·74	12·65	9·80	16
17	13·58	10·23	13·53	10·29	13·49	10·35	13·44	10·41	17
18	14·38	10·83	14·33	10·90	14·28	10·96	14·23	11·02	18
19	15·17	11·43	15·12	11·50	15·07	11·57	15·02	11·63	19
20	15·97	12·04	15·92	12·11	15·87	12·18	15·81	12·24	20
21	16·77	12·64	16·72	12·71	16·66	12·78	16·60	12·86	21
22	17·57	13·24	17·51	13·32	17·45	13·39	17·40	13·47	22
23	18·37	13·84	18·31	13·92	18·25	14·00	18·19	14·08	23
24	19·17	14·44	19·10	14·53	19·04	14·61	18·98	14·69	24
25	19·97	15·05	19·90	15·13	19·83	15·22	19·77	15·31	25
26	20·76	15·65	20·70	15·74	20·63	15·83	20·56	15·92	26
27	21·56	16·25	21·49	16·34	21·42	16·44	21·35	16·53	27
28	22·36	16·85	22·29	16·95	22·21	17·05	22·14	17·14	28
29	23·16	17·45	23·08	17·55	23·01	17·65	22·93	17·75	29
30	23·96	18·05	23·88	18·16	23·80	18·26	23·72	18·37	30
31	24·76	18·66	24·68	18·76	24·59	18·87	24·51	18·98	31
32	25·56	19·26	25·47	19·37	25·39	19·48	25·30	19·59	32
33	26·35	19·86	26·27	19·97	26·18	20·09	26·09	20·20	33
34	27·15	20·46	27·06	20·58	26·97	20·70	26·88	20·82	34
35	27·95	21·06	27·86	21·19	27·77	21·31	27·67	21·43	35
36	28·75	21·67	28·66	21·79	28·56	21·92	28·46	22·04	36
37	29·55	22·27	29·45	22·40	29·35	22·52	29·26	22·65	37
38	30·35	22·87	30·25	23·00	30·15	23·13	30·05	23·26	38
39	31·15	23·47	31·04	23·61	30·94	23·74	30·84	23·88	39
40	31·95	24·07	31·84	24·21	31·73	24·35	31·63	24·49	40
41	32·74	24·67	32·64	24·82	32·53	24·96	32·42	25·10	41
42	33·54	25·28	33·43	25·42	33·32	25·57	33·21	25·71	42
43	34·34	25·88	34·23	26·03	34·11	26·18	34·00	26·33	43
44	35·14	26·48	35·02	26·63	34·91	26·79	34·79	26·94	44
45	35·94	27·08	35·82	27·24	35·70	27·39	35·58	27·55	45
46	36·74	27·68	36·62	27·84	36·49	28·00	36·37	28·16	46
47	37·54	28·29	37·41	28·45	37·29	28·61	37·16	28·77	47
48	38·33	28·89	38·21	29·05	38·08	29·22	37·95	29·39	48
49	39·13	29·49	39·00	29·66	38·87	29·83	38·74	30·00	49
50	39·93	30·09	39·80	30·26	39·67	30·44	39·53	30·61	50
Distance.	Dep.	Lat.	Dep.	Lat.	Dep.	Lat.	Dep.	Lat.	Distance.
	53 Deg.		52¾ Deg.		52½ Deg.		52¼ Deg.		

Distance.	37 Deg.		37¼ Deg.		37½ Deg.		37¾ Deg.		Distance.
	Lat.	Dep.	Lat.	Dep.	Lat.	Dep.	Lat.	Dep.	
51	40·73	30·69	40·60	30·87	40·46	31·05	40·33	31·22	51
52	41·53	31·29	41·39	31·48	41·25	31·66	41·12	31·84	52
53	42·33	31·90	42·19	32·08	42·05	32·26	41·91	32·45	53
54	43·13	32·50	42·98	32·69	42·84	32·87	42·70	33·06	54
55	43·92	33·10	43·78	33·29	43·63	33·48	43·49	33·67	55
56	44·72	33·70	44·58	33·90	44·43	34·09	44·28	34·28	56
57	45·52	34·30	45·37	34·50	45·22	34·70	45·07	34·90	57
58	46·32	34·91	46·17	35·11	46·01	35·31	45·86	35·51	58
59	47·12	35·51	46·96	35·71	46·81	35·92	46·65	36·12	59
60	47·92	36·11	47·76	36·32	47·60	36·53	47·44	36·73	60
61	48·72	36·71	48·56	36·92	48·39	37·13	48·23	37·35	61
62	49·52	37·31	49·35	37·53	49·19	37·74	49·02	37·96	62
63	50·31	37·91	50·15	38·13	49·98	38·35	49·81	38·57	63
64	51·11	38·52	50·94	38·74	50·77	38·96	50·60	39·18	64
65	51·91	39·12	51·74	39·34	51·57	39·57	51·39	39·79	65
66	52·71	39·72	52·54	39·95	52·36	40·18	52·19	40·41	66
67	53·51	40·32	53·33	40·55	53·15	40·79	52·98	41·02	67
68	54·31	40·92	54·13	41·16	53·95	41·40	53·77	41·63	68
69	55·11	41·53	54·92	41·77	54·74	42·00	54·56	42·24	69
70	55·90	42·13	55·72	42·37	55·53	42·61	55·35	42·86	70
71	56·70	42·73	56·52	42·98	56·33	43·22	56·14	43·47	71
72	57·50	43·33	57·31	43·58	57·12	43·83	56·93	44·08	72
73	58·30	43·93	58·11	44·19	57·91	44·44	57·72	44·69	73
74	59·10	44·53	58·90	44·79	58·71	45·05	58·51	45·30	74
75	59·90	45·14	59·70	45·40	59·50	45·66	59·30	45·92	75
76	60·70	45·74	60·50	46·00	60·29	46·27	60·09	46·53	76
77	61·49	46·34	61·29	46·61	61·09	46·87	60·88	47·14	77
78	62·29	46·94	62·09	47·21	61·88	47·48	61·67	47·75	78
79	63·09	47·54	62·88	47·82	62·67	48·09	62·46	48·37	79
80	63·89	48·15	63·68	48·42	63·47	48·70	63·26	48·98	80
81	64·69	48·75	64·48	49·03	64·26	49·31	64·05	49·59	81
82	65·49	49·35	65·27	49·63	65·05	49·92	64·84	50·20	82
83	66·29	49·95	66·07	50·24	65·85	50·53	65·63	50·81	83
84	67·09	50·55	66·86	50·84	66·64	51·14	66·42	51·43	84
85	67·88	51·15	67·66	51·45	67·43	51·74	67·21	52·04	85
86	68·68	51·76	68·46	52·06	68·23	52·35	68·00	52·65	86
87	69·48	52·36	69·25	52·66	69·02	52·96	68·79	53·26	87
88	70·28	52·96	70·05	53·27	69·82	53·57	69·58	53·88	88
89	71·08	53·56	70·84	53·87	70·61	54·18	70·37	54·49	89
90	71·88	54·16	71·64	54·48	71·40	54·79	71·16	55·10	90
91	72·68	54·77	72·44	55·08	72·20	55·40	71·95	55·71	91
92	73·47	55·37	73·23	55·69	72·99	56·01	72·74	56·32	92
93	74·27	55·97	74·03	56·29	73·78	56·61	73·53	56·94	93
94	75·07	56·57	74·82	56·90	74·58	57·22	74·32	57·55	94
95	75·87	57·17	75·62	57·50	75·37	57·83	75·12	58·16	95
96	76·67	57·77	76·42	58·11	76·16	58·44	75·91	58·77	96
97	77·47	58·38	77·21	58·71	76·96	59·05	76·70	59·39	97
98	78·27	58·98	78·01	59·32	77·75	59·66	77·49	60·00	98
99	79·06	59·58	78·80	59·92	78·54	60·27	78·28	60·61	99
100	79 86	60·18	79·60	60·53	79·34	60·88	79·07	61·22	100
Distance.	Dep.	Lat.	Dep.	Lat.	Dep.	Lat.	Dep.	Lat.	Distance.
	53 Deg.		52¾ Deg.		52½ Deg.		52¼ Deg.		

Distance.	38 Deg.		38¼ Deg.		38½ Deg.		38¾ Deg.		Distance.
	Lat.	Dep.	Lat.	Dep.	Lat.	Dep.	Lat.	Dep.	
1	0·79	0·62	0·79	0·62	0·78	0·62	0·78	0·63	1
2	1·58	1·23	1·57	1·24	1·57	1·24	1·56	1·25	2
3	2·36	1·85	2·36	1·86	2·35	1·87	2·34	1·88	3
4	3·15	2·46	3·14	2·48	3·13	2·49	3·12	2·50	4
5	3·94	3·08	3·93	3·10	3·91	3·11	3·90	3·13	5
6	4·73	3·69	4·71	3·71	4·70	3·74	4·68	3·76	6
7	5·52	4·31	5·50	4·33	5·48	4·36	5·46	4·38	7
8	6·30	4·93	6·28	4·95	6·26	4·98	6·24	5·01	8
9	7·09	5·54	7·07	5·57	7·04	5·60	7·02	5·63	9
10	7·88	6·16	7·85	6·19	7·83	6·23	7·80	6·26	10
11	8·67	6·77	8·64	6·81	8·61	6·85	8·58	6·89	11
12	9·46	7·39	9·42	7·43	9·39	7·47	9·36	7·51	12
13	10·24	8·00	10·21	8·05	10·17	8·09	10·14	8·14	13
14	11·03	8·62	10·99	8·67	10·96	8·72	10·92	8·76	14
15	11·82	9·23	11·78	9·29	11·74	9·34	11·70	9·39	15
16	12·61	9·85	12·57	9·91	12·52	9·96	12·48	10·01	16
17	13·40	10·47	13·35	10·52	13·30	10·58	13·26	10·64	17
18	14·18	11·08	14·14	11·14	14·09	11·21	14·04	11·27	18
19	14·97	11·70	14·92	11·76	14·87	11·83	14·82	11·89	19
20	15·76	12.31	15·71	12·38	15·65	12·45	15·60	12·52	20
21	16·55	12·93	16·49	13·00	16·43	13·07	16·38	13·14	21
22	17·34	13·54	17·28	13·62	17·22	13·70	17·16	13·77	22
23	18·12	14·16	18·06	14·24	18·00	14·32	17·94	14·40	23
24	18·91	14·78	18·85	14·86	18·78	14·94	18·72	15·02	24
25	19·70	15·39	19·63	15·48	19·57	15·56	19·50	15·65	25
26	20·49	16·01	20·42	16·10	20·35	16·19	20·28	16·27	26
27	21·28	16·62	21·20	16·72	21·13	16·81	21·06	16·90	27
28	22·06	17·24	21·99	17·33	21·91	17·43	21·84	17·53	28
29	22·85	17·85	22·77	17·95	22·70	18·05	22·62	18·15	29
30	23·64	18·47	23·56	18·57	23·48	18·68	23·40	18·78	30
31	24·43	19·09	24·34	19·19	24·26	19·30	24·18	19·40	31
32	25·22	19·70	25·13	19·81	25·04	19·92	24·96	20·03	32
33	26·00	20·32	25·92	20·43	25·83	20·54	25·74	20·66	33
34	26·79	20·93	26·70	21·05	26·61	21·17	26·52	21·28	34
35	27·58	21·55	27·49	21·67	27·39	21·79	27·30	21·91	35
36	28·37	22·16	28·27	22·29	28·17	22·41	28·08	22·53	36
37	29·16	22·78	29·06	22·91	28·96	23·03	28·86	23·16	37
38	29·94	23·40	29·84	23·53	29·74	23·66	29·64	23·79	38
39	30·73	24·01	30·63	24·14	30·52	24·28	30·42	24·41	39
40	31·52	24·63	31·41	24·76	31·30	24·90	31·20	25·04	40
41	32·31	25·24	32·20	25·38	32·09	25·52	31·98	25·66	41
42	33·10	25·86	32·98	26·00	32·87	26·15	32·76	26·29	42
43	33·88	26·47	33·77	26·62	33·65	26·77	33·53	26·91	43
44	34·67	27·09	34·55	27·24	34·43	27·39	34·31	27·54	44
45	35·46	27·70	35·34	27·86	35·22	28·01	35·09	28·17	45
46	36·25	28·32	36·12	28·48	36·00	28·64	35·87	28·79	46
47	37·04	28·94	36·51	29·10	36·78	29·26	36·65	29·42	47
48	37·82	29·55	37·79	29·72	37·57	29·88	37·43	30·04	48
49	38·61	30·17	38·48	30·34	38·35	30·50	38·21	30·67	49
50	39·40	30·78	39·27	30·95	39·13	31·13	38·99	31·30	50
Distance.	Dep.	Lat.	Dep.	Lat.	Dep.	Lat.	Dep.	Lat.	Distance.
	52 Deg.		51¾ Deg.		51½ Deg.		51¼ Deg.		

Distance.	38 Deg.		38¼ Deg.		38½ Deg.		38¾ Deg.		Distance.
	Lat.	Dep.	Lat.	Dep.	Lat.	Dep.	Lat.	Dep.	
51	40·19	31·40	40·05	31·57	39·91	31·75	39·77	31·92	51
52	40·98	32·01	40·84	32·19	40·70	32·37	40·55	32·55	52
53	41·76	32·63	41·62	32·81	41·48	32·99	41·33	33·17	53
54	42·55	33·25	42·41	33·43	42·26	33·62	42·11	33·80	54
55	43·34	33·86	43·19	34·05	43·04	34·24	42·89	34·43	55
56	44·13	34·48	43·98	34·67	43·83	34·86	43·67	35·05	56
57	44·92	35·09	44·76	35·29	44·61	35·48	44·45	35·68	57
58	45·70	35·71	45·55	35·91	45·39	36·11	45·23	36·30	58
59	46·49	36·32	46·33	36·53	46·17	36·73	46·01	36·93	59
60	47·28	36·94	47·12	37·15	46·96	37·35	46·79	37·56	60
61	48·07	37·56	47·90	37·76	47·74	37·97	47·57	38·18	61
62	48·86	38·17	48·69	38·38	48·52	38·60	48·35	38·81	62
63	49·64	38·79	49·47	39·00	49·30	39·22	49·13	39·43	63
64	50·43	39·40	50·26	39·62	50·09	39·84	49·91	40·06	64
65	51·22	40·02	51·05	40·24	50·87	40·46	50·69	40·68	65
66	52·01	40·63	51·83	40·86	51·65	41·09	51·47	41·31	66
67	52·80	41·25	52·62	41·48	52·43	41·71	52·25	41·94	67
68	53·58	41·86	53·40	42·10	53·22	42·33	53·03	42·56	68
69	54·37	42·48	54·19	42·72	54·00	42·95	53·81	43·19	69
70	55·16	43·10	54·97	43·34	54·78	43·58	54·59	43·81	70
71	55.95	43·71	55·76	43·96	55·57	44·20	55·37	44·44	71
72	56·74	44·33	56·54	44·57	56·35	44·82	56·15	45·07	72
73	57·52	44·94	57·33	45·19	57·13	45·44	56·93	45·69	73
74	58·31	45·56	58·11	45·81	57·91	46·07	57·71	46·32	74
75	59·10	46·17	58·90	46·43	58·70	46·69	58·49	46·94	75
76	59·89	46·79	59·68	47·05	59·48	47·31	59·27	47·57	76
77	60·68	47·41	60·47	47·67	60·26	47·93	60·05	48·20	77
78	61·46	48·02	61·25	48·29	61·04	48·56	60·83	48·82	78
79	62·25	48·64	62·04	48·91	61·83	49·18	61·61	49·45	79
80	63·04	49·25	62·83	49·53	62·61	49·80	62·39	50·07	80
81	63·83	49·87	63·61	50·15	63·39	50·42	63·17	50·70	81
82	64·62	50·48	64·40	50·77	64·17	51·05	63·95	51·33	82
83	65·40	51·10	65·18	51·38	64·96	51·67	64·73	51·95	83
84	66·19	51·72	65·97	52·00	65·74	52·29	65·51	52·58	84
85	66·98	52·33	66·75	52·62	66·52	52·91	66·29	53·20	85
86	67·77	52·95	67·54	53·24	67·30	53·54	67·07	53·83	86
87	68·56	53·56	68·32	53·86	68·09	54·16	67·85	54·46	87
88	69·34	54·18	69·11	54·48	68·87	54·78	68·63	55·08	88
89	70·13	54·79	69·89	55·10	69·65	55·40	69·41	55·71	89
90	70·92	55·41	70·68	55·72	70·43	56·03	70·19	56·33	90
91	71·71	56·03	71·46	56·34	71·22	56·65	70·97	56·96	91
92	72·50	56·64	72·25	56·96	72·00	57·27	71·75	57·58	92
93	73·28	57·26	73·03	57·58	72·78	57·89	72·53	58·21	93
94	74·07	57·87	73·82	58·19	73·57	58·52	73·31	58·84	94
95	74·86	58·49	74·61	58·81	74·35	59·14	74·09	59·46	95
96	75·65	59·10	75·39	59·43	75·13	59·76	74·87	60·09	96
97	76·44	59·72	76·18	60·05	75·91	60·38	75·65	60·71	97
98	77·22	60·33	76·96	60·67	76·70	61·01	76·43	61·34	98
99	78·01	60·95	77·75	61·29	77·48	61·63	77·21	61·97	99
100	78·80	61·57	78·53	61·91	78·26	62·25	77·99	62·59	100
Distance.	Dep.	Lat.	Dep.	Lat.	Dep.	Lat.	Dep.	Lat.	Distance.
	52 Deg.		51¾ Deg.		51½ Deg.		51¼ Deg.		

Distance.	39 Deg.		39¼ Deg.		39½ Deg.		39¾ Deg.		Distance.
	Lat.	Dep.	Lat.	Dep.	Lat.	Dep.	Lat.	Dep.	
1	0·78	0·63	0·77	0·63	0·77	0·64	0·77	0·64	1
2	1·55	1·26	1·55	1·27	1·54	1·27	1·54	1·28	2
3	2·33	1·89	2·32	1·90	2·31	1·91	2·31	1·92	3
4	3·11	2·52	3·10	2·53	3·09	2·54	3·08	2·56	4
5	3·89	3·15	3·87	3·16	3·86	3·18	3·84	3·20	5
6	4·66	3·78	4·65	3·80	4·63	3·82	4·61	3·84	6
7	5·44	4·41	5·42	4·43	5·40	4·45	5·38	4·48	7
8	6·22	5·03	6·20	5·06	6·17	5·09	6·15	5·12	8
9	6·99	5·66	6·97	5·69	6·94	5·72	6·92	5·75	9
10	7·77	6·29	7·74	6·33	7·72	6·36	7·69	6·39	10
11	8·55	6·92	8·52	6·96	8·49	7·00	8·46	7·03	11
12	9·33	7·55	9·29	7·59	9·26	7·63	9·23	7·67	12
13	10·10	8·18	10·07	8·23	10·03	8·27	9·99	8·31	13
14	10·88	8·81	10·84	8·86	10·80	8·91	10·76	8·95	14
15	11·66	9·44	11·62	9·49	11·57	9·54	11·53	9·59	15
16	12·43	10·07	12·39	10·12	12·35	10·18	12·30	10·23	16
17	13·21	10·70	13·16	10·76	13·12	10·81	13·07	10·87	17
18	13·99	11·33	13·94	11·39	13·89	11·45	13·84	11·51	18
19	14·77	11·96	14·71	12·02	14·66	12·09	14·61	12·15	19
20	15·54	12·59	15·49	12·65	15·43	12·72	15·38	12·79	20
21	16·32	13·22	16·26	13·29	16·20	13·36	16·15	13·43	21
22	17·10	13·84	17·04	13·92	16·98	13·99	16·91	14·07	22
23	17·87	14·47	17·81	14·55	17·75	14·63	17·68	14·71	23
24	18·65	15·10	18·59	15·18	18·52	15·27	18·45	15·35	24
25	19·43	15·73	19·36	15·82	19·29	15·90	19·22	15·99	25
26	20·21	16·36	20·13	16·45	20·06	16·54	19·99	16·63	26
27	20·98	16·99	20·91	17·08	20·83	17·17	20·76	17·26	27
28	21·76	17·62	21·68	17·72	21·61	17·81	21·53	17·90	28
29	22·54	18·25	22·46	18·35	22·38	18·45	22·30	18·54	29
30	23·31	18·88	23·23	18·98	23·15	19·08	23·07	19·18	30
31	24·09	19·51	24·01	19·61	23·92	19·72	23·83	19·82	31
32	24·87	20·14	24·78	20·25	24·69	20·35	24·60	20·46	32
33	25·65	20·77	25·55	20·88	25·46	20·99	25·37	21·10	33
34	26·42	21·40	26·33	21·51	26·24	21·63	26·14	21·74	34
35	27·20	22·03	27·10	22·14	27·01	22·26	26·91	22·38	35
36	27·98	22·66	27·88	22·78	27·78	22·90	27·68	23·02	36
37	28·75	23·28	28·65	23·41	28·55	23·53	28·45	23·66	37
38	29·53	23·91	29·43	24·04	29·32	24·17	29·22	24·30	38
39	30·31	24·54	30·20	24·68	30·09	24·81	29·98	24·94	39
40	31·09	25·17	30·98	25·31	30·86	25·44	30·75	25·58	40
41	31·86	25·80	31·75	25·94	31·64	26·08	31·52	26·22	41
42	32·64	26·43	32·52	26·57	32·41	26·72	32·29	26·86	42
43	33·42	27·06	33·30	27·21	33·18	27·35	33·06	27·50	43
44	34·19	27·69	34·07	27·84	33·95	27·99	33·83	28·14	44
45	34·97	28·32	34·85	28·47	34·72	28·62	34·60	28·77	45
46	35·75	28·95	35·62	29·10	35·49	29·26	35·37	29·41	46
47	36·53	29·58	36·40	29·74	36·27	29·90	36·14	30·05	47
48	37·30	30·21	37·17	30·37	37·04	30·53	36·90	30·69	48
49	38·08	30·84	37·95	31·00	37·81	31·17	37·67	31·33	49
50	38·86	31·47	38·72	31·64	38·58	31·80	38·44	31·97	50
Distance.	Dep.	Lat.	Dep.	Lat.	Dep.	Lat.	Dep.	Lat.	Distance.
	51 Deg.		50¾ Deg.		50½ Deg.		50¼ Deg.		

Distance.	39 Deg.		39¼ Deg.		39½ Deg.		39¾ Deg.		Distance.
	Lat.	Dep.	Lat.	Dep.	Lat.	Dep.	Lat.	Dep.	
51	39·63	32·10	39·49	32·27	39·35	32·44	39·21	32·61	51
52	40.41	32·72	40·27	32·90	40·12	33·08	39·98	33·25	52
53	41·19	33·35	41·04	33·53	40·90	33·71	40·75	33·89	53
54	41·97	33·98	41·82	34·17	41·67	34·35	41·52	34·53	54
55	42·74	34·61	42·59	34·80	42·44	34·98	42·29	35·17	55
56	43·52	35·24	43·37	35·43	43·21	35·62	43·06	35·81	56
57	44·30	35·87	44·14	36·06	43·98	36·26	43·82	36·45	57
58	45·07	36·50	44·91	36·70	44·75	36·89	44·59	37·09	58
59	45·85	37·13	45·69	37·33	45·53	37·53	45·36	37·73	59
60	46·63	37·76	46·46	37·96	46·30	38·16	46·13	38·37	60
61	47·41	38·39	47·24	38·60	47·07	38·80	46·90	39·01	61
62	48·18	39·02	48·01	39·23	47·84	39·44	47·67	39·65	62
63	48·96	39·65	48·79	39·86	48·61	40·07	48·44	40·28	63
64	49·74	40·28	49·56	40·49	49·38	40·71	49·21	40·92	64
65	50·51	40·91	50·34	41·13	50·16	41·35	49·97	41·56	65
66	51·29	41·54	51·11	41·76	50·93	41·98	50·74	42·20	66
67	52·07	42·16	51·88	42·39	51·70	42·62	51·51	42·84	67
68	52·85	42·79	52·66	43·02	52·47	43·25	52·28	43·48	68
69	53·52	43·42	53·43	43·66	53·24	43·89	53·05	44·12	69
70	54·40	44·05	54·21	44·29	54·01	44·53	53·82	44·76	70
71	55·18	44·68	54·98	44·92	54·79	45·16	54·59	45·40	71
72	55·95	45·31	55·76	45·55	55·56	45·80	55·36	46·04	72
73	56·73	45·94	56·53	46·19	56·33	46·43	56·13	46·68	73
74	57·51	46·57	57·31	46·82	57·10	47·07	56·89	47·32	74
75	58·29	47·20	58·08	47·45	57·87	47·71	57·66	47·96	75
76	59·06	47·83	58·85	48·09	58·64	48·34	58·43	48·60	76
77	59·84	48·46	59·63	48·72	59·42	48·98	59·20	49·24	77
78	60·62	49·09	60·40	49·35	60·19	49·61	59·97	49·88	78
79	61·39	49·72	61·18	49·98	60·96	50·25	60·74	50·52	79
80	62·17	50·35	61·95	50·62	61·73	50·89	61·51	51·16	80
81	62·95	50·97	62·73	51·25	62·50	51·52	62·28	51·79	81
82	63·73	51·60	63·50	51·88	63·27	52·16	63·04	52·43	82
83	64·50	52·23	64·27	52·51	64·04	52·79	63·81	53·07	83
84	65·28	52·86	65·05	53·15	64·82	53 43	64·58	53·71	84
85	66·06	53·49	65·82	53·78	65·59	54·07	65·35	54·35	85
86	66·83	54·12	66·60	54·41	66·36	54·70	66·12	54·99	86
87	67·61	54·75	67·37	55·05	67·13	55·34	66·89	55·63	87
88	68·39	55·38	68·15	55·68	67·90	55·97	67·66	56·27	88
89	69·17	56·01	68·92	56·32	68·67	56·61	68·43	56·91	89
90	69·94	56·64	69·70	56·94	69·45	57·25	69·20	57·55	90
91	70·72	57·27	70·47	57·58	70·22	57·88	69·96	58·19	91
92	71·50	57·90	71·24	58·21	70·99	58·52	70·73	58·83	92
93	72·27	58·53	72·02	58.84	71·76	59·16	71·50	59·47	93
94	73·05	59·16	72·79	59.47	72·53	59·79	72·27	60·11	94
95	73·83	59·79	73·57	60.11	73·30	60·43	73·04	60·75	95
96	74·61	60·41	74·34	60.74	74·08	61·06	73·81	61·39	96
97	75·38	61·04	75·12	61.37	74·85	61·70	74·58	62·03	97
98	76·16	61·67	75·89	62·01	75·62	62·34	75·35	62·66	98
99	76·94	62·30	76·66	62·64	76·39	62·97	76·12	63·30	99
100	77·71	62·93	77·44	63·27	77·16	63·61	76·88	63·94	100
Distance.	Dep.	Lat.	Dep.	Lat.	Dep.	Lat.	Dep.	Lat.	Distance.
	51 Deg.		50¾ Deg.		50½ Deg.		50¼ Deg.		

Distance.	40 Deg.		40¼ Deg.		40½ Deg.		40¾ Deg.		Distance.
	Lat.	Dep.	Lat.	Dep.	Lat.	Dep.	Lat.	Dep.	
1	0·77	0·64	0·76	0·65	0·76	0·65	0·76	0·65	1
2	1·53	1·29	1·53	1·29	1·52	1·30	1·52	1·31	2
3	2·30	1·93	2·29	1·94	2·28	1·95	2·27	1·96	3
4	3·06	2·57	3·05	2·58	3·04	2·60	3·03	2·61	4
5	3·83	3·21	3·82	3·23	3·80	3·25	3·79	3·26	5
6	4·60	3·86	4·58	3·88	4·56	3·90	4·55	3·92	6
7	5·36	4·50	5·34	4·52	5·32	4·55	5·30	4·57	7
8	6·13	5·14	6·11	5·17	6·08	5·20	6·06	5·22	8
9	6·89	5·79	6·87	5·82	6·84	5·84	6·82	5·87	9
10	7·66	6·43	7·63	6·46	7·60	6·49	7·58	6·53	10
11	8·43	7·07	8·40	7·11	8·36	7·14	8·33	7·18	11
12	9·19	7·71	9·16	7·75	9·12	7·79	9·09	7·83	12
13	9·96	8·36	9·92	8·40	9·89	8·44	9·85	8·49	13
14	10·72	9·00	10·69	9·05	10·65	9·09	10·61	9·14	14
15	11·49	9·64	11·45	9·69	11·41	9·74	11·36	9·79	15
16	12·26	10·28	12·21	10·34	12·17	10·39	12·12	10·44	16
17	13·02	10·93	12·97	10·98	12·93	11·04	12·88	11·10	17
18	13·79	11·57	13·74	11·63	13·69	11·69	13·64	11·75	18
19	14·55	12·21	14·50	12·28	14·45	12·34	14·39	12·40	19
20	15·32	12·86	15·26	12·92	15·21	12·99	15·15	13·06	20
21	16·09	13·50	16·03	13·57	15·97	13·64	15·91	13·71	21
22	16·85	14·14	16·79	14·21	16·73	14·29	16·67	14·36	22
23	17·62	14·78	17·55	14·86	17·49	14·94	17·42	15·01	23
24	18·39	15·43	18·32	15·51	18·25	15·59	18·18	15·67	24
25	19·15	16·07	19·08	16·15	19·01	16·24	18·94	16·32	25
26	19·92	16·71	19·84	16·80	19·77	16·89	19·70	16·97	26
27	20·68	17·36	20·61	17·45	20·53	17·54	20·45	17·62	27
28	21·45	18·00	21·37	18·09	21·29	18·18	21·21	18·28	28
29	22·22	18·64	22·13	18·74	22·05	18·83	21·97	18·93	29
30	22·98	19·28	22·90	19·38	22·81	19·48	22·73	19·58	30
31	23·75	19·93	23·66	20·03	23·57	20·13	23·48	20·24	31
32	24·51	20·57	24·42	20·68	24·33	20·78	24·24	20·89	32
33	25·28	21·21	25·19	21·32	25·09	21·43	25·00	21·54	33
34	26·05	21·85	25·95	21·97	25·85	22·08	25·76	22·19	34
35	26·81	22·50	26·71	22·61	26·61	22·73	26·51	22·85	35
36	27·58	23·14	27·48	23·26	27·37	23·38	27·27	23·50	36
37	28·34	23·78	28·24	23·91	28·13	24·03	28·03	24·15	37
38	29·11	24·43	29·00	24·55	28·90	24·68	28·79	24·80	38
39	29·88	25·07	29·77	25·20	29·66	25·33	29·54	25·46	39
40	30·64	25·71	30·53	25·84	30·42	25·98	30·30	26·11	40
41	31·41	26·35	31·29	26·49	31·18	26·63	31·06	26·76	41
42	32·17	27·00	32·06	27·14	31·94	27·28	31·82	27·42	42
43	32·94	27·64	32·82	27·78	32·70	27·93	32·58	28·07	43
44	33·71	28·28	33·58	28·43	33·46	28·58	33·33	28·72	44
45	34·47	28·93	34·35	29·08	34·22	29·23	34·09	29·37	45
46	35·24	29·57	35·11	29·72	34·98	29·87	34·85	30·03	46
47	36·00	30·21	35·87	30·37	35·74	30·52	35·61	30·68	47
48	36·77	30·85	36·64	31·01	36·50	31·17	36·36	31·33	48
49	37·54	31·50	37·40	31·66	37·26	31·82	37·12	31·99	49
50	38·30	32·14	38·16	32·31	38·02	32·47	37·88	32·64	50
Distance.	Dep.	Lat.	Dep.	Lat.	Dep.	Lat.	Dep.	Lat.	Distance.
	50 Deg.		49¾ Deg.		49½ Deg.		49¼ Deg.		

Distance.	40 Deg.		40¼ Deg.		40½ Deg.		40¾ Deg.		Distance.
	Lat.	Dep.	Lat.	Dep.	Lat.	Dep.	Lat.	Dep.	
51	39·07	32·78	38·92	32·95	38·78	33·12	38·64	33·29	51
52	39·83	33·42	39·69	33·60	39·54	33·77	39·39	33·94	52
53	40·60	34·07	40·45	34·24	40·30	34·42	40·15	34·60	53
54	41·37	34·71	41·21	34·89	41·06	35·07	40·91	35·25	54
55	42·13	35·35	41·98	35·54	41·82	35·72	41·67	35·90	55
56	42·90	36·00	42·74	36·18	42·58	36·37	42·42	36·55	56
57	43·66	36·64	43·50	36·83	43·34	37·02	43·18	37·21	57
58	44·43	37·28	44·27	37·48	44·10	37·67	43·94	37·86	58
59	45·20	37·92	45·03	38·12	44·86	38·32	44·70	38·51	59
60	45·96	38·57	45·79	38·77	45·62	38·97	45·45	39·17	60
61	46·73	39·21	46·56	39·41	46·38	39·62	46·21	39·82	61
62	47·49	39·85	47·32	40·06	47·15	40·27	46·97	40·47	62
63	48·26	40·50	48·08	40·71	47·91	40·92	47·73	41·12	63
64	49·03	41·14	48·85	41·35	48·67	41·56	48·48	41·78	64
65	49·79	41·78	49·61	42·00	49·43	42·21	49·24	42·43	65
66	50·56	42·42	50·37	42·64	50·19	42·86	50·00	43·08	66
67	51·32	43·07	51·14	43·29	50·95	43·51	50·76	43·73	67
68	52·09	43·71	51·90	43·94	51·71	44·16	51·51	44·39	68
69	52·86	44·35	52·66	44·58	52·47	44·81	52·27	45·04	69
70	53·62	45·00	53·43	45·23	53·23	45·46	53·03	45·69	70
71	54·39	45·64	54·19	45·87	53·99	46·11	53·79	46·35	71
72	55·16	46·28	54·95	46·52	54·75	46·76	54·54	47·00	72
73	55·92	46·92	55·72	47·17	55·51	47·41	55·30	47·65	73
74	56·69	47·57	56·48	47·81	56·27	48·06	56·06	48·30	74
75	57·45	48·21	57·24	48·46	57·03	48·71	56·82	48·96	75
76	58·22	48·85	58·01	49·11	57·79	49·36	57·57	49·61	76
77	58·99	49·49	58·77	49·75	58·55	50·01	58·33	50·26	77
78	59·75	50·14	59·53	50·40	59·31	50·66	59·09	50·92	78
79	60·52	50·78	60·30	51·04	60·07	51·31	59·85	51·57	79
80	61·28	51·42	61·06	51·69	60·83	51·96	60·61	52·22	80
81	62·05	52·07	61·82	52·34	61·59	52·61	61·36	52·87	81
82	62·82	52·71	62·59	52·98	62·35	53.25	62·12	53·53	82
83	63·58	53·35	63·35	53·63	63·11	53·90	62·88	54·18	83
84	64·35	53·99	64·11	54·27	63·87	54·55	63·64	54·83	84
85	65·11	54·64	64·87	54·92	64·63	55·20	64·39	55·48	85
86	65·88	55·28	65·64	55·57	65·39	55·85	65·15	56·14	86
87	66·65	55·92	66·40	56·21	66·16	56·50	65·91	56·79	87
88	67·41	56·57	67·16	56·86	66·92	57·15	66·67	57·44	88
89	68·18	57·21	67·93	57·50	67·68	57·80	67·42	58·10	89
90	68·94	57·85	68·69	58·15	68·44	58·45	68·18	58·75	90
91	69·71	58·49	69·45	58·80	69·20	59·10	68·94	59·40	91
92	70·48	59·14	70·22	59·44	69·96	59·75	69·70	60·05	92
93	71·24	59·78	70·98	60·09	70·72	60·40	70·45	60·71	93
94	72·01	60·42	71·74	60·74	71·48	61·05	71·21	61·36	94
95	72·77	61·06	72·51	61·38	72·24	61·70	71·97	62·01	95
96	73·54	61·71	73·27	62·03	73·00	62·35	72·73	62·66	96
97	74·31	62·35	74·03	62 67	73·76	63·00	73·48	63.32	97
98	75·07	62·99	74·80	63·32	74·52	63·65	74·24	63·97	98
99	75·84	63·64	75·56	63·97	75·28	64·30	75·00	64·62	99
100	76·60	64·28	76·32	64·61	76·04	64·94	75·76	65·28	100
Distance.	Dep.	Lat.	Dep.	Lat.	Dep.	Lat.	Dep.	Lat.	Distance.
	50 Deg.		49¾ Deg.		49½ Deg.		49¼ Deg.		

Distance.	41 Deg.		41¼ Deg.		41½ Deg.		41¾ Deg.		Distance.
	Lat.	Dep.	Lat.	Dep.	Lat.	Dep.	Lat.	Dep.	
1	0·75	0·66	0·75	0·66	0·75	0·66	0·75	0·67	1
2	1·51	1·31	1·50	1·32	1·50	1·33	1·49	1·33	2
3	2·26	1·97	2·26	1·98	2·25	1·99	2·24	2·00	3
4	3·02	2·62	3·01	2·64	3·00	2·65	2·98	2·66	4
5	3·77	3·28	3·76	3·30	3·74	3·31	3·73	3·33	5
6	4·53	3·94	4·51	3·96	4·49	3·98	4·48	4·00	6
7	5·28	4·59	5·26	4·62	5·24	4·64	5·22	4·66	7
8	6·04	5·25	6·01	5·27	5·99	5·30	5·97	5·33	8
9	6·79	5·90	6·77	5·93	6·74	5·96	6·71	5·99	9
10	7·55	6·56	7·52	6·59	7·49	6·63	7·46	6·66	10
11	8·30	7·22	8·27	7·25	8·24	7·29	8·21	7·32	11
12	9·06	7·87	9·02	7·91	8·99	7·95	8·95	7·99	12
13	9·81	8·53	9·77	8·57	9·74	8·61	9·70	8·66	13
14	10·57	9·18	10·53	9·23	10·49	9·28	10·44	9·32	14
15	11·32	9·84	11·28	9·89	11·23	9·94	11·19	9·99	15
16	12·08	10·50	12·03	10·55	11·98	10·60	11·94	10·65	16
17	12·83	11·15	12·78	11·21	12·73	11·26	12·68	11·32	17
18	13·58	11·81	13·53	11·87	13·48	11·93	13·43	11·99	18
19	14·34	12·47	14·28	12·53	14·23	12·59	14·18	12·65	19
20	15·09	13·12	15·04	13·19	14·98	13·25	14·92	13·32	20
21	15·85	13·78	15·79	13·85	15·73	13·91	15·67	13·98	21
22	16·60	14·43	16·54	14·51	16·48	14·58	16·41	14·65	22
23	17·36	15·09	17·29	15·16	17·23	15·24	17·16	15·32	23
24	18·11	15·75	18·04	15·82	17·97	15·90	17·91	15·98	24
25	18·87	16·40	18·80	16·48	18·72	16·57	18·65	16·65	25
26	19·62	17·06	19·55	17·14	19·47	17·23	19·40	17·31	26
27	20·38	17·71	20·30	17·80	20·22	17·89	20·14	17·98	27
28	21·13	18·37	21·05	18·46	20·97	18·55	20·89	18·64	28
29	21·89	19·03	21·80	19·12	21·72	19·22	21·64	19·31	29
30	22·64	19·68	22·56	19·78	22·47	19·88	22·38	19·98	30
31	23·40	20·34	23·31	20·44	23·22	20·54	23·13	20·64	31
32	24·15	20·99	24·06	21·10	23·97	21·20	23·87	21·31	32
33	24·91	21·65	24·81	21·76	24·72	21·87	24·62	21·97	33
34	25·66	22·31	25·56	22·42	25·46	22·53	25·37	22·64	34
35	26·41	22·96	26·31	23·08	26·21	23·19	26·11	23·31	35
36	27·17	23·62	27·07	23·74	26·96	23.85	26·86	23·97	36
37	27·92	24·27	27·82	24·40	27·71	24·52	27·60	24·64	37
38	28·68	24·93	28·57	25·06	28·46	25·18	28·35	25·30	38
39	29·43	25·59	29·32	25·71	29·21	25·84	29·10	25·97	39
40	30·19	26·24	30·07	26·37	29·96	26·50	29·84	26·64	40
41	30·94	26·90	30·83	27·03	30·71	27·17	30·59	27·30	41
42	31·70	27·55	31·58	27·69	31·46	27·83	31·33	27·97	42
43	32·45	28·21	32·33	28·35	32·21	28·49	32·08	28·63	43
44	33·21	28·87	33·08	29·01	32·95	29·16	32·83	29·30	44
45	33·96	29·52	33·83	29·67	33·70	29·82	33·57	29·97	45
46	34·72	30·18	34·58	30·33	34·45	30·48	34·32	30·63	46
47	35·47	30·83	35·34	30·99	35·20	31·14	35·06	31·30	47
48	36·23	31·49	36·09	31·65	35·95	31·81	35·81	31·96	48
49	36·98	32·15	36·84	32·31	36·70	32·47	36·56	32·63	49
50	37·74	32·80	37·59	32·97	37·45	33·13	37·30	33·29	50
Distance.	Dep.	Lat.	Dep.	Lat.	Dep.	Lat.	Dep.	Lat.	Distance.
	49 Deg.		48¾ Deg.		48½ Deg.		48¼ Deg.		

Distance.	41 Deg.		41¼ Deg.		41½ Deg.		41¾ Deg.		Distance.
	Lat.	Dep.	Lat.	Dep.	Lat.	Dep.	Lat.	Dep.	
51	38·49	33·46	38·34	33·63	38·20	33·79	38·05	33·96	51
52	39·24	34·12	39·10	34·29	38·95	34·46	38·79	34·63	52
53	40·00	34·77	39·85	34·95	39·69	35·12	39·54	35·29	53
54	40·75	35·43	40·60	35·60	40·44	35·78	40·29	35·96	54
55	41·51	36·08	41·35	36·26	41·19	36·44	41·03	36·62	55
56	42·26	36·74	42·10	36·92	41·94	37·11	41·78	37·29	56
57	43·02	37·40	42·85	37·58	42·69	37·77	42·53	37·96	57
58	43·77	38·05	43·61	38·24	43·44	38·43	43·27	38·62	58
59	44·53	38·71	44·36	38·90	44·19	39·09	44·02	39·29	59
60	45·28	39·36	45·11	39·56	44·94	39·76	44·76	39·95	60
61	46·04	40·02	45·86	40·22	45·69	40·42	45·51	40·62	61
62	46·79	40·68	46·61	40·88	46·44	41·08	46·26	41·28	62
63	47·55	41·33	47·37	41·54	47·18	41·75	47·00	41·95	63
64	48·30	41·99	48·12	42·20	47·93	42·41	47·75	42·62	64
65	49·06	42·64	48·87	42·86	48·68	43·07	48·49	43·28	65
66	49·81	43·30	49·62	43·52	49·43	43·73	49·24	43·95	66
67	50·57	43·96	50·37	44·18	50·18	44·40	49·99	44·61	67
68	51·32	44·61	51·13	44·84	50·93	45·06	50·73	45·28	68
69	52·07	45·27	51·88	45·49	51·68	45·72	51·48	45·95	69
70	52·83	45·92	52·63	46·15	52·43	46·38	52·22	46·61	70
71	53·58	46·58	53·38	46·81	53·18	47·05	52·97	47·28	71
72	54·34	47·24	54·13	47·47	53·92	47·71	53·72	47·94	72
73	55·09	47·89	54·88	48·13	54·67	48·37	54·46	48·61	73
74	55·85	48·55	55·64	48·79	55·42	49·03	55·21	49·28	74
75	56·60	49·20	56·39	49·45	56·17	49·70	55·95	49·94	75
76	57·36	49·86	57·14	50·11	56·92	50·36	56·70	50·61	76
77	58·11	50·52	57·89	50·77	57·67	51·02	57·45	51·27	77
78	58·87	51·17	58·64	51·43	58·42	51·68	58·19	51·94	78
79	59·62	51·83	59·40	52·09	59·17	52·35	58·94	52·60	79
80	60·38	52·48	60·15	52·75	59·92	53·01	59·68	53·27	80
81	61·13	53·14	60·90	53·41	60·67	53·67	60·43	53·94	81
82	61·89	53·80	61·65	54·07	61·41	54·33	61·18	54·60	82
83	62·64	54·45	62·40	54·73	62·16	55·00	61·92	55·27	83
84	63·40	55·11	63·15	55·38	62·91	55·66	62·67	55·93	84
85	64·15	55·76	63·91	56·04	63·66	56·32	63·41	56·60	85
86	64·90	56·42	64·66	56·70	64·41	56·99	64·16	57·27	86
87	65·66	57·08	65·41	57·36	65·16	57·65	64·91	57·93	87
88	66·41	57·73	66·16	58·02	65·91	58·31	65·65	58·60	88
89	67·17	58·39	66·91	58·68	66·66	58·97	66·40	59·26	89
90	67·92	59·05	67·67	59·34	67·41	59·64	67·15	59·93	90
91	68·68	59·70	68·42	60·00	68·15	60·30	67·89	60·60	91
92	69·43	60·36	69·17	60·66	68·90	60·96	68·64	61·26	92
93	70·19	61·01	69·92	61·32	69·65	91·62	69·38	61·93	93
94	70·94	61·67	70·67	61·98	70·40	62·29	70·13	62·59	94
95	71·70	62·33	71·43	62·64	71·15	62·95	70·88	63·26	95
96	72·45	62·98	72·18	63·30	71·90	63·61	71·62	63·92	96
97	73·21	63·64	72·93	63·96	72·65	64·27	72·37	64·59	97
98	73·96	64·29	73·68	64·62	73·40	64·94	73·11	65·26	98
99	74·72	64·95	74·43	65·28	74·15	65·60	73·86	65·92	99
100	75·47	65·61	75·18	65·93	74·90	66·26	74·61	66·59	100
Distance.	Dep.	Lat.	Dep.	Lat.	Dep.	Lat.	Dep.	Lat.	Distance.
	49 Deg.		48¾ Deg.		48½ Deg.		48¼ Deg.		

Distance.	42 Deg.		42¼ Deg.		42½ Deg.		42¾ Deg.		Distance.
	Lat.	Dep.	Lat.	Dep.	Lat.	Dep.	Lat.	Dep.	
1	0·74	0·67	0·74	0·67	0·74	0·68	0·73	0·68	1
2	1·49	1·34	1·48	1·34	1·47	1·35	1·47	1·36	2
3	2·23	2·01	2·22	2·02	2·21	2·03	2·20	2·04	3
4	2·97	2·68	2·96	2·69	2·95	2·70	2·94	2·72	4
5	3·72	3·35	3·70	3·36	3·69	3·38	3·67	3·39	5
6	4·46	4·01	4·44	4·03	4·42	4·05	4·41	4·07	6
7	5·20	4·68	5·18	4·71	5·16	4·73	5·14	4·75	7
8	5·95	5·35	5·92	5·38	5·90	5·40	5·87	5·43	8
9	6·69	6·02	6·66	6·05	6·64	6·08	6·61	6·11	9
10	7·43	6·69	7·40	6·72	7·37	6·76	7·34	6·79	10
11	8·17	7·36	8·14	7·40	8·11	7·43	8·08	7·47	11
12	8·92	8·03	8·88	8·07	8·85	8·11	8·81	8·15	12
13	9·66	8·70	9·62	8·74	9·58	8·78	9·55	8·82	13
14	10·40	9·37	10·36	9·41	10·32	9·46	10·28	9·50	14
15	11·15	10·04	11·10	10·09	11·06	10·13	11·01	10·18	15
16	11·89	10·71	11·84	10·76	11·80	10·81	11·75	10·86	16
17	12·63	11·38	12·58	11·43	12·53	11·48	12·48	11·54	17
18	13·38	12·04	13·32	12·10	13·27	12·16	13·22	12·22	18
19	14·12	12·71	14·06	12·77	14·01	12·84	13·95	12·90	19
20	14·86	13.38	14·80	13·45	14·75	13·51	14·69	13·58	20
21	15·61	14·05	15·54	14·12	15·48	14·19	15·42	14·25	21
22	16·35	14·72	16·28	14·79	16·22	14·86	16·16	14·93	22
23	17·09	15·39	17·02	15·46	16·96	15·54	16·89	15·61	23
24	17·84	16·06	17·77	16·14	17·69	16·21	17·62	16·29	24
25	18·58	16·73	18·51	16·81	18·43	16·89	18·36	16 97	25
26	19·32	17·40	19·25	17·48	19·17	17·57	19·09	17·65	26
27	20·06	18·07	19·99	18·15	19·91	18·24	19·83	18·33	27
28	20·81	18·74	20·73	18·83	20·64	18·92	20·56	19·01	28
29	21·55	19·40	21·47	19·50	21·38	19·59	21·30	19·69	29
30	22·29	20·07	22·21	20·17	22·12	20·27	22·03	20·36	30
31	23·04	20·74	22·95	20·84	22·86	20·94	22·76	21·04	31
32	23·78	21·41	23·69	21·52	23·59	21·62	23·50	21·72	32
33	24·52	22·08	24·43	22·19	24·33	22·29	24·23	22·40	33
34	25·27	22·75	25·17	22·86	25·07	22·97	24·97	23·08	34
35	26·01	23·42	25·91	23·53	25·80	23·65	25·70	23·76	35
36	26·75	24·09	26·65	24·21	26·54	24·32	26·44	24·44	36
37	27·50	24·76	27·39	24·88	27·28	25·00	27·17	25·12	37
38	28·24	25·43	28·13	25·55	28·02	25·67	27·90	25·79	38
39	28·98	26·10	28·87	26·22	28·75	26·35	28·64	26·47	39
40	29·73	26·77	29·61	26·89	29·49	27·02	29·37	27·15	40
41	30·47	27·43	30·35	27·57	30·23	27·70	30·11	27·83	41
42	31·21	28·10	31·09	28·24	30·97	28·37	30·84	28·51	42
43	31·96	28·77	31·83	28·91	31·70	29·05	31·58	29·19	43
44	32·70	29·44	32·57	29·58	32·44	29·73	32·31	29·87	44
45	33·44	30·11	33·31	30·26	33·18	30·40	33·04	30·55	45
46	34·18	30·78	34·05	30·93	33·91	31·08	33·78	31·22	46
47	34·93	31·45	34·79	31·60	34·65	31·75	34·51	31·90	47
48	35·67	32·12	35·53	32·27	35·39	32·43	35·25	32·58	48
49	36·41	32·79	36·27	32·95	36·13	33·10	35·98	33·26	49
50	37·16	33·46	37·01	33·62	36·86	33·78	36·72	33·94	50
Distance.	Dep.	Lat.	Dep.	Lat.	Dep.	Lat.	Dep.	Lat.	Distance.
	48 Deg.		47¾ Deg.		47½ Deg.		47¼ Deg.		

Distance.	42 Deg.		42¼ Deg.		42½ Deg.		42¾ Deg.		Distance.
	Lat.	Dep.	Lat.	Dep.	Lat.	Dep.	Lat.	Dep.	
51	37·90	34·13	37·75	34·29	37·60	34·46	37·45	34·62	51
52	38·64	34·79	38·49	34·96	38·34	35·13	38·18	35·30	52
53	39·39	35·46	39·23	35·64	39·08	35·81	38·92	35·98	53
54	40·13	36·13	39·97	36·31	39·81	36·48	39·65	36·66	54
55	40·87	36·80	40·71	36·98	40·55	37·16	40·39	37·33	55
56	41·62	37·47	41·45	37·65	41·29	37·83	41·12	38·01	56
57	42·36	38·14	42·19	38·32	42·02	38·51	41·86	38·69	57
58	43·10	38·81	42·93	39·00	42·76	39·18	42·59	39·37	58
59	43·85	39·48	43·67	39·67	43·50	39·86	43·32	40·05	59
60	44·59	40·15	44·41	40·34	44·24	40·54	44·06	40·73	60
61	45·33	40·82	45·15	41·01	44·97	41·21	44·79	41·41	61
62	46·07	41·49	45·89	41·69	45·71	41·89	45·53	42·09	62
63	46·82	42·16	46·63	42·36	46·45	42·56	46·26	42·76	63
64	47·56	42·82	47·37	43·03	47·19	43·24	47·00	43·44	64
65	48·30	43·49	48·11	43·70	47·92	43·91	47·73	44·12	65
66	49·05	44·16	48·85	44·38	48·66	44·59	48·47	44·80	66
67	49·79	44·83	49·59	45·05	49·40	45·26	49·20	45·48	67
68	50·53	45·50	50·33	45·72	50·13	45·94	49·93	46·16	68
69	51·28	46·17	51·07	46·39	50·87	46·62	50·67	46·84	69
70	52·02	46·84	51·82	47·07	51·61	47·29	51·40	47·52	70
71	52.76	47·51	52·56	47·74	52·35	47·97	52·14	48·19	71
72	53·51	48·18	53·30	48·41	53·08	48·64	52·87	48·87	72
73	54·25	48·85	54·04	49·08	53·82	49·32	53·61	49·55	73
74	54·99	49·52	54·78	49·76	54·56	49·99	54·34	50·23	74
75	55·74	50·18	55·52	50·43	55·30	50·67	55·07	50·91	75
76	56·48	50·85	56·26	51·10	56·03	51·34	55·81	51·59	76
77	57·22	51·52	57·00	51·77	56·77	52·02	56·54	52·27	77
78	57·97	52·19	57·74	52·44	57·51	52·70	57·28	52·95	78
79	58·71	52·86	58·48	53·12	58·24	53·37	58·01	53·63	79
80	59·45	53·53	59·22	53·79	58·98	54·05	58·75	54·30	80
81	60·19	54·20	59·96	54·46	59·72	54·72	59·48	54·98	81
82	60·94	54·87	60·70	55·13	60·46	55·40	60·21	55·66	82
83	61·68	55·54	61·44	55·81	61·19	56·07	60·95	56·34	83
84	62·42	56·21	62·18	56·48	61·93	56·75	61·68	57·02	84
85	63·17	56·88	62·92	57·15	62·67	57·43	62·42	57·70	85
86	63·91	57·55	63·66	57·82	63·41	58·10	63·15	58·38	86
87	64·65	58·21	64·40	58·50	64·14	58·78	63·89	59·06	87
88	65·40	58·88	65·14	59·17	64·88	59·45	64·62	59·73	88
89	66·14	59·55	65·88	59·84	65·62	60·13	65·35	60·41	89
90	66·88	60·22	66·62	60·51	66·35	60·80	66·09	61·09	90
91	67·63	60·89	67·36	61·19	67·09	61·48	66·82	61·77	91
92	68·37	61·56	68·10	61·86	67·83	62·15	67·56	62·45	92
93	69·11	62·23	68·84	62·53	68·57	62·83	68·29	63·13	93
94	69·86	62·90	69·58	63·20	69·30	63·51	69·03	63·81	94
95	70·60	63·57	70·32	63·87	70·04	64·18	69·76	64·49	95
96	71·34	64·24	71·06	64·55	70·78	64·86	70·49	65·16	96
97	72·08	64·91	71·80	65·22	71·52	65·53	71·23	65·84	97
98	72·83	65·57	72·54	65·89	72·25	66·21	71·96	66·52	98
99	73·57	66·24	73·28	66·56	72·99	66 88	72·70	67·20	99
100	74·31	66·91	74·02	67·24	73·73	67·56	73·43	67·88	100
Distance.	Dep.	Lat.	Dep.	Lat.	Dep.	Lat.	Dep.	Lat.	Distance.
	48 Deg.		47¾ Deg.		47½ Deg.		47¼ Deg.		

Distance.	43 Deg.		43¼ Deg.		43½ Deg.		43¾ Deg.		Distance.
	Lat.	Dep.	Lat.	Dep.	Lat.	Dep.	Lat.	Dep.	
1	0·73	0·68	0·73	0·69	0·73	0·69	0·72	0·69	1
2	1·46	1·36	1·46	1·37	1·45	1·38	1·44	1·38	2
3	2·19	2·05	2·19	2·06	2·18	2·07	2·17	2·07	3
4	2·93	2·73	2·91	2·74	2·90	2·75	2·89	2·77	4
5	3·66	3·41	3·64	3·43	3·63	3·44	3·61	3·46	5
6	4·39	4·09	4·37	4·11	4·35	4·13	4·33	4·15	6
7	5·12	4·77	5·10	4·80	5·08	4·82	5·06	4·84	7
8	5·85	5·46	5·83	5·48	5·80	5·51	5·78	5·53	8
9	6·58	6·14	6·56	6·17	6·53	6·20	6·50	6·22	9
10	7·31	6·82	7·28	6·85	7·25	6·88	7·22	6·92	10
11	8·04	7·50	8·01	7·54	7·98	7·57	7·95	7·61	11
12	8·78	8·18	8·74	8·22	8·70	8·26	8·67	8·30	12
13	9·51	8·87	9·47	8·91	9·43	8·95	9·39	8·99	13
14	10·24	9·55	10·20	9·59	10·16	9·64	10·11	9·68	14
15	10·97	10·23	10·93	10·28	10·88	10·33	10·84	10·37	15
16	11·70	10·91	11·65	10·96	11·61	11·01	11·56	11·06	16
17	12·43	11·59	12·38	11·65	12·33	11·70	12·28	11·76	17
18	13·16	12·28	13·11	12·33	13·06	12·39	13·00	12·45	18
19	13·90	12·96	13·84	13·02	13·78	13·08	13·72	13·14	19
20	14·63	13·64	14·57	13·70	14·51	13·77	14·45	13·83	20
21	15·36	14·32	15·30	14·39	15·23	14·46	15·17	14·52	21
22	16·09	15·00	16·02	15·07	15·96	15·14	15·89	15·21	22
23	16·82	15·69	16·75	15·76	16·68	15·83	16·51	15·90	23
24	17·55	16·37	17·48	16·44	17·41	16·52	17·34	16·60	24
25	18·28	17·05	18·21	17·13	18·13	17·21	18·06	17·29	25
26	19·02	17·73	18·94	17·81	18·86	17·90	18·78	17·98	26
27	19·75	18·41	19·67	18·50	19·59	18·59	19·50	18·67	27
28	20·48	19·10	20·39	19·19	20·31	19·27	20·23	19·36	28
29	21·21	19·78	21·12	19·87	21·04	19·96	20·95	20·05	29
30	21·94	20·46	21·85	20·56	21·76	20·65	21·67	20·75	30
31	22·67	21·14	22·58	21·24	22·49	21·34	22·39	21·44	31
32	23·40	21·82	23·31	21·93	23·21	22·03	23·12	22·13	32
33	24·13	22·51	24·04	22·61	23·94	22·72	23·84	22·82	33
34	24·87	23·19	24·76	23·30	24·66	23·40	24·56	23·51	34
35	25·60	23·87	25·49	23·98	25·39	24·09	25·28	24·20	35
36	26·33	24·55	26·22	24·67	26·11	24·78	26·01	24·89	36
37	27·06	25·23	26·95	25·35	26·84	25·47	26·73	25·59	37
38	27·79	25·92	27·68	26·04	27·56	26·16	27·45	26·28	38
39	28·52	26·60	28·41	26·72	28·29	26·85	28·17	26·97	39
40	29·25	27·28	29·13	27·41	29·01	27·53	28·89	27·66	40
41	29·99	27·96	29·86	28·09	29·74	28·22	29·62	28·35	41
42	30·72	28·64	30·59	28·78	30·47	28·91	30·34	29·04	42
43	31·45	29·33	31·32	29·46	31·19	29·60	31·06	29·74	43
44	32·18	30·01	32·05	30·15	31·92	30·29	31·78	30·43	44
45	32·91	30·69	32·78	30·83	32·64	30·98	32·51	31·12	45
46	33·64	31·37	33·51	31·52	33·37	31·66	33·23	31·81	46
47	34·37	32·05	34·23	32·20	34·09	32·35	33·95	32·50	47
48	35·10	32·74	34·96	32·89	34·82	33·04	34·67	33·19	48
49	35·84	33·42	35·69	33·57	35·54	33·73	35·40	33·88	49
50	36·57	34·10	36·42	34·26	36·27	34·42	36·12	34·58	50
Distance.	Dep.	Lat.	Dep.	Lat.	Dep.	Lat.	Dep.	Lat.	Distance.
	47 Deg.		46¾ Deg.		46½ Deg.		46¼ Deg.		

Distance.	43 Deg.		43¼ Deg.		43½ Deg.		43¾ Deg.		Distance.
	Lat.	Dep.	Lat.	Dep.	Lat.	Dep.	Lat.	Dep.	
51	37·30	34·78	37·15	34·94	36·99	35·11	36·84	35·27	51
52	38·03	35·46	37·88	35·63	37·72	35·79	37·56	35·96	52
53	38·76	36·15	38·60	36·31	38·44	36·48	38·29	36·65	53
54	39·49	36·83	39·33	37·00	39·17	37·17	39·01	37·34	54
55	40·22	37·51	40·06	37·69	39·90	37·86	39·73	38·03	55
56	40·96	38·19	40·79	38·37	40·62	38·55	40·45	38·72	56
57	41·69	38·87	41·52	39·06	41·35	39·24	41·17	39·42	57
58	42·42	39·56	42·25	39·74	42·07	39·92	41·90	40·11	58
59	43·15	40·24	42·97	40·43	42·80	40·61	42·62	40·80	59
60	43·88	40·92	43·70	41·11	43·52	41·30	43·34	41·49	60
61	44·61	41·60	44·43	41·80	44·25	41·99	44·06	42·18	61
62	45·34	42·28	45·16	42·48	44·97	42·68	44·79	42·87	62
63	46·08	42·97	45·89	43·17	45·70	43·37	45·51	43·57	63
64	46·81	43·65	46·62	43·85	46·42	44·05	46·23	44·26	64
65	47·54	44·33	47·34	44·54	47·15	44·74	46·95	44·95	65
66	48·27	45·01	48·07	45·22	47·87	45·43	47·68	45·64	66
67	49·00	45·69	48·80	45·91	48·60	46·12	48·40	46·33	67
68	49·73	46·38	49·53	46·59	49·33	46·81	49·12	47·02	68
69	50·46	47·06	50·26	47·28	50·05	47·50	49·84	47·71	69
70	51·19	47·74	50·99	47·96	50·78	48·18	50·57	48·41	70
71	51·93	48·42	51·71	48·65	51·50	48·87	51·29	49·10	71
72	52·66	49·10	52·44	49·33	52·23	49·56	52·01	49·79	72
73	53·39	49·79	53·17	50·02	52·95	50·25	52·73	50·48	73
74	54·12	50·47	53·90	50·70	53·68	50·94	53·45	51·17	74
75	54·85	51·15	54·63	51·39	54·40	51·63	54·18	51·86	75
76	55·58	51·83	55·36	52·07	55·13	52·31	54·90	52·55	76
77	56·31	52·51	56·08	52·76	55·85	53·00	55·62	53·25	77
78	57·05	53·20	56·81	53·44	56·58	53·69	56·34	53·94	78
79	57·78	53·88	57·54	54·13	57·30	54·38	57·07	54·63	79
80	58·51	54·56	58·27	54·81	58·03	55·07	57·79	55·32	80
81	59·24	55·24	59·00	55·50	58·76	55·76	58·51	56·01	81
82	59·97	55·92	59·73	56·18	59·48	56·45	59·23	56·70	82
83	60·70	56·61	60·45	56·87	60·21	57·13	59·96	57·40	83
84	61·43	57·29	61·18	57·56	60·93	57·82	60·68	58·09	84
85	62·17	57·97	61·91	58·24	61·66	58·51	61·40	58·78	85
86	62·90	58·65	62·64	58·93	62·38	59·20	62·12	59·47	86
87	63·63	59·33	63·37	59·61	63·11	59·89	62·85	60·16	87
88	64·36	60·02	64·10	60·30	63·83	60·58	63·57	60·85	88
89	65·09	60·70	64·82	60·98	64·56	61·26	64·29	61·54	89
90	65·82	61·38	65·55	61·67	65·28	61·95	65·01	62·24	90
91	66·55	62·06	66·28	62·35	66·01	62·64	65·74	62·93	91
92	67·28	62·74	67·01	63·04	66·73	63·33	66·46	63·62	92
93	68·02	63·43	67·74	63·72	67·46	64·02	67·18	64·31	93
94	68·75	64·11	68·47	64·41	68·19	64·71	67·90	65·00	94
95	69·48	64·79	69·20	65·09	68·91	65·39	68·62	65·69	95
96	70·21	65·47	69·92	65·78	69·64	66·08	69·35	66·39	96
97	70·94	66·15	70·65	66·46	70·36	66·77	70·07	67·08	97
98	71·67	66·84	71·37	67·15	71·09	67·46	70·79	67·77	98
99	72·40	67·52	72·11	67·83	71·81	68·15	71·51	68·46	99
100	73·14	68·20	72·84	68·52	72·54	68·84	72·24	69·15	100
Distance.	Dep.	Lat.	Dep.	Lat.	Dep.	Lat.	Dep.	Lat.	Distance.
	47 Deg.		46¾ Deg.		46½ Deg.		46¼ Deg.		

Distance.	44 Deg.		44¼ Deg.		44½ Deg.		44¾ Deg.		45 Deg.		Distance.
	Lat.	Dep.	Lat.	Dep.	Lat.	Dep.	Lat.	Dep.	Lat.	Dep.	
1	0·72	0·69	0·72	0·70	0·71	0·70	0·71	0·71	0·71	0·71	1
2	1·44	1·39	1·43	1·40	1·43	1·40	1·42	1·41	1·41	1·41	2
3	2·16	2·08	2·15	2·09	2·14	2·10	2·13	2·11	2·12	2·12	3
4	2·88	2·78	2·87	2·79	2·85	2·80	2·84	2·82	2·83	2·83	4
5	3·60	3·47	3·58	3·49	3·57	3·50	3·55	3·52	3·54	3·54	5
6	4·32	4·17	4·30	4·19	4·28	4·21	4·26	4·22	4·24	4·24	6
7	5·04	4·86	5·01	4·88	4·99	4·91	4·97	4·93	4·95	4·95	7
8	5·75	5·56	5·73	5·58	5·71	5·61	5·68	5·63	5·66	5·66	8
9	6·47	6·25	6·45	6·28	6·42	6·31	6·39	6·34	6·36	6·36	9
10	7·19	6·95	7·16	6·98	7·13	7·01	7·10	7·04	7·07	7·07	10
11	7·91	7·64	7·88	7·68	7·85	7·71	7·81	7·74	7·78	7·78	11
12	8·63	8·34	8·60	8·37	8·56	8·41	8·52	8·45	8·49	8·49	12
13	9·35	9·03	9·31	9·07	9·27	9·11	9·23	9·15	9·19	9·19	13
14	10·07	9·73	10·03	9·77	9·99	9·81	9·94	9·86	9·90	9·90	14
15	10·79	10·42	10·74	10·47	10·70	10·51	10·65	10·56	10·61	10·61	15
16	11·51	11·11	11·46	11·16	11·41	11·21	11·36	11·26	11·31	11·31	16
17	12·23	11·81	12·18	11·86	12·13	11·92	12·07	11·97	12·02	12·02	17
18	12·95	12·50	12·89	12·56	12·84	12·62	12·78	12·67	12·73	12·73	18
19	13·67	13·20	13·61	13·26	13·55	13·32	13·49	13·38	13·43	13.43	19
20	14·39	13·89	14·33	13·96	14·26	14·02	14·20	14·08	14·14	14·14	20
21	15·11	14·59	15·04	14·65	14·98	14·72	14·91	14·78	14·85	14·85	21
22	15·83	15·28	15·76	15·35	15·69	15·42	15·62	15·49	15·56	15·56	22
23	16·54	15·98	16·47	16·05	16·40	16·12	16·33	16·19	16·26	16·26	23
24	17·26	16·67	17·19	16·75	17·12	16·82	17·04	16·90	16·97	16·97	24
25	17·98	17·37	17·91	17·44	17·83	17·52	17·75	17·60	17·68	17·68	25
26	18·70	18·06	18·62	18·14	18·54	18·22	18·46	18·30	18·38	18·38	26
27	19·42	18·76	19·34	18·84	19·26	18·92	19·17	19·01	19·09	19·09	27
28	20·14	19·45	20·06	19·54	19·97	19·63	19·89	19·71	19·80	19·80	28
29	20·86	20·15	20·77	20·24	20·68	20·33	20·60	20·42	20·51	20·51	29
30	21·58	20·84	21·49	20·93	21·40	21·03	21·31	21·12	21·21	21·21	30
31	22·30	21·53	22·21	21·63	22·11	21·73	22·02	21·82	21·92	21·92	31
32	23·02	22·23	22·92	22·33	22·82	22·43	22·73	22·53	22·63	22·63	32
33	23·74	22·92	23·64	23·03	23·54	23·13	23·44	23·23	23·33	23·33	33
34	24·46	23·62	24·35	23·72	24·25	23·83	24·15	23·94	24·04	24·04	34
35	25·18	24·31	25·07	24·42	24·96	24·53	24·86	24·64	24·75	24·75	35
36	25·90	25·01	25·79	25·12	25·68	25·23	25·57	25·34	25·46	25·46	36
37	26·62	25·70	26·50	25·82	26·39	25·93	26·28	26·05	26·16	26·16	37
38	27·33	26·40	27·22	26·52	27·10	26·63	26·99	26·75	26·87	26·87	38
39	28·05	27·09	27·94	27·21	27·82	27·34	27·70	27·46	27·58	27·58	39
40	28·77	27·79	28·65	27·91	28·53	28·04	28·41	28·16	28·28	28·28	40
41	29·49	28·48	29·37	28·61	29·24	28·74	29·12	28·86	28·99	28·99	41
42	30·21	29·18	30·08	29·31	29·96	29·44	29·83	29·57	29·70	29·70	42
43	30·93	29·87	30·80	30·00	30·67	30·14	30·54	30·27	30·41	30·41	43
44	31·65	30·56	31·52	30·70	31·38	30·84	31·25	30·98	31·11	31·11	44
45	32·37	31·26	32·23	31·40	32·10	31·54	31·96	31·68	31·82	31·82	45
46	33·09	31·95	32·95	32·10	32·81	32·24	32·67	32·38	32·53	32·53	46
47	33·81	32·65	33·67	32·80	33·52	32·94	33·38	33·09	33·23	33·23	47
48	34·53	33·34	34·38	33·49	34·24	33·64	34·09	33·79	33·94	33·94	48
49	35·25	34·04	35·10	34·19	34·95	34·34	34·80	34·50	34·65	34·65	49
50	35·97	34·73	35·82	34·89	35·66	35·05	35·51	35·20	35·36	35·36	50
Distance.	Dep.	Lat.	Dep.	Lat.	Dep.	Lat.	Dep.	Lat.	Dep.	Lat.	Distance.
	46 Deg.		45¾ Deg.		45½ Deg.		45¼ Deg.		45 Deg.		

Distance.	44 Deg.		44¼ Deg.		44½ Deg.		44¾ Deg.		45 Deg.		Distance.
	Lat.	Dep.	Lat.	Dep.	Lat.	Dep.	Lat.	Dep.	Lat.	Dep.	
51	36·69	35·43	36·53	35·59	36·38	35·75	36·22	35·90	36·06	36·06	51
52	37·41	36·12	37·25	36·29	37·09	36·45	36·93	36·61	36·77	36·77	52
53	38·12	36·82	37·96	36·98	37·80	37·15	37·64	37·31	37·48	37·48	53
54	38·84	37·51	38·68	37·68	38·52	37.85	38·35	38·02	38·18	38·18	54
55	39·56	38·21	39·40	38·38	39·23	38·55	39·06	38·72	38·89	38·89	55
56	40·28	38·90	40·11	39·08	39·94	39·25	39·77	39·42	39·60	39·60	56
57	41·00	39·60	40·83	39·77	40·66	39·95	40·48	40·13	40·31	40·31	57
58	41·72	40·29	41·55	40·47	41·37	40·65	41·19	40·83	41·01	41·01	58
59	42·44	40·98	42·26	41·17	42·08	41·35	41·90	41·54	41·72	41·72	59
60	43·16	41·68	42·98	41·87	42·79	42·05	42·61	42·24	42·43	42·43	60
61	43·88	42·37	43·69	42·57	43·51	42·76	43·32	42·94	43·13	43·13	61
62	44·60	43·07	44·41	43·26	44·22	43·46	44·03	43·65	43·84	43·84	62
63	45·32	43·76	45·13	43·96	44·93	44·16	44·74	44·35	44·55	44·55	63
64	46·04	44·46	45·84	44·66	45·65	44·86	45·45	45·06	45·25	45·25	64
65	46·76	45·15	46·56	45·36	46·36	45·56	46·16	45·76	45·96	45·96	65
66	47·48	45·85	47·28	46·05	47·07	46·26	46·87	46·46	46·67	46·67	66
67	48·20	46·54	47·99	46·75	47·79	46·96	47·58	47·17	47·38	47·38	67
68	48·92	47·24	48·71	47·45	48·50	47·66	48·29	47·87	48·08	48·08	68
69	49·63	47·93	49·42	48·15	49·21	48·36	49·00	48·58	48·79	48·79	69
70	50·35	48·63	50·14	48·85	49·93	49·06	49·71	49·28	49·50	49·50	70
71	51·07	49·32	50·86	49·54	50·64	49·76	50·42	49·98	50·20	50·20	71
72	51·79	50·02	51·57	50·24	51·35	50·47	51·13	50·69	50·91	50·91	72
73	52·51	50·71	52·29	50·94	52·07	51·17	51·84	51·39	51·62	51·62	73
74	53·23	51·40	53·01	51·64	52·78	51·87	52·55	52·10	52·33	52·33	74
75	53·95	52·10	53·72	52·33	53·49	52·57	53·26	52·80	53·03	53·03	75
76	54·67	52·79	54·44	53·03	54·21	53·27	53·97	53·51	53·74	53·74	76
77	55·39	53·49	55·16	53·73	54·92	53·97	54·68	54·21	54·45	54·45	77
78	56·11	54·18	55·87	54·43	55·63	54·67	55·39	54·91	55·15	55·15	78
79	56·83	54·88	56·59	55·13	56·35	55·37	56·10	55·62	55·86	55·86	79
80	57·55	55·57	57·30	55·82	57·06	56·07	56·81	56·32	56·57	56·57	80
81	58·27	56·27	58·02	56·52	57·77	56·77	57·52	57·03	57·28	57·28	81
82	58·99	56·96	58·74	57·22	58·49	57·47	58·24	57·73	57·98	57·98	82
83	59·71	57·56	59·45	57·92	59·20	58·18	58·95	58·43	58·69	58·69	83
84	60·42	58·35	60·17	58·61	59·91	58·88	59·66	59·14	59·40	59·40	84
85	61·14	59·05	60·89	59·31	60·63	59·58	60·37	59·84	60·10	60·10	85
86	61·86	59·74	61·60	60·01	61·34	60·28	61·08	60·55	60·81	60·81	86
87	62·58	60·44	62·32	60·71	62·05	60·98	61·79	61·25	61·52	61·52	87
88	63·30	61·13	63·03	61·41	62·77	61·68	62·50	61·95	62·23	62·23	88
89	64·02	61·82	63·75	62·10	63·48	62·38	63·21	62·66	62·93	62·93	89
90	64·74	62·52	64·47	62·80	64·19	63·08	63·92	63·36	63·64	63·64	90
91	65·46	63·21	65·18	63·50	64·91	63·78	64·63	64·07	64·35	64·35	91
92	66·18	63·91	65·90	64·20	65·62	64·48	65·34	64·77	65·05	65·05	92
93	66·90	64·60	66·62	64·89	66·33	65·18	66·05	65·47	65·76	65·76	93
94	67·62	65·30	67·33	65·59	67·05	65·89	66·76	66·18	66·47	66·47	94
95	68·34	65·99	68·05	66·29	67·76	66·59	67·47	66·88	67·18	67·18	95
96	69·06	66·69	68·76	66·99	68·47	67·29	68·18	67·59	67·88	67·88	96
97	69·78	67·38	69·48	67·69	69·19	67·99	68·89	68·29	68·59	68·59	97
98	70·50	68·08	70·20	68·38	69·90	68·69	69·60	68·99	69·30	69·30	98
99	71·21	68·77	70·91	69·08	70·61	69·39	70·31	69·70	70·00	70·00	99
100	71·93	69·47	71·63	69·78	71·33	70·09	71·02	70·40	70·71	70·71	100
Distance.	Dep.	Lat.	Dep.	Lat.	Dep.	Lat.	Dep.	Lat.	Dep.	Lat.	Distance.
	46 Deg.		45¾ Deg.		45½ Deg.		45¼ Deg.		45 Deg.		

′	0°	1°	2°	3°	4°	5°	6°	7°	′
0	·000 0000	·017 4524	·034 8995	·052 3360	·069 7565	·087 1557	·104 5285	·121 8693	60
1	2909	7432	·035 1902	6264	·070 0467	4455	8178	·122 1581	59
2	5818	·018 0341	4809	9169	3368	7353	·105 1070	4468	58
3	8727	3249	7716	·053 2074	6270	·088 0251	3963	7355	57
4	·001 1636	6158	·036 0623	4979	9171	3148	6856	·123 0241	56
5	4544	9066	3530	7883	·071 2073	6046	9748	3128	55
6	7453	·019 1974	6437	·054 0788	4974	8943	·106 2641	6015	54
7	·002 0362	4883	9344	3693	7876	·089 1840	5533	8901	53
8	3271	7791	·037 2251	6597	·072 0777	4738	8425	·124 1788	52
9	6180	·020 0699	5158	9502	3678	7635	·107 1318	4674	51
10	9089	3608	8065	·055 2406	6580	·090 0532	4210	7560	50
11	·003 1998	6516	·038 0971	5311	9481	3429	7102	·125 0446	49
12	4907	9424	3878	8215	·073 2382	6326	9994	3332	48
13	7815	·021 2332	6785	·056 1119	5283	9223	·108 2885	6218	47
14	·004 0724	5241	9692	4024	8184	·091 2119	5777	9104	46
15	3633	8149	·039 2598	6928	·074 1085	5016	8669	·126 1990	45
16	6542	·022 1057	5505	9832	3986	7913	·109 1560	4875	44
17	9451	3965	8411	·057 2736	6887	·092 0809	4452	7761	43
18	·005 2360	6873	·040 1318	5640	9787	3706	7343	·127 0646	42
19	5268	9781	4224	8544	·075 2688	6602	·110 0234	3531	41
20	8177	·023 2690	7131	·058 1448	5589	9499	3126	6416	40
21	·006 1086	5598	·041 0037	4352	8489	·093 2395	6017	9302	39
22	3995	8506	2944	7256	·076 1390	5291	8908	·128 2186	38
23	6904	·024 1414	5850	·059 0160	4290	8187	·111 1799	5071	37
24	9813	4322	8757	3064	7190	·094 1083	4689	7956	36
25	·007 2721	7230	·042 1663	5967	·077 0091	3979	7580	·129 0841	35
26	5630	·025 0138	4569	8871	2991	6875	·112 0471	3725	34
27	8539	3046	7475	·060 1775	5891	9771	3361	6609	33
28	·008 1448	5954	·043 0382	4678	8791	·095 2666	6252	9494	32
29	4357	8862	3288	7582	·078 1691	5562	9142	·130 2378	31
30	7265	·026 1769	6194	·061 0485	4591	8458	·113 2032	5262	30
31	·009 0174	4677	9100	3389	7491	·096 1353	4922	8146	29
32	3083	7585	·044 2006	6292	·079 0391	4248	7812	·131 1030	28
33	5992	·027 0493	4912	9196	3290	7144	·114 0702	3913	27
34	8900	3401	7818	·062 2099	6190	·097 0039	3592	6797	26
35	·010 1809	6309	·045 0724	5002	9090	2934	6482	9681	25
36	4718	9216	3630	7905	·080 1989	5829	9372	·132 2564	24
37	7627	·028 2124	6536	·063 0808	4889	8724	·115 2261	5447	23
38	·011 0535	5032	9442	3711	7788	·098 1619	5151	8330	22
39	3444	7940	·046 2347	6614	·081 0687	4514	8040	·133 1213	21
40	6353	·029 0847	5253	9517	3587	7408	·116 0929	4096	20
41	9261	3755	8159	·064 2420	6486	·099 0303	3818	6979	19
42	·012 2170	6662	·047 1065	5323	9385	3197	6707	9862	18
43	5079	9570	3970	8226	·082 2284	6092	9596	·134 2744	17
44	7987	·030 2478	6876	·065 1129	5183	8986	·117 2485	5627	16
45	·013 0896	5385	9781	4031	8082	·100 1881	5374	8509	15
46	3805	8293	·048 2687	6934	·083 0981	4775	8263	·135 1392	14
47	6713	·031 1200	5592	9836	3880	7669	·118 1151	4274	13
48	9622	4108	8498	·066 2739	6778	·101 0563	4040	7156	12
49	·014 2530	7015	·049 1403	5641	9677	3457	6928	·136 0038	11
50	5439	9922	4308	8544	·084 2576	6351	9816	2919	10
51	8348	·032 2830	7214	·067 1446	5474	9245	·119 2704	5801	9
52	·015 1256	5737	·050 0119	4349	8373	·102 2138	5593	8683	8
53	4165	8644	3024	7251	·085 1271	5032	8481	·137 1564	7
54	7073	·033 1552	5929	·068 0153	4169	7925	·120 1368	4445	6
55	9982	4459	8835	3055	7067	·103 0819	4256	7327	5
56	·016 2890	7366	·051 1740	5957	9966	3712	7144	·138 0208	4
57	5799	·034 0274	4645	8859	·086 2864	6605	·121 0031	3089	3
58	8707	3181	7550	·069 1761	5762	9499	2919	5970	2
59	·017 1616	6088	·052 0455	4663	8660	·104 2392	5806	8850	1
60	4524	8995	3360	7565	·087 1557	5285	8693	·139 1731	0
′	89°	88°	87°	86°	85°	84°	83°	82°	′

/	8°	9°	10°	11°	12°	13°	14°	15°	/
0	·139 1731	·156 4345	·173 6482	·190 8090	·207 9117	·224 9511	·241 9219	·258 8190	60
1	4612	7218	9346	·191 0945	·208 1962	·225 2345	·242 2041	·259 1000	59
2	7492	·157 0091	·174 2211	3801	4807	5179	4863	3810	58
3	·140 0372	2963	5075	6656	7652	8013	7685	6619	57
4	3252	5836	7939	9510	·209 0497	·226 0846	·243 0507	9428	56
5	6132	8708	·175 0803	·192 2365	3341	3680	3329	·260 2237	55
6	9012	·158 1581	3667	5220	6186	6513	6150	5045	54
7	·141 1892	4453	6531	8074	9030	9346	8971	7853	53
8	4772	7325	9395	·193 0928	·210 1874	·227 2179	·244 1792	·261 0662	52
9	7651	·159 0197	·176 2258	3782	4718	5012	4613	3469	51
10	·142 0531	3069	5121	6636	7561	7844	7433	6277	50
11	3410	5940	7984	9490	·211 0405	·228 0677	·245 0254	9085	49
12	6289	8812	·177 0847	·194 2344	3248	3509	3074	·262 1892	48
13	9168	·160 1683	3710	5197	6091	6341	5894	4699	47
14	·143 2047	4555	6573	8050	8934	9172	8713	7506	46
15	4926	7426	9435	·195 0903	·212 1777	·229 2004	·246 1533	·263 0312	45
16	7805	·161 0297	·178 2298	3756	4619	4835	4352	3118	44
17	·144 0684	3167	5160	6609	7462	7666	7171	5925	43
18	3562	6038	8022	9461	·213 0304	·230 0497	9990	8730	42
19	6440	8909	·179 0884	·196 2314	3146	3328	·247 2809	·264 1536	41
20	9319	·162 1779	3746	5166	5988	6159	5627	4342	40
21	·145 2197	4650	6607	8018	8829	8989	8445	7147	39
22	5075	7520	9469	·197 0870	·214 1671	·231 1819	·248 1263	9952	38
23	7953	·163 0390	·180 2330	3722	4512	4649	4081	·265 2757	37
24	·146 0830	3260	5191	6573	7353	7479	6899	5561	36
25	3708	6129	8052	9425	·215 0194	·232 0309	9716	8366	35
26	6585	8999	·181 0913	·198 2276	3035	3138	·249 2533	·266 1170	34
27	9463	·164 1868	3774	5127	5876	5967	5350	3973	33
28	·147 2340	4738	6635	7978	8716	8796	8167	6777	32
29	5217	7607	9495	·199 0829	·216 1556	·233 1625	·250 0984	9581	31
30	8094	·165 0476	·182 2355	3679	4396	4454	3800	·267 2384	30
31	·148 0971	3345	5215	6530	7236	7282	6616	5187	29
32	3848	6214	8075	9380	·217 0076	·234 0110	9432	7989	28
33	6724	9082	·183 0935	·200 2230	2915	2938	·251 2248	·268 0792	27
34	9601	·166 1951	3795	5080	5754	5766	5063	3594	26
35	·149 2477	4819	6654	7930	8593	8594	7879	6396	25
36	5353	7687	9514	·201 0779	·218 1432	·235 1421	·252 0694	9198	24
37	8230	·167 0556	·184 2373	3629	4271	4248	3508	·269 2000	23
38	·150 1106	3423	5232	6478	7110	7075	6323	4801	22
39	3981	6291	8091	9327	9948	9902	9137	7602	21
40	6857	9159	·185 0949	·202 2176	·219 2786	·236 2729	·253 1952	·270 0403	20
41	9733	·168 2026	3808	5024	5624	5555	4766	3204	19
42	151 2608	4894	6666	7873	8462	8381	7579	6004	18
43	5484	7761	9524	·203 0721	·220 1300	·237 1207	·254 0393	8805	17
44	8359	·169 0628	·186 2382	3569	4137	4033	3206	·271 1605	16
45	·152 1234	3495	5240	6418	6974	6859	6019	4404	15
46	4109	6362	8098	9265	9811	9684	8832	7204	14
47	6984	9228	·187 0956	·204 2113	·221 2648	·238 2510	·255 1645	·272 0003	13
48	9858	·170 2095	3813	4961	5485	5335	4458	2802	12
49	·153 2733	4961	6670	7808	8321	8159	7270	5601	11
50	5607	7828	9528	·205 0655	·222 1158	·239 0984	·256 0082	8400	10
51	8482	·171 0694	·188 2385	3502	3994	3808	2894	·273 1198	9
52	·154 1356	3560	5241	6349	6830	6633	5705	3997	8
53	4230	6425	8098	9195	9666	9457	8517	6794	7
54	7104	9291	·189 0954	·206 2042	·223 2501	·240 2280	·257 1328	9592	6
55	9978	·172 2156	3811	4888	5337	5104	4139	·274 2390	5
56	·155 2851	5022	6667	7734	8172	7927	6950	5187	4
57	5725	7887	9523	·207 0580	·224 1007	·241 0751	9760	7984	3
58	8598	·173 0752	·190 2379	3426	3842	3574	·258 2570	·275 0781	2
59	·156 1472	3617	5234	6272	6676	6396	5381	3577	1
60	4345	6482	8090	9117	9511	9219	8190	6374	0
/	81°	80°	79°	78°	77°	76°	75°	74°	/

/	16°	17°	18°	19°	20°	21°	22°	23°	/
0	·275 6374	·292 3717	·309 0170	·325 5682	·342 0201	·358 3679	·374 6066	·390 7311	60
1	9170	6499	2936	8432	2935	6395	8763	9989	59
2	·276 1965	9280	5702	·326 1182	5668	9110	·375 1459	·391 2666	58
3	4761	·293 2061	8468	3932	8400	·359 1825	4156	5343	57
4	7556	4842	·310 1234	6681	·343 1133	4540	6852	8019	56
5	·277 0352	7623	3999	9430	3865	7254	9547	·392 0695	55
6	3147	·294 0403	6764	·327 2179	6597	9968	·376 2243	3371	54
7	5941	3183	9529	4928	9329	·360 2682	4938	6047	53
8	8736	5963	·311 2294	7676	·344 2060	5395	7632	8722	52
9	·278 1530	8743	5058	·328 0424	4791	8108	·377 0327	·393 1397	51
10	4324	·295 1522	7822	3172	7521	·361 0821	3021	4071	50
11	7118	4302	·312 0586	5919	·345 0252	3534	5714	6745	49
12	9911	7081	3349	8666	2982	6246	8408	9419	48
13	·279 2704	9859	6112	·329 1413	5712	8958	·378 1101	·394 2093	47
14	5497	·296 2638	8875	4160	8441	·362 1669	3794	4766	46
15	8290	5416	·313 1638	6906	·346 1171	4380	6486	7439	45
16	·280 1083	8194	4400	9655	3900	7091	9178	·395 0111	44
17	3875	·297 0971	7163	·330 2398	6628	9802	·379 1870	2783	43
18	6667	3749	9925	5144	9357	·363 2512	4562	5455	42
19	9459	6526	·314 2680	7889	·347 2085	5222	7253	8127	41
20	·281 2251	9303	5448	·331 0634	4812	7932	9944	·396 0798	40
21	5042	·298 2079	8209	3378	7540	·364 0641	·380 2134	3468	39
22	7833	4856	·315 0969	6123	·348 0267	3351	5324	6139	38
23	·282 0624	7632	3730	8867	2994	6059	8014	8809	37
24	3415	·299 0408	6490	·332 1611	5720	8768	·381 0704	·397 1479	36
25	6205	3184	9250	4355	8447	·365 1476	3393	4148	35
26	8995	5959	·316 2010	7098	·349 1173	4184	6082	6818	34
27	·283 1785	8734	4770	9841	3898	6891	8770	9486	33
28	4575	·300 1509	7529	·333 2584	6624	9599	·382 1459	·398 2155	32
29	7364	4284	·317 0288	5326	9349	·366 2306	4147	4823	31
30	·284 0153	7058	3047	8069	·350 2074	5012	6834	7491	30
31	2942	9832	5805	·334 0810	4798	7719	9522	·399 0158	29
32	5731	·301 2606	8563	3552	7523	·367 0425	·383 2209	2825	28
33	8520	5380	·318 1321	6295	·351 0246	3130	4895	5492	27
34	·285 1308	8153	4079	9034	2970	5836	7582	8158	26
35	4096	·302 0926	6836	·335 1775	5693	8541	·384 0268	·400 0825	25
36	6884	3699	9593	4516	8416	·368 1246	2953	3490	24
37	9671	6471	·319 2350	7256	·352 1139	3950	5639	6156	23
38	·286 2458	9244	5106	9996	3862	6654	8324	8821	22
39	5246	·303 2016	7863	·336 2735	6584	9358	·385 1008	·401 1486	21
40	8032	4788	·320 0619	5475	9306	·369 2061	3693	4150	20
41	·287 0819	7559	3374	8214	·353 2027	4765	6377	6814	19
42	3605	·304 0331	6130	·337 0953	4748	7468	9060	9478	18
43	6391	3102	8885	3691	7469	·370 0170	·386 1744	·402 2141	17
44	9177	5872	·321 1640	6429	·354 0190	2872	4427	4804	16
45	·288 1963	8643	4395	9167	2910	5574	7110	7467	15
46	4748	·305 1413	7149	·338 1905	5630	8276	9792	·403 0129	14
47	7533	4183	9903	4642	8350	·371 0977	·387 2474	2791	13
48	·289 0318	6953	·322 2657	7379	·355 1070	3678	5156	5453	12
49	3103	9723	5411	·339 0116	3789	6379	7837	8114	11
50	5887	·306 2492	8164	2852	6508	9079	·388 0518	·404 0775	10
51	8671	5261	·323 0917	5589	9226	·372 1780	3199	3436	9
52	·290 1455	8030	3670	8325	·356 1944	4479	5880	6096	8
53	4239	·307 0798	6422	·340 1060	4662	7179	8560	8756	7
54	7022	3566	9174	3796	7380	9878	·389 1240	·405 1416	6
55	9805	6334	·324 1926	6531	·357 0097	·373 2577	3919	4075	5
56	·291 2588	9102	4678	9265	2814	5275	6598	6734	4
57	5371	·308 1869	7429	·341 2000	5531	7973	9277	9393	3
58	8153	4636	·325 0180	4734	8248	·374 0671	·390 1955	·406 2051	2
59	·292 0935	7403	2931	7468	·358 0964	3369	4633	4709	1
60	3717	·309 0170	5682	·342 0201	3679	6066	7311	7366	0
/	73°	72°	71°	70°	69°	68°	67°	66°	/

/	24°	25°	26°	27°	28°	29°	30°	31°	/
0	·406 7366	·422 6183	·438 3711	·453 9905	·469 4716	·484 8096	·500 0000	·515 0381	60
1	·407 0024	8819	6326	·454 2497	7284	·485 0640	2519	2874	59
2	2681	·423 1455	8940	5088	9852	3184	5037	5367	58
3	5337	4090	·439 1553	7679	·470 2419	5727	7556	7859	57
4	7993	6725	4166	·455 0269	4986	8270	·501 0073	·516 0351	56
5	·408 0649	9360	6779	2859	7553	·486 0812	2591	2842	55
6	3305	·424 1994	9392	5449	·471 0119	3354	5107	5333	54
7	5960	4628	·440 2004	8038	2685	5895	7624	7824	53
8	8615	7262	4615	·456 0627	5250	8436	·502 0140	·517 0314	52
9	·409 1269	9895	7227	3216	7815	·487 0977	2655	2804	51
10	3923	·425 2528	9838	5804	·472 0380	3517	5170	5293	50
11	6577	5161	·441 2448	8392	2944	6057	7685	7782	49
12	9230	7793	5059	·457 0979	5508	8597	·503 0199	·518 0270	48
13	·410 1883	·426 0425	7668	3566	8071	·488 1136	2713	2758	47
14	4536	3056	·442 0278	6153	·473 0634	3674	5227	5246	46
15	7189	5687	2887	8739	3197	6212	7740	7733	45
16	9841	8318	5496	·458 1325	5759	8750	·504 0252	519 0219	44
17	·411 2492	·427 0949	8104	3910	8321	·489 1288	2765	2705	43
18	5144	3579	·443 0712	6496	·474 0882	3825	5276	5191	42
19	7795	6208	3319	9080	3443	6361	7788	7676	41
20	·412 0445	8838	5927	·459 1665	6004	8897	·505 0298	·520 0161	40
21	3096	·428 1467	8534	4248	8564	·490 1433	2809	2646	39
22	5745	4095	·444 1140	6832	·475 1124	3968	5319	5130	38
23	8395	6723	3746	9415	3683	6503	7828	7613	37
24	·413 1044	9351	6352	·460 1998	6242	9038	·506 0338	521 0096	36
25	3693	·429 1979	8957	4580	8801	·491 1572	2846	2579	35
26	6342	4606	·445 1562	7162	·476 1359	4105	5355	5061	34
27	8990	7233	4167	9744	3917	6638	7863	7543	33
28	·414 1638	9859	6771	·461 2325	6474	9171	·507 0370	·522 0024	32
29	4285	·430 2485	9375	4906	9031	·492 1704	2877	2505	31
30	6932	5111	·446 1978	7486	·477 1588	4236	5384	4986	30
31	9579	7736	4581	·462 0066	4144	6767	7890	7466	29
32	·415 2226	·431 0361	7184	2646	6700	9298	·508 0396	9945	28
33	4872	2986	9786	5225	9255	·493 1829	2901	·523 2424	27
34	7517	5610	·447 2388	7804	·478 1810	4359	5406	4903	26
35	·416 0163	8234	4990	·463 0382	4364	6889	7910	7381	25
36	2808	·432 0857	7591	2960	6919	9419	·509 0414	9859	24
37	5453	3481	·448 0192	5538	9472	·494 1948	2918	·524 2336	23
38	8097	6103	2792	8115	·479 2026	4476	5421	4813	22
39	·417 0741	8726	5392	·464 0692	4579	7005	7924	7290	21
40	3385	·433 1348	7992	3269	7131	9532	·510 0426	9766	20
41	6028	3970	·449 0591	5845	9683	·495 2060	2928	·525 2241	19
42	8671	6591	3190	8420	·480 2235	4587	5429	4717	18
43	·418 1313	9212	5789	·465 0996	4786	7113	7930	7191	17
44	3956	·434 1832	8387	3571	7337	9639	·511 0431	9665	16
45	6597	4453	·450 0984	6145	9888	·496 2165	2931	·526 2139	15
46	9239	7072	3582	8719	·481 2438	4690	5431	4613	14
47	·419 1880	9692	6179	·466 1293	4987	7215	7930	7085	13
48	4521	·435 2311	8775	3866	7537	9740	·512 0429	9558	12
49	7161	4930	·451 1372	6439	·482 0086	·497 2264	2927	·527 2030	11
50	9801	7548	3967	9012	2634	4787	5425	4502	10
51	·420 2441	·436 0166	6563	·467 1584	5182	7310	7923	6973	9
52	5080	2784	9158	4156	7730	9833	·513 0420	9443	8
53	7719	5401	·452 1753	6727	·483 0277	·498 2355	2916	·528 1914	7
54	·421 0358	8018	4347	9298	2824	4877	5413	4383	6
55	2996	·437 0634	6941	·468 1869	5370	7399	7908	6852	5
56	5634	3251	9535	4439	7916	9920	·514 0404	9322	4
57	8272	5866	·453 2128	7009	·484 0462	·499 2441	2899	·529 1790	3
58	·422 0909	8482	4721	9578	3007	4961	5393	4258	2
59	3546	·438 1097	7313	·469 2147	5552	7481	7887	6726	1
60	6183	3711	9905	4716	8096	·500 0000	·515 0381	9193	0
/	65°	64°	63°	62°	61°	60°	59°	58°	/

′	32°	33°	34°	35°	36°	37°	38°	39°	′
0	·529 9193	·544 6390	·559 1929	·573 5764	·587 7853	·601 8150	·615 6615	·629 3204	60
1	·530 1659	8830	4340	8147	·588 0206	·602.0473	8907	5464	59
2	4125	·545 1269	6751	·574 0529	2558	2795	·616 1198	7724	58
3	6591	3707	9162	2911	4910	5117	3489	9983	57
4	9057	6145	·560 1572	5292	7262	7439	5780	·630 2242	56
5	·531 1521	8583	3981	7672	9613	9760	8069	4500	55
6	3986	·546 1020	6390	·575 0053	·589 1964	·603 2080	·617 0359	6758	54
7	6450	3456	8798	2432	4314	4400	2648	9015	53
8	8913	5892	·561 1206	4811	6663	6719	4936	·631 1272	52
9	·532 1376	8328	3614	7190	9012	9038	7224	3528	51
10	3839	·547 0763	6021	9568	·590 1361	.604 1356	9511	5784	50
11	6301	3198	8428	·576.1946	3709	3674	·618 1798	8039	49
12	8763	5632	·562 0834	4323	6057	5991	4084	·632 0293	48
13	·533 1224	8066	3239	6700	8404	8308	6370	2547	47
14	3685	·548 0499	5645	9076	·591 0750	·605 0624	8655	4800	46
15	6145	2932	8049	·577 1452	3096	2940	·619 0939	7053	45
16	8605	5365	·563 0453	3827	5442	5255	3224	9306	44
17	·534 1065	7797	2857	6202	7787	7570	5507	·633 1557	43
18	3523	·549 0228	5260	8576	·592 0132	9884	7790	3809	42
19	5982	2659	7663	·578 0950	2476	·606 2198	·620 0073	6059	41
20	8440	5090	·564 0066	3323	4819	4511	2355	8310	40
21	·535 0898	7520	2467	5696	7163	6824	4636	·634 0559	39
22	3355	9950	4869	8069	9505	9136	6917	2808	38
23	5812	·550 2379	7270	·579 0440	·593 1847	·607 1447	9198	5057	37
24	8268	4807	9670	2812	4189	3758	·621 1478	7305	36
25	·536 0724	7236	·565 2070	5183	6530	6069	3757	9553	35
26	3179	9663	4469	7553	8871	8379	6036	·635 1800	34
27	5634	·551 2091	6868	9923	·594 1211	·608 0689	8314	4046	33
28	8089	4518	9267	·580 2292	3550	2998	·622 0592	6292	32
29	·537 0543	6944	·566.1665	4661	5889	5306	2870	8537	31
30	2996	9370	4062	7030	8228	7614	5146	·636 0782	30
31	5449	·552 1795	6459	9397	·595 0566	9922	7423	3026	29
32	7902	4220	8856	·581 1765	2904	·609 2229	9698	5270	28
33	·538 0354	6645	·567 1252	4132	5241	4535	·623 1974	7513	27
34	2806	9069	3648	6498	7577	6841	4248	9756	26
35	5257	·553 1492	6043	8864	9913	9147	6522	·637 1998	25
36	7708	3915	8437	·582 1230	·596 2249	·610 1452	8796	4240	24
37	·539 0158	6338	·568 0832	3595	4584	3756	·624 1069	6481	23
38	2608	8760	3225	5959	6918	6060	3342	8721	22
39	5058	·554 1182	5619	8323	9252	8363	5614	·638 0961	21
40	7507	3603	8011	·583 0687	·597 1586	·611 0666	7885	3201	20
41	9955	6024	·569 0403	3050	3919	2969	·625 0156	5440	19
42	·540 2403	8444	2795	5412	6251	5270	2427	7678	18
43	4851	·555 0864	5187	7774	8583	7572	4696	9916	17
44	7298	3283	7577	·584 0136	·598 0915	9873	6966	·639 2153	16
45	9745	5702	9968	2497	3246	·612 2173	9235	4390	15
46	·541 2191	8121	·570 2357	4857	5577	4473	·626 1503	6626	14
47	4637	·556 0539	4747	7217	7906	6772	3771	8862	13
48	7082	2956	7136	9577	·599 0236	9071	6038	·640 1097	12
49	9527	5373	9524	·585 1936	2565	·613 1369	8305	3332	11
50	·542 1971	7790	·571 1912	4294	4893	3666	·627 0571	5566	10
51	4415	·557 0206	4299	6652	7221	5964	2837	7799	9
52	6859	2621	6686	9010	9549	8260	5102	·641 0032	8
53	9302	5036	9073	·586 1367	·600 1876	·614 0556	7366	2264	7
54	·543 1744	7451	·572 1459	3724	4202	2852	9631	4496	6
55	4187	9865	3844	6080	6528	5147	·628 1894	6728	5
56	6628	·558 2279	6229	8435	8854	7442	4157	8958	4
57	9069	4692	8614	·587 0790	·601 1179	9736	6420	·642 1189	3
58	·544 1510	7105	·573 0998	3145	3503	·615 2029	8682	3418	2
59	3951	9517	3381	5499	5827	4322	0943	5647	1
60	6390	·559 1929	5764	7853	8150	6615	·629 3204	7876	0
′	57°	56°	55°	54°	53°	52°	51°	50°	′

′	40°	41°	42°	43°	44°	45°	46°	47°	′
0	·642 7876	·656 0590	·669 1306	·681 9984	·694 6584	·707 1068	·719 3398	·731 3537	60
1	·643 0104	2785	3468	·682 2111	8676	3124	5418	5521	59
2	2332	4980	5628	4237	·695 0767	5180	7438	7505	58
3	4559	7174	7789	6363	2858	7236	9457	9488	57
4	6785	9367	9948	8489	4949	9291	·720 1476	·732 1467	56
5	9011	·657 1560	·670 2108	·683 0613	7039	·708 1345	3494	3449	55
6	·644 1236	3752	4266	2738	9128	3398	5511	5429	54
7	3461	5944	6424	4861	·696 1217	5451	7528	7409	53
8	5685	8135	8582	6984	3305	7504	9544	9388	52
9	7909	·658 0326	·671 0739	9107	5392	9556	·721 1559	·733 1367	51
10	·645 0132	2516	2895	·684 1229	7479	·709 1607	3574	3345	50
11	2355	4706	5051	3350	9565	3657	5589	5322	49
12	4577	6895	7206	5471	·697 1651	5707	7602	7299	48
13	6798	9083	9361	7591	3736	7757	9615	9275	47
14	9019	·659 1271	·672 1515	9711	5821	9806	·722 1628	·734 1250	46
15	·646 1240	3458	3668	·685 1830	7905	·710 1854	3640	3225	45
16	3460	5645	5821	3948	9988	3901	5651	5199	44
17	5679	7831	7973	6066	·698 2071	5948	7661	7173	43
18	7898	·660 0017	·673 0125	8184	4153	7995	9671	9146	42
19	·647 0116	2202	2276	·686 0300	6234	·711 0041	·723 1681	·735 1118	41
20	2334	4386	4427	2416	8315	2086	3690	3090	40
21	4551	6570	6577	4532	·699 0396	4130	5698	5061	39
22	6767	8754	8727	6647	2476	6174	7705	7032	38
23	8984	·661 0936	·674 0876	8761	4555	8218	9712	9002	37
24	·648 1199	3119	3024	·687 0875	6633	·712 0260	·724 1719	·736 0971	36
25	3414	5300	5172	2988	8711	2303	3724	2940	35
26	5628	7482	7319	5101	·700 0789	4344	5729	4908	34
27	7842	9662	9466	7213	2866	6385	7734	6875	33
28	·649 0056	·662 1842	·675 1612	9325	4942	8426	9738	8842	32
29	2268	4022	3757	·688 1435	7018	·713 0465	·725 1741	·737 0808	31
30	4480	6200	5902	3546	9093	2504	3744	2773	30
31	6692	8379	8046	5655	·701 1167	4543	5746	4738	29
32	8903	·663 0557	·676 0190	7765	3241	6581	7747	6703	28
33	·650 1114	2734	2333	9873	5314	8618	9748	8666	27
34	3324	4910	4476	·689 1981	7387	·714 0655	·726 1748	·738 0629	26
35	5533	7087	6618	4089	9459	2691	3748	2592	25
36	7742	9262	8760	6195	·702 1531	4727	5747	4553	24
37	9951	·664 1437	·677 0901	8302	3601	6762	7745	6515	23
38	·651 2158	3612	3041	·690 0407	5672	8796	9743	8475	22
39	4366	5785	5181	2512	7741	·715 0830	·727 1740	·739 0435	21
40	6572	7959	7320	4617	9811	2863	3736	2394	20
41	8778	·665 0131	9459	6721	·703 1879	4895	5732	4353	19
42	·652 0984	2304	·678 1597	8824	3947	6927	7728	6311	18
43	3189	4475	3734	·691 0927	6014	8959	9722	8268	17
44	5394	6646	5871	3029	8081	·716 0989	·728 1716	·740 0225	16
45	7598	8817	8007	5131	·704 0147	3019	3710	2181	15
46	9801	·666 0987	·679 0143	7232	2213	5049	5703	4137	14
47	·653 2004	3156	2278	9332	4278	7078	7695	6092	13
48	4206	5325	4413	·692 1432	6342	9106	9686	8046	12
49	6408	7493	6547	3531	8406	·717 1134	·729 1677	·741 0000	11
50	8609	9661	8681	5630	·705 0469	3161	3668	1953	10
51	·654 0810	·667 1828	·680 0813	7728	2532	5187	5657	3905	9
52	3010	3994	2946	9825	4594	7213	7646	5857	8
53	5209	6160	5078	·693 1922	6655	9238	9635	7808	7
54	7408	8326	7209	4018	8716	·718 1263	·730 1623	9758	6
55	9607	·668 0490	9339	6114	·706 0776	3287	3610	·742 1708	5
56	·655 1804	2655	·681 1469	8209	2835	5310	5597	3658	4
57	4002	4818	3599	·694 0304	4894	7333	7583	5606	3
58	6198	6981	5728	2398	6953	9355	9568	7554	2
59	8395	9144	7856	4491	9011	·719 1377	·731 1553	9502	1
60	·656 0590	·669 1306	9984	6584	·707 1068	3398	3537	·743 1448	0
′	49°	48°	47°	46°	45°	44°	43°	42°	′

′	48°	49°	50°	51°	52°	53°	54°	′
0	·743 1448	·754 7096	·766 0444	·777 1460	·788 0108	·798 6355	·809 0170	60
1	3394	9004	2314	3290	1898	8105	1879	59
2	5340	·755 0911	4183	5120	3688	9855	3588	58
3	7285	2818	6051	6949	5477	·799 1604	5296	57
4	9229	4724	7918	8777	7266	3352	7004	56
5	·744 1173	6630	9785	·778 0604	9054	5100	8710	55
6	3115	8535	·767 1652	2431	·789 0841	6847	·810 0416	54
7	5058	·756 0439	3517	4258	2627	8593	2122	53
8	6999	2342	5382	6084	4413	·800 0338	3826	52
9	8941	4246	7246	7909	6198	2083	5530	51
10	·745 0881	6148	9110	9733	7983	3827	7234	50
11	2821	8050	·768 0973	·779 1557	9767	5571	8936	49
12	4760	9951	2835	3380	·790 1550	7314	·811 0638	48
13	6699	·757 1851	4697	5202	3333	9056	2339	47
14	8636	3751	6558	7024	5115	·801 0797	4040	46
15	·746 0574	5650	8418	8845	6896	2538	5740	45
16	2510	7548	·769 0278	·780 0665	8676	4278	7439	44
17	4446	9446	2137	2485	·791 0456	6018	9137	43
18	6382	·758 1343	3996	4304	2235	7756	·812 0835	42
19	8317	3240	5853	6123	4014	9495	2532	41
20	·747 0251	5136	7710	7940	5792	·802 1232	4229	40
21	2184	7031	9567	9757	7569	2969	5925	39
22	4117	8926	·770 1423	·781 1574	9345	4705	7620	38
23	6049	·759 0820	3278	3390	·792 1121	6440	9314	37
24	7981	2713	5132	5205	2896	8175	·813 1008	36
25	9912	4606	6986	7019	4671	9909	2701	35
26	·748 1842	6498	8840	8833	6445	·803 1642	4393	34
27	3772	8389	·771 0692	·782 0646	8218	3375	6084	33
28	5701	·760 0280	2544	2459	9990	5107	7775	32
29	7629	2170	4395	4270	·793 1762	6838	9466	31
30	9557	4060	6246	6082	3533	8569	·814 1155	30
31	·749 1484	5949	8096	7892	5304	·804 0299	2844	29
32	3411	7837	9945	9702	7074	2028	4532	28
33	5337	9724	·772 1794	·783 1511	8843	3756	6220	27
34	7262	·761 1611	3642	3320	·794 0611	5484	7906	26
35	9187	3497	5489	5127	2379	7211	9593	25
36	·750 1111	5383	7336	6935	4146	8938	·815 1278	24
37	3034	7268	9182	8741	5913	·805 0664	2963	23
38	4957	9152	·773 1027	·784 0547	7678	2389	4647	22
39	6879	·762 1036	2872	2352	9444	4113	6330	21
40	8800	2919	4716	4157	·795 1208	5837	8013	20
41	·751 0721	4802	6559	5961	2972	7560	9695	19
42	2641	6683	8402	7764	4735	9283	·816 1376	18
43	4561	8564	·774 0244	9566	6497	·806 1005	3056	17
44	6480	·763 0445	2086	·785 1368	8259	2726	4736	16
45	8398	2325	3926	3169	·796 0020	4446	6416	15
46	·752 0316	4204	5767	4970	1780	6166	8094	14
47	2233	6082	7606	6770	3540	7885	9772	13
48	4149	7960	9445	8569	5299	9603	·817 1449	12
49	6065	9838	·775 1283	·786 0367	7058	·807 1321	3125	11
50	7980	·764 1714	3121	2165	8815	3038	4801	10
51	9894	3590	4957	3963	·797 0572	4754	6476	9
52	·753 1808	5465	6794	5759	2329	6470	8151	8
53	3721	7340	8629	7555	4084	8185	9824	7
54	5634	9214	·776 0464	9350	5839	9899	·818 1497	6
55	7546	·765 1087	2298	·787 1145	7594	·808 1612	3169	5
56	9457	2960	4132	2939	9347	3325	4841	4
57	·754 1368	4832	5965	4732	·798 1100	5037	6512	3
58	3278	6704	7797	6524	2853	6749	8182	2
59	5187	8574	9629	8316	4604	8460	9852	1
60	7096	·766 0444	·777 1460	·788 0108	6355	·809 0170	·819 1520	0
′	41°	40°	39°	38°	37°	36°	35°	′

/	55°	56°	57°	58°	59°	60°	61°	/
0	·819 1520	·829 0376	·838 6706	·848 0481	·857 1673	·866 0254	·874 6197	60
1	3189	2002	8290	2022	3171	1708	7607	59
2	4856	3628	9873	3562	4668	3161	9016	58
3	6523	5252	·839 1455	5102	6164	4614	·875 0425	57
4	8189	6877	3037	6641	7660	6066	1832	56
5	9854	8500	4618	8179	9155	7517	3239	55
6	·820 1519	·830 0123	6199	9717	·858 0649	8967	4645	54
7	3183	1745	7778	·849 1254	2143	·867 0417	6051	53
8	4846	3366	9357	2790	3635	1866	7455	52
9	6509	4987	·840 0936	4325	5127	3314	8859	51
10	8170	6607	2513	5860	6619	4762	·876 0263	50
11	9832	8226	4090	7394	8109	6209	1665	49
12	·821 1492	9845	5666	8927	9599	7655	3067	48
13	3152	·831 1463	7241	·850 0459	·859 1088	9100	4468	47
14	4811	3080	8816	1991	2576	·868 0544	5868	46
15	6469	4696	·841 0390	3522	4064	1988	7268	45
16	8127	6312	1963	5053	5551	3431	8666	44
17	9784	7927	3536	6582	7037	4874	·877 0064	43
18	·822 1440	9541	5108	8111	8523	6315	1462	42
19	3096	·832 1155	6679	9639	·860 0007	7756	2858	41
20	4751	2768	8249	·851 1167	1491	9196	4254	40
21	6405	4380	9819	2693	2975	·869 0636	5649	39
22	8059	5991	·842 1388	4219	4457	2074	7043	38
23	9712	7602	2956	5745	5939	3512	8437	37
24	·823 1364	9212	4524	7269	7420	4949	9830	36
25	3015	·833 0822	6091	8793	8901	6386	·878 1222	35
26	4666	2430	7657	·852 0316	·861 0380	7821	2613	34
27	6316	4038	9222	1839	1859	9256	4004	33
28	7965	5646	·843 0787	3360	3337	·870 0691	5394	32
29	9614	7252	2351	4881	4815	2124	6783	31
30	·824 1262	8858	3914	6402	6292	3557	8171	30
31	2909	·834 0463	5477	7921	7768	4989	9559	29
32	4556	2068	7039	9440	9243	6420	·879 0946	28
33	62.2	3672	8600	·853 0958	·862 0717	7851	2332	27
34	7847	5275	·844 0161	2475	2191	9281	3717	26
35	9491	6877	1720	3992	3664	·871 0710	5102	25
36	·825 1135	8479	3279	5508	5137	2138	6486	24
37	2778	·835 0080	4838	7023	6608	3566	7869	23
38	4420	1680	6395	8538	8079	4993	9251	22
39	6062	3279	7952	·854 0051	9549	6419	·880 0633	21
40	7703	4878	9508	1564	·863 1019	7844	2014	20
41	9343	6476	·845 1064	3077	2488	9269	3394	19
42	·826 0983	8074	2618	4588	3956	·872 0693	4774	18
43	2622	9670	4172	6099	5423	2116	6152	17
44	4260	·836 1266	5726	7609	6889	3538	7530	16
45	5897	2862	7278	9119	8355	4960	8907	15
46	7534	4456	8830	·855 0627	9820	6381	·881 0284	14
47	9170	6050	·846 0381	2135	·864 1284	7801	1660	13
48	·827 0806	7643	1932	3643	2748	9221	3035	12
49	2440	9236	3481	5149	4211	·873 0640	4409	11
50	4074	·837 0827	5030	6655	5673	2058	5782	10
51	5708	2418	6579	8160	7134	3475	7155	9
52	7340	4009	8126	9664	8595	4891	8527	8
53	8972	5598	9673	·856 1168	·865 0055	6307	9898	7
54	·828 0603	7187	·847 1219	2671	1514	7722	·882 1269	6
55	2234	8775	2765	4173	2973	9137	2638	5
56	3864	·838 0363	4309	5674	4430	·874 0550	4007	4
57	5493	1950	5853	7175	5887	1963	5376	3
58	7121	3536	7397	8675	7344	3375	6743	2
59	8749	5121	8939	·857 0174	8799	4786	8110	1
60	·829 0376	6706	·848 0481	1673	·866 0254	6197	9476	0
/	34°	33°	32°	31°	30°	29°	28°	/

′	62°	63°	64°	65°	66°	67°	68°	′
0	·882 9476	.891 0065	·898 7940	·906 3078	·913 5455	·920 5049	·927 1839	60
1	·883 0841	1385	9215	4307	6037	6185	2928	59
2	2206	2705	·899 0489	5535	7819	7320	4016	58
3	3569	4024	1763	6762	9001	8455	5104	57
4	4933	5342	3035	7989	·914 0181	9589	6191	56
5	6295	6659	4307	9215	1361	.921 0722	7277	55
6	7656	7975	5578	·907 0440	2540	1854	8363	54
7	9017	9291	6848	1665	3718	2986	9447	53
8	·884 0377	·892 0606	8117	2888	4895	4116	·928 0531	52
9	1736	1920	9386	4111	6072	5246	1614	51
10	3095	3234	·900 0654	5333	7247	6375	2696	50
11	4453	4546	1921	6554	8422	7504	3778	49
12	5810	5858	3188	7775	9597	8632	4858	48
13	7166	7169	4453	8995	·915 0770	9758	5938	47
14	8522	8480	5718	·908 0214	1943	·922 0884	7017	46
15	9876	9789	6982	1432	3115	2010	8096	45
16	·885 1230	·893 1098	8246	2649	4286	3134	9173	44
17	2584	2406	9508	3866	5456	4258	·929 0250	43
18	3936	3714	·901 0770	5082	6626	5281	1326	42
19	5288	5021	2031	6297	7795	6503	2401	41
20	6639	6326	3292	7511	8963	7624	3475	40
21	7989	7632	4551	8725	·916 0130	8745	4549	39
22	9339	8936	5810	9938	1297	9865	5622	38
23	·886 0688	·894 0240	7068	·909 1150	2462	·923 0984	6694	37
24	2036	1542	8325	2361	3627	2102	7765	36
25	3383	2844	9582	3572	4791	3220	8835	35
26	4730	4146	·902 0838	4781	5955	4336	9905	34
27	6075	5446	2092	5990	7118	5452	·930 0974	33
28	7420	6746	3347	7199	8279	6567	2042	32
29	8765	8045	4600	8406	9440	7682	3109	31
30	·887 0108	9344	5853	9613	·917 0601	8795	4176	30
31	1451	·895 0641	7105	·910 0819	1760	9908	5241	29
32	2793	1938	8356	2024	2919	·924 1020	6306	28
33	4134	3234	9606	3228	4077	2131	7370	27
34	5475	4529	·903 0856	4432	5234	3242	8434	26
35	6815	5824	2105	5635	6391	4351	9496	25
36	8154	7118	3353	6837	7546	5460	·931 0558	24
37	9492	8411	4600	8038	8701	6568	1619	23
38	·888 0830	9703	5847	9238	9855	7676	2679	22
39	2166	.896 0994	7093	·911 0438	·918 1009	8782	3739	21
40	3503	2285	8338	1637	2161	9888	4797	20
41	4838	3575	9582	2835	3313	·925 0993	5855	19
42	6172	4864	·904 0825	4033	4464	2097	6912	18
43	7506	6153	2068	5229	5614	3201	7969	17
44	8839	7440	3310	6425	6763	4303	9024	16
45	·889 0171	8727	4551	7620	7912	5405	·932 0079	15
46	1503	·897 0014	5792	8815	9060	6506	1133	14
47	2834	1299	7032	·912 0008	·919 0207	7606	2186	13
48	4164	2584	8271	1201	1353	8706	3238	12
49	5493	3868	9509	2393	2499	9805	4290	11
50	6822	5151	·905 0746	3584	3644	·926 0902	5340	10
51	8149	6433	1983	4775	4788	2000	6390	9
52	9476	7715	3219	5965	5931	3096	7439	8
53	·890 0803	8996	4454	7154	7073	4192	8488	7
54	2128	·898 0276	5688	8342	8215	5286	9535	6
55	3453	1555	6922	9529	9356	6380	·933 0582	5
56	4777	2834	8154	·913 0716	·920 0496	7474	1628	4
57	6100	4112	9386	1902	1635	8566	2673	3
58	7423	5389	·906 0618	3087	2774	9658	3718	2
59	8744	6665	1848	4271	3912	·927 0748	4761	1
60	·891 0065	7940	3078	5455	5049	1839	5804	0
′	27°	26°	25°	24°	23°	22°	21°	′

′	69°	70°	71°	72°	73°	74°	75°	′
0	·933 5804	·939 6926	·945 5186	·951 0565	·956 3048	·961 2617	·965 9258	60
1	6846	7921	6132	1464	3898	3418	·966 0011	59
2	7888	8914	7078	2361	4747	4219	0762	58
3	8928	9907	8023	3258	5595	5019	1513	57
4	9968	·940 0899	8968	4154	6443	5818	2263	56
5	·934 1007	1891	9911	5050	7290	6616	3012	55
6	2045	2881	·946 0854	5944	8136	7413	3761	54
7	3082	3871	1795	6838	8981	8210	4508	53
8	4119	4860	2736	7731	9825	9005	5255	52
9	5154	5848	3677	8623	·957 0669	9800	6001	51
10	6189	6835	4616	9514	1512	·962 0594	6746	50
11	7223	7822	5555	·952 0404	2354	1387	7490	49
12	8257	8808	6493	1294	3195	2180	8234	48
13	9289	9793	7430	2183	4035	2972	8977	47
14	·935 0321	·941 0777	8366	3071	4875	3762	9718	46
15	1352	1760	9301	3958	5714	4552	·967 0459	45
16	2382	2743	·947 0236	4844	6552	5342	1200	44
17	3412	3724	1170	5730	7389	6130	1939	43
18	4440	4705	2103	6615	8225	6917	2678	42
19	5468	5686	3035	7499	9060	7704	3415	41
20	6495	6665	3966	8382	9895	8490	4152	40
21	7521	7644	4897	9264	·958 0729	9275	4888	39
22	8547	8621	5827	·953 0146	1562	·963 0060	5624	38
23	9571	9598	6756	1027	2394	0843	6358	37
24	·936 0595	·942 0575	7684	1907	3226	1626	7092	36
25	1618	1550	8612	2786	4056	2408	7825	35
26	2641	2525	9538	3664	4886	3189	8557	34
27	3662	3498	·948 0464	4542	5715	3969	9288	33
28	4683	4471	1389	5418	6543	4748	·968 0018	32
29	5703	5444	2313	6294	7371	5527	0748	31
30	6722	6415	3237	7170	8197	6305	1476	30
31	7740	7386	4159	8044	9023	7081	2204	29
32	8758	8355	5081	8917	9848	7858	2931	28
33	9774	9324	6002	9790	·959 0672	8633	3658	27
34	·937 0790	·943 0293	6922	·954 0662	1496	9407	4383	26
35	1806	1260	7842	1533	2318	·964 0181	5108	25
36	2820	2227	8760	2403	3140	0954	5832	24
37	3833	3192	9678	3273	3961	1726	6555	23
38	4846	4157	·949 0595	4141	4781	2497	7277	22
39	5858	5122	1511	5009	5600	3268	7998	21
40	6869	6085	2426	5876	6418	4037	8719	20
41	7880	7048	3341	6743	7236	4806	9438	19
42	8889	8010	4255	7608	8053	5574	·969 0157	18
43	9898	8971	5168	8473	8869	6341	0875	17
44	·938 0906	9931	6080	9336	9684	7108	1593	16
45	1913	·944 0890	6991	·955 0199	0499	7873	2309	15
46	2920	1849	7902	1062	·960 1312	8638	3025	14
47	3925	2807	8812	1923	2125	9402	3740	13
48	4930	3764	9721	2784	2937	·965 0165	4453	12
49	5934	4720	·950 0629	3643	3748	0927	5167	11
50	6938	5675	1536	4502	4558	1689	5879	10
51	7940	6630	2443	5361	5368	2449	6591	9
52	8942	7584	3348	6218	6177	3209	7301	8
53	9943	8537	4253	7074	6984	3968	8011	7
54	·939 0943	9489	5157	7930	7792	4726	8720	6
55	1942	·945 0441	6061	8785	8598	5484	9428	5
56	2940	1391	6963	9639	9403	6240	·970 0135	4
57	3938	2341	7865	·956 0492	·961 0208	6996	0842	3
58	4935	3290	8766	1345	1012	7751	1548	2
59	5931	4238	9666	2197	1815	8505	2253	1
60	6926	5186	·951 0565	3048	2617	9258	2957	0
′	20°	19°	18°	17°	16°	15°	14°	′

′	76°	77°	78°	79°	80°	81°	82°	′
0	·970 2957	·974 3701	·978 1476	·981 6272	·9848 078	·9876 883	·9902 681	60
1	3630	4355	2080	6826	582	·9877 338	·9903 085	59
2	4363	5008	2684	7380	·9849 086	792	489	58
3	5065	5660	3287	7933	589	·9878 245	891	57
4	5766	6311	3889	8485	·9850 091	697	·9904 293	56
5	6466	6962	4490	9037	593	·9879 148	694	55
6	7165	7612	5090	9587	·9851 093	599	·9905 095	54
7	7863	8261	5689	·982 0137	593	·9880 048	494	53
8	8561	8909	6288	0686	·9852 092	497	893	52
9	9258	9556	6886	1234	590	945	·9906 290	51
10	9953	·975 0203	7483	1781	·9853 087	·9881 392	687	50
11	·971 0649	0849	8079	2327	583	838	·9907 083	49
12	1343	1494	8674	2873	·9854 079	·9882 284	478	48
13	2036	2138	9268	3417	574	728	873	47
14	2729	2781	9862	3961	·9855 068	·9883 172	·9908 266	46
15	3421	3423	·979 0455	4504	561	615	659	45
16	4112	4065	1047	5046	·9856 053	·9884 057	·9909 051	44
17	4802	4706	1638	5587	544	498	442	43
18	5491	5345	2228	6128	·9857 035	939	832	42
19	6180	5985	2818	6668	524	·9885 378	·9910 221	41
20	6867	6623	3406	7206	·9858 013	817	610	40
21	7554	7260	3994	7744	501	·9886 255	997	39
22	8240	7897	4581	8282	988	692	·9911 384	38
23	8926	8533	5167	8818	·9859 475	·9887 128	770	37
24	9610	9168	5752	9353	960	564	·9912 155	36
25	·972 0294	9802	5337	9888	·9860 445	998	540	35
26	0976	·976 0435	6921	·983 0422	929	·9888 432	923	34
27	1658	1067	7504	0955	·9861 412	865	·9913 306	33
28	2339	1699	8086	1487	894	·9889 297	688	32
29	3020	2330	8667	2019	·9862 375	728	·9914 069	31
30	3699	2960	9247	2549	856	·9890 159	449	30
31	4378	3589	9827	3079	·9863 336	588	828	29
32	5056	4217	·980 0405	3608	815	·9891 017	·9915 206	28
33	5733	4845	0983	4136	·9864 293	445	584	27
34	6409	5472	1560	4663	770	872	961	26
35	7084	6098	2136	5189	·9865 246	·9892 298	·9916 337	25
36	7759	6723	2712	5715	722	723	712	24
37	8432	7347	3286	6239	·9866 196	·9893 148	·9917 086	23
38	9105	7970	3860	6763	670	572	459	22
39	9777	8593	4433	7286	·9867 143	994	832	21
40	·973 0449	9215	5005	7808	615	·9894 416	·9918 204	20
41	1119	9836	5576	8330	·9868 087	838	574	19
42	1789	·977 0456	6147	8850	557	·9895 258	944	18
43	2458	1075	6716	9370	·9869 027	677	·9919 314	17
44	3125	1693	7285	9889	496	·9896 096	682	16
45	3793	2311	7853	·984 0407	964	514	·9920 049	15
46	4458	2928	8420	0924	·9870 431	931	416	14
47	5124	3544	8986	1441	897	·9897 347	782	13
48	5789	4159	9552	1956	·9871 363	762	·9921 147	12
49	6453	4773	·981 0116	2471	827	·9898 177	511	11
50	7116	5386	0680	2985	·9872 291	590	874	10
51	7778	5999	1243	3498	754	·9899 003	·9922 237	9
52	8439	6611	1805	4010	·9873 216	415	599	8
53	9100	7222	2366	4521	678	826	959	7
54	9760	7832	2927	5032	·9874 138	·9900 237	·9923 319	6
55	·974 0419	8441	3486	5542	598	646	679	5
56	1077	9050	4045	6050	·9875 057	·9901 055	·9924 037	4
57	1734	9658	4603	6558	514	462	394	3
58	2390	·978 0265	5160	7066	972	869	751	2
59	3046	0871	5716	7572	·9876 428	·9902 275	·9925 107	1
60	3701	1476	6272	8078	883	681	462	0
′	13°	12°	11°	10°	9°	8°	7°	′

′	83°	84°	85°	86°	87°	88°	89°	′
0	·9925 462	·9945 219	·9961 947	·9975 641	·9986 295	·9993 908	·9998 477	60
1	816	523	·9962 200	843	447	·9994 009	527	59
2	·9926 169	825	452	·9976 045	598	110	577	58
3	521	·9946 127	704	245	748	209	625	57
4	873	428	954	445	898	308	673	56
5	·9927 224	729	·9963 204	645	·9987 046	405	720	55
6	573	·9947 028	453	843	194	502	766	54
7	922	327	701	·9977 040	340	598	812	53
8	·9928 271	625	948	237	486	693	856	52
9	618	921	·9964 195	433	631	788	900	51
10	965	·9948 217	440	627	775	881	942	50
11	·9929 310	513	685	821	919	974	984	49
12	655	807	929	·9978 015	·9988 061	·9995 066	·9999 025	48
13	999	·9949 101	·9965 172	207	203	157	065	47
14	·9930 342	393	414	399	344	247	105	46
15	685	685	655	589	484	336	143	45
16	·9931 026	976	895	779	623	424	181	44
17	367	·9950 266	·9966 135	968	761	512	218	43
18	706	556	374	·9979 156	899	599	254	42
19	·9932 045	844	612	343	·9989 035	684	289	41
20	384	·9951 132	849	530	171	770	323	40
21	721	419	·9967 085	716	306	854	357	39
22	·9933 057	705	321	900	440	937	389	38
23	393	990	555	·9980 084	573	·9996 020	421	37
24	728	·9952 274	789	267	706	101	452	36
25	·9934 062	557	·9968 022	450	837	182	482	35
26	395	840	254	631	968	262	511	34
27	727	·9953 122	485	811	·9990 098	341	539	33
28	·9935 058	403	715	991	227	419	567	32
29	389	683	945	·9981 170	355	497	593	31
30	719	962	·9969 173	348	482	573	619	30
31	·9936 047	·9954 240	401	525	609	649	644	29
32	375	517	628	701	734	724	668	28
33	703	794	854	877	859	798	692	27
34	·9937 029	·9955 070	·9970 080	·9982 052	983	871	714	26
35	355	345	304	225	·9991 106	943	736	25
36	679	620	528	398	228	·9997 015	756	24
37	·9938 003	893	750	570	350	086	776	23
38	326	·9956 165	972	742	470	156	795	22
39	648	437	·9971 193	912	590	224	813	21
40	969	708	413	·9983 082	709	292	831	20
41	·9939 290	978	633	250	827	360	847	19
42	610	·9957 247	851	418	944	426	863	18
43	928	515	·9972 069	585	·9992 060	492	878	17
44	·9940 246	783	286	751	176	556	892	16
45	563	·9958 049	502	917	290	620	905	15
46	880	315	717	·9984 081	404	683	917	14
47	·9941 195	580	931	245	517	745	928	13
48	510	844	·9973 145	408	629	807	939	12
49	823	·9959 107	357	570	740	867	949	11
50	·9942 136	370	569	731	851	927	958	10
51	448	631	780	891	960	986	966	9
52	760	892	990	·9985 050	·9993 069	·9998 044	973	8
53	·9943 070	·9960 152	·9974 199	209	177	101	979	7
54	379	411	408	367	284	157	985	6
55	688	669	615	524	390	213	989	5
56	996	926	822	680	495	267	993	4
57	·9944 303	·9961 183	·9975 028	835	600	321	996	3
58	609	438	233	989	704	374	998	2
59	914	693	437	·9986 143	806	426	1·0000 000	1
60	·9945 219	947	641	295	908	477	000	0
′	6°	5°	4°	3°	2°	1°	0°	′

′	0°	1°	2°	3°	4°	5°	6°	7°	′
0	·000 0000	·017 4551	·034 9208	·052 4078	·069 9268	·087 4887	·105 1042	·122 7846	60
1	2909	7460	·035 2120	6995	·070 2191	7818	3983	·123 0798	59
2	5818	·018 0370	5033	9912	5115	·088 0749	6925	3752	58
3	8727	3280	7945	·053 2829	8038	3681	9866	6705	57
4	·001 1636	6190	·036 0858	5746	·071 0961	6612	·106 2808	9658	56
5	4544	9100	3771	8663	3885	9544	5750	·124 2612	55
6	7453	·019 2010	6683	·054 1581	6809	·089 2476	8692	5566	54
7	·002 0362	4920	9596	4498	9733	5408	107 1634	8520	53
8	3271	7830	·037 2509	7416 07 2	2657	8341	4576	·125 1474	52
9	6180	·020 0740	5422	·055 0333	5581	·090 1273	7519	4429	51
10	9089	3650	8335	3251	8505	4206	·108 0462	7384	50
11	·003 1998	6560	·038 1248	6169	·073 1430	7138	3405	·126 0339	49
12	4907	9470	4161	9087	4354	·091 0071	6348	3294	48
13	7816	·021 2330	7074	·056 2005	7279	3004	9291	6249	47
14	·004 0725	5291	9988	4923	·074 0203	5938	·109 2234	9205	46
15	3634	8201	·039 2901	7841	3128	8871	5178	·127 2161	45
16	6542	·022 1111	5814	·057 0759	6053	·092 1804	8122	5117	44
17	9451	4021	8728	3678	8979	4738	·110 1066	8073	43
18	·005 2360	6932	·040 1641	6596	·075 1904	7672	4010	·128 1030	42
19	5269	9842	4555	9515	4829	·093 0606	6955	3986	41
20	8178	·023 2753	7469	·058 2434	7755	3540	9899	6943	40
21	·006 1087	5663	·041 0383	5352	·076 0680	6474	·111 2844	9900	39
22	3996	8574	3296	8271	3606	9409	5789	·129 2858	38
23	6905	·024 1484	6210	·059 1190	6532	·094 2344	8734	5815	37
24	9814	4395	9124	4109	9458	5278	·112 1680	8773	36
25	·007 2723	7305	·042 2038	7029	·077 2384	8213	4625	·130 1731	35
26	5632	·025 0216	4952	9948	5311	·095 1148	7571	4690	34
27	8541	3127	7866	·060 2867	8237	4084	·113 0517	7648	33
28	·008 1450	6038	·043 0781	5787	·078 1164	7019	3463	·131 0607	32
29	4360	8948	3695	8706	4090	9955	6410	3566	31
30	7269	·026 1859	6609	·061 1626	7017	·096 2890	9356	6525	30
31	·009 0178	4770	9524	4546	9944	5826	·114 2303	9484	29
32	3087	7681	·044 2438	7466	·079 2871	8763	5250	·132 2444	28
33	5996	·027 0592	5353	·062 0386	5798	·097 1699	8197	5404	27
34	8905	3503	8268	3306	8726	4635	·115 1144	8364	26
35	·010 1814	6414	·045 1183	6226	·080 1653	7572	4092	·133 1324	25
36	4724	9325	4097	9147	4581	·098 0509	7039	4285	24
37	7633	·028 2236	7012	·063 2067	7509	3446	9987	7246	23
38	·011 0542	5148	9927	4988	·081 0437	6383	·116 2936	·134 0207	22
39	3451	8059	·046 2842	7908	3365	9320	5884	3168	21
40	6361	·029 0970	5757	·064 0829	6293	·099 2257	8832	6129	20
41	9270	3882	8673	3750	9221	5194	·117 1781	9091	19
42	·012 2179	6793	·047 1588	6671	·082 2150	8133	4730	·135 2053	18
43	5088	9705	4503	9592	5078	·100 1071	7679	5015	17
44	7998	·030 2616	7419	·065 2513	8007	4009	·118 0628	7978	16
45	·013 0907	5528	·048 0334	5435	·083 0936	6947	3578	·136 0940	15
46	3817	8439	3250	8356	3865	9886	6528	3903	14
47	6726	·031 1351	6166	·066 1278	6794	·101 2824	9478	6866	13
48	9635	4263	9082	4199	9723	5763	·119 2428	9830	12
49	·014 2545	7174	·049 1997	7121	·084 2653	8702	5378	·137 2793	11
50	5454	·032 0086	4913	·067 0043	5583	·102 1641	8329	5757	10
51	8364	2998	7829	2965	8512	4580	·120 1279	8721	9
52	·015 1273	5910	·050 0745	5887	·085 1442	7520	4230	·138 1685	8
53	4183	8822	3662	8809	4372	·103 0460	7182	4650	7
54	7093	·033 1734	6578	·068 1732	7302	3399	·121 0133	7615	6
55	·016 0002	4646	9495	4654	·086 0233	6340	3085	·139 0580	5
56	2912	7558	·051 2411	7577	3163	9280	6036	3545	4
57	5821	·034 0471	5327	·069 0499	6094	·104 2220	8988	6510	3
58	8731	3383	8244	3422	9025	5161	·122 1941	9476	2
59	·017 1641	6295	·052 1161	6345	·087 1956	8101	4893	·140 2442	1
60	4551	9208	4078	9268	4887	·105 1042	7846	5408	0
′	89°	88°	87°	86°	85°	84°	83°	82°	′

′	8°	9°	10°	11°	12°	13°	14°	15°	′
0	·140 5408	·158 3844	·176 3270	·194 3803	·212 5566	·230 8682	·249 3280	·267 9492	60
1	8375	6826	6269	6822	8606	231 1746	6370	·268 2610	59
2	·141 1342	9809	9269	9841	·213 1647	4811	9460	5728	58
3	4308	·159 2791	·177 2269	·195 2861	4688	7876	·250 2551	8847	57
4	7276	5774	5270	5881	7730	·232 0941	5642	·269 1967	56
5	·142 0245	8757	8270	8901	·214 0772	4007	8734	5087	55
6	3211	·160 1740	·178 1271	·196 1922	3814	7073	·251 1826	8207	54
7	6179	4724	4273	4943	6857	·233 0140	4919	·270 1328	53
8	9147	7708	7274	7964	9900	3207	8012	4449	52
9	·143 2115	·161 0692	·179 0276	·197 0986	·215 2944	6274	·252 1106	7571	51
10	5084	3677	3279	4008	5988	9342	4200	·271 0694	50
11	8053	6662	6281	7031	9032	·234 2410	7294	3817	49
12	·144 1022	9647	9284	·198 0053	·216 2077	5479	·253 0389	6940	48
13	3991	·162 2632	·180 2287	3076	5122	8548	3484	·272 0064	47
14	6961	5618	5291	6100	8167	·235 1617	6580	3188	46
15	9931	8603	8295	9124	·217 1213	4687	9676	6313	45
16	·145 2901	·163 1590	·181 1299	·199 2148	4259	7758	·254 2773	9438	44
17	5872	4576	4303	5172	7306	·236 0829	5870	·273 2564	43
18	8842	7563	7308	8197	·218 0353	3900	8968	5690	42
19	·146 1813	·164 0550	·182 0313	·200 1222	3400	6971	·255 2066	8817	41
20	4784	3537	3319	4248	6448	·237 0044	5165	·274 1945	40
21	7756	6525	6324	7274	9496	3116	8264	5072	39
22	·147 0727	9513	9330	·201 0300	·219 2544	6189	·256 1363	8201	38
23	3699	·165 2501	·183 2337	3327	5593	9262	4463	·275 1330	37
24	6672	5489	5343	6354	8643	·238 2336	7564	4459	36
25	9644	8478	8350	9381	·220 1692	5410	·257 0664	7589	35
26	·148 2617	·166 1467	·184 1358	·202 2409	4742	8485	3766	·276 0719	34
27	5590	4456	4365	5437	7793	·239 1560	6868	3850	33
28	8563	7446	7373	8465	·221 0844	4635	9970	6981	32
29	·149 1536	·167 0436	·185 0382	·203 1494	3895	7711	·258 3073	·277 0113	31
30	4510	3426	3390	4523	6947	·240 0788	6176	3245	30
31	7484	6417	6399	7552	9999	3864	9280	6378	29
32	·150 0458	9407	9409	·204 0582	·222 3051	6942	·259 2384	9512	28
33	3433	·168 2398	·186 2418	3612	6104	·241 0019	5488	·278 2646	27
34	6408	5390	5428	6643	9157	3097	8593	5780	26
35	9383	8381	8439	9674	·223 2211	6176	·260 1699	8915	25
36	·151 2358	·169 1373	·187 1449	·205 2705	5265	9255	4805	·279 2050	24
37	5333	4366	4460	5737	8319	·242 2334	7911	5186	23
38	8309	7358	7471	8769	·224 1374	5414	·261 1018	8322	22
39	·152 1285	·170 0351	·188 0483	·206 1801	4429	8494	4126	·280 1459	21
40	4262	3344	3495	4834	7485	·243 1575	7234	4597	20
41	7238	6338	6507	7867	·225 0541	4656	·262 0342	7735	19
42	·153 0215	9331	9520	·207 0900	3597	7737	3451	·281 0873	18
43	3192	·171 2325	·189 2533	3934	6654	·244 0819	6560	4012	17
44	6170	5320	5546	6968	9711	3902	9670	7152	16
45	9147	8314	8559	·208 0003	·226 2769	6984	·263 2780	·282 0292	15
46	·154 2125	·172 1309	·190 1573	3038	5827	·245 0068	5891	3432	14
47	5103	4304	4587	6073	8885	3151	9002	6573	13
48	8082	7300	7602	9109	·227 1944	6236	·264 2114	9715	12
49	·155 1061	·173 0296	·191 0617	·209 2145	5003	9320	5226	·283 2857	11
50	4040	3292	3632	5181	8063	·246 2405	8339	5999	10
51	7019	6288	6648	8218	·228 1123	5491	·265 1452	9143	9
52	9998	9285	9664	·210 1255	4184	8577	4566	·284 2286	8
53	·156 2978	·174 2282	·192 2680	4293	7244	·247 1663	7680	5430	7
54	5958	5279	5696	7331	·229 0306	4750	·266 0794	8575	6
55	8939	8277	8713	·211 0369	3367	7837	3909	·285 1720	5
56	·157 1919	·175 1275	·193 1731	3407	6429	·248 0925	7025	4866	4
57	4900	4273	4748	6446	9492	4013	·267 0141	8012	3
58	7881	7272	7766	9486	·230 2555	7102	3257	·286 1159	2
59	·158 0863	·176 0271	·194 0784	·212 2525	5618	·249 0191	6374	4306	1
60	3844	3270	3803	5566	8682	3280	9492	7454	0
′	81°	80°	79°	78°	77°	76°	75°	74°	′

/	16°	17°	18°	19°	20°	21°	22°	23°	/
0	·286 7454	·305 7307	·324 9197	·344 3276	·363 9705	·383 8640	·404 0262	·424 4748	60
1	·287 0602	·306 0488	·325 2415	6530	·364 2997	·384 1978	3646	8182	59
2	3751	3670	5630	9785	6293	5317	7031	·425 1610	58
3	6900	6852	8848	·345 3040	9589	8656	·405 0417	5051	57
4	·288 0050	·307 0034	·326 2060	6296	·365 2885	·385 1996	3804	8487	56
5	3201	3218	5284	9553	6182	5337	7191	·426 1924	55
6	6352	6402	8504	·346 2810	9480	8679	·406 0579	5361	54
7	9503	9586	·327 1724	6068	·366 2779	·386 2021	3968	8800	53
8	·289 2655	·308 2771	4944	9327	6078	5364	7358	·427 2238	52
9	5808	5957	8165	·347 2586	9379	8708	·407 0748	5680	51
10	8961	9143	·328 1387	5846	·367 2680	387 2053	4139	9121	50
11	·290 2114	·309 2330	4610	9107	5981	5398	7531	·428 2563	49
12	5269	5517	7833	·348 2368	9284	8744	·408 0924	6005	48
13	8423	8705	·329 1056	5630	·368 2587	·388 2091	4318	9449	47
14	·291 1578	·310 1893	4281	8893	5890	5439	7713	·429 2894	46
15	4734	5083	7505	·349 2156	9193	8787	·409 1108	6339	45
16	7890	8272	·330 0731	5420	·369 2500	·389 2136	4504	9785	44
17	·292 1047	·311 1462	3957	8685	5809	5486	7901	·430 3232	43
18	4205	4653	7184	·350 1950	9112	8837	·410 1299	6680	42
19	7363	7845	·331 0411	5216	·370 2420	·390 2189	4697	·431 0129	41
20	·293 0521	·312 1036	3639	8483	5728	5541	8097	3579	40
21	3680	4229	6868	·351 1750	9036	8894	·411 1497	7030	39
22	6839	7422	·332 0097	5018	·371 2346	·391 2247	4898	·432 0481	38
23	9999	·313 0616	3327	8287	5656	5602	8300	3933	37
24	·294 3160	3810	6557	·352 1556	8967	8957	·412 1703	7386	36
25	6321	7005	9788	4826	·372 2278	·392 2313	5106	·433 0840	35
26	9483	·314 0200	·333 3020	8096	5590	5670	8510	4295	34
27	·295 2645	3396	6252	·353 1368	8903	9027	·413 1915	7751	33
28	5808	6593	9485	4640	·373 2217	·393 2386	5321	·434 1208	32
29	8971	9790	·334 2719	7912	5532	5745	8728	4665	31
30	·296 2135	·315 2988	5953	·354 1186	8847	9105	·414 2136	8124	30
31	5299	6186	9188	4460	·374 2163	·394 2465	5544	·435 1582	29
32	8464	9385	·335 2424	7734	5479	5827	8953	5043	28
33	·297 1630	·316 2585	5660	·355 1010	8797	9189	·415 2363	8504	27
34	4796	5785	8896	4286	·375 2115	·395 2552	5774	·436 1966	26
35	7962	8986	·336 2134	7562	5433	5916	9186	5429	25
36	·298 1129	·317 2187	5372	·356 0840	8753	9280	·416 2598	8893	24
37	4297	5389	8610	4118	·376 2073	·396 2645	6012	·437 2357	23
38	7465	8591	·337 1850	7397	5394	6011	9426	5823	22
39	·299 0634	·318 1794	5090	·357 0676	8716	9378	·417 2841	9289	21
40	3803	4998	8330	3956	·377 2038	·397 2746	6257	·438 2756	20
41	6973	8202	·338 1571	7237	5361	6114	9673	6224	19
42	·300 0144	·319 1407	4813	·358 0518	8685	9483	·418 3091	9693	18
43	3315	4613	8056	3801	·378 2010	·398 2853	6509	·439 3163	17
44	6486	7819	·339 1299	7083	5335	6224	9928	6634	16
45	9658	·320 1025	4543	·359 0367	8661	9595	·419 3348	·440 0105	15
46	·301 2831	4232	7787	3651	·379 1988	·399 2968	6769	3578	14
47	6004	7440	·340 1032	6936	5315	6341	·420 0190	7051	13
48	9178	·321 0649	4278	·360 0222	8644	9715	3613	·441 0526	12
49	·302 2352	3858	7524	3508	·380 1973	·400 3089	7036	4001	11
50	5527	7067	·341 0771	6795	5302	6465	·421 0460	7477	10
51	8703	·322 0278	4019	·361 0082	8633	9841	3885	·442 0954	9
52	·303 1879	3489	7267	3371	·381 1964	·401 3218	7311	4432	8
53	5055	6700	·342 0516	6660	5296	6596	·422 0738	7910	7
54	8232	9912	3765	9949	8629	9974	4165	·443 1390	6
55	·304 1410	·323 3125	7015	·362 3240	·382 1962	·402 3354	7594	4871	5
56	4588	6338	·343 0266	6531	5296	6734	·423 1023	8352	4
57	7767	9552	3518	9823	8631	·403 0115	4453	·444 1834	3
58	·305 0946	·324 2766	6770	·363 3115	·383 1967	3496	7884	5318	2
59	4126	5981	·344 0023	6408	5303	6879	·424 1316	8802	1
60	7307	9197	3276	9702	8640	·404 0262	4748	·445 2287	0
/	73°	72°	71°	70°	69°	68°	67°	66°	/

/	24°	25°	26°	27°	28°	29°	30°	31°	/
0	·445 2287	·466 3077	·487 7326	·509 5254	·531 7094	·554 3091	·577 3503	·600 8606	60
1	5773	6618	·488 0927	8919	·532 0826	6894	7382	·601 2566	59
2	9260	·467 0161	4530	·510 2585	4559	·555 0698	·578 1262	6527	58
3	·446 2747	3705	8133	6252	8293	4504	5144	·602 0490	57
4	6236	7250	·489 1737	9919	·533 2029	8311	9027	4454	56
5	9726	·468 0796	5343	·511 3588	5765	·556 2119	·579 2912	8419	55
6	·447 3216	4342	8949	7259	9503	5929	6797	·603 2386	54
7	6708	7890	·490 2557	·512 0930	·534 3242	9739	·580 0684	6354	53
8	·448 0200	·469 1439	6166	4602	6981	·557 3551	4573	·604 0323	52
9	3693	4988	9775	8275	·535 0723	7364	8462	4294	51
10	7187	8539	·491 3386	·513 1950	4465	·558 1179	·581 2353	8266	50
11	·449 0682	·470 2090	6997	5625	8208	4994	6245	·605 2240	49
12	4178	5643	·492 0610	9302	·536 1953	8811	·582 0139	6215	48
13	7675	9196	4224	·514 2980	5699	·559 2629	4034	·606 0192	47
14	·450 1173	·471 2751	7838	6658	9446	6449	7930	4170	46
15	4672	6306	·493 1454	·515 0338	·537 3194	·560 0269	·583 1828	8149	45
16	8171	9863	5071	4019	6943	4091	5726	·607 2130	44
17	·451 1672	·472 3420	8689	7702	·538 0694	7914	9627	6112	43
18	5173	6978	·494 2308	·516 1385	4445	·561 1738	·584 3528	·608 0095	42
19	8676	·473 0538	5928	5069	8198	5564	7431	4080	41
20	·452 2179	4098	9549	8755	·539 1952	9391	·585 1335	8067	40
21	5683	7659	·495 3171	·517 2441	5707	·562 3219	5241	·609 2054	39
22	9188	·474 1222	6794	6129	9464	7048	9148	6043	38
23	·453 2694	4785	·496 0418	9818	·540 3221	·563 0879	·586 3056	·610 0034	37
24	6201	8349	4043	·518 3508	6980	4710	6965	4026	36
25	9709	·475 1914	7669	7199	·541 0740	8543	·587 0876	8019	35
26	·454 3218	5481	·497 1297	·519 0891	4501	·564 2378	4788	·611 2014	34
27	6728	9048	4925	4584	8263	6213	8702	6011	33
28	·455 0238	·476 2616	8554	8278	·542 2027	·565 0050	·588 2616	·612 0008	32
29	3750	6185	·498 2185	·520 1974	5791	3888	6533	4007	31
30	7263	9755	5816	5671	9557	7728	·589 0450	8008	30
31	·456 0776	·477 3326	9449	9368	·543 3324	·566 1568	4369	·613 2010	29
32	4290	6899	·499 3082	·521 3067	7092	5410	8289	6013	28
33	7806	·478 0472	6717	6767	·544 0862	9254	·590 2211	·614 0018	27
34	·457 1322	4046	·500 0352	·522 0468	4632	·567 3098	6134	4024	26
35	4839	7621	3989	4170	8404	6944	·591 0058	8032	25
36	8357	·479 1197	7627	7874	·545 2177	·568 0791	3984	·615 2041	24
37	·458 1877	4774	·501 1266	·523 1578	5951	4639	7910	6052	23
38	5397	8352	4906	5284	9727	8488	·592 1839	·616 0064	22
39	8918	·480 1932	8547	8990	·546 3503	·569 2339	5768	4077	21
40	·459 2439	5512	·502 2189	·524 2698	7281	6191	9699	8092	20
41	5962	9093	5832	6407	·547 1060	·570 0045	·593 3632	·617 2108	19
42	9486	·481 2675	9476	·525 0117	4840	3899	7565	6126	18
43	·460 3011	6258	·503 3121	3829	8621	7755	·594 1501	·618 0145	17
44	6537	9842	6768	7541	·548 2404	·571 1612	5437	4166	16
45	·461 0063	·482 3427	·504 0415	·526 1255	6188	5471	9375	8188	15
46	3591	7014	4063	4969	9973	9331	·595 3314	·619 2211	14
47	7119	·483 0601	7713	8685	·549 3759	·572 3192	7255	6236	13
48	·462 0649	4189	·505 1363	·527 2402	7547	7054	·596 1196	·620 0263	12
49	4179	7778	5015	6120	·550 1335	·573 0918	5140	4291	11
50	7710	·484 1368	8668	9839	5125	4783	9084	8320	10
51	·463 1243	4959	·506 2322	·528 3560	8916	8649	·597 3030	·621 2351	9
52	4776	8552	5977	7281	·551 2708	·574 2516	6978	6383	8
53	8310	·485 2145	9633	·529 1004	6502	6385	·598 0926	·622 0417	7
54	·464 1845	5739	·507 3290	4727	·552 0297	·575 0255	4877	4452	6
55	5382	9334	6948	8452	4093	4126	8828	8488	5
56	8919	·486 2931	·508 0607	·530 2178	7890	7999	·599 2781	·623 2527	4
57	·465 2457	6528	4267	5906	·553 1688	·576 1873	6735	6566	3
58	5996	·487 0126	7929	9634	5488	5748	·600 0691	·624 0607	2
59	9536	3726	·509 1591	·531 3364	9288	9625	4648	4650	1
60	·466 3077	7326	5254	7094	·554 3091	·577 3503	8606	8694	0
/	65°	64°	63°	62°	61°	60°	59°	58°	/

′	32°	33°	34°	35°	36°	37°	38°	39°	′
0	·624 8694	·649 4076	·674 5085	·700 2075	726 5425	·753 5541	·781 2856	·809 7840	60
1	·625 2739	8212	9318	6411	9871	·754 0102	7542	·810 2658	59
2	6786	·650 2350	·675 3553	·701 0749	·727 4318	4666	·782 2229	7478	58
3	·626 0834	6490	7790	5089	8767	9232	6919	·811 2300	57
4	4884	·651 0631	·676 2028	9430	·728 3218	·755 3799	·783 1611	7124	56
5	8935	4774	6268	·702 3773	7671	8369	6305	·812 1951	55
6	·627 2988	8918	·677 0509	8118	·729 2125	·756 2941	·784 1002	6780	54
7	7042	·652 3064	4752	·703 2464	6582	7514	5700	·813 1611	53
8	·628 1098	7211	8997	6813	·730 1041	·757 2090	·785 0400	6444	52
9	5155	·653 1360	·678 3243	·704 1163	5501	6668	5103	·814 1280	51
10	9214	5511	7492	5515	9963	·758 1248	9808	6118	50
11	·629 3274	9663	·679 1741	9869	·731 4428	5829	·786 4515	·815 0958	49
12	7336	·654 3817	5993	·705 4224	8894	·759 0413	9224	5801	48
13	·630 1399	7972	·680 0246	8581	·732 3362	4999	·787 3935	·816 0646	47
14	5464	·655 2129	4501	·706 2940	7832	9587	8649	5493	46
15	9530	6287	8758	7301	·733 2303	·760 4177	·788 3364	·817 0343	45
16	·631 3598	·656 0447	·681 3016	·707 1664	6777	8769	8082	5195	44
17	7667	4609	7276	6028	·734 1253	·761 3363	·789 2802	·818 0049	43
18	·632 1738	8772	·682 1537	·708 0393	5730	7959	7524	4905	42
19	5810	·657 2937	5801	4762	·735 0210	·762 2557	·790 2248	9764	41
20	9883	7103	·683 0066	9133	4691	7157	6975	·819 4625	40
21	·633 3959	·658 1271	4333	·709 3504	9174	·763 1759	·791 1703	9488	39
22	8035	5441	8601	7878	·736 3660	6363	6434	·820 4354	38
23	·634 2113	9612	·684 2871	·710 2253	8147	·764 0969	·792 1167	9222	37
24	6193	·659 3785	7143	6630	·737 2636	5577	5902	·821 4093	36
25	·635 0274	7960	·685 1416	·711 1009	7127	·765 0188	·793 0640	8965	35
26	4357	·660 2136	5692	5390	·738 1620	4800	5379	·822 3840	34
27	8441	6313	9969	9772	6115	9414	·794 0121	8718	33
28	·636 2527	·661 0492	·686 4247	·712 4157	739 0611	·766 4031	4865	·823 3597	32
29	6614	4673	8528	8549	5110	8649	9611	8479	31
30	·637 0703	8856	·687 2810	·713 2931	9611	·767 3270	·795 4359	·824 3364	30
31	4793	·662 3040	7093	7320	·740 4113	7893	9110	8251	29
32	8885	7225	·688 1379	·714 1712	8618	·768 2517	·796 3862	·825 3140	28
33	·638 2978	·663 1413	5666	6106	·741 3124	7144	8617	8031	27
34	7073	5601	9955	·715 0501	7633	·769 1773	·797 3374	·826 2925	26
35	·639 1169	9792	·689 4246	4898	·742 2143	6404	8134	7821	25
36	5267	·664 3984	8538	9297	6655	·770 1037	·798 2895	·827 2719	24
37	9366	8178	·690 2832	·716 3698	·743 1170	5672	7659	7620	23
38	·640 3467	·665 2373	7128	8100	5686	·771 0309	·799 2425	·828 2523	22
39	7569	6570	·691 1425	·717 2505	·744 0204	4948	7193	7429	21
40	·641 1673	·666 0769	5725	6911	4724	9589	·800 1963	·829 2337	20
41	5779	4969	692 0026	·718 1319	9246	·772 4233	6736	7247	19
42	9886	9171	4328	5729	·745 3770	8878	·801 1511	·830 2160	18
43	·642 3994	·667 3374	8633	·719 0141	8296	·773 3526	6288	7075	17
44	8105	7580	.693 2939	4554	·746 2824	8176	·802 1067	·831 1992	16
45	·643 2216	·668 1786	7247	8970	7354	·774 2827	5849	6912	15
46	6329	5995	·694 1557	·720 3387	·747 1886	7481	·803 0632	·832 1834	14
47	.644 0444	·669 0205	5868	7806	6420	·775 2137	5418	6759	13
48	4560	4417	·695 0181	·721 2227	·748 0956	6795	·804 0206	·833 1686	12
49	8678	8630	4496	6650	5494	·776 1455	4997	6615	11
50	·645 2797	·670 2845	8813	·722 1075	·749 0033	6118	9790	·834 1547	10
51	6918	7061	.696 3131	5502	4575	·777 0782	·805 4584	6481	9
52	·646 1041	·671 1280	7451	9930	9119	5448	9382	·835 1418	8
53	5165	5500	·697 1773	·723 4361	·750 3665	·778 0117	·806 4181	6357	7
54	9290	9721	6097	8793	8212	4788	8983	·836 1298	6
55	·647 3417	·672 3944	·698 0422	·724 3227	·751 2762	9460	·807 3787	6242	5
56	7546	8169	4749	7663	7314	·779 4135	8593	·837 1188	4
57	·648 1676	·673 2396	9078	·725 2101	·752 1867	8812	·808 3401	6136	3
58	5808	6624	·699 3409	6540	6423	·780 3492	8212	·838 1087	2
59	9941	·674 0854	7741	·726 0982	·753 0981	8173	·809 3025	6041	1
60	·649 4076	5085	·700 2075	5425	5541	·781 2856	7840	·839 0996	0
′	57°	56°	55°	54°	53°	52°	51°	50°	′

/	40°	41°	42°	43°	44°	45°	46°	47°	/
0	·839 0996	·869 2867	·900 4040	·932 5151	·965 6888	1·00 00000	1·03 55203	1·07 23687	60
1	5955	7976	9309	·933 0591	·966 2511	05819	61333	29943	59
2	·840 0915	·870 3087	·901 4580	6034	8137	11642	67367	36203	58
3	5878	8200	9854	·934 1479	·967 3767	17469	73404	42467	57
4	·841 0844	·871 3316	·902 5131	6928	9399	23298	79445	48734	56
5	5812	8435	·903 0411	·935 2380	·968 5035	29131	85489	55006	55
6	·842 0782	·872 3556	5692	7834	·969 0674	34968	91538	61282	54
7	5755	8680	·904 0979	·936 3292	6316	40807	97589	67561	53
8	·843 0730	·873 3806	6267	8753	·970 1962	46651	1·04 03645	73845	52
9	5708	8935	·905 1557	·937 4216	7610	52497	09704	80132	51
10	·844 0688	·874 4067	6851	9683	·971 3262	58348	15767	86423	50
11	5670	9201	·906 2147	·938 5153	8917	64201	21833	92718	49
12	·845 0655	·875 4338	7446	·939 0625	·972 4575	70058	27904	99018	48
13	5643	9478	·907 2748	6101	·973 0236	75918	33977	1·08 05321	47
14	·846 0633	·876 4620	8053	·940 1579	5901	81782	40055	11628	46
15	5625	9765	·908 3360	7061	·974 1569	87649	46136	17939	45
16	·847 0620	·877 4912	8671	941 2545	7240	93520	52221	24254	44
17	5617	·878 0062	·909 3984	8033	·975 2914	99394	58310	30573	43
18	·848 0617	5215	9300	·942 3523	8591	1·01 05272	64402	36896	42
19	5619	·879 0370	·910 4619	9017	·976 4272	11153	70498	43223	41
20	·849 0624	5528	9940	·943 4513	9956	17038	76598	49554	40
21	5631	·880 0688	·911 5265	·944 0013	·977 5643	22925	82702	55889	39
22	·850 0640	5852	·912 0592	5516	·978 1333	28817	88809	62228	38
23	5653	·881 1017	5922	·945 1021	7027	34712	94920	68571	37
24	·851 0667	6186	·913 1255	6530	·979 2724	40610	1·05 01034	74918	36
25	5684	·882 1357	6591	·946 2042	8424	46512	07153	81269	35
26	·852 0704	6531	·914 1929	7556	·980 4127	52418	13275	87624	34
27	5726	·883 1707	7270	·947 3074	9833	58326	19401	93984	33
28	·853 0750	6886	·915 2615	8595	·981 5543	64239	25531	1·09 00347	32
29	5777	·884 2068	7962	·948 4119	·982 1256	70155	31664	06714	31
30	·854 0807	7253	·916 3312	9646	6973	76074	37801	13085	30
31	5839	·885 2440	8665	·949 5176	·983 2692	81997	43942	19460	29
32	·855 0873	7630	·917 4020	·950 0709	8415	87923	50087	25840	28
33	5910	·886 2822	9379	6245	·984 4141	93853	56235	32223	27
34	·856 0950	8017	·918 4740	·951 1784	9871	99786	62388	38610	26
35	5992	·887 3215	·919 0104	7326	·985 5603	1·02 05723	68544	45002	25
36	·857 1037	8415	5471	·952 2871	·986 1339	11664	74704	51397	24
37	6084	·888 3619	·920 0841	8420	7079	17608	80867	57797	23
38	·858 1133	8825	6214	·953 3971	·987 2821	23555	87035	64201	22
39	6185	·889 4033	·921 1590	9526	8567	29506	93206	70609	21
40	·859 1240	9244	6969	·954 5083	·988 4316	35461	99381	77020	20
41	6297	·890 4458	·922 2350	·955 0644	·989 0069	41419	1·06 05560	83436	19
42	·860 1357	9675	7734	6208	5825	47381	11742	89857	18
43	6419	·891 4894	·923 3122	·956 1774	·990 1584	53346	17929	96281	17
44	·861 1484	·892 0116	8512	7344	7346	59315	24119	1·10 02709	16
45	6551	5341	·924 3905	·957 2917	·991 3112	65287	30313	09141	15
46	·862 1621	·893 0569	9301	8494	8881	71263	36511	15578	14
47	6694	5799	·925 4700	·958 4073	·992 4654	77243	42713	22019	13
48	·863 1768	·894 1032	·926 0102	9655	·993 0429	83226	48918	28463	12
49	6846	6268	5506	·959 5241	6208	89212	55128	34912	11
50	·864 1926	·895 1506	·927 0914	·960 0829	·994 1991	95203	61341	41365	10
51	7009	6747	6324	6421	7777	1·03 01196	67558	47823	9
52	·865 2094	·896 1991	·928 1738	·961 2016	·995 3566	07194	73779	54284	8
53	7181	7238	7154	7614	9358	13195	80004	60750	7
54	·866 2272	·897 2487	·929 2573	·962 3215	·996 5154	19199	86233	67219	6
55	7365	7739	7996	8819	·997 0953	25208	92466	73693	5
56	·867 2460	·898 2994	·930 3421	·963 4427	6756	31220	98702	80171	4
57	7558	8251	8849	·964 0037	·998 2562	37235	1·07 04943	86653	3
58	·868 2659	·899 3512	·931 4280	5651	8371	43254	11187	93140	2
59	7762	8775	9714	·965 1268	·999 4184	49277	17435	99630	1
60	·869 2867	·900 4040	·932 5151	6888	1·000 0000	55303	23687	1·11 06125	0
/	49°	48°	47°	46°	45°	44°	43°	42°	/

′	48°	49°	50°	51°	52°	53°	54°	′
0	1·11 06125	1·15 03684	1·19 17536	1·23 48972	1·27 99416	1·32 70448	1·37 63819	60
1	12624	10445	24579	56319	1·28 07094	78483	72242	59
2	19127	17210	31626	63672	14776	86524	80672	58
3	25635	23979	38679	71030	22465	94571	89108	57
4	32146	30754	45736	78393	30160	1·33 02624	97551	56
5	38662	37532	52799	85762	37860	10684	1·38 06001	55
6	45182	44316	59866	93136	45566	18750	14458	54
7	51706	51104	66938	1·24 00515	53277	26822	22922	53
8	58235	57896	74015	07900	60995	34900	31392	52
9	64768	64693	81097	15290	68718	42984	39869	51
10	71305	71495	88184	22685	76447	51075	48353	50
11	77846	78301	95276	30086	84182	59172	56844	49
12	84391	85112	1·20 02373	37492	91922	67276	65342	48
13	90941	91927	09475	44903	99669	75386	73847	47
14	97495	98747	16581	52320	1·29 07421	83502	82358	46
15	1·12 04053	1·16 05571	23693	59742	15179	91624	90876	45
16	10616	12400	30810	67169	22943	99753	99401	44
17	17183	19234	37932	74602	30713	1·34 07888	1·39 07934	43
18	23754	26073	45058	82040	38488	16029	16473	42
19	30329	32916	52190	89484	46270	24177	25019	41
20	36909	39763	59327	96933	54057	32331	33571	40
21	43493	46615	66468	1·25 04388	61850	40492	42131	39
22	50081	53472	73615	11848	69649	48658	50698	38
23	56674	60334	80767	19313	77454	56832	59272	37
24	63271	67200	87924	26784	85265	65011	67852	36
25	69872	74071	95085	34260	93081	73198	76440	35
26	76478	80947	1·21 02252	41742	1·30 00904	81390	85034	34
27	83088	87827	09424	49229	08733	89589	93636	33
28	89702	94712	16601	56721	16567	97794	1·40 02245	32
29	96321	1·17 01601	23783	64219	24407	1·35 06006	10860	31
30	1·13 02944	08496	30970	71723	32254	14224	19483	30
31	09571	15395	38162	79232	40106	22449	28113	29
32	16203	22298	45359	86747	47964	30680	36749	28
33	22839	29207	52562	94267	55828	38918	45393	27
34	29479	36120	59769	1·26 01792	63699	47162	54044	26
35	36124	43038	66982	09323	71575	55413	62702	25
36	42773	49960	74199	16860	79457	63670	71367	24
37	49427	56888	81422	24402	87345	71934	80039	23
38	56085	63820	88650	31950	95239	80204	88718	22
39	62747	70756	95883	39503	1·31 03140	88481	97405	21
40	69414	77698	1·22 03121	47062	11046	96764	1·41 06098	20
41	76086	84644	10364	54626	18958	1·36 05054	14799	19
42	82761	91595	17613	62196	26876	13350	23506	18
43	89441	98551	24866	69772	34801	21653	32221	17
44	96126	1·18 05512	32125	77353	42731	29963	40943	16
45	1·14 02815	12477	39389	84940	50668	38279	49673	15
46	09508	19447	46658	92532	58610	46602	58409	14
47	16206	26422	53932	1·27 00130	66559	54931	67153	13
48	22908	33402	61211	07733	74513	63267	75904	12
49	29615	40387	68496	15342	82474	71610	84662	11
50	36326	47376	75786	22957	90441	79959	93427	10
51	43041	54370	83081	30578	98414	88315	1·42 02200	9
52	49762	61369	90381	38204	1·32 06393	96678	10979	8
53	56486	68373	97687	45835	14379	1·37 05047	19766	7
54	63215	75382	1·23 04997	53473	22370	13423	28561	6
55	69949	82395	12313	61116	30368	21806	37362	5
56	76687	89414	19634	68765	38371	30195	46171	4
57	83429	96437	26961	76419	46381	38591	54988	3
58	90176	1·19 03465	34292	84079	54397	46994	63811	2
59	96928	10498	41629	91745	62420	55403	72642	1
60	1·15 03684	17536	48972	99416	70448	63819	81480	0
′	41°	40°	39°	38°	37°	36°	35°	′

′	55°	56°	57°	58°	59°	60°	61°	′
0	1·42 81480	1·48 25610	1·53 98650	1·60 03345	1·66 427 5	1·73 20508	1·80 40478	60
1	90320	34916	1·54 08160	13709	53766	32149	52860	59
2	99178	44231	18280	24082	64748	43803	65256	58
3	1·43 08038	53554	28108	34465	75741	55468	77664	57
4	16900	62884	37946	44858	86744	67144	90086	56
5	25781	72225	47792	55260	97758	78833	1·81 02521	55
6	34664	81576	57647	65672	1·67 08782	90533	14969	54
7	43554	90925	67510	76094	19818	1·74 02245	27430	53
8	52451	1·49 00288	77383	86525	30864	13969	39904	52
9	61350	09659	87264	96966	41921	25705	52391	51
10	70268	19039	97155	1·61 07417	52988	37453	64892	50
11	79187	28423	1·55 07054	17878	64067	49213	77405	49
12	88114	37822	16963	28349	75156	60984	89932	48
13	97049	47225	26880	38829	86256	72768	1·82 02473	47
14	1·44 05991	56637	36806	49320	97367	84564	15026	46
15	14940	66058	46741	59820	1·68 08489	96371	27593	45
16	23897	75480	56685	70330	19621	1·75 08191	40173	44
17	32862	84923	66639	80850	30765	20023	52767	43
18	41834	94367	76601	91380	41919	31866	65374	42
19	50814	1·50 03821	86572	1·62 01920	53085	43722	77994	41
20	59801	13282	96552	12469	64261	55590	90628	40
21	68790	22751	1·56 06542	23029	75449	67470	1·83 03275	39
22	77798	32229	16540	33599	86647	79362	15936	38
23	86808	41716	26548	44178	97856	91267	28610	37
24	95825	51210	36564	54768	1·69 09077	1·76 03183	41297	36
25	1·45 04850	60713	46590	65368	20308	15112	53999	35
26	13883	70224	56625	75977	31550	27053	66713	34
27	22923	79743	66669	86597	42804	39007	79442	33
28	31971	89271	76722	97227	54069	50972	92184	32
29	41027	98807	86784	1·63 07867	65344	62950	1·84 04940	31
30	50090	1·51 08352	96856	18517	76631	74940	17709	30
31	59161	17905	1·57 06936	29177	87929	86943	30492	29
32	68240	27466	17026	39847	99238	98958	43289	28
33	77326	37036	27126	50528	1·70 10559	1·77 10985	56099	27
34	86420	46614	37234	61218	21890	23024	68923	26
35	95522	56201	47352	71919	33233	35076	81761	25
36	1·46 04632	65796	57479	82630	44587	47141	94613	24
37	13749	75400	67615	93351	55953	59218	1·85 07479	23
38	22874	85012	77760	1·64 04082	67329	71307	20358	22
39	32007	94632	87915	14824	78717	83409	33252	21
40	41147	1·52 04261	98079	25576	90116	95524	46159	20
41	50296	13899	1·58 08253	36338	1·71 01527	1·78 07651	59080	19
42	59452	23545	18436	47111	12949	19790	72015	18
43	68616	33200	28628	57893	24382	31943	84965	17
44	77788	42863	38830	68687	35827	44107	97928	16
45	86967	52535	49041	79490	47283	56285	1·86 10905	15
46	96155	62215	59261	90304	58751	68475	23896	14
47	1·47 05350	71904	69491	1·65 01128	70230	80678	36902	13
48	14553	81602	79731	11963	81720	92893	49921	12
49	23764	91308	89979	22808	93222	1·79 05121	62955	11
50	32983	1·53 01023	1·59 00238	33663	1·72 04736	17362	76003	10
51	42210	10746	10505	44529	16261	29616	89065	9
52	51445	20479	20783	55405	27797	41883	1·87 02141	8
53	60688	30219	31070	66292	39346	54162	15231	7
54	69938	39969	41366	77189	50905	66454	28336	6
55	79197	49727	51672	88097	62477	78759	41455	5
56	88463	59494	61987	99016	74060	91077	54588	4
57	97738	69270	72312	1·66 09945	85654	1·80 03408	67736	3
58	1·48 07021	79054	82647	20884	97260	15751	80898	2
59	16311	88848	92991	31834	1·73 08878	28108	94074	1
60	25610	98650	1·60 03345	42795	20508	40478	1·88 07265	0
′	34°	33°	32°	31°	30°	29°	28°	′

′	62°	63°	64°	65°	66°	67°	68°	′
0	1·88 07265	1·96 26105	2·05 03038	2·14 45069	2·24 60368	2·35 58524	2·47 50869	60
1	20470	40227	18185	61366	77962	77590	71612	59
2	33690	54364	33349	77683	95580	96683	92386	58
3	46924	68518	48531	94021	2·25 13221	2·36 15801	2·48 13190	57
4	60172	82688	63732	2·15 10378	30885	34946	34023	56
5	73436	96874	78950	26757	48572	54118	54887	55
6	86713	1·97 11077	94187	43156	66283	73316	75781	54
7	1·89 00006	25296	2·06 09442	59575	84016	92540	96706	53
8	13313	39531	24716	76015	2·26 01773	2·37 11791	2·49 17660	52
9	26635	53782	40008	92476	19554	31068	38645	51
10	39971	68050	55318	2·16 08958	37357	50372	59661	50
11	53322	82334	70646	25460	55184	69703	80707	49
12	66688	96635	85994	41983	73035	89060	2·50 01784	48
13	80068	1·98 10952	2·07 01359	58527	90909	2·38 08444	22891	47
14	93464	25286	16743	75091	2·27 08807	27855	44029	46
15	1·90 06874	39636	32146	91677	26729	47293	65198	45
16	20299	54003	47567	2·17 08283	44674	66758	86398	44
17	33738	68387	63007	24911	62643	86250	2·51 07629	43
18	47193	82787	78465	41559	80636	2·39 05769	28890	42
19	60663	97204	93942	58229	98653	25316	50183	41
20	74147	1·99 11637	2·08 09438	74920	2·28 16693	44889	71507	40
21	87647	26087	24953	91631	34758	64490	92863	39
22	1·91 01162	40554	40487	2·18 08364	52846	84118	2·52 14249	38
23	14691	55038	56039	25119	70959	2·40 03774	35667	37
24	28236	69539	71610	41894	89096	23457	57117	36
25	41795	84056	87200	58691	2·29 07257	43168	78598	35
26	55370	98590	2·09 02809	75510	25442	62906	2·53 00111	34
27	68960	2·00 13142	18437	92349	43651	82672	21655	33
28	82565	27710	34085	2·19 09210	61885	2·41 02465	43231	32
29	96186	42295	49751	26093	80143	22286	64839	31
30	1·92 09821	56897	65436	42997	98425	42136	86479	30
31	23472	71516	81140	59923	2·30 16732	62013	2·54 08151	29
32	37138	86153	96864	76871	35064	81918	29855	28
33	50819	2·01 00806	2·10 12607	93840	53420	2·42 01851	51591	27
34	64516	15477	28369	2·20 10831	71801	21812	73359	26
35	78228	30164	44150	27843	90206	41801	95160	25
36	91956	44869	59951	44878	2·31 08637	61819	2·55 16992	24
37	1·93 05699	59592	75771	61934	27092	81864	38858	23
38	19457	74331	91611	79012	45571	2·43 01938	60756	22
39	33231	89088	2·11 07470	96112	64076	22041	82686	21
40	47020	2·02 03862	23348	2·21 13234	82606	42172	2·56 04649	20
41	60825	18654	39246	30379	2·32 01160	62331	26645	19
42	74645	33462	55164	47545	19740	82519	48674	18
43	88481	48289	71101	64733	38345	2·44 02736	70735	17
44	1·94 02333	63133	87057	81944	56975	22982	92830	16
45	16200	77994	2·12 03034	99177	75630	43256	2·57 14957	15
46	30083	92873	19030	2·22 16432	94311	63559	37118	14
47	43981	2·03 07769	35046	33709	2·33 13017	83891	59312	13
48	57896	22683	51082	51009	31748	2·45 04252	81539	12
49	71826	37615	67137	68331	50505	24642	2·58 03800	11
50	85772	52565	83213	85676	69287	45061	26094	10
51	99733	67532	99308	2·23 03043	88095	65510	48421	9
52	1·95 13711	82517	2·13 15423	20433	2·34 06928	85987	70782	8
53	27704	97519	31559	37845	25787	2.46 06494	93177	7
54	41713	2·04 12540	47714	55280	44672	27030	2·59 15606	6
55	55739	27578	63890	72738	63582	47596	38068	5
56	69780	42634	80085	90218	82519	68191	60564	4
57	83837	57708	96301	2·24 07721	2·35 01481	88816	83095	3
58	97910	72800	2·14 12537	25247	20469	2·47 09470	2·60 05659	2
59	1·96 12000	87910	28793	42796	39483	30155	28258	1
60	26105	2·05 03038	45069	60368	58524	50869	50891	0
′	27°	26°	25°	24°	23°	22°	21°	′

/	69°	70°	71°	72°	73°	74°	75°	/
0	2·60 50891	2·74 74774	2·90 42109	3·07 76835	3·27 08526	3·48 74144	3·73 20508	60
1	73558	99661	69571	3·08 07325	42588	3·49 12470	63380	59
2	96259	2·75 24588	97089	37869	76715	50874	3·74 07546	58
3	2·61 18995	49554	2·91 24649	68468	3·28 10907	89356	51207	57
4	41766	74561	52256	99122	45164	3·50 27916	94963	56
5	64571	99608	79909	3·09 29831	79487	66555	3·75 38815	55
6	87411	2·76 24695	2·92 07610	60596	3·29 13576	3·51 05273	82763	54
7	2·62 10286	49822	35358	91416	48330	44070	3·76 26807	53
8	33196	74990	63152	3·10 22291	82851	82946	70947	52
9	56141	2·77 00199	90995	53223	3·30 17438	3·52 21902	3·77 15185	51
10	79121	25448	2·93 18885	84210	52091	60938	59519	50
11	2·63 02136	50738	46822	3·11 15254	86811	3·53 00054	3·78 03951	49
12	25186	76069	74807	46353	3·31 21598	39251	48481	48
13	48271	2·78 01440	2·94 02840	77509	56452	78528	93109	47
14	71392	26853	30921	3·12 08722	91373	3·54 17886	3·79 37835	46
15	94549	52307	59050	39991	3·32 26362	57325	82661	45
16	2·64 17741	77802	87227	71317	61419	96846	3·80 27585	44
17	40969	2·79 03339	2·95 15453	3·13 02701	96543	3·55 36449	72609	43
18	64232	28917	43727	34141	3·33 31736	76133	3·81 17733	42
19	87531	54537	72050	65639	66997	3·56 15900	62957	41
20	2·65 10867	80198	2·96 00422	97194	3·34 02326	55749	3·82 08281	40
21	34238	2·80 05901	28842	3·14 28807	37724	95681	53707	39
22	57645	31646	57312	60478	73191	3·57 35696	99233	38
23	81089	57433	85831	92207	3·35 08728	75794	3·83 44861	37
24	2·66 04569	83263	2·97 14399	3·15 23994	44333	3·58 15975	90591	36
25	28085	2·81 09134	43016	55840	80008	56241	3·84 36424	35
26	51638	35048	71683	87744	3·36 15753	96590	82358	34
27	75227	61004	2·98 00400	3·16 19706	51568	3·59 37024	3·85 28396	33
28	98853	87003	29167	51728	87453	77543	74537	32
29	2·67 22516	2·82 13045	57983	83808	3·37 23408	3·60 18146	3·86 20782	31
30	46215	39129	86850	3·17 15948	59434	58835	67131	30
31	69951	65256	2·99 15766	48147	95531	99609	3·87 13584	29
32	93725	91426	44734	80406	3·38 31699	3·61 40469	60142	28
33	2·68 17535	2·83 17639	73751	3·18 12724	67938	81415	3·88 06805	27
34	41383	43896	3·00 02820	45102	3·39 04249	3·62 22447	53574	26
35	65267	70196	31939	77540	40631	63566	3·89 00448	25
36	89190	96539	61109	3·19 10039	77085	3·63 04771	47429	24
37	2·69 13149	2·84 22926	90330	42598	3·40 13612	46064	94516	23
38	37147	49356	3·01 19603	75217	50210	87444	3·90 41710	22
39	61181	75831	48926	3·20 07897	86882	3·64 28911	89011	21
40	85254	2·85 02349	78301	40638	3·41 23626	70467	3·91 36420	20
41	2·70 09364	28911	3·02 07728	73440	60443	3·65 12111	83937	19
42	33513	55517	37207	3·21 06304	97333	53844	3·92 31563	18
43	57699	82168	66737	39228	3·42 34297	95665	79297	17
44	81923	2·86 08863	96320	72215	71334	3·66 37575	3·93 27141	16
45	2·71 06186	35602	3·03 25954	3·22 05263	3·43 08446	79575	75094	15
46	30487	62386	55641	38373	45631	3·67 21665	3·94 23157	14
47	54826	89215	85381	71546	82891	63845	71331	13
48	79204	2·87 16088	3·04 15173	3·23 04780	3·44 20226	3·68 06115	3·95 19615	12
49	2·72 03620	43007	45018	38078	57635	48475	68011	11
50	28076	69970	74915	71438	95120	90927	3·96 16518	10
51	52569	96979	3·05 04866	3·24 04860	3·45 32679	3·69 33469	65137	9
52	77102	2·88 24033	34870	38346	70315	76104	3·97 13868	8
53	2·73 01674	51132	64928	71895	3·46 08026	3·70 18830	62712	7
54	26284	78277	95038	3·25 05508	45813	61648	3·98 11669	6
55	50934	2·89 05467	3·06 25203	39184	83676	3·71 04558	60739	5
56	75623	32704	55421	72924	3·47 21616	47561	3·99 09924	4
57	2·74 00352	59986	85694	3·26 06728	59632	90658	59223	3
58	25120	87314	3·07 16020	40596	97726	3·72 33847	4·00 08636	2
59	49927	2·90 14688	46400	74529	3·48 35896	77131	58165	1
60	74774	42109	76835	3·27 08526	74144	3·73 20508	4·01 07809	0
/	20°	19°	18°	17°	16°	15°	14°	/

′	76°	77°	78°	79°	80°	81°	82°	′
0	4·01 07809	4·33 14759	4·70 46301	5·1 445540	5·6 712818	6·3 137515	7·1 153697	60
1	57570	72316	4·71 13686	525557	809446	256601	304190	59
2	4·02 07446	4·34 36018	81256	605813	906394	376126	455308	58
3	57440	87866	4·72 49012	686311	5·7 003663	496092	607056	57
4	4·03 07550	4·35 45861	4·73 16954	767051	101256	616502	759437	56
5	57779	4·36 04003	85083	848035	199173	737359	912456	55
6	4·04 08125	62293	4·74 53401	929264	297416	858665	7·2 066116	54
7	58590	4·37 20731	4·75 21907	5·2 010738	395988	980422	220422	53
8	4·05 09174	79317	90603	092459	494889	6·4 102633	375378	52
9	59877	4·38 38054	4·76 59490	174428	594122	225301	530987	51
10	4·06 10700	96940	4·77 28568	256647	693688	348428	687255	50
11	61643	4·39 55977	97837	339116	793588	472017	844184	49
12	4·07 12707	4·40 15164	4·78 67300	421836	893825	596070	7·3 001780	48
13	63892	74504	4·79 36957	504809	994400	720591	160047	47
14	4·08 15199	4·41 33996	4·80 06808	588035	5·8 095315	845581	318989	46
15	66627	93641	76854	671517	196572	971043	478610	45
16	4·09 18178	4·42 53439	4·81 47096	755255	298172	6·5 096981	638916	44
17	69852	4·43 13392	4·82 17536	839251	400117	223396	799909	43
18	4·10 21649	73500	88174	923505	502410	350293	961595	42
19	73569	4·44 33762	4·83 59010	5·3 008018	605051	477672	7·4 123978	41
20	4·11 25614	94181	4·84 30045	092793	708042	605538	287064	40
21	77784	4·45 54756	4·85 01282	177830	811386	733892	450855	39
22	4·12 30079	4·46 15489	72719	263131	915084	862739	615357	38
23	82499	76379	4·86 44359	348696	5·9 019138	992080	780576	37
24	4·13 35046	4·47 37428	4·87 16201	434527	123550	6·6 121919	946514	36
25	87719	98636	88248	520626	228322	252258	7·5 113178	35
26	4·14 40519	4·48 60004	4·88 60499	606993	333455	383100	280571	34
27	93446	4·49 21532	4·89 32956	693630	438952	514449	448699	33
28	4·15 46501	83221	4·90 05620	780538	544815	646307	617567	32
29	99685	4·50 45072	78491	867718	651045	778677	787179	31
30	4·16 52998	4·51 07085	4·91 51570	955172	757644	911562	957541	30
31	4·17 06440	69261	4·92 24859	5·4 042901	864614	6·7 044966	7·6 128657	29
32	60011	4·52 31601	98358	130906	971957	178891	300533	28
33	4·18 13713	94105	4·93 72068	219188	6·0 079676	313341	473174	27
34	67546	4·53 56773	4·94 45990	307750	187772	448318	646584	26
35	4·19 21510	4·54 19608	4·95 20125	396592	296247	583826	820769	25
36	75606	82608	94474	485715	405103	719867	995735	24
37	4·20 29835	4·55 45776	4·96 69037	575121	514343	856446	7·7 171486	23
38	84196	4·56 09111	4·97 43817	664812	623967	993565	348028	22
39	4·21 38690	72615	4·98 18813	754788	733979	6·8 131227	525366	21
40	93318	4·57 36287	94027	845052	844381	269437	703506	20
41	4·22 48080	4·58 00129	4·99 69459	935604	955174	408196	882453	19
42	4·23 02977	64141	5·00 45111	5·5 026446	6·1 066360	547508	7·8 062212	18
43	58009	4·59 28325	5·01 20984	117579	177943	687378	242790	17
44	4·24 13177	92680	97078	209005	289923	827807	424191	16
45	68482	4·60 57207	5·02 73395	300724	402303	968799	606423	15
46	4·25 23923	4·61 21908	5·03 49935	392740	515085	6·9 110359	789489	14
47	79501	86783	5·04 26700	485052	628272	252489	973396	13
48	4·26 35218	4·62 51832	5·05 03690	577663	741865	395192	7·9 158151	12
49	91072	4·63 17056	80907	670574	855867	538473	343758	11
50	4·27 47066	82457	5·06 58352	763786	970279	682335	530224	10
51	4·28 03199	4·64 48034	5·07 36025	857302	6·2 085106	826781	717555	9
52	59472	4·65 13788	5·08 13928	951121	200347	971806	905756	8
53	4·29 15885	79721	92061	5·6 045247	316007	7·0 117441	8·0 094835	7
54	72440	4·66 45832	5·09 70426	139680	432086	263662	284796	6
55	4·30 29136	4·67 12124	5·10 49024	234421	548588	410482	475647	5
56	85974	78595	5·11 27855	329474	665515	557905	667394	4
57	4·31 42955	4·68 45248	5·12 06921	424838	782868	705934	860042	3
58	4·32 00079	4·69 12083	86224	520516	900651	854573	8·1 053599	2
59	57347	79100	5·13 65763	616509	6·3 018866	7·1 003826	248071	1
60	4·33 14759	4·70 46301	5·14 45540	712818	137515	153697	443464	0
′	13°	12°	11°	10°	9°	8°	7°	′

′	83°	84°	85°	86°	87°	88°	89°	′
0	8·1 443464	9·5 143645	11.430052	14·300666	19·081137	28·636253	57·289962	60
1	639786	410613	468474	360696	187930	877089	58·261174	59
2	837041	679068	507154	421230	295922	29·122006	59·265872	58
3	8·2 035239	949022	546093	482273	405133	371106	60·305820	57
4	234384	9·6 220486	585294	543833	515584	624499	61·382905	56
5	434485	493475	624761	605916	627296	882299	62·499154	55
6	635547	768000	664495	668529	740291	30·144619	63·656741	54
7	837579	9·7 044075	704500	731679	854591	411580	64·858008	53
8	8·3 040586	321713	744779	795372	970219	683307	66·105473	52
9	244577	600927	785333	859616	20·087199	959928	67·401854	51
10	449558	881732	826167	924417	205553	31·241577	68·750087	50
11	655536	9·8 164140	867282	989784	325308	528392	70·153346	49
12	862519	448166	908682	15·055723	446486	820516	71·615070	48
13	8·4 070515	733823	950370	122242	569115	32·118099	73·138991	47
14	279531	9·9 021125	992349	189349	693220	421295	74·729165	46
15	489573	310088	12.034622	257052	818828	730265	76·390009	45
16	700651	600724	077192	325358	945966	33·045173	78·126342	44
17	912772	893050	120062	394276	21·074664	366194	79·943430	43
18	8·5 125943	10·018708	163236	463814	204949	693509	81·847041	42
19	340172	048283	206716	533981	336851	34·027303	83·843507	41
20	555468	078031	250505	604784	470401	367771	85·939791	40
21	771838	107954	294609	676233	605630	715115	88·143572	39
22	989290	138054	339028	748337	742569	35·069546	90·463336	38
23	8·6 207833	168332	383768	821105	881251	431282	92·908487	37
24	427475	198789	428831	894545	22·021710	800553	95·489475	36
25	648223	229428	474221	968667	163980	36·177596	98·217943	35
26	870088	260249	519942	16·043482	308097	562659	101·10690	34
27	8·7 093077	291255	565997	118998	454096	956001	104·17094	33
28	317198	322447	612390	195225	602015	37·357892	107·42648	32
29	542461	353827	659125	272174	751892	768613	110·89205	31
30	768874	385397	706205	349855	903766	38·188459	114·58865	30
31	996446	417158	753634	428279	23·057677	617738	118·54018	29
32	8·8 225186	449112	801417	507456	213666	39·056771	122·77396	28
33	455103	481261	849557	587396	371777	505895	127·32134	27
34	686206	513607	898058	668112	532052	965460	132·21851	26
35	918505	546151	946924	749614	694537	40·435837	137·50745	25
36	8·9 152009	578895	996160	831915	859277	917412	143·23712	24
37	386726	611841	13·045769	915025	24·026320	41·410588	149·46502	23
38	622668	644992	095757	998957	195714	915790	156·25908	22
39	859843	678348	146127	17·083724	367509	42·433464	163·70019	21
40	9·0 098261	711913	196883	169337	541758	964077	171·88540	20
41	337933	745687	248031	255809	718512	43·508122	180·93220	19
42	578867	779673	299574	343155	897826	44·066113	190·98419	18
43	821074	813872	351518	431385	25·079757	638596	202·21875	17
44	9·1 064564	848288	403867	520516	264361	45·226141	214·85762	16
45	309348	882921	456625	610559	451700	829351	229·18166	15
46	555436	917775	509799	701529	641832	46·448862	245·55198	14
47	802838	952850	563391	793442	834823	47·085343	264·44080	13
48	9·2 051564	988150	617409	886310	26·030736	739501	286·47773	12
49	301627	11·023676	671856	980150	229638	48·412084	312·52137	11
50	553035	059431	726738	18·074977	431600	49·103881	343·77371	10
51	805802	095416	782060	170807	636690	815726	381·97099	9
52	9·3 059936	131635	837827	267654	844984	50·548506	429·71757	8
53	315450	168089	894045	365537	27·056557	51·303157	491·10600	7
54	572355	204780	950719	464471	271486	52·080673	572·95721	6
55	830663	241712	14·007856	564473	489853	882109	687·54887	5
56	9·4 090384	278885	065459	665562	711740	53·708587	859·43630	4
57	351531	316304	123536	767754	937233	54·561300	1145·9153	3
58	614116	353970	182092	871068	28·166422	55·441517	1718·8732	2
59	878149	391885	241134	975523	399397	56·350590	3437·7467	1
60	9.5 143645	430052	300666	19·081137	636253	57·289962	Infinite.	0
′	6°	5°	4°	3°	2°	1°	0°	′

Millimetres.	English inches.	Millimetres.	English inches.	Millimetres.	English inches.	Millimetres.	English inches.	Millimetres.	English inches.	Millimetres.	English inches
501	19·725	551	21·693	601	23·662	651	25·630	701	27·599	751	29·567
502	·764	552	·733	602	·701	652	·670	702	·638	752	·606
503	·803	553	·772	603	·741	653	·709	703	·677	753	·646
504	·843	554	·811	604	·780	654	·748	704	·717	754	·685
505	·882	555	·851	605	·819	655	·788	705	·756	755	·725
506	·921	556	·890	606	·859	656	·827	706	·795	756	·764
507	19·961	557	·930	607	·898	657	·867	707	·835	757	·803
508	20·000	558	21·969	608	·937	658	·906	708	·874	758	·843
509	·040	559	22·009	609	23·977	659	·945	709	·914	759	·882
510	·079	560	·048	610	24·016	660	25·985	710	·953	760	·921
511	·118	561	·087	611	·056	661	26.024	711	27·992	761	29·961
512	·158	562	·126	612	·095	662	·063	712	28·032	762	30·000
513	·197	563	·166	613	·134	663	·103	713	·071	763	·040
514	·236	564	·205	614	·174	664	·142	714	·110	764	·079
515	·276	565	·244	615	·213	665	·181	715	·150	765	·118
516	·315	566	·284	616	·252	666	·221	716	·189	766	·158
517	·354	567	·323	617	·292	667	·260	717	·229	767	·197
518	·394	568	·363	618	·331	668	·300	718	·268	768	·236
519	·433	569	·402	619	·371	669	·339	719	·307	769	·276
520	·473	570	·441	620	·410	670	·378	720	·347	770	·315
521	·512	571	·481	621	·449	671	·418	721	·386	771	·355
522	·551	572	·520	622	·489	672	·457	722	·425	772	·394
523	·591	573	·559	623	·528	673	·496	723	·465	773	·433
524	·630	574	·599	624	·567	674	·536	724	·504	774	·473
525	·670	575	·638	625	·607	675	·575	725	·543	775	·512
526	·709	576	·678	626	·646	676	·615	726	·583	776	·551
527	·748	577	·717	627	·685	677	·654	727	·622	777	·591
528	·788	578	·756	628	·725	678	·693	728	·662	778	·630
529	·827	579	·796	629	·764	679	·733	729	·701	779	·670
530	·867	580	·835	630	·804	680	·772	730	·740	780	·709
531	·906	581	·875	631	·843	681	·811	731	·780	781	·748
532	·945	582	·914	632	·882	682	·851	732	·819	782	·788
533	20·985	583	·953	633	·922	683	·890	733	·858	783	·827
534	21·024	584	22·993	634	·961	684	·930	734	·898	784	·866
535	·063	585	23·032	635	25·000	685	26·969	735	·937	785	·906
536	·103	586	·071	636	·040	686	27·008	736	28·977	786	·945
537	·142	587	·111	637	·079	687	·048	737	29·016	787	30·984
538	·181	588	·150	638	·118	688	·087	738	·055	788	31·024
539	·221	589	·189	639	·158	689	·126	739	·095	789	·063
540	·266	590	·229	640	·197	690	·166	740	·134	790	·103
541	·300	591	·268	641	·237	691	·205	741	·173	PROP'L PARTS.	
542	·339	592	·308	642	·276	692	·245	742	·213	0·1	0·0039
543	·378	593	·347	643	·315	693	·284	743	·252	·2	·0079
544	·417	594	·386	644	·355	694	·323	744	·292	·3	·0118
545	·457	595	·426	645	·394	695	·363	745	·331	·4	·0157
546	·496	596	·465	646	·433	696	·402	746	·370	·5	·0197
547	·536	597	·504	647	·473	697	·441	747	·410	·6	·0236
548	·575	598	·544	648	·512	698	·481	748	·449	·7	·0276
549	·614	599	·583	649	·552	699	·520	749	·488	·8	·0315
550	·654	600	·622	650	·591	700	·559	750	·528	·9	·0354

1 Metre = 39·3707 English inches = 443·296 Paris lines.
1 English foot = 0·304794 metre = 135·114 Paris lines.
1 French foot = 1·0658 English feet = 0·32484 metre.

D. M.	Chords.	D. M.	Chords	D. M.	Chords.	D. M.	Chords.	D. M.	Chords.
5	·0015	9	·1569	18	·3129	27	·4669	36	·6180
10	·0029	10	·1598	10	·3157	10	·4697	10	·6208
20	·0058	20	·1627	20	·3186	20	·4725	20	·6236
30	·0087	30	·1656	30	·3215	30	·4754	30	·6263
40	·0116	40	·1685	40	·3244	40	·4782	40	·6291
50	·0145	50	·1714	50	·3272	50	·4810	50	·6318
1	·0175	10	·1743	19	·3301	28	·4838	37	·6346
10	·0204	10	·1772	10	·3330	10	·4867	10	·6374
20	·0233	20	·1801	20	·3358	20	·4895	20	·6401
30	·0262	30	·1830	30	·3387	30	·4923	30	·6429
40	·0291	40	·1859	40	·3416	40	·4951	40	·6456
50	·0320	50	·1888	50	·3444	50	·4979	50	·6484
2	·0349	11	·1917	20	·3473	29	·5008	38	·6511
10	·0378	10	·1946	10	·3502	10	·5036	10	·6539
20	·0407	20	·1975	20	·3530	20	·5064	20	·6566
30	·0436	30	·2004	30	·3559	30	·5092	30	·6594
40	·0465	40	·2033	40	·3587	40	·5120	40	·6621
50	·0494	50	·2062	50	·3616	50	·5148	50	·6649
3	·0523	12	·2091	21	·3645	30	·5176	39	·6676
10	·0553	10	·2119	10	·3673	10	·5204	10	·6703
20	·0582	20	·2148	20	·3702	20	·5233	20	·6731
30	·0611	30	·2177	30	·3730	30	·5261	30	·6758
40	·0640	40	·2206	40	·3759	40	·5289	40	·6786
50	·0669	50	·2235	50	·3788	50	·5317	50	·6813
4	·0698	13	·2264	22	·3816	31	·5345	40	·6840
10	·0727	10	·2293	10	·3845	10	·5373	10	·6866
20	·0756	20	·2322	20	·3873	20	·5401	20	·6895
30	·0785	30	·2351	30	·3902	30	·5429	30	·6922
40	·0814	40	·2380	40	·3930	40	·5457	40	·6950
50	·0843	50	·2409	50	·3959	50	·5485	50	·6977
5	·0872	14	·2437	23	·3987	32	·5513	41	·7004
10	·0901	10	·2466	10	·4016	10	·5541	10	·7031
20	·0931	20	·2495	20	·4044	20	·5569	20	·7059
30	·0960	30	·2524	30	·4073	30	·5597	30	·7086
40	·0989	40	·2553	40	·4101	40	·5625	40	·7113
50	·1018	50	·2582	50	·4130	50	·5652	50	·7140
6	·1047	15	·2611	24	·4158	33	·5680	42	·7167
10	·1076	10	·2639	10	·4187	10	·5708	10	·7194
20	·1105	20	·2668	20	·4215	20	·5736	20	·7222
30	·1134	30	·2697	30	·4244	30	·5764	30	·7249
40	·1163	40	·2726	40	·4272	40	·5792	40	·7276
50	·1192	50	·2755	50	·4300	50	·5820	50	·7303
7	·1221	16	·2783	25	·4329	34	·5847	43	·7330
10	·1250	10	·2812	10	·4357	10	·5875	10	·7357
20	·1279	20	·2841	20	·4386	20	·5903	20	·7384
30	·1308	30	·2870	30	·4414	30	·5931	30	·7411
40	·1337	40	·2899	40	·4442	40	·5959	40	·7438
50	·1365	50	·2927	50	·4471	50	·5986	50	·7465
8	·1395	17	·2956	26	·4499	35	·6014	44	·7492
10	·1424	10	·2985	10	·4527	10	·6042	10	·7519
20	·1453	20	·3014	20	·4557	20	·6070	20	·7546
30	·1482	30	·3042	30	·4584	30	·6097	30	·7573
40	·1511	40	·3071	40	·4612	40	·6125	40	·7600
50	·1540	50	·3100	50	·4641	50	·6153	50	·7627

D. M.	Chords	D. M.	Chords.	D. M.	Chords	D. M.	Chords.	D. M.	Chords.
45	·7654	54	·9080	63	1·0450	72	1·1756	81	1·2989
10	·7681	10	·9106	10	1·0475	10	1·1779	10	1·3011
20	·7707	20	·9132	20	1·0500	20	1·1803	20	1·3033
30	·7734	30	·9157	30	1·0524	30	1·1826	30	1·3055
40	·7761	40	·9183	40	1·0549	40	1·1850	40	1·3077
50	·7788	50	·9209	50	1·0574	50	1·1873	50	1·3099
46	·7815	55	·9235	64	1·0598	73	1·1896	82	1·3121
10	·7841	10	·9261	10	1·0623	10	1·1920	10	1·3143
20	·7868	20	9287	20	1·0648	20	1·1943	20	1·3165
30	·7895	30	·9312	30	1·0672	30	1·1966	30	1·3187
40	·7922	40	·9338	40	1·0697	40	1·1990	40	1·3209
50	·7948	50	·9364	50	1·0721	50	1·2013	50	1·3231
47	·7975	56	·9389	65	1·0746	74	1·2036	83	1·3252
10	·8002	10	·9415	10	1·0771	10	1·2060	10	1·3274
20	·8028	20	·9441	20	1·0795	20	1·2083	20	1·3296
30	·8055	30	·9466	30	1·0819	30	1·2106	30	1·3318
40	·8082	40	·9492	40	1·0844	40	1·2129	40	1·3339
50	·8108	50	·9518	50	1·0868	50	1·2152	50	1·3361
48	·8135	57	·9543	66	1·0893	75	1·2175	84	1·3383
10	·8161	10	·9569	10	1·0917	10	1·2198	10	1·3404
20	·8188	20	·9594	20	1·0942	20	1·2221	20	1·3426
30	·8214	30	·9620	30	1·0966	30	1·2244	30	1·3447
40	·8241	40	·9645	40	1·0990	40	1·2267	40	1·3469
50	·8267	50	·9671	50	1·1014	50	1·2290	50	1·3490
49	·8294	58	·9696	67	1·1039	76	1·2313	85	1·3512
10	·8320	10	·9722	10	1·1063	10	1·2336	10	1·3533
20	·8347	20	·9747	20	1·1087	20	1·2359	20	1·3555
30	·8373	30	·9772	30	1·1111	30	1·2382	30	1·3576
40	·8400	40	·9798	40	1·1136	40	1·2405	40	1·3597
50	·8426	50	·9823	50	1·1160	50	1·2428	50	1·3619
50	·8452	59	·9848	68	1·1184	77	1·2450	86	1·3640
10	·8479	10	·9874	10	1·1208	10	1·2473	10	1·3661
20	·8505	20	·9899	20	1·1232	20	1·2496	20	1·3682
30	·8531	30	·9924	30	1·1256	30	1·2518	30	1·3704
40	·8558	40	·9950	40	1·1280	40	1·2541	40	1·3725
50	·8584	50	·9975	50	1·1304	50	1·2564	50	1·3746
51	·8610	60	1·0000	69	1·1328	78	1·2586	87	1·3767
10	·8636	10	1·0025	10	1·1352	10	1·2609	10	1·3788
20	·8663	20	1·0050	20	1·1376	20	1·2632	20	1·3809
30	·8689	30	1·0075	30	1·1400	30	1·2654	30	1·3830
40	·8715	40	1·0101	40	1·1424	40	1·2677	40	1·3851
50	·8741	50	1·0126	50	1·1448	50	1·2699	50	1·3872
52	·8767	61	1·0151	70	1·1472	79	1·2722	88	1·3893
10	·8794	10	1·0176	10	1·1495	10	1·2744	10	1·3914
20	·8820	20	1·0201	20	1·1519	20	1·2766	20	1·3935
30	·8846	30	1·0226	30	1·1543	30	1·2789	30	1·3956
40	·8872	40	1·0251	40	1·1567	40	1·2811	40	1·3977
50	·8898	50	1·0276	50	1·1590	50	1·2833	50	1·3997
53	·8924	62	1·0301	71	1·1614	80	1·2856	89	1·4018
10	·8950	10	1·0326	10	1·1638	10	1·2878	10	1·4039
20	·8976	20	1·0351	20	1·1661	20	1·2900	20	1·4060
30	·9002	30	1·0375	30	1·1685	30	1·2922	30	1·4080
40	·9028	40	1·0400	40	1·1709	40	1·2945	40	1·4101
50	·9054	50	1·0425	50	1·1732	50	1·2967	50	1·4122

Chord of 90 Degrees = 1·4142.

M.